The Potential for Scaling Climate Finance in China

February 2021

CLIMATE
POLICY
INITIATIVE

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ACKNOWLEDGMENTS

The authors of this report would like to acknowledge the financial support received from the Hewlett Foundation which made this work possible. We would also like to acknowledge the generous support from CPI colleagues Bella Tonkonogy, Donovan Escalante, Rob Macquarie, Chavi Meattle, Barbara Buchner, Rob Kahn, Elysha Davila, Julia Janicki, Josh Wheeling, Alice Moi, as well as Jie Pan for translation.

We are also grateful for the following individuals who contributed their perspectives through interviews and consultations during the research process (in alphabetical order). Kevin Ao, Melissa Brown, Andrew Chang, Peiyuan Guo, Bondy Lau, Thomas Lapham, Mathias Lund Larsen, Robert Liu, Yujun Liu, Wen Ma, John Maclean, Alfonso Pating, Alex Shoer, Bob Tansey, Marilyn Waite, Phylicia Wu, Wenhong Xie, Hongfu Zhang, Ruoyao Zhang.

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SECTOR

Climate finance

REGION

China

KEYWORDS

Climate finance, China, Green financial reform

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FOREWORD

Within a short span of five years, China has achieved remarkable progress in building a green financial system. This was initiated by the Communist Party of China Central Committee and the State Council's issuance of the Integrated Reform Plan for Promoting Ecological Progress in September 2015, and the Guidelines for Establishing a Green Financial System jointly issued by the People's Bank of China and six ministries and commissions in August 2016. Under China's leadership as the G20 chair in 2016, green finance was included as a topic in the G20 communiqué for the first time. As a result of these strong beginnings, a diverse range of financial products and supporting policies have been launched, and China's green credit and green bond market have become the largest in the world today.

In the context of taking China's green financial reform to the next stage, we are pleased to present this report, which for the first time offers detailed insights into China's green and climate financing trends across sectors and financing actors. It also outlines the key challenges and opportunities for achieving the primary objective of green financial reform: mobilizing and incentivizing more social, increasingly private, capital into green industries, while effectively controlling investments in polluting projects. Innovations in financial institutions and markets to develop new instruments and services will contribute substantially to realizing this goal.

At a time when the COVID-19 pandemic has dampened global economic prospects in the near-term, China has continued to reaffirm its climate commitments. In a recent address to the UN General Assembly, President Xi Jinping announced that China will aim to achieve peak CO_2 emissions before 2030, and carbon neutrality before 2060. The Guidance on Promoting Investment and Financing to Address Climate Change issued in October reiterates the role of investment and finance in implementing China's Nationally Determined Contribution (NDC) and low-carbon development. Mobilizing resources, especially through the rapidly diversifying financial channels that aggregate private capital, will be essential in meeting the goals of national economic and environmental transition. It is our hope that this report offers usable guidance for expanding these efforts.

2021 is a critical year for climate action. It marks the beginning of a new decade for accelerating the transition to a sustainable future, while ensuring a sustainable recovery from the COVID-19 crisis. China will announce its 14th Five Year Plan and host the COP 15 to the Convention on Biological Diversity, as the international community works towards strengthening collective climate action building up to COP 26. We look forward to an ambitious start to the next decade of climate action, marked by enhanced cooperation and strong leadership.

Tom Heller

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EXECUTIVE SUMMARY

China's climate action in the coming decade will play a decisive role in whether the world can limit global warming to 1.5 degrees Celsius. As the world's largest source of CO_2 emissions, China accounts for nearly a third of the global total.[1] Based on its current trajectory, China's emissions are expected to increase further by 7%-15% by 2030 above 2015 levels, which would more than offset the global decreasing trend.[2] To ensure that China meets its own goals for advancing an ecological society, as well as its stated commitments to the Paris Agreement, climate and green finance needs to mobilize at an unprecedented scale.

This report provides an overview of the potential for climate finance, green finance and innovative finance to accelerate China's decarbonization and support its transition to a green economy. As one of the first countries to emerge from the COVID-19 pandemic lockdown and start on a path towards recovery, coupled with the 14th Five-Year Plan to be released in March 2021, China faces a historic opportunity to outline a path for sustainable growth that also highlights the role of innovative green and climate finance.

The report addresses the following specific questions:

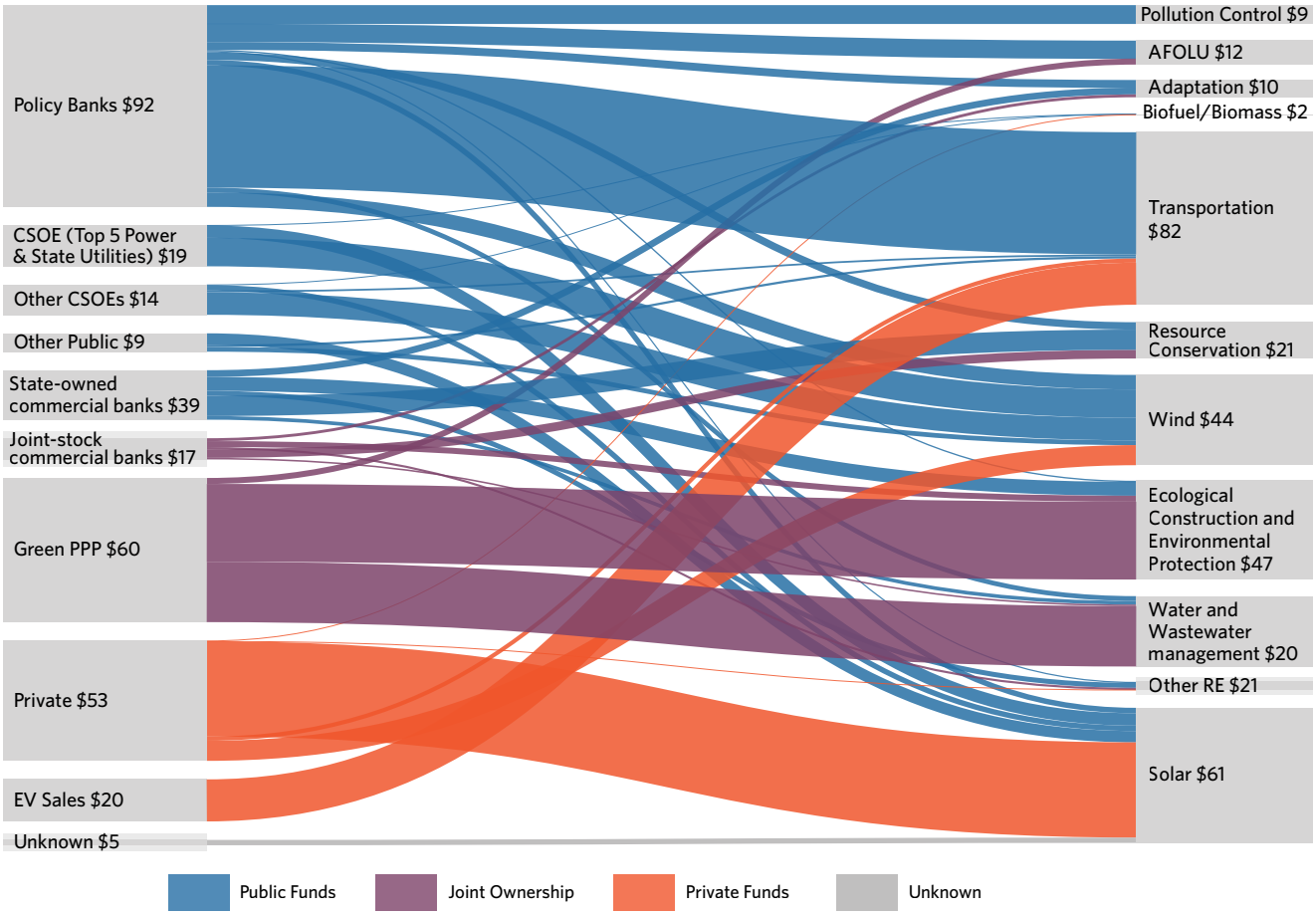
- Who are the key actors involved in China's green/climate finance landscape?
- What is the policy and regulatory framework enabling and/or hindering green/climate finance in China? How could the policy framework be improved?
- What are the common financial instruments and sectors of green/climate investment? How might these be leveraged to scale up green/climate investments?
- What are some of the key barriers to innovative green/climate finance? How could these barriers be addressed?

KEY FINDINGS

- **China's green financial reform made great progress during the 13th Five-Year Plan.** Key factors such as high-level political support, central bank leadership, green taxonomies, and substantial incentives, all contributed to this success. Green credit and green bonds emerged as particular success stories, mobilizing RMB trillions for green projects in the past five years.
- **Overall green finance in China was an annual average of RMB 2.1 trillion (USD 320 billion) during 2017/2018. It will need to scale up by at least four times to meet estimated green investment needs.** As much as USD 1.4 trillion in annual investment is needed over the next decade to meet the climate targets and environmental protection standards that China established in 2015.[3] Investment needs might be even higher, considering China's emission targets are based on carbon intensity and not on absolute reductions.

1 China's CO_2 emissions was 9.5 GT CO2 in 2018. IEA (2019)
2 Climate Action Tracker (2020)
3 CCICED (2015)

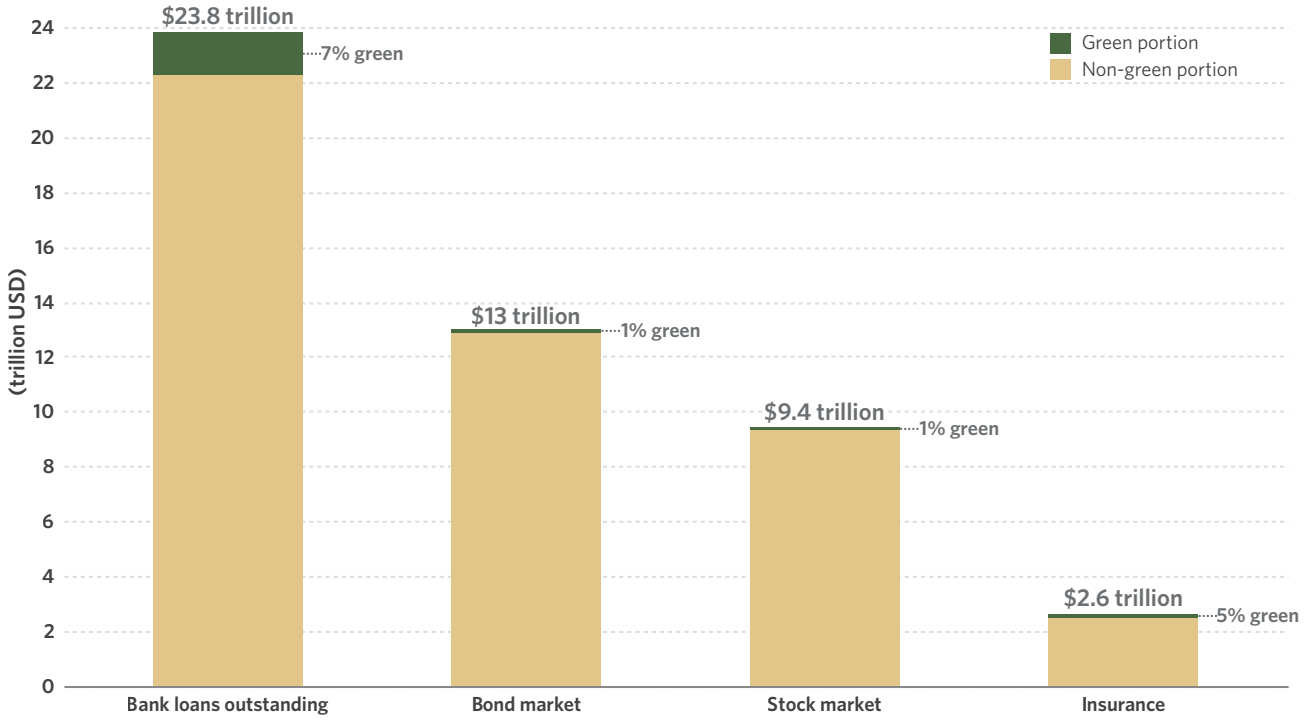
Fig ES1. China's green finance, from financing source to sector allocation



- **The public sector plays an outsized role.** Public sources accounted for at least 51% of total green finance, with nearly 95% of that amount attributable to Central State Owned Enterprises (CSOEs), policy banks and other major state-owned banks (Figure 3). Green PPP projects provided a fifth of climate finance, but it remains largely subsidized by government budgets and has few incentives for private actors to participate. The private sector's contribution to climate finance was concentrated in the solar sector.
- **There is tremendous potential for climate finance to grow.** The current 'green penetration' in China's financial system is around 4%. As China's capital market continues to evolve and actors become familiar with green financial instruments, uptake in the market will grow. China has been increasing financial support for SMEs, new sources of concessional capital are in development, and there is growing interest in exploring innovative structures. Mobile payment and online banking systems offer new financing channels for retail consumers and investors. Finally, there are growing opportunities for foreign private capital to collaborate with domestic actors through funds and joint ventures.

- **China faces several key barriers for scaling up private climate finance.** While the top-down approach to implementing green finance reform has led to the mobilization of large pools of green capital, access remains concentrated among public actors. Private capital will be essential for meeting investment targets, but private actors are not benefiting from the increasing pools of available green capital. It remains unclear how private actors can access the funds. For private companies and investors interested in climate impact, there are high 'search costs' and their access to formal financing channels and investment pipelines are limited.
- **There are important opportunities for greening China's outbound finance.** China's outbound investment reached over USD 2 trillion from 2013-2019, of which USD 739 billion, or 37%, went to Belt and Road Initiative (BRI) partner countries. Energy-related investments to BRI countries over the same period was around USD 292 billion, half of which went to fossil fuels. Initiatives are underway to embed green standards in BRI investments. While such initiatives are promising, green requirements must be ambitious, clearly articulated, and adopted in project screening and investment decision making processes.

Figure ES2. Comparison of the green share in financial assets



RECOMMENDATIONS

Scaling climate finance in China will require clear policy signals and incentives, utilization of all financial tools in the system, participation from a diverse base of financing actors, and a robust framework for accountability.

Specific recommendations include:

1. **Continue raising the ambition of high-level targets and green standards.**
    - Targets in national policy documents like five-year plans provide important signals for economic actors across the country. The updated Nationally Determined Contributions (NDCs) and the 14th Five-Year Plan, which will be released in 2021, are key opportunities to raise climate ambitions and demonstrate China's continued leadership in the field.
    - Raising standards in China's existing green taxonomies and articulating clear thresholds for exclusion can improve the quality of green assets and projects that receive financing.
    - As one of the first countries to enter the COVID-19 pandemic recovery phase, China faces a historic opportunity to reiterate climate ambitions and mainstream green considerations in its recovery efforts.
2. **Incentivize experimentation with innovative financing structures.**
    - Regulatory authorities can encourage experimentation by rewarding innovation efforts through inclusion in performance evaluation schemes and other monetary benefits.
    - Funds from the National Green Development Fund and the Clean Development Mechanism Fund could be deployed to provide grants and guarantees to fund early-stage projects, feasibility studies, and results-based projects.
    - Insurance schemes could be used to insure performance risks undertaken by private investors in impact-oriented climate projects.
3. **Build and increase visibility on the pipeline of green projects for private actors.**
    - There is little transparency in the investment decision-making processes in large banks and green funds established by the government. This disincentivizes actors without connections to State Owned Enterprises (SOEs) or local governments. Matchmaking platforms, such as Bank of Huzhou's Green Credit Management Platform and the Huzhou municipal government's Green Finance One-stop Service Platform, can reduce search costs and increase efficiency by linking interested investors with qualified green projects and investment products.
    - The recently issued "Guidance on Investment and Financing to address climate change" encourages the development of various mechanisms to attract private capital, which should aim to widely promote collaboration opportunities and lessons learned.
4. **Track and monitor finance flows for ultimate allocation and impact.**
    - Without robust tracking and impact reporting standards, it will be difficult to ensure that climate finance flows are being effectively allocated to projects that can generate the most impact. Currently, green finance policies only suggest some key

metrics that actors can report at the aggregate level, using their own methodologies. Ensuring that reported climate impacts are ex-post, and pro-rated to an actor's share of contributions to a project could be one way to improve impact tracking and avoid double counting.

- The China Securities Regulatory Commission's forthcoming mandatory environmental information disclosure for listed companies is an opportunity to strengthen tracking and monitoring of progress. The measure will ask companies to report on their climate finance and are currently taking suggestions on which metrics to include.

5. **Introduce mandatory exclusion lists and negative incentives for high-emission sectors.**

    - Green financial reform is not only about increasing the green, but also about decreasing support for high-emission sectors. So far, China's green financial reform has not made a significant impact on its high-emissions portfolios.
    - The Ministry of Ecology and Environment's list of polluting industries that require pollution liability insurance is a practice that could be further expanded and applied in other areas.
    - The recently proposed "Climate Investment and Finance Standard System" is an opportunity to establish concrete criteria for screening climate investments and encourage robust monitoring of ex-post performance.

CONTENTS

INTRODUCTION

China's climate action in the coming decade will play a decisive role in whether the world can meet the ambitious Paris Agreement target of limiting warming to 1.5 degrees Celsius. China's emissions increased by 2.3% and 2.6% in 2018 and 2019, enough to offset the global decreasing trend,[4] and is expected to further increase by 7%-15% by 2030 above 2015 levels.[5] Already, China's recovery from COVID-19 has led to a rapid rebound in emissions.[6] To reverse China's increasing emissions trend and ensure that China can meet its own goals for advancing an ecological society, as well as its stated commitments to the Paris Agreement, climate and green finance needs to mobilize at an unprecedented scale.

Recognizing the challenge at hand, China has undertaken significant steps for green financial reform. Led by the central bank's initiative, China introduced green finance as a major topic for the 2016 G20 summit and endorsed a nation-wide blueprint for establishing a green financial system in 2016. So far, China's green financial reform has led to more than RMB 10.6 trillion (USD 1.5 trillion) in outstanding green loans, RMB 977 billion (USD 140 billion) in green bonds, hundreds of established green funds, opportunities for green stock indices and insurance.[7] In total, an average USD 202 billion was deployed annually in climate-related investments and an additional USD 118 billion in other environmental sectors during the period 2017-2018.

However, current levels of finance remain far below what is necessary. As much as RMB 95.45 trillion (USD 14 trillion) over the next decade, or USD 1.4 trillion annually, will be needed to meet China's climate targets and environmental protection standards established in 2015.[8] This means that investment will need to increase by more than four times the current levels. The estimated investment needs could be much higher, considering that China's climate targets are not based on absolute emissions reduction, but on carbon intensity, which still allows room for China to continue increasing its emissions. Despite private capital mobilization being one of China's major goals with green financial reform, evidence presented in this report suggests that the private sector has played a limited role to date.

China's green financial reform has major implications at the global level. For instance, China's "Big Four" state-owned banks are also the world's four largest banks, representing combined assets of USD 14.8 trillion, greater than the combined assets of the 11 largest banks in the US.[9] These "Big Four" banks contributed USD 240 billion to the fossil fuel industry in the past four years.[10] 44% of this amount, or USD 106 billion, went towards the coal sector, making China's Big Four the world's largest financiers of coal.[11] Furthermore, China's outbound finance has increased significantly in the past decade, with USD 196 billion in energy-related

4 RAN (2020)
5 Climate Action Tracker (2020)
6 CarbonBrief (2020)
7 This report uses the IMF's annual official exchange rates for currency conversion unless provided in USD by the original data source. All estimates provided in parentheses have been rounded.
8 CCICED (2015)
9 S&P (2020)
10 RAN (2020)
11 ibid

investments in Belt and Road Initiative countries over the past four years.[12] Half of this amount, or around USD 98 billion, went to fossil fuel projects.[13]

So far, however, green financial reform has not impacted China's support for fossil fuels in a significant way. Green definitions in China have been contested for their inclusion of clean coal and other efficiency-related improvements for fossil fuels.[14] On the other hand, exclusionary lists for fossil fuels have not been developed and China's key financial institutions have not made any public commitments to reduce investments in fossil fuels. Ensuring that progress is made on both climate-friendly and climate-harmful investments will be a key step forward for China's climate action in the coming years.

Section One of this report provides context on the drivers of China's green financial reform and progress to date. **Section Two** provides an overview of China's domestic climate finance landscape from 2017-2018. **Section Three** describes the barriers and opportunities for scaling up innovative climate finance. **Section Four** provides a brief overview of China's outbound finance and the potential for greening outbound flows. The report concludes with recommendations for improving quality and scaling up innovative climate finance.

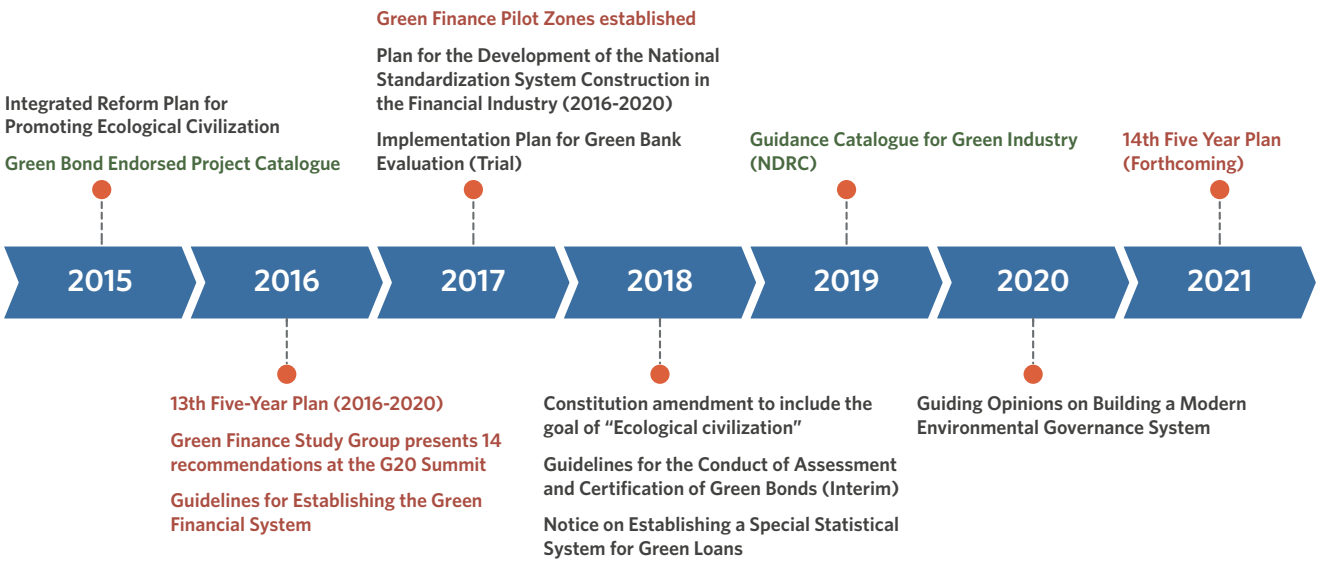
12 Calculations based on AEI and BU-GEGI data
13 ibid
14 EIB and GFC (2017)

1. POLICY FRAMEWORK FOR GREEN FINANCIAL REFORM

China's green financial reform benefits from top-down design and policy framework, with buy-in at the highest levels of the government. Green finance is considered the main channel for mobilizing the necessary resources to achieve the national goal of constructing an "ecological civilization," a concept first introduced in 2007 and now officially included in the Party's Constitution since 2018. The idea to "build a green financial system" was first mentioned in the State Council's "Integrated Reform Plan for Promoting Ecological Civilization" in 2015, the first-time green finance was mentioned in a national top-level policy document. The 13th Five-Year Plan (2016-2020) extensively cites the importance of an ecological civilization alongside the need for a green financial system, demonstrating the state's increasing prioritization of environmental standards alongside economic development. Most recently in October 2020, high-level policy guidance for promoting climate investment and finance was jointly issued by five government and regulatory bodies,[15] the first time "climate" finance and NDC targets were explicitly mentioned as the policy objective (Box 1).

China's central bank, the People's Bank of China (PBoC), led the formulation of specific green finance policies. In 2014, the PBoC and UNEP Inquiry jointly convened the Green Finance Task Force and put forward 14 recommendations for establishing a green finance system, which were presented at the G20 summit in 2016 under China's presidency. The recommendations were officially endorsed the same year by seven leading ministries and regulatory bodies[16] in the "Guidelines for Establishing the Green Financial System," which currently serves as the national blueprint covering all aspects of the financial sector. The PBoC continues to oversee green finance development through the Green Finance Committee.

Figure 1. Policy highlights in China's green financial reform



15 Ministry of Ecology and Environment (MEE), National Development and Reform Commission (NDRC), People's Bank of China (PBOC), China Banking and Insurance Regulatory Commission (CBIRC), and China Securities Regulatory Commission (CSRC)
16 People's Bank of China, the Ministry of Finance, the National Development and Reform Commission, the Ministry of Environmental Protection, China Banking Regulatory Commission, China Securities Regulatory Commission, and China Insurance Regulatory Commission

A key objective of China's green financial reform is to mobilize private capital. The PBoC/UNEP report in 2015 estimated that 85% of green investment needs during the 13th Five-Year Plan period would need to come from the private sector.[17] This understanding is embedded in the PBoC's definition of green finance as *"a series of policy and institutional arrangements to attract private capital investments into green industries such as environmental protection, energy conservation and clean energy through financial services including lending, private equity funds, bonds, shares and insurance."*[18] Given that China's green transition is much less reliant on bottom-up action from the private sector compared to the US and Europe, policy and institutional arrangements have an important role to play. There are limitations to this top-down approach in mobilizing private capital, which are further discussed in Section 3.2.

Despite its limitations, China's top-down approach has generated significant momentum. Some key factors contributing to China's success so far include:

- **Policy-signaling through high-level policy documents:** Five-year plans form the basis of China's economic development strategy, providing clear policy signals in the form of medium-term goals and priorities, including climate and energy targets (Box 2). These targets are frequently referenced by regulatory authorities and local governments to launch new policies in their respective jurisdictions. The inclusion of building a green financial system in the 13th Five-Year Plan (2016-2020), and the seven ministries joint issuance of the "Guiding Opinions Establishing the Financial System" was an important signal for policymakers and financial actors to adopt measures for increasing green finance.[19]
- **Green standardization and taxonomies:** One of the most important steps for driving investment into green sectors is to establish harmonized standards and taxonomies for determining what counts as green. China has established three green taxonomies to date, for green loans, green bonds, and green industry. Increasing harmonization is underway through initiatives such as the Green Bonds Standards Committee. The new draft plan for green bonds eligible projects released in May 2020 excludes key fossil fuel-related activities, which would be a major step forward for raising green standards in China. Furthermore, the National Development and Reform Commission (NDRC) green industry catalogue released in March 2019 will serve as a basis for aligning green definitions both within and beyond the financial system.
- **Establishing innovative pilot zones:** China has historically relied on pilot cities and provinces to demonstrate how they can contribute to national goals in their respective contexts. Lessons learned from pilot initiatives are widely communicated to serve as examples for replication elsewhere. In 2017, the State Council approved nine cities in five provinces to establish pilot zones for green finance innovation.[20] The pilot cities focus on five major tasks, including designing local policies, setting up finance units or branches, developing environmental rights trading, innovating products and services, and establishing market mechanism and infrastructure.

17 PBoC and UNEP Inquiry (2015)
18 UNEP Inquiry (2016)
19 PBoC (2016)
20 Huzhou and Quzhou in Zhejiang province; Ganjiang in Jiangxi province, Guangzhou in Guangdong province, Gui'an in Guizhou province, Hami, Changji, and Kelamayi in Xinjiang province; in December 2019, Lanzhou in Gansu province was added as the ninth pilot city.

Box 1. "Green Finance" vs "Climate Finance"

The term "green finance" in China's context covers a much broader range of activities than is typically covered under the term "climate finance," a term used more frequently outside of developing countries to refer specifically to activities that combat climate change. The International Development Finance Club (IDFC) also employs the broader definition of green finance to track financing efforts among member institutions. As mentioned above, China's national goal of building an ecological civilization means that combating climate change is only one of several objectives of green finance, which also include combating air pollution, ecological restoration, water conservation, waste management, and reducing excess industry capacity, among many others.[1] In some cases, green finance also includes clean coal utilization and other efficiency-related improvements for fossil fuel projects. This broader definition imposes challenges for measuring the mitigation impact of China's green investments. This report uses the term climate finance to encompass all green financing activities in China, with the exclusion of projects involving fossil fuel efficiency improvements, large hydropower, manufacturing, and waste incineration. Recently however, policy guidance in China has used the term "climate" finance to refer specifically to financing needs for addressing climate change for the first time, acknowledging it as an important part of green finance.[2]

1. See also IIGF (2018). China Green Finance Development Report (In Mandarin)

2. Guidance on promoting investment and financing to address climate change

- **Monetary and performance incentives:** Green finance policies are supported by concrete monetary and performance incentives. For instance, local provinces offer grants to reduce issuance costs and certification fees, subsidies to reduce debt interest, and tax benefits. Banks are rewarded for their performance on green credit through higher scores in the PBoC's Macroprudential Assessment (MPA), which can lead to monetary benefits such as more flexible capital adequacy requirements. Banks also benefit from increased access to the PBoC's Short-term Standing and Medium-term Lending Facilities, in which green loans and bonds are accepted as collateral. Within banks, managers and local branches are evaluated on their green performance as well.

Box 2. China's climate targets

Carbon neutrality by 2060

Paris Agreement (By 2030)

- Peak CO2 emissions by 2030
- Carbon intensity: >65% decrease from 2005 levels
- Non-fossil fuel share: increase to 25%

13th Five-Year Plan Targets (By 2020)

- Carbon intensity: -18% from 2015 levels
- Energy consumption intensity: -15% from 2015 levels
- Coal cap: less than 1100 GW
- Share of coal in primary energy consumption: <58%
- Share of non-fossil fuel in primary energy consumption: >15%

1.1 PROGRESS TO DATE

This section revisits the initial fourteen recommendations made by the Green Finance Study Group in 2016 to highlight progress to date. The recommendations are grouped into four areas: 1) Specialized Investment Institutions, 2) Fiscal and Financial Support, 3) Financial Infrastructure, and 4) Legal Infrastructure. A summary is provided in Table 1.

Table 1. Summary of progress on Green Finance Study Group recommendations

	RECOMMENDATION	PROGRESS TO DATE
Specialized Investment Institutions	**Green Banks**	First green banks established (e.g. Ma'anshan Rural Commercial Bank) Increasing adoption of green banking practices and governance systems
	Green Funds and PPP	780 green funds established to date[21] Green PPP project investment total around USD 300 billion (active since 2014)
	Greening Development Banks	Support for Asian Infrastructure Investment Bank's (AIIB) sustainable energy and cities strategy[22] Support for greening investments through multilateral financial institutions such as AIIB, BRICS Development Bank, and the Silk Road Fund
Fiscal and Financial Policy Support	**Green Loans and Discounts**	RMB 10.6 trillion (USD 1.5 trillion) in green loans by end of 2019, doubling since 2013[23] Green loan statistics system established (2018) Discounted loans accessible through the PBoC's green re-lending facility, short-term and medium-term facilities
	Green Bonds	Green bonds eligible project catalogue published by the PBoC Total RMB 977 billion (USD 140 billion) outstanding, representing Year-on-Year average growth of 30% (active since 2016)[24] The world's largest source of labelled green bonds in 2019
	Green IPO	16 clean energy company IPOs between 2016 and Q2 2019[25] Streamlining IPO processes for green companies under discussion (CSRC)
Financial Infrastructure	**Carbon Markets**	Seven provincial pilots in place, national ETS postponed to 2021
	Green Ratings	Green bond verification and rating systems developed
	Green Stock Indices	23 ESG/Green indices, 22 green passive index funds (RMB 7.39 billion), 25 green open index funds (RMB 25.28 billion) developed[26]
	Environmental Cost Analysis	Stress-test methodologies and analyses shared through a knowledge platform
	Green Investor Network	Green Finance Committee, more than 240 members consisting of financial institutions, green companies, and research organizations Greening BRI Coalition, Green Investment Principles

21 Tsinghua (2020)
22 AIIB (2017); AIIB (2018)
23 Tsinghua (2020)
24 CBI (2020)
25 Xinhua Finance (2019)
26 IIGF (2018)

Legal Infrastructure	**Green Insurance**	RMB 882 billion (USD 130 billion) in green investment, representing 5% of total insurance funds balance (as of September 2019) Remote Damage Assessment and Claim Settlement Platform Green buildings insurance scheme (PICC)
	Lender Liability	Increasing number of climate stress-tests undertaken by banks
	Compulsory Disclosure	Mandatory ESG and increasing disclosure requirements (CBIRC)

While there has been considerable progress across all four areas, green credit and green bonds have emerged as particular success stories. Green credit represents one of the earliest intervention points of China's green finance policy, dating back to 1995 when the PBoC first issued guidance on integrating environmental factors in lending decisions. In 2012 and 2013, the China Banking Regulatory Commission (CBRC) issued further guidance on increasing green credit and established a green credit statistics system to track environmental impact and financial performance. By the end of 2019, outstanding green loans from 21 major banks were RMB 10.6 trillion (USD 1.5 trillion), more than double the amount from end of 2013. The environmental impact achieved by the green loans include CO_2 reduction of 518 million tons and energy consumption reduction equivalent to 247 million tons of standard coal.[27] Furthermore, green loans delivered better financial performance with an average non-performing ratio of 0.48%, 1.81 percentage points lower than that of corporate loans.[28] These datapoints make a strong case for reducing the risk weighting of green assets, which is already being piloted in some banks.

Despite the relatively late start in 2016, China's green bond market is now the world's largest source of labeled green bonds with RMB 977 billion (USD 140 billion) outstanding at the end of 2019, averaging 30% annual growth.[29] Transport and energy were the two largest sectors supported by the green bonds' use of proceeds, and the total market has achieved an annual CO_2 reduction of at least 52.6 million tons.[30] Supporting market infrastructure has also significantly evolved, with increasing business volumes flowing to domestic third party verifiers and rating agencies.

27 Ibid.
28 Tsinghua (2020)
29 CBI (2020)
30 Escalante et al. (2020)

2. DOMESTIC GREEN AND CLIMATE FINANCE LANDSCAPE

This section gives an overview of China's domestic green and climate finance landscape from 2017-2018. It presents new research that builds on CPI's Global Landscape of Climate Finance methodology,[31] a new method for classifying financing entities, and integration of additional data sources.

Annual domestic green finance averaged RMB 2.25 trillion (USD 320 billion), making China one of the largest contributors of green finance globally. This section investigates specific investment trends during 2017-2018, as well as barriers to and the potential for scaling up.

2.1 DEFINING PUBLIC VS PRIVATE ACTORS

Classifying Chinese entities as public or private is challenging due to complex shareholding structures and the state's control over economic actors through its large state-owned enterprises and banks. Despite ongoing efforts to shift towards a market-driven economy, the financial sector still has a strong tendency to favor state-owned businesses and those with political connections.[32] Even private companies are not exempt from state control, due to their dependence on state-owned banks. This became clear during the widespread selloff of foreign assets by large Chinese conglomerates in 2017 prompted by state directives to rein in capital outflows.[33]

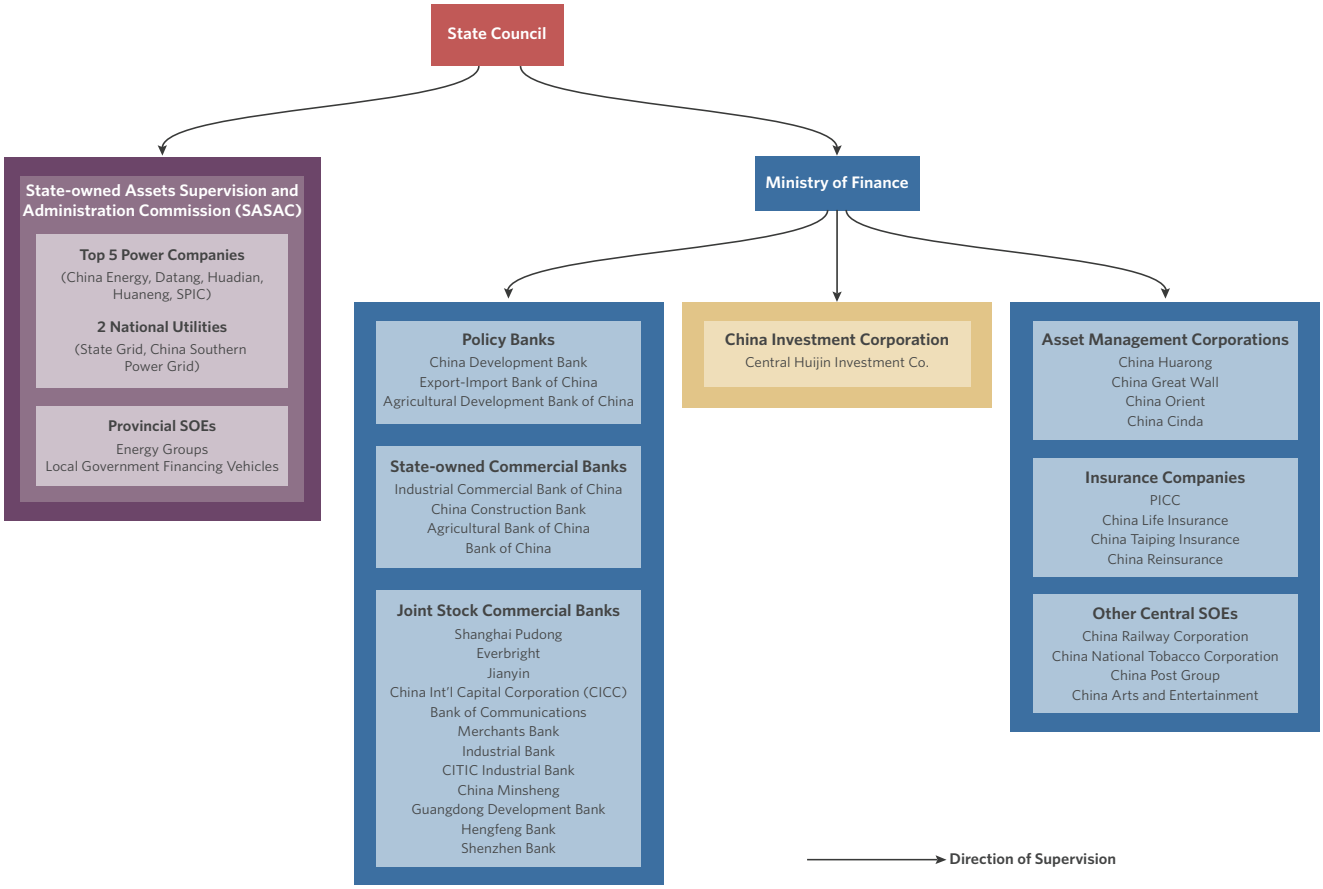
In this report, "public actors" are defined as actors and subsidiaries with direct identifiable links to the State Council, including the State-owned Assets supervision and Administration Commission (SASAC), Ministry of Finance, three policy banks, Big Four state-owned commercial banks, and the sovereign wealth fund China Investment Corporation (CIC) (Figure 2). The wholly-owned subsidiary and investment arm of CIC, China Huijin Investment Co., makes equity investments in key state-owned financial institutions on behalf of the State Council and holds controlling shares in the Big Four banks. Despite their status as listed commercial entities, the strategic direction and overall operations of the Big Four commercial banks are overseen by the Ministry of Finance and Huijin, which is why they are tracked as public entities in this report.

Joint stock commercial banks have mixed ownership, but the top shareholders are usually state-related entities such as the People's Insurance Company of China (PICC) and the provincial finance department (e.g. Industrial Bank) or local investment groups (e.g. Huaxia Bank, Shanghai Pudong Development Bank). Some joint stock commercial banks are subsidiaries of CSOEs (e.g. CITIC, China Merchants) or majority owned by Huijin (e.g. China Everbright, Hengfeng Bank). Because the banks providing green credit in this report are majority state-owned, they are also tracked as public entities.

31 CBI GLCF Methodology (2019)
32 China US Focus (2012); Elliot & Yan, The Chinese Financial System
33 SCMP (2019); Nikkei Asia (2019)

All other actors whose ownership was unclear or did not indicate any direct links to governmental bodies listed above were tracked as private actors. These included project developers, corporate groups, holding companies, private equity providers, and other institutional investors. A detailed methodology is available in the Annex.

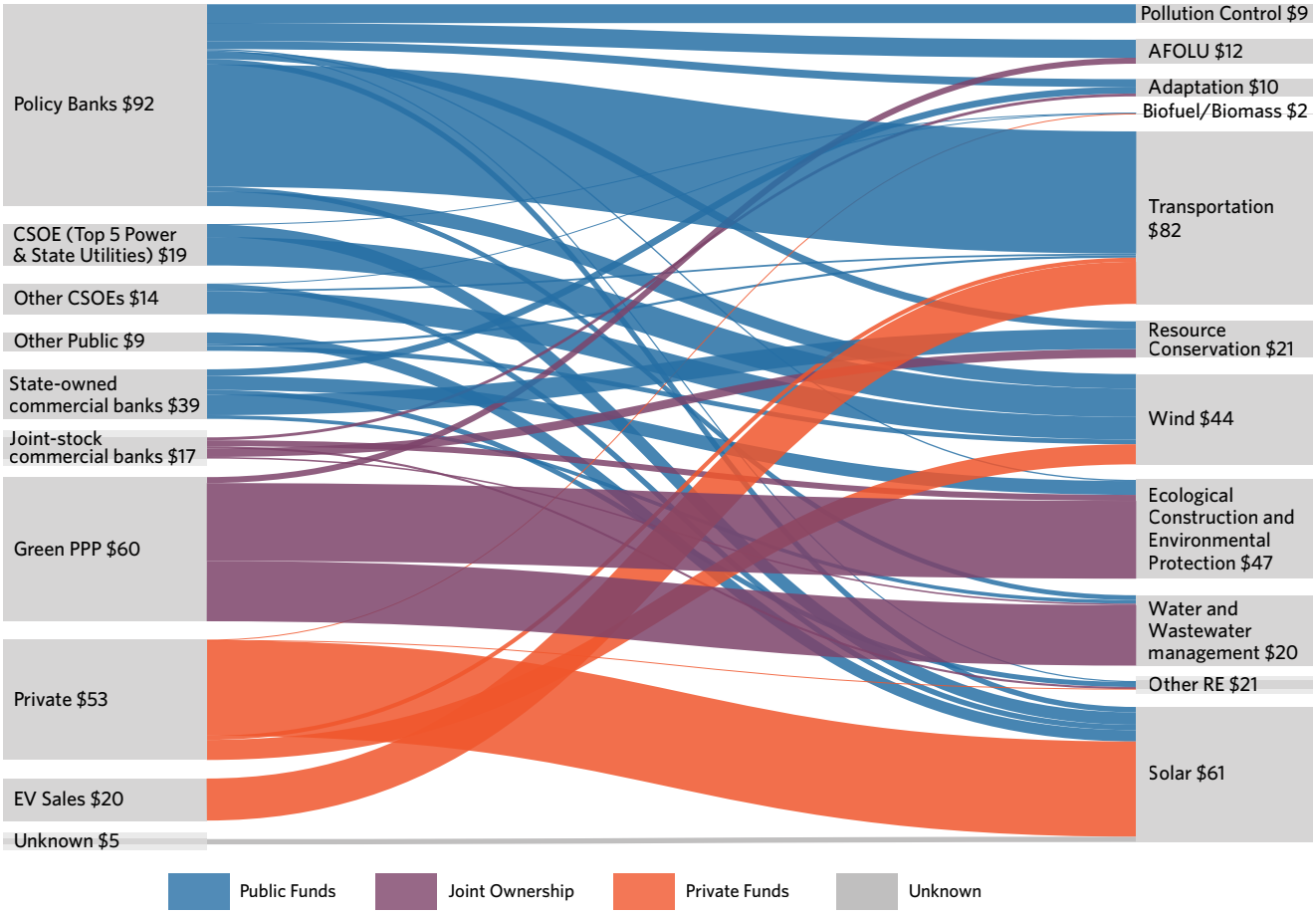
Figure 2. Map of relevant public actors in the green finance landscape



2.2 INVESTMENT TRENDS

Total domestic climate finance during 2017-2018 was RMB 4.3 trillion (USD 640 billion), or an annual average of RMB 2.1 trillion (USD 320 billion), making China the largest contributor of climate finance globally over the same time period. The following figures in this section are expressed as the annual average unless stated otherwise.

Figure 3. China's green finance, from financing source to sector allocation[34]



2.2.1 SOURCES AND SECTOR ALLOCATION

Public sources accounted for 51% of total green finance, or RMB 1.1 trillion (USD 162 billion). Policy banks were the largest contributors with RMB 643 billion (USD 96 billion), or 44% of public finance. Their main contribution was to the transportation sector, accounting for 71% (RMB 389 billion (USD 58 billion)) of total investment in the transportation sector. CSOEs, including enterprises directly overseen by the central SASAC and other non-bank institutions regulated by the Ministry of Finance,[35] contributed RMB 228 billion (USD 34 billion), or 21% of total public finance. China's "Big Five" power generation companies[36] and two national utilities[37] accounted for more than half (58%) of all CSOE finance, contributing RMB 90 billion (USD 13.5 billion) and RMB 40 billion (USD 6 billion) to wind and solar respectively.

Major state-owned and joint-stock commercial banks[38] contributed an estimated RMB 228 billion (USD 34 billion). This estimate is based on the 21 major banks that report their green credit portfolio figures to the China Banking and Insurance Regulatory Commission (CBIRC). The Big Four state-owned commercial banks contributed RMB 157 billion (USD 23.5 billion),

34 Other major state-owned banks and green PPP data is estimated based on CBIRC and WIND data. N.b. investment in fossil fuel efficiency, large hydro, and waste incineration are excluded.
35 Policy banks (excluding CDB), State-owned Commercial Banks and Joint-Stock Commercial Banks are covered under "Other major state-owned banks."
36 State Power Investment Corporation, Huaneng, Datang, Huadian, China Energy Investment Corporation
37 State Grid, China Southern
38 Excluding policy banks

while joint stock commercial banks contributed RMB 67 billion (USD 10 billion). Under CBIRC guidelines, banks may report a wide range of green projects including industrial water saving, waste disposal, drinking water safety, and disaster prevention. Another category of green finance for banks is the "strategic emerging industry," which includes manufacturing of energy conservation and environmental protection products, new energy products, and new energy vehicles.[39] An estimated RMB 134 billion (USD 20 billion) went towards manufacturing of new energy products and other smart grid projects, which are excluded from the overall green finance figures in this report in line with CPI's methodology for tracking climate finance. These banks are also the largest financiers of CSOEs, and therefore partly responsible for the investment flowing from the wind and solar sectors through the CSOEs in Figure 4.

Green PPP projects accounted for around a fifth of total finance, or RMB 459 trillion (USD 68.5 billion). A majority of these projects were labeled "Ecological Construction and Environmental Protection," a catch-all term for a portfolio of projects at the village or county level, which include river restoration, constructing wetlands and ecological corridors, improving rural drinking water, and waste management.[40] This category accounted for RMB 315 billion (USD 47 billion), or 15% of all domestic climate finance flows. PPP projects are largely financed through green funds established by government budgets (Box 3).

Box 3. Green PPP and green funds

Green PPP projects and green funds started to be actively promoted in China in 2014 as a way to mobilize social (private) capital. The PPP model is largely financed through green funds that aim to blend public and private sources of capital and are initiated by local government budgets. More than 780 green funds have been established to date.[1] According to different funding sources, it can be divided into green industry funds, regional green PPP funds, green industry merger and acquisition funds, and green guarantee funds. While detailed information on the composition of funds, how they operate, and their private capital leverage ratios are not disclosed, available information on fund composition suggests that these funds aim to achieve leverage ratios of around 3:7 to 1:4. The success of these funds in reaching their targets is unclear, however, and PPP projects have been known for their inadequately designed return mechanisms and low incentives for private investors to participate.[2] 95% of green PPP projects are supported by a direct government subsidy or feasibility study subsidy.[3]

1. Tsinghua; 2. Interviews; IIGF 2018; 3. WIND

Private sources accounted for 24% of total finance at RMB 516 billion (USD 77 billion). These sources included project developers, corporates, leasing companies, and institutional investors. Together they made the largest contribution to the solar industry, with RMB 301 billion (USD 45 billion), or 70% of the sector total. This is indicative of the generous government incentives and subsidies that the solar industry benefited from over the past decade. Solar installed capacity in China grew from 2.5GW in 2011 to 205GW at the end of 2019.[41] Despite the state's sudden decision in May 2018 to halt all subsidies for utility-scale solar in favor of competitive bidding,[42] momentum for solar remains relatively strong.

39 N.B. the GLCF methodology excludes investment in manufacturing considering the possibility that these costs may be double counted in the investment amounts of new projects. However, the "strategic emerging industry" category is included in this report as China's green credit taxonomy tracks this investment category separately.

40 For inclusion in this report as a green PPP, projects were screened to exclude roads, plantations, and waste incineration plants (excluding waste-to-energy plants).

41 PowerTechnology (2019)

42 NDRC (2018)

Climate finance investments from domestic sources largely remained within the country. During the period 2017-2018, around RMB 28 billion (USD 4 billion) Chinese-origin sources was outbound, while there were RMB 17 billion (USD 2.5 billion) of inbound investment from foreign sources. Foreign sources were largely public institutions, with 67% provided by multilateral development finance institutions. An additional 25% was via private corporations and commercial banks.

2.2.2 MITIGATION VS ADAPTATION

Overall, sectors with mitigation benefits received RMB 1.3 trillion (USD 193 billion), or 60% of the total. Of this total, 55% went to wind and solar. "Other environment" sectors, or sectors with indirect mitigation and adaptation benefits, including AFOLU (agriculture, forestry and other land use), resource conservation, and ecological construction, received an estimated RMB 791 billion (USD 118 billion).

Adaptation related projects received RMB 56 billion (USD 8.3 billion), or 4% of total climate finance. This mainly included financing for disaster risk prevention and flood control measures, such as building sponge cities, dikes, and drainage systems. This figure is likely underestimated considering the potential adaptation benefits of projects such as those in the category of ecological construction and water management, as well as difficulties in tracking adaptation finance among private entities. Tracking adaptation finance is a challenge globally, given the difficulty of defining and measuring adaptation benefits, as well as issues related to drawing boundaries with traditional development finance.

Table 2. Investment by sector and mitigation vs adaptation benefits

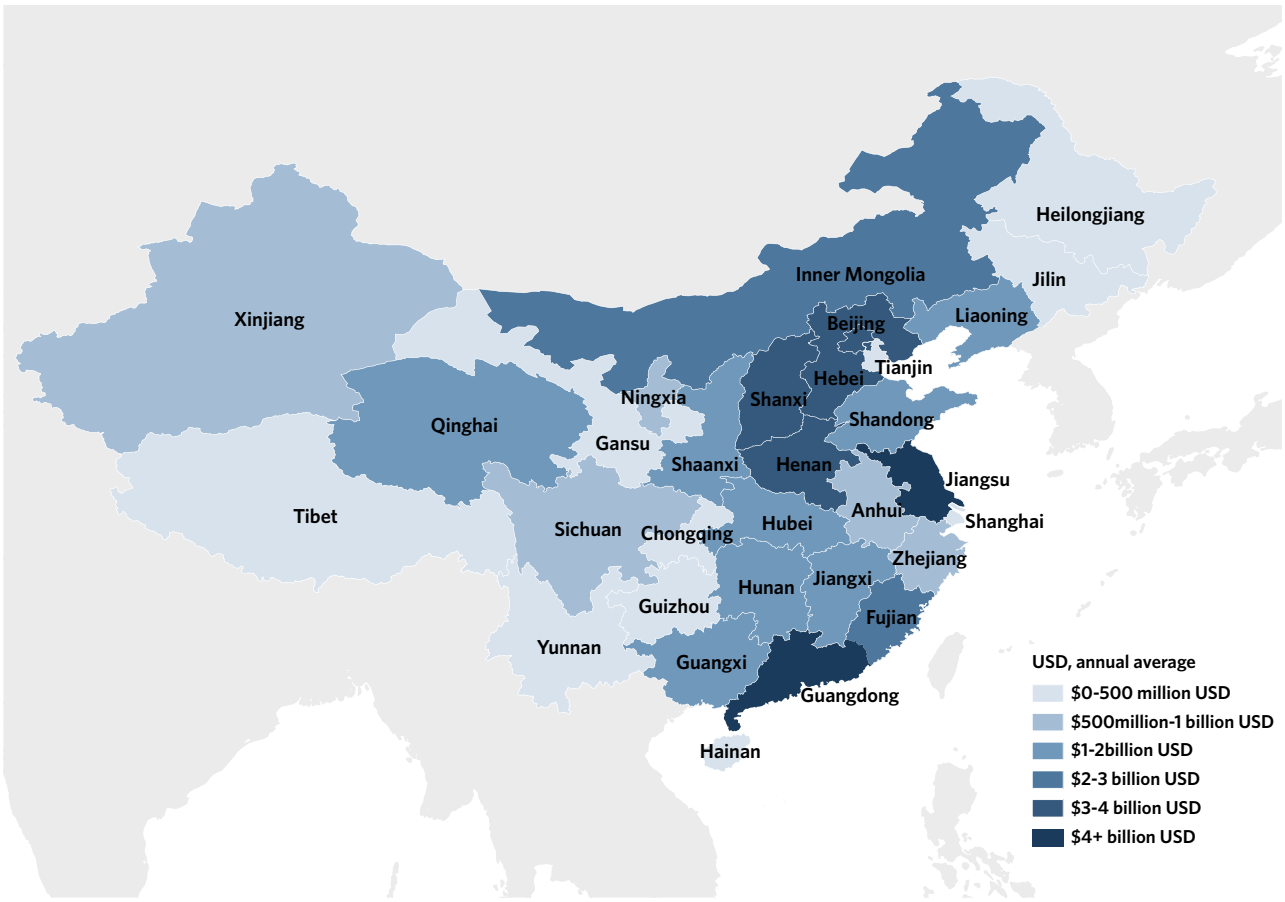
	SECTORS INCLUDED	INVESTMENT AMOUNT
Mitigation	Solar	RMB 429 billion (USD 64 billion)
	Wind	RMB 288 billion (USD 43 billion)
	Biofuel/biomass	RMB 3 billion (USD 0.46 billion)
	Other renewable energy (including smart power grids and other renewable energy projects)	RMB 27 billion (USD 4 billion)
	Transport	RMB 549 billion (USD 82 billion)
Adaptation	Disaster prevention, flood control measures	RMB 56 billion (USD 8.3 billion)
Other Environment	Resource conservation	RMB 114 billion (USD 17 billion)
	Pollution control	RMB 60 billion (USD 9 billion)
	AFOLU	RMB 77 billion (USD 11.5 billion)
	Water and wastewater management	RMB 221 billion (USD 33 billion)
	Ecological construction and Environmental Protection	RMB 315 (USD 47 billion)

2.2.3 REGIONAL DISTRIBUTION

Investments were concentrated north and southeast, especially along the coastal provinces. Solar dominated in the northeastern provinces, led by Hebei, Shanxi, Shaanxi, and Inner Mongolia. Wind was prominent in the southeast, led by Jiangsu, Guangdong, and Henan. The green finance pilot zones selected by the State Council in 2017[43] are well distributed across the country to reflect the different development contexts and natural resource conditions in each. These include Zhejiang in the east, Jiangxi, Guangdong, Guizhou in the south, and Xinjiang and Gansu in the west. The cities in these provinces were selected to establish local green finance policies and establish innovative market mechanisms for mobilizing green finance.

Figure 4. Regional distribution of climate finance (wind and solar)[44]

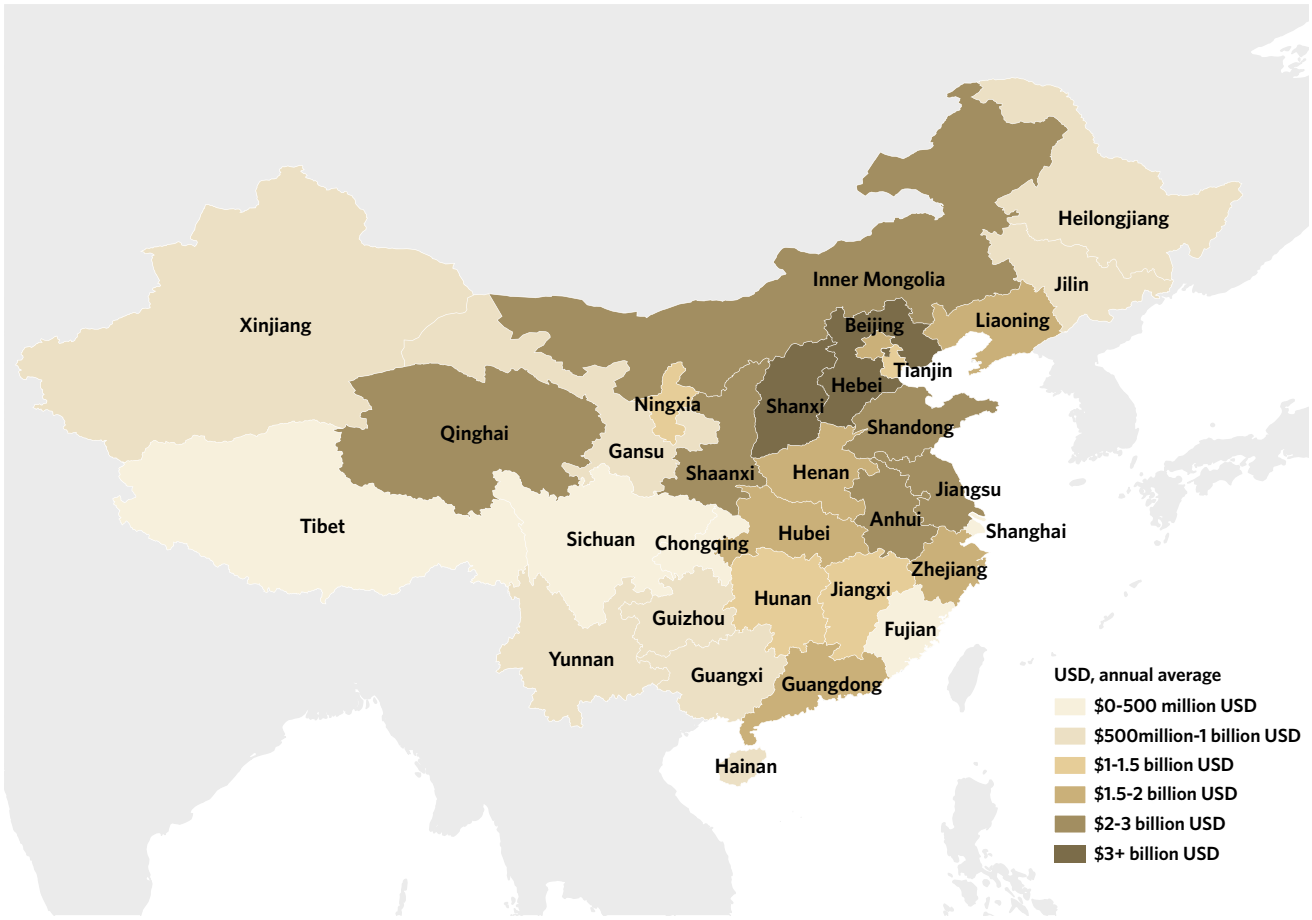
Wind



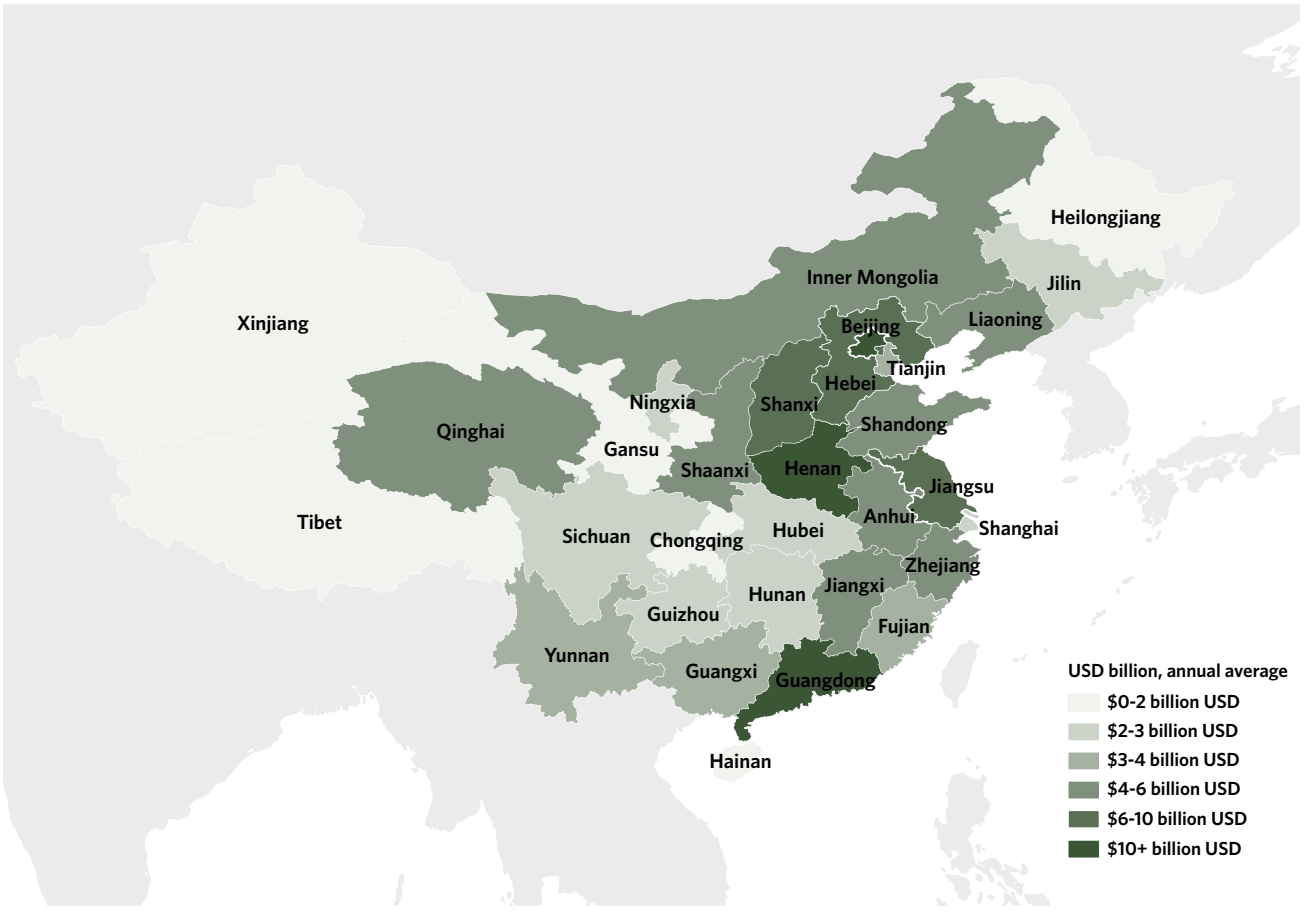
43 Huzhou and Quzhou in Zhejiang province; Ganjiang in Jiangxi province, Guangzhou in Guangdong province, Gui'an in Guizhou province, Hami, Changji, and Kelamayi in Xinjiang province; in December 2019, Lanzhou in Gansu province was added as the ninth pilot city.

44 Figures exclude China Development Bank, residential spending, and EV sales. Sources: GLCF, WIND

Solar


Heilongjiang
Inner Mongolia
Jilin
Xinjiang
Beijing
Liaoning
Tianjin
Hebei
Ningxia
Shanxi
Qinghai
Shandong
Gansu
Shaanxi
Henan
Jiangsu
Tibet
Anhui
Shanghai
Sichuan
Chongqing
Hubei
Zhejiang
Hunan
Jiangxi
Guizhou
Fujian
Yunnan
Guangxi
Guangdong
Hainan
USD, annual average
$0-500 million USD
$500million-1 billion USD
$1-1.5 billion USD
$1.5-2 billion USD
$2-3 billion USD
$3+ billion USD

Total

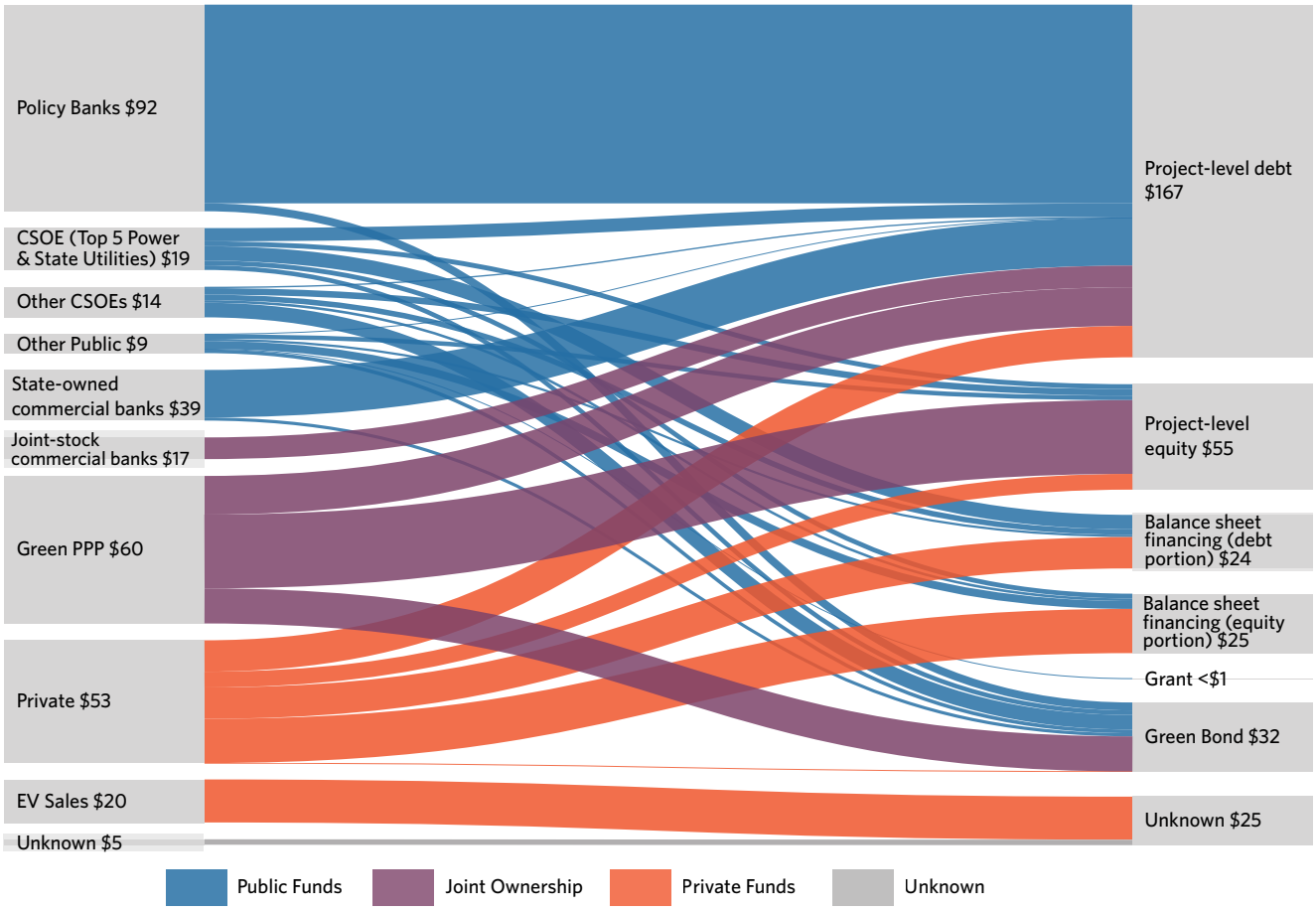

Heilongjiang
Inner Mongolia
Jilin
Xinjiang
Beijing
Liaoning
Tianjin
Hebei
Ningxia
Shanxi
Qinghai
Shandong
Gansu
Shaanxi
Henan
Jiangsu
Tibet
Anhui
Shanghai
Sichuan
Chongqing
Hubei
Zhejiang
Hunan
Jiangxi
Guizhou
Fujian
Yunnan
Guangxi
Guangdong
Hainan
USD billion, annual average
$0-2 billion USD
$2-3 billion USD
$3-4 billion USD
$4-6 billion USD
$6-10 billion USD
$10+ billion USD

2.3 INSTRUMENT ANALYSIS

The majority of climate finance was funded through project-level debt, followed by project-level equity and balance sheet financing (Figure 5). Project-level debt is estimated to be as high as RMB 1 trillion (USD 164 billion), including funds raised through green bonds. Annual onshore green bond issuance was around RMB 215 billion (USD 32 billion) during 2017-2018, accounting for about 10% of domestic climate finance flows.[45]

However, considering the level of green bond proceeds that may be allocated to working capital under Chinese guidelines, up to RMB 31 billion (USD 4.6 billion) of proceeds could have been used to replenish working capital of the issuers.[46]

Figure 5. Estimated Instrument breakdown by financing actor



The investment figures discussed above do not adequately capture all potential climate finance channels in China, such as those flowing through consumer channels. For instance, digital retail consumer finance channels such as Alipay and WeBank are innovating new ways to encourage consumers, retail investors, and SMEs to adopt green practices through their mobile payment platforms. In 2019, mobile payment transaction volumes reached RMB 347 trillion (USD 50 trillion), an increase of more than 28 times from six years ago.[47] Platforms like Ant Forest, initiated by Alibaba's Ant Financial, utilize customers' mobile payment data to track and incentivize green behavior among users, in exchange for planting physical trees. Over a 122 million trees have been planted by August 2019, resulting in 7.92

45 WIND Financial Terminal
46 Corporate bonds may allocate up to 30%, and enterprise bonds may allocate up to 50% of proceeds to working capital. See Escalante et al. (2020)
47 Paulson Institute (2020)

million tons of CO_2 avoided (see section 3.3.1).There are also several initiatives researching blockchain applications for the green bond and insurance markets, which could considerably decrease verification and other transaction costs. Such investments in improving operations and reducing transaction costs for identifying and verifying green assets and environmental impacts help accelerate and improve the quality of climate finance flows.

The potential for these new financing channels to drive innovative climate finance is discussed in Section 3.1.

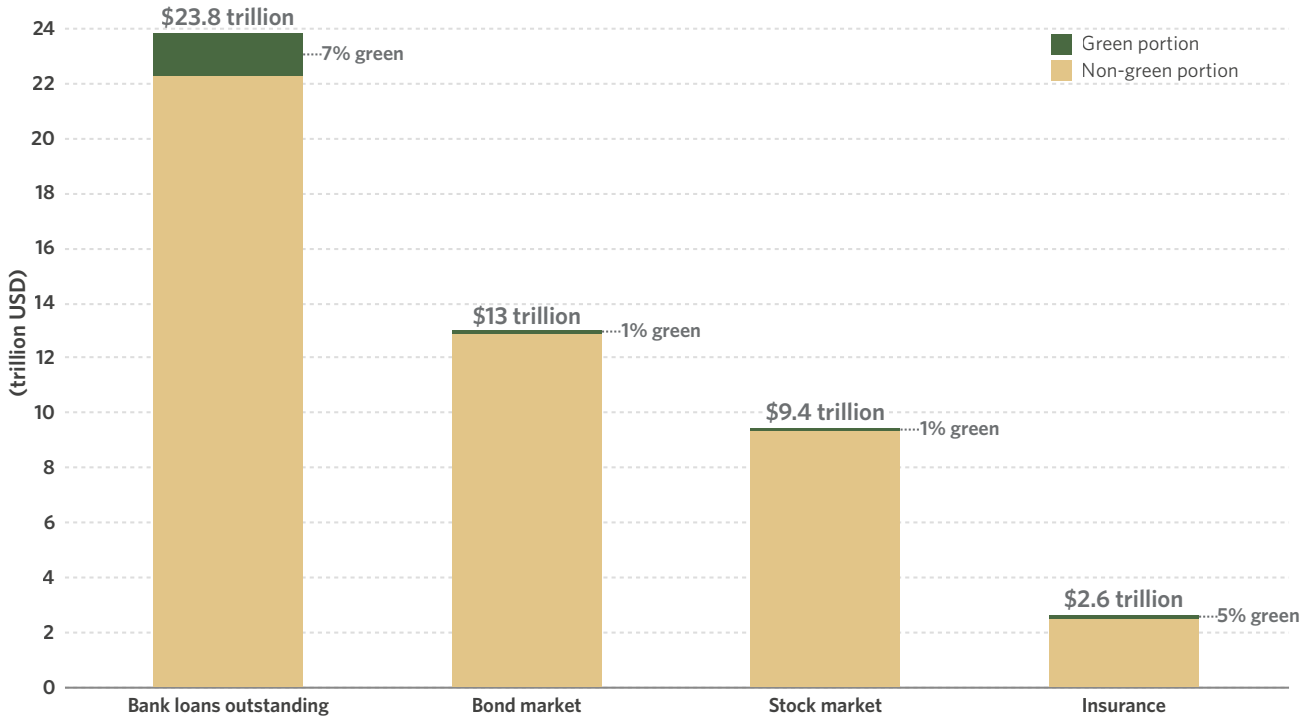
3. SCALING UP CLIMATE FINANCE

While annual climate finance flows of RMB 2.1 trillion (USD 320 billion) is not trivial, this figure must increase by at least four times to meet China's annual investment needs of RMB 9.5 trillion (USD 1.4 trillion) over the next decade. Mobilizing private capital will be key to meeting estimated needs. However, the current climate finance landscape indicates that the private sector has played a limited role to date.

3.1 POTENTIAL TO SCALE UP

There is tremendous potential for climate finance to grow, simply given the size of China's financial assets. The current green penetration of China's financial system remains at around 4% (Figure 6).

Figure 6. Comparison of the green share in financial assets[48]



As China's capital market continues to evolve and actors become familiar with green financial instruments, uptake in the market will continue to grow. Already the green credit and green bond portfolios have achieved tremendous growth. Green credit has more than doubled over six years to RMB 10.6 trillion (USD 1.5 trillion), and green bonds have grown to RMB 977 billion (USD 140 billion) outstanding over four years. Around RMB 866 billion (USD 124 billion) worth of green bonds in China reach maturity in the next 5 years[49], representing new opportunities for green refinancing. As for green stocks, discussions are under way to

48 Data from CBIRC and CSRC (As of Q1 2020), estimated green portion based on IIGF (2018), CBI (2020), *Xinhuafinance*
49 CBI (2020)

launch expedited listing processes for green company IPOs, and multiple green indices and funds have been established.

China is providing more support for SMEs. Similar to their green credit guidelines, regulators have advised banks to increase lending to SMEs and track progress on their growth. These recent efforts are part of the state's ongoing campaign to reduce banks' preferential treatment for SOEs, reduce the perception of implicit government guarantees, and reduce unsustainable levels of local government sponsored debt. As banks start lending to more SMEs and become more familiar with managing different credit risk profiles, this will increase opportunities for banks to take interest in more innovative, risk sharing arrangements.

New sources of concessional capital for climate finance are on the way. In 2016, the central government announced plans to set up a unified National Green Development Fund (NGDF) to invest in green industries. The Fund was jointly launched in July 2020 by the Ministry of Finance, Ministry of Ecology and Environment, and the Shanghai municipal government with an initial capital of RMB 88.5 billion (USD 13 billion).[50] The Fund will adopt the PPP model for its operation and will largely focus on green development along the Yangtze River Economic Belt, in various projects including environmental protection, pollution prevention and control, ecological restoration, energy conservation and utilization, green transportation, and clean energy.

There is growing interest in exploring innovative structures. For instance, China's Clean Development Mechanism Fund (CDM Fund) was launched in 2010 to support China's efforts to address climate change and promote sustainable development. By April 2020, the CDM Fund had implemented 317 clean concessional loan projects in 27 provinces, municipalities, and districts, with a total loan value of RMB 19.4 billion (USD 2.8 billion), and leveraging capital of nearly RMB 100 billion (USD 15 billion).[51] In May 2020, the CDM Fund signed a Green Innovation Investment Cooperation Agreement with the Department of Finance of Jiangsu Province and Industrial Bank Nanjing Branch. The three parties will initiate risk-sharing arrangements to support low-carbon development, energy conservation and emission reduction projects at the local level. According to the business model determined by the Agreement, the Department of Finance of Jiangsu Province will be responsible for project origination, the CDM Fund will provide concessional funds, and Industrial Bank will provide financing guarantees for projects. This would enable Jiangsu enterprises to obtain loans from a bank at lower interest rates. Similar arrangements are also in place with the Finance Bureau and Qilu Bank in Shandong Province, the Department of Finance and China Everbright Bank in Yunnan Province, and the Department of Finance and Industrial Bank in Hunan Province.

The prevalence of mobile payment technologies and online banking represents new financing avenues for consumers, retail investors, and small businesses. China's volume of credit asset issuance is expected to grow from RMB 57 trillion (USD 8.4 trillion) in 2018 to RMB 80 trillion (USD 11.7 trillion) in 2022. 54% of this growth will be driven by the expansion of credit to long-tail customers who have had difficulties accessing finance from traditional financial institutions.[52] For instance, Tencent-backed online bank WeBank automates risk-based pricing using nearly 6,000 factors including credit history, consumption, and other behavioral data to price loans for specific customers. The capability to price customer-

50 China Forum of Environmental Journalists (2020)
51 CDM Fund Website
52 Oliver Wyman (2019)

specific risks allows WeBank to reach a wider range of clients who may not have had prior access to finance from traditional banks. As another example, Alibaba's Ant Financial leverages more than 20 million SME accounts and nearly 1.2 billion individual consumer accounts globally to incentivize customers to adopt green practices in exchange for access to discounted loans.

Finally, there are growing opportunities for foreign private capital participation. Foreign private capital only accounted for RMB 9 billion (USD 1.34 billion) of inbound climate finance flows in 2017-2018. Chinese domestic actors are increasingly encouraged to establish funds with foreign investors, and restrictions on foreign ownership are gradually being lifted. Several new funds established by foreign investors with participating Chinese institutions include Innovator Capital's Sustainable Finance & Investment Corporation (SFIC) and Milltrust's Climate Impact Asia Fund (CIAF). SFIC will receive a RMB 6.85 billion (USD 1 billion) contribution from the Investment Association of China to invest in sustainable technology innovation, while CIAF is targeting RMB 3.4 billion (USD 500 million) to invest in green companies across Asia and make revenue-based donations to WWF conservation programs. Foreign investors may also establish long-term partnerships with local businesses through Joint Ventures. An example is the Asian Environment Impact Fund launched by a Joint Venture between Huaneng and Invesco, a US-based private equity firm. Finally, Chinese bonds are now represented in major global bond indices, such as the Bloomberg Barclays Index, which is expected to lead to more than RMB 685 billion (USD 100 billion) of additional foreign inflows.[53]

3.2 BARRIERS TO SCALING UP

While the top-down approach to implementing green finance reform has led to the mobilization of large pools of green capital, access to capital remains concentrated among public actors. There is a lack of incentives for private actors to get involved in climate-related projects, and explore blended finance structures for sharing risk. SOEs and local governments tend to be the first to benefit from concessional capital sources like CDB and local green funds.

- **Few incentives to explore innovative structures.** Green finance in China is dominated by large players and flows largely through plain vanilla instruments. As shown in the section above, public sources accounted for half of green finance, with nearly 95% of that amount attributable to CSOEs, policy banks, and the Big Four state-owned commercial banks (Figure 5). Sophisticated funding structures to blend different financing actors' risk appetites are generally not very well understood, nor are they considered necessary.
- **Limited success of PPP structures.** PPP structures, which were widely promoted to leverage government funds and mobilize private investment, have not been very effective to date and incentives for private actors to participate remain low.[54] While many local governments have adopted the PPP model, a system to efficiently allocate funding and track key outcomes is often missing. In some cases, the PPP model may be adopted for unsuitable projects due to the lack of a feasibility study. Another risk with the PPP model is that it may add to local hidden debts, as PPPs are largely funded by public sources. To

53 Bloomberg (2019)
54 Interview; IIGF (2018)

enhance PPP performance management, the Ministry of Finance issued the *Notice of Issuing the Operational Guidelines for the Performance Management of Public-private Partnership Projects in 2020,* requiring local governments to better manage and evaluate PPP projects.[55] Meanwhile, the Ministry of Finance and local governments have established information centers of PPP project pipelines to increase the transparency and information sharing of PPPs.[56]

- **Lack of diverse sources of capital.** China's capital market is less developed than those in many developed countries and remains dominated by traditional banking. This means there is a relatively small class of impact-oriented investors. Corporate actors rely heavily on traditional bank loans. According to start-up accelerator Plug and Play's recent internal survey, the vast majority of start-ups in China looked to bank loans rather than seeking PE/VC funding.[57] Furthermore, domestic concessional capital providers—like NGOs and foundations—that could drive research and early stage climate action through technical assistance and grants are largely missing in China.
- **Access barriers to formal financing channels and investment deals.** There is a strong tendency for the formal financial sector to prefer large state-owned clients and others with political connections, leaving smaller players to fund growth through informal, more expensive channels. Several factors contribute to the overall inaccessibility of China's financial system to private actors: 1) implicit government guarantees for SOEs and state-owned banks; 2) senior managers of the major banks are often appointed by the government; 3) government officials sometimes intervene in loan decisions in ways that circumvent traditional credit procedures.[58] Moreover, CDB is the largest provider of concessional capital, but the majority of its clients remain SOEs and local governments. CDB's decision-making processes are not transparent.[59] Preliminary analysis on PPP projects shows that many of the disclosed private capital participants have actually been central and local SOEs, which could be potentially crowding out private capital opportunities.[60]
- **Asymmetric information.** There are high search costs for investors interested in impact investing, not to mention investors interested in making climate action their investment thesis. Green definitions and taxonomies often do not identify thresholds for meeting specific standards. Environmental impact reporting is limited to aggregate metrics, not supported by a standardized methodology. Project origination is dominantly led by national and local economic development authorities.
- **High policy uncertainty.** Even though China is known for long-term planning and sending strong policy signals through key policy documents, it can sometimes unexpectedly reverse those decisions as well. For example, the NDRC announced its decision to abruptly halt solar subsidies in May 31, 2018, reversing an era of generous subsidies that made China the world's largest renewable energy market. This led to a turbulent period for many solar producers who initially entered the market attracted by the subsidies. Producers with business models that relied more heavily on the subsidies were forced to exit the market.

55 China Public Private Partnership Center
56 Guangdong Department of Finance
57 Results of undisclosed internal Plug and Play survey
58 Brookings (2013)
59 China is not a member of the OECD and not bound by OECD Development Assistance Committee (DAC) or other reporting requirements
60 Wind Financial Terminal

3.3 CASE STUDIES: INNOVATIVE CLIMATE FINANCE

Some of the barriers outlined above may be addressed through innovative financing structures that align incentives for diverse groups of actors, leverage public funds to catalyze private capital, and channel finance to green project pipelines. The Global Innovation Lab for Climate Finance has produced several ideas for such innovative financing mechanisms, across various sectors and geographies (Box 4). While China-specific ideas have not been featured in the Lab, the following case studies highlight China's potential for scaling up innovative climate finance, while overcoming some of the barriers identified in section 3.2.

Box 4. The Global Innovation Lab for Climate Finance

The Lab identifies, develops, and launches innovative finance instruments that can drive billions in private investment to take action on climate change and sustainable development. Since 2014, the Lab has launched 41 innovative solutions that have collectively mobilized $2.07 billion in sustainable development to date, with $370 million in original investment contributed by Lab Member institutions. These ideas represent a range of financial innovations that are led by enterprises, fund managers, market experts, and others, that are all structured to tackle investment barriers for climate projects in the most critical regions and sectors.

For the 2020 cycle, the Lab had a special call for ideas in sustainable energy access, sustainable cities, sustainable agricultures, and nature-based solutions, and ideas targeting the geographies of India, Brazil, and Southern Africa. Once selected, ideas receive robust technical and financial modeling support, including development of promotional content and market implementation strategies. Idea proponents also gain access to the Lab's network of investors and advisors.

The Lab is composed of over 60 expert institutions in government, development finance, philanthropy, and the private sector. Funders include the Australian, UK, German, and Netherlands governments, Bloomberg Philanthropies, Rockefeller Foundation, and the Shakti Sustainable Energy Foundation. Climate Policy Initiative serves as the Lab Secretariat.

3.3.1 GREEN FINTECH

Fintech was identified as one of the three major research topics under the G20 Sustainable Finance Study Group for its potential to scale up climate finance.[61] Digital technologies, including big data, artificial intelligence (AI), mobile platforms, blockchain, and the Internet of Things (IoT), can overcome traditional barriers for climate finance such as limited access to capital and cost burden of issuance and verification. Digital finance can also significantly increase data availability and transparency on environmental and financial information. It also encourages greater financial inclusion and innovation, expanding financial access for citizens and SMEs, and cultivating new business models.

China has been a leader in mobile payment systems due to the popularity of Alipay and WeChat pay. In 2019, mobile payment transaction volumes reached RMB 347.11 trillion (USD 51 trillion), an increase of more than 28 times from six years ago.[62] The leading example of green fintech in China is Ant Forest, an initiative led by Ant Financial, the financial arm of Alibaba. It represents the world's first large-scale effort to promote green consumption behavior by combining mobile payment, big data, and social media.

61 UNEP Inquiry (2018)
62 Paulson Institute (2020)

Ant Forest was initiated in August 2016 on the Alipay platform, incentivizing users to reduce their carbon footprint in exchange for a physical tree planted in Alashan, China. In order to plant a tree, each individual has to grow a virtual tree through earning "green energy" on an individual carbon account from activities such as walking or taking public transportation, using online payment, and stop using plastic bags. By August 2019, over 500 million people across China were participating in Ant Forest, resulting in over 7.92 million tons of cumulative carbon avoided and over 122 million trees planted in arid regions in Inner Mongolia, Gansu, Qinghai, and Shanxi provinces. Currently, Ant Financial manages 900 million individual consumer accounts in China and 1.2 billion globally.

Ant Financial joined UNEP to launch the Sustainable Digital Finance Alliance (SDFA) in 2017, to explore further opportunities for leveraging digital technologies to accelerate financing in sustainable development.

3.3.2 MATCHMAKING PLATFORMS

One of the green finance pilot cities, Huzhou, is pioneering new approaches for matching local SMEs with green financing opportunities. Huzhou is one of nine pilot cities for green finance reformation, located in Zhejiang province in Southeast China. To support the green growth of local SMEs, the municipal government launched a Green Finance One-Stop Service Platform in 2018.

The platform provides three primary financial services for SMEs. First, the platform connects business with banks, facilitating the green lending process. By combining 36 local banks and 300+ financial products, it efficiently matches SMEs with banks and products that can support their diverse needs.The platform also compiles information on businesses from 31 government departments including commercial operations, tax, and environmental performance, which makes data-sharing across departments possible. Second, the platform directly connects businesses with investors, lowering administrative costs and increasing transparency. Investors may review detailed information and compare all available enterprises and projects; businesses can attract more investors and expand their financing sources through the platform. Third, the platform establishes a green credit rating system to identify qualified green projects and businesses. The government plans to issue subsidies for those rated as "green."

Since its launch in 2018, the platform has attracted over 16,000 SMEs, over 30 financial institutions, and nearly 80 investors. In terms of green lending, over 13,000 SMEs have successfully received more than RMB 160 billion (USD 23 billion) in credit from banks. It also connected investors to 73 projects, which received funding totaling more than RMB 6.6 billion (USD 1 billion).

To complement the municipal government's efforts, the Bank of Huzhou initiated a Green Credit Management System in 2019 to identify green projects and improve social and environmental risk management. The system has two major functions. First, it employs AI and machine learning to automatically filter financial transactions and projects that do not meet national or local standards. Then, it will give "smart green labels" to projects that pass those standards and it will also estimate those project's environmental benefits. Second, it uses big data to help manage environmental and social risks. The system will extract environmental risk information, such as pollutant permits, send warnings about potential

risk factors, and monitor environmental performance including regulatory penalties and workplace accidents. The system leverages digital technology to support green lending, increasing its efficiency and lowering costs. In July 2019, Huzhou Bank became the third bank in China to officially announce its commitment to the Equator Principles.

3.3.3 GREEN INSURANCE

Green insurance is an important financial tool for internalizing the cost of environmental risks and managing performance risks. The risk prevention mechanism of insurance instruments can help increase climate resilience and encourage investment.

There are two major types of green insurance in China: Environmental Pollution Liability (EPL) insurance and climate risk insurance. EPL insurance was formally established through Guiding Opinions in 2016, which pointed out the need to develop insurance mechanisms for environmental protection. It also provided guidelines to establish compulsory liability insurance in fields with high environmental risks and encouraged innovation of green insurance products and services. The Management Method of Compulsory Environmental Pollution Liability Insurance in 2017 required businesses in high risk industries, such as heavy metal and hazardous waste, to register. The Reform Plan for Ecological Environment Damage Compensation System was also launched in 2017, extending the pilot green insurance schemes in seven provinces to the national level.

Climate risk insurance in China was initially developed to address the vulnerability of the agricultural sector to extreme weather and other climate events. The State Council's Strategy Plan for Rural Revitalization (2018-2022) proposed to improve the agricultural insurance system by designing insurance products with different levels of protection, as well as to encourage index-based weather insurance. People's Insurance Company of China (PICC), one of China's two largest insurance companies overseen by the Ministry of Finance, has been developing a remote damage assessment and claim assessments scheme for its catastrophe insurance product. Currently being piloted in Ningbo, the platform may be used for generating flood maps and a database for residential buildings to calculate the number of affected households and the expected total amount of claims. This process expedites the claim settlement process to as little as four days.

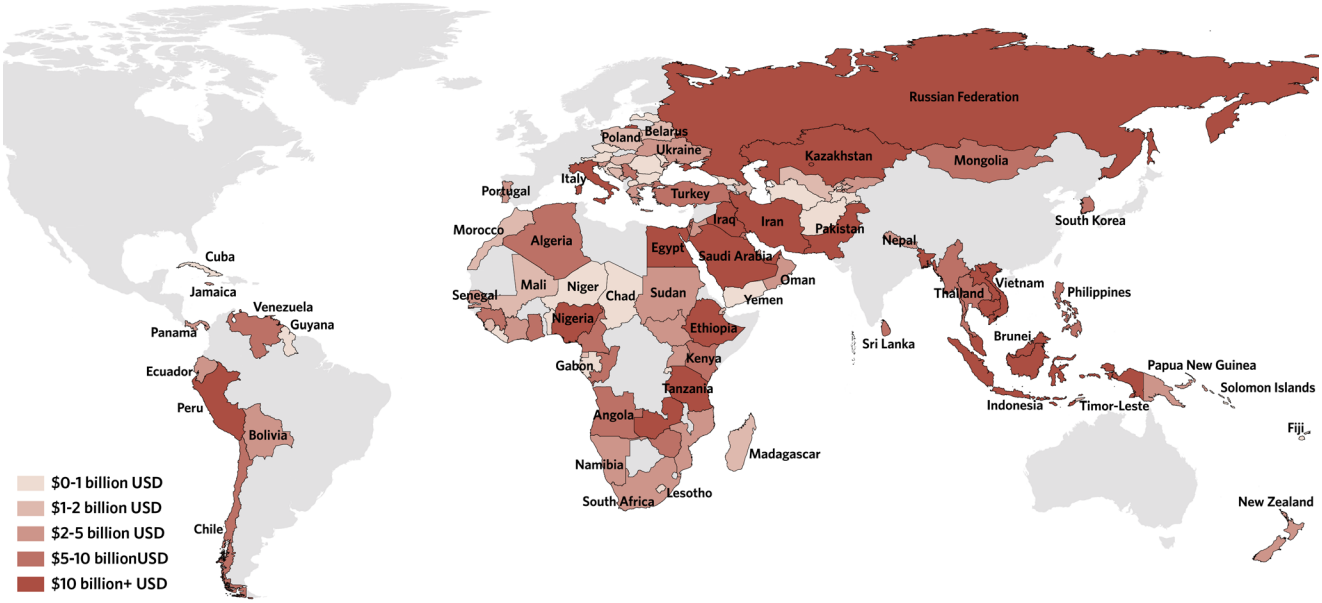
Although green insurance can be an important market mechanism for managing environmental liabilities and climate risks, it is still in the initial stages of development. Additionality, the proportion of China's insurance funds invested in the green sector is still low. Insurance companies' assets under management is around RMB 17.8 trillion (USD 2.6 trillion), of which only 5% (RMB 882 billion (USD 130 billion)) is invested in green sectors.[63] More innovative products that help de-risk projects and businesses, making them more attractive to private investors, need to be developed and applied at a wider scale.

63 Xinhua Finance (2020)

4. OPPORTUNITIES FOR GREENING CHINA'S OUTBOUND FINANCE

There are important opportunities for greening China's outbound finance. China's outbound investment was more than USD 2 trillion from 2013-2019, of which USD 730 billion, or 37%, went to Belt and Road Initiative (BRI) partner countries (Figure 7). 138 countries have signed BRI MoUs with China as of March 2020. The investment decision-making processes for BRI are driven by host country demands and largely financed through China's policy banks and the Big Four state-owned banks.

Figure 7. China's finance to BRI partner countries (2013-2019)[64]



Energy-related investments to BRI countries over the same period was USD 292 billion, half of which went to fossil fuels (Figure 8). The two leading financiers of outbound BRI energy-related investments were CDB and EXIM Bank, providing 35% of the total (Figure 9). There is little transparency on the composition of the remaining 65%. Available data indicates that many projects are financed through syndicates in which the Big Four state-owned banks are common participants.

If BRI countries follow historical growth trajectories while the rest of the world decarbonizes, their share of global carbon emissions could grow to 66% by 2050, or double the level of emissions required to limit warming to two degrees Celsius.[65] There is an opportunity for China to support the greening of growth trajectories in BRI countries, rather than continuing fossil-based growth. A number of approaches could support this goal, including raising environmental standards in BRI partner countries, establishing fossil exclusion lists for financing institutions, and developing pipelines for green BRI opportunities. Especially in the

64 Data calculated from American Enterprise Institute and Boston University
65 Tsinghua PBSCF (2019)

context of COVID-19 recovery, BRI may support partner countries' sustainable recovery plans by stimulating investment in green infrastructure.

Figure 8. China's BRI energy investments by type

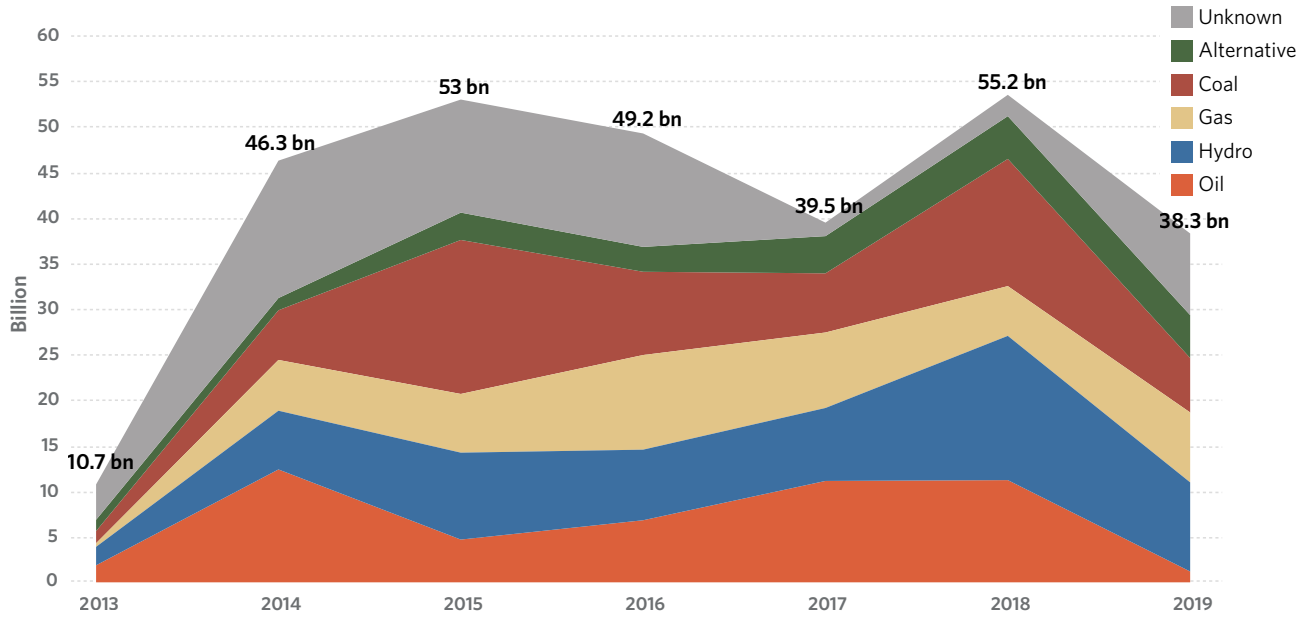
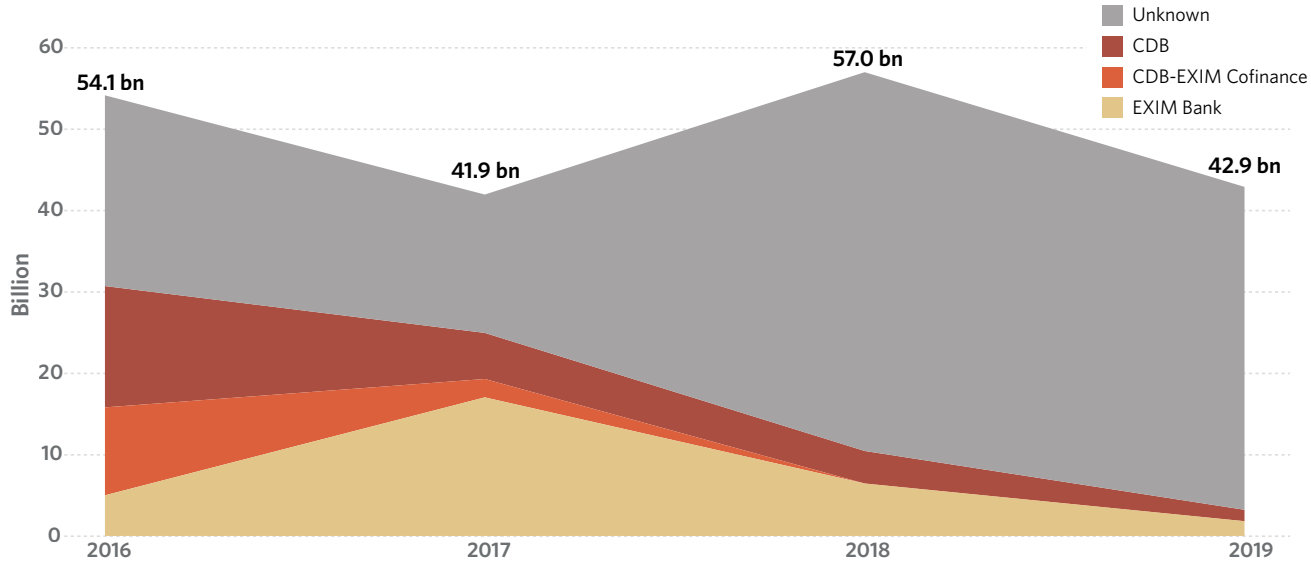


Figure 9. China's BRI energy investments by financing source



Several initiatives are underway to embed green standards in BRI investments. These include the Chinese Ministry of Ecology and Environment's BRI Ecological and Environmental Cooperation Plan, the BRI International Green Development Coalition (involving more than 20 UN agencies and programs), and other more thematic initiatives such as the BRI Green Cooling Initiative, BRI Green Lighting Initiative, and the BRI Green Going-Out Initiative (targeting Chinese companies' investments abroad).

The Green Investment Principles (GIP) led by the Green Finance Committee (GFC) and City of London Corporation's Green Finance Initiative brings together all BRI stakeholders to agree to common standards for BRI investments (Box 4). Signatories include all major Chinese banks involved in BRI and other large financial institutions across 12 countries, including Credit Agricole, Deutsche Bank, HSBC, Standard Chartered, Luxembourg Stock Exchange, Natixis, and UBS Group. Another initiative led by the GFC is a "traffic light" system for BRI projects that categorize projects on their greenness, with a red light issued for high-emission projects.

Box 5. BRI Green Investment Principles

Principle 1: Embed sustainability into corporate governance

Principle 2: Understand environmental, social and governance risks

Principle 3: Disclose environmental information

Principle 4: Enhance communication with stakeholders

Principle 5: Utilise green financial instruments

Principle 6: Adopt green supply chain management

Principle 7: Build capacity through collective action

While such initiatives are promising, green definitions must be ambitious, clearly articulated, and mandatory to make an impact. So far, the GIP and other green standards remain voluntary and loosely articulated, allowing much room for interpretation depending on host-country context. Exclusion lists for high-emission projects should be developed and accompanied by pecuniary measures for noncompliance. Nonetheless, initiatives such as the GIP that bring together large financial institutions in China and abroad can potentially serve as an important platform for raising global climate standards.

Finally, there is an opportunity to increase climate investments in developing countries through debt-swap arrangements. Especially in the context of the COVID-19 pandemic, many developing countries have sought debt relief to mitigate the impact of COVID-19 and finance economic recovery. In response, the G20 nations launched a debt service suspension initiative in April 2020 for the poorest countries until the end of June 2021.[66] As a participant of the G20 initiative, China has a potentially influential role given its position as the largest bilateral creditor to Africa and many low-income developing countries elsewhere. It accounts for USD 104 billion, or 20% of the total debt owed by 73 countries eligible for the initiative.[67] This is more than the total debt owed to all Paris Club lenders combined, which include debts owed to the US, Britain, and Japan. Climate-for-debt swap arrangements could be used to earmark funds for climate investment in exchange for debt relief, while also contributing to a sustainable recovery in these countries.

66 G20 communique (April 2020)
67 Economist (2020)

5. CONCLUSIONS AND RECOMMENDATIONS

China's green financial reform made great progress during the 13th Five-Year Plan. Key factors such as high-level political support, leadership of the central bank, development of green taxonomies and pilot zones, and substantial incentives, all contributed to this success. Green credit and green bonds emerged as particular success stories, mobilizing a combined RMB 4 trillion for green projects in the past five years. Financial and regulatory infrastructure also evolved, with new methodologies for green rating and risk evaluation, the development of numerous green stock indices, and green insurance products.

However, China also has high potential to further green financial reform, particularly by expanding to new actor groups and markets. Access to the pools of green capital that are being mobilized remains concentrated among public actors. Private actors lack incentives or reliable information that would facilitate getting involved in climate-related projects, and few are interested in exploring blended finance structures for sharing risk. The relatively underdeveloped capital markets, dominance of the traditional banking sector, and lack of access to formal financing channels and investment deals inhibits innovation and access by smaller actors. Concessional capital providers that help drive innovative climate action in other regions, like NGOs and foundations, are largely missing in China.

Overall investment needs to scale up by more than four times its current levels to meet investment needs. As much as RMB 95.45 trillion (USD 14 trillion) will be needed over the next decade to meet China's climate targets from 2015. Average annual climate finance in 2017 and 2018 remained at around RMB 2.14 trillion (USD 320 billion). While private capital mobilization will be key in meeting estimated needs, the current climate finance landscape indicates that private actors have played a limited role to date.

There is great potential to scale up climate finance in China. The current green penetration of China's financial system remains at around 4%. As China's capital market continues to evolve and actors become familiar with green financial instruments, uptake in the market will grow. The government has started to direct more financial support for SMEs, there are increasing sources of concessional capital for climate projects, and there is growing interest in exploring innovative structures. Mobile payment platforms and online banking represent new avenues for channeling green finance and changing consumption habits for more than a billion customers. There are also growing opportunities for foreign private capital participation, through funds, joint ventures, and bond markets. Finally, there are opportunities for greening China's outbound finance, through initiatives such as the Green Investment Principles for the Belt and Road.

While the outbreak of COVID-19 has imposed immediate challenges for China's economy and green finance development, the government has sent positive signals through policies that increase support for renewables and support small businesses. Stimulus measures emphasize investment in "new infrastructure" projects such as 5G networks, ultra-high voltage transmission lines, high-speed rail and EV charging infrastructure. The State Council also

removed the 2020 GDP target to focus on recovery, reversing a decades-long practice. This relieved significant pressure from local governments that would have otherwise increased their unsustainable debt loads to fund investments.

5.1 RECOMMENDATIONS

The following recommendations for tapping into China's potential for climate finance build on the existing strengths of China's policy framework for green financial reform, which combines top-down design and high-level political buy-in with bottom-up experimentation and innovation. Recommendations include:

1. **Continue raising the ambition of high-level targets and green standards.**
    - Key targets in national policy documents like five-year plans provide important signals for economic actors across the country. The updated Nationally Determined Contributions (NDCs) and 14th Five-Year-Plan which will be released in 2021 are opportunities to raise climate ambitions and demonstrate China's continued leadership in the field. For instance, absolute carbon emission targets could be introduced in lieu of carbon intensity targets. The coal cap and target share of coal in primary energy consumption could be further decreased (current targets are 1100GW and less than 58%).
    - Raising green standards in taxonomies and articulating clear thresholds for exclusion can improve the quality of green assets and projects that receive financing. Currently, three green taxonomies are in place for loans, bonds, and industry, but they allow room for investment in fossil fuels and other high-emission sectors.
    - As one of the first countries to enter the COVID-19 pandemic recovery phase, China faces a historic opportunity to reiterate climate ambitions and mainstream green considerations in its recovery efforts.
2. **Incentivize experimentation and implementation of innovative financing structures.**
    - Regulatory authorities can encourage experimentation by rewarding innovation efforts through inclusion in performance evaluation schemes and other monetary benefits. For example, the qualitative portion of macroprudential assessments undertaken by the PBoC could reward banks for participating in results-oriented, innovative green funds and blended finance structures without encouraging excessive risk taking. The PBoC could also provide increased access to green re-lending facilities at low costs. Risk weighting green assets in favor of polluting assets is already a topic under discussion at the PBoC given the lower NPL ratios achieved by green credit portfolios.
    - Funds from the National Green Development Fund and the Clean Development Mechanism Fund could be deployed to provide grants and guarantees to fund early-stage projects, feasibility studies, and results-based projects.
    - Green insurance schemes could be used not only for protection against environmental liabilities, but also to provide guarantees against performance risks undertaken by private investors in impact-oriented climate projects.

3. **Build and increase visibility on the pipeline of green projects for private actors.**

    - There is little transparency in the investment decision-making processes in large banks and government-established green funds, disincentivizing actors without connections to SOEs or local governments. Matchmaking platforms such as Bank of Huzhou's Green Credit Management Platform and the Huzhou municipal government's Green Finance One-stop Service Platform can reduce search costs and increase efficiency by linking interested investors with qualified green projects and investment products.

    - The recently issued "Guidance on Investment and Financing to address climate change" encourages the development of various mechanisms to attract private capital, which should aim to widely promote collaboration opportunities and lessons learned.

4. **Track and monitor finance flows for ultimate allocation and impact.**

    - Without robust tracking and impact reporting standards, it will be difficult to ensure that climate finance flows are being effectively allocated to projects that can generate the most impact. Currently, green finance policies only suggest some key metrics that actors can report at the aggregate level, using their own methodologies. Ensuring that reported climate impacts are ex-post, and pro-rated to an actor's share of contributions to a project could be one way to improve impact tracking and avoid double counting.

    - The China Securities Regulatory Commission forthcoming mandatory environmental information disclosure for listed companies is an opportunity to strengthen tracking and monitoring of progress. The measure will ask companies to report on their climate finance and are currently taking suggestions on which metrics to include.

5. **Introduce mandatory exclusion lists and negative incentives for high-emission sectors.**

    - Green financial reform is not only about increasing the green, but also about decreasing support for high-emission sectors. China's green credit guidelines discourage banks from investing in high-polluting industries and overcapacity sectors but have not introduced mandatory targets or pecuniary measures for continued investment in these sectors.

    - The Ministry of Ecology and Environment's list of polluting industries that require pollution liability insurance is a practice that could be further expanded and applied in other areas.

    - The recently proposed "Climate Investment and Finance Standard System" is an opportunity to establish concrete criteria for screening climate investments and encourage robust monitoring of ex-post performance.

The COVID-19 pandemic has underscored the urgency of building back better and ensuring a sustainable recovery, presenting a real opportunity for China to demonstrate its strengthened leadership in green and climate finance.

The CCICED's policy recommendations for recovery highlight the close relationship between public health and environmental issues and promote a shift towards a green development model to drive resilient economic growth.[68] How China implements these recommendations in its actions over the next few years will have implications not just for China's recovery but also for the global community and its capacity to meet global climate targets.

68 CCICED (2020) From Recovery to Green Prosperity: Accelerating the transition toward high-quality green development during the 14th FYP period

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