

# GREENING CHINA'S FINANCIAL SYSTEM

**DRC** - FINANCE RESEARCH  
INSTITUTE

 **IISD**  
International Institute for  
Sustainable Development

IN ASSOCIATION WITH



**Inquiry:** Design of a  
Sustainable Financial System

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**FRIDTJOF NANSENS INSTITUTT**  
FRIDTJOF NANSEN INSTITUTE



# **GREENING CHINA'S FINANCIAL SYSTEM**

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## ABOUT THIS REPORT

This book is the final output of an 18-month project, Greening China's Financial System, carried out by the International Institute for Sustainable Development (IISD) and the Finance Research Institute (FRI), Development Research Center (DRC) of the State Council, in association with the United Nations Environment Programme (UNEP) Inquiry into the Design of a Sustainable Financial System, and with support from the Fridtjof Nansen Institute. The aim is to develop specific proposals for greening China's financial system based on an analysis of current practice in China and an exchange of experience with international experts.

The project was carried out through initial research, which led to the publication *Greening China's Financial System: An Initial Exploration in 2013*. This was followed up in 2014 with in-depth research workshops with Chinese and international experts in Beijing, and a study tour by the DRC to Europe and the United States to understand the latest developments in this field. This included attending the Global Green Growth Forum, meetings with the Fridtjof Nansen Institute and other key finance-related institutions in Norway, as well as Citi Group in the United States. We also participated in a multi-country symposium, hosted by the UNEP Inquiry and the Rockefeller Brothers Foundation, that included participants from the central banks of China, Bangladesh and Brazil; the Prudential Regulation Authority of the Bank of England; the U.S. Treasury; Global Green Growth Initiative; and the National Renewable Energy Laboratory.

Section 1 of the report is an overall synthesis written by Zhang Chenghui, Simon Zadek, Chen Ning and Mark Halle.

Section 2 contains chapters contributed by the Chinese team of experts led by Zhang Chenghui and coordinated by Zhang Liping. Team members include Zhuo Xian and Zhang Liping, Development Research Center of the State Council; Zheng Zheng, Development Research Center of the State Council; Ma Zhong and Lan Hong, School of Environment and Natural Resources, Renmin University of China; Tian Hui, Development Research Center of the State Council; Wang Gang, Development Research Center of the State Council.

Section 3 contains chapters contributed by the international team led by Simon Zadek and Mark Halle, and coordinated by Kelly Yu. Authors include Ben Caldecott, Smith School of Enterprise and the Environment, and Nick Robins, UNEP Inquiry into the Design of a Sustainable Financial System; Pierre Monnin, Council on Economic Policies, and Alexander Barkawi, Council on Economic Policies; Sony Kapoor, Re-Define; Butch Baccani, UNEP Finance Initiative; Sean Kidney, Climate Bonds Initiative and Network for Sustainable Financial Markets, Padraig Oliver, Climate Bonds Initiative, Beate Sonerud, Climate Bonds Initiative; Stanislas Dupre and Jakob Thomä, 2° Investing Initiative.

The reports were edited by Maya Forstater.

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We would also like to thank the China Development Fund, the Government of Norway via the Fridtjof Nansen Institute and the HSBC for their support of this work.

Findings and opinions expressed in this paper are not necessarily shared by those contributing to the work, and any errors and omissions are the responsibility of the authors and partner institutions.

**FOREWORD – DEVELOPMENT RESEARCH CENTRE**

In 2014, China's gross economic output exceeded \$10 trillion, making China one of the only two members of the “\$10 trillion” club in the world. At the same time, China is also facing unprecedented challenges from the depletion and pollution of its resources and the deterioration of its environment. Air pollution has become increasingly prevalent and serious in recent years, and is now a major obstacle to China's economic and social development. To compound the issue, water pollution and land pollution have reached alarming levels; wasteful and excess use of energy and resources are still a common sight around the country. The deep-rooted cause of these environmental woes is the crude, extensive economic growth model. However, after more than three decades of rapid expansion, China's economic development has entered a new normal. As the national economy shifts into a new gear, China's traditional growth model, which is mostly focused and reliant on quantitative increases, can no longer be sustained. Instead, China will have to quickly identify a new system that allows for qualitative development, a crucial element of which is the promotion of green development on the national level. Accelerating the pace of green development under the new normal will not only require the adoption of a new mindset—that green development represents a major transformation of the national growth model and limitless future potentials—but, more importantly, also the implementation and realization of green philosophies, strategies and policies, so that we have both achievable targets and evaluation mechanisms for green development as well as the related incentive measures and support systems for facilitating a green economy. Against this new economic climate, actively developing green finance is an inevitable choice for China.

President Xi Jinping once articulated the motivation for green development with the remark that “[China] wants clear waters and green mountains just as much as golden and silver mountains. In fact, clear waters and green mountains are China's gold and silver.” Fortuitously, a rapid development of China's green finance system holds the key to sparking the public's interest in actively protecting and expanding “clear waters and green mountains” and turning them into “golden and silver mountains.” Clear waters and green mountains are desired and admired by the public because they bring actual benefits and improve their quality of life, and thus have great intrinsic value. This value cannot dwell on paper only but has to be realized, and should be measurable, evaluable, tradable as well as marketed, monetized, and capitalized to provide the engine necessary for making green development a lasting and sustainable undertaking. Finance will be an integral component of this transformative process. Even more significantly, green development will build an even bigger stage for bona fide financial innovations. Because of the significant positive externalities that many green financial products create, they should be supported by government resources and policies. In some instances, policy-based financial instruments should be used directly. Through these efforts, green finance can become a key component of China's overall financial system in the foreseeable future. In the long run, after green development matures into a highly-recognized model for economic growth, all financial activities should be green.

The discussion and research on green finance has a long history internationally. Notably, after the world financial crisis, the building of a green and sustainable economic system, which encompasses green finance, is quickly becoming a global consensus. The concept of green finance is proposed to promote the green and inclusive economic growth through reshaping existing financial systems. This multi-faceted concept defines many actionable initiatives that include, among others, requiring financial institutions to give full consideration to the environmental impacts of their investments, reducing or even cutting off support to polluting projects, increasing the support for environment restoration projects, and building a general framework of the green finance system that incorporates social risks and governance risks. Currently, the concept of “green finance” is spreading and gaining traction globally, as more and more countries start to

include green finance into their policy framework, and institutional investors in developed countries have already become a major force in advancing green finance agendas. China's experience in developing its own green finance system has also steadily attracted wider attention from the international community. As a member of the global village, strengthening its involvement in the international green dialogues and cooperative efforts will not only help China to learn from positive international experiences, but also allow China to actively participate in the building and development of the global green finance system, and contribute its theoretical acumen and practical experience to the international community.

Since 2013, the Development Research Center of the State Council (DRC) has collaborated with the International Institute for Sustainable Development (IISD) on the topic of “greening China's finance system.” And for the past two years, the task group has dedicated itself to in-depth research and discussions development of green finance, both in China and internationally. This book is the product of that research's outstanding insight and innovativeness, and represents an important domestic milestone in the development of comprehensive research on green finance. On the subject of China's practices and experiences in green finance, the task group pivoted their discussions by first analyzing and evaluating the macro environment, current state, policy environment, and other aspects related to the domestic green finance, then summarized China's experiences and lessons in developing its green finance system, including the importance of the appropriate division of rights and obligations between the government and the market, of the coordination mechanism and the supporting policies, as well as how to achieve a balanced development. On this factual basis, the task group outlined a conceptual framework for China's green finance system, and proposed that the system should not limit itself to conventional focal points such as clean energy, low-carbon transportation and energy-efficient buildings, but should instead expand its scope to provide financial support for the restructuring of China's industrial sector, the green transformation of traditional enterprises, and the cleanup of environmental pollution, which will constitute the key departures of China's green finance system from those of the developed countries. In addition, based on the development and financing characteristics of China's green investments, the task group estimated that building China's green finance system would require an investment of around CNY 2 trillion per annum. Lastly on the domestic front, the task group studied China's current environmental industry, covering topics including laws and regulations, management system, environmental investments, and environmental and industry policies relating to green finance. On the subject of international practices and experiences in green finance, the task group scrutinized a wide range of hot issues at the forefront of the international green finance industry, including stranded assets, monetary policies and green finance, green insurance, green bonds, and the impacts and risks of climate change, and compared and reviewed the latest domestic and international practices and trends in green finance. On top of all these groundwork, the task group offered an action plan for developing China's green finance system.

At present, domestic and international thinking and research on green finance is still in an explorative stage. With the steady emergence of new industries and continued progress in science and technology, we expect that our understanding of “green” and “sustainability” will be ever more profound, and that the research and discussions on green finance will continue well into the future. I look forward to scholars and researchers—including the experts of this task group—contributing more wisdom to the development of China's and the international green finance system.

**Liu Shijin, Vice President of the DRC**

**Zhang Chenghui, Director General Finance Research Institute**



## FOREWORD – INTERNATIONAL INSTITUTE FOR SUSTAINABLE DEVELOPMENT

The Chinese leadership has expressed a strong public commitment to building an “ecological civilization”—a stable and prosperous country that operates within the limits imposed by natural resources, ecosystems and planetary boundaries. As this book lays out compellingly, reaching this goal is a formidable challenge.

At the same time, no major country has made so clear and so forceful a commitment to making the green transition and, if China is genuinely able to lead the way, the positive impact on the planet will be enormous. The green transition will need action at all levels and in all sectors. It will require a shift to green infrastructure development. It will demand a large-scale upgrading and renewal of technology. It will require cleanup of polluted sites. And it will involve reviewing the way in which goods and services are produced and consumed.

At the heart of the challenge, however, lie the rules that govern finance, for two reasons. First, the transition will carry costs, especially if it is to take place at a scale commensurate with the challenges and on a timeline that will place China quickly on a path to sustainability. The investment necessary for the green transition is considerable, but not when compared with the cost to China’s society and economy of the environmental problems from which the country currently suffers. Indeed, the question is not whether China can afford the investment required for the green transition, but whether it can afford not to make that investment.

Second, however, the rules governing finance to a large extent determine the incentives and disincentives that guide the behaviour of investors. To the extent that these rules reward green investment, our progress will be quicker; but to the extent that they reward brown investment, they are an obstacle to the green transition.

The DRC-IISD project, in association with the UNEP Inquiry into the Design of a Sustainable Financial System, has explored a wide range of possible reforms to the rules governing China’s capital markets and financial institutions with a view to identifying both those that are most urgently needed and those most ripe for short-term implementation. The result is a roadmap for China’s leadership that, if followed, will greatly accelerate the green transition to which they have publicly and forcefully committed. It is significant that this roadmap represents the voice of DRC, whose Finance Institute is a pivotal source of research aimed at informing decisions that shape China’s financial market reform. The recommendations contained in the report of this work, and that are summarized in this book, are practical and most could be implemented on a relatively short time scale. They represent the surest path towards the eco-civilization that not only China but the whole world must achieve.

**Scott Vaughan, IISD President**

## EXECUTIVE SUMMARY

Realizing sustainable development depends on “greening finance”—that is, ensuring that the financial institutions charged with allocating available financial assets take environmental and social factors into account when allocating credit, making investments and providing other financial services such as insurance.

Transforming from a resource and pollution-intensive economy to a green economy is now a strategic priority for China. Success depends on the development of green industries and the transformation and reduced importance of many traditional industries. Key priorities include clean energy, industrial energy conservation, building energy conservation, transport energy conservation, improvement of energy efficiency and environmental pollution control. Investment needs across key green sectors in China will be approximately RMB 2.9 trillion per year from 2015 to 2020 (USD 460 billion). Two thirds of this, about RMB 2.0 trillion annually (USD 320 billion), will need to come from domestic and international financial and capital markets, given fiscal limitations and priorities.

At the same time, China’s financial system is developing rapidly, with key priorities being to internationalize its practices, increase its sophistication and depth, and improve its efficiency in ensuring the productivity of available financial assets and its overall contribution to China’s development. There is an alignment between China’s green economy and financial priorities and its capital market policy priorities. Improved flows of green finance will both accelerate the transition towards a sustainable real economy and improve the efficiency, productivity and resilience of China’s financial system.

That is, greening a country’s financial system is not an “additional” performance requirement but concerns the efficiency and effectiveness of the whole system. A lack of green financing, after all, delivers poor allocation of capital, mispriced risks and weaker long-term economic growth, creating stresses that ultimately lead to financial market instability and under performance.

Greening finance is a growing focus for the Chinese government through the promotion of *green credit*, *green securities* and *green insurance*. However, despite significant progress, some constraints must still be overcome: first, perverse price signals resulting from absent or inappropriate policies; second, unwillingness of short-term focused investors to finance green development projects that often require higher upfront investment and give slower returns; and third, a lack of clear definitions and frameworks, which results in inadequate enabling policies, regulations and standards. Furthermore, progress is constrained by divergent interests and approaches between central and local government, as well as between government and market institutions.

The international context is one of growing awareness about, and action on, green finance in both developing and developed countries. Though international experience remains at an early, largely ad-hoc stage, broad consensus is emerging in some key areas:

- **Better information** is crucial for embedding sustainability considerations in risk assessment and investment decisions, with many initiatives focused on transparency, metrics, indexes, incentives, reporting and governance, notably in banking and stock markets.
- **Systems, competencies and culture** of financial institutions need to reflect environmental and social responsibilities in ways that inform decision-making. This calls for increased action by financial institutions, as well as by central banks and regulators, to require enhanced and demonstrable environmental risk management across not only the banking community but also pension funds and insurance companies, as well as public investment vehicles such as development banks and sovereign wealth funds.

- **Assets at risk of becoming “stranded”** due to high environmental costs need to be more effectively monitored, with suitable precautionary measures being taken by both financial institutions and, potentially, central banks and financial regulators concerned with financial stability.
- **Greening debt markets** through product innovation (such as green bonds), robust and unified standards, regulation and, potentially, tax incentives can significantly advance long-term, green investment flows and associated outcomes.
- **Monetary policies** that have fundamental influence on the economy and the society as a whole need to be more designed to take greater account of environmental and broader sustainable development objectives.

A systematic approach to developing green finance in China through policies targeted across these and other areas could both unlock domestic opportunities for green economic growth and catalyze related developments internationally.

This book proposes a framework for actions covering five key areas that, if adopted by the Chinese government, would promote the systematic development of green finance.

## GREEN FINANCE: FRAMEWORK FOR ACTION

**A. Establish and strengthen legal frameworks**, including environmental laws and law enforcement that contribute to the demand for green finance.

**B. Improve coordination and information sharing** between environmental, financial and industrial regulators and with third-party institutions.

### **C. Develop comprehensive policy support for green finance**

1. Align monetary policy with sustainable development goals.
2. Continue to strengthen green credit policies in banking.
3. Provide incentives to grow the market for green securities, including green bonds.
4. Expand the scope of green insurance and strengthen environmental liability insurance regulations.
5. Use fiscal incentives to accelerate the development of green finance markets.

**D. Foster the development of the information infrastructure** with information on environmental costs and a green credit rating system.

**E. Green the policy banks** as leaders in establishing markets and best practices for commercial banks.

# GREENING CHINA'S FINANCIAL SYSTEM

## SECTION 1: SYNTHESIS

ZHANG CHENGHUI, RESEARCH INSTITUTE OF FINANCE, DEVELOPMENT RESEARCH CENTRE; SIMON ZADEK, UNEP INQUIRY IN THE DESIGN OF A SUSTAINABLE FINANCIAL SYSTEM; CHEN NING, RESEARCH INSTITUTE OF FINANCE, DEVELOPMENT RESEARCH CENTRE; MARK HALLE, INTERNATIONAL INSTITUTE FOR SUSTAINABLE DEVELOPMENT



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# 1

## BACKGROUND

Over the past 30 years, China has developed rapidly to become the world's second largest economy, reaching the status of a middle-income country. Realizing this success, however, has involved a development approach entailing massive and inefficient resource use and extensive damage to the quality of air, water and soil (MEP,2013).

Despite industrial and credit policies to curb the development of high pollution-generating and energy-intensive industries, the scale of these industries and practices continues to grow. While the energy intensity of the economy has decreased, total energy consumption continues to rise. At the same time, the traditional competitive advantage of low-cost production has gradually weakened, leading to an imperative for industrial restructuring aligned to higher value-added, cleaner and resource-efficient development (Zhejiang, 2012) (see Box 1).

Transforming from a resource and pollution-intensive economy to a green economy is now a strategic priority for China. Success depends on the development of green industries and the transformation and reduced importance of many traditional industries. Key priorities include clean energy, industrial energy conservation, building energy conservation, transport energy conservation, improvement of energy efficiency and environmental pollution control. Investment needs across key green sectors in China will be approximately RMB 2.9 trillion per year from 2015 to 2020 (USD 460 billion). Two thirds of this, about RMB 2.0 trillion (USD 320 billion) annually, will need to come from domestic and international financial and capital markets, given fiscal limitations and priorities.

At the same time, China's financial system itself is also developing and facing challenges to efficiency and stability (see Box 2). Green policies have been strengthened during the 11th and 12th Five-Year Plan (FYP) periods (2006–2010 and 2011–2015), including a new and stronger Environmental Protection Law and measures to enhance allocation of capital towards green financing needs.

Premier Li Keqiang's commitment to *“resolutely declare war on pollution as we declared war against poverty”* (Reuters, 2014) highlights the high priority being placed on environmental protection, as was the greater discussion of environmental issues in the Third Plenary Session of the 18th Central Committee of the Communist Party of China.

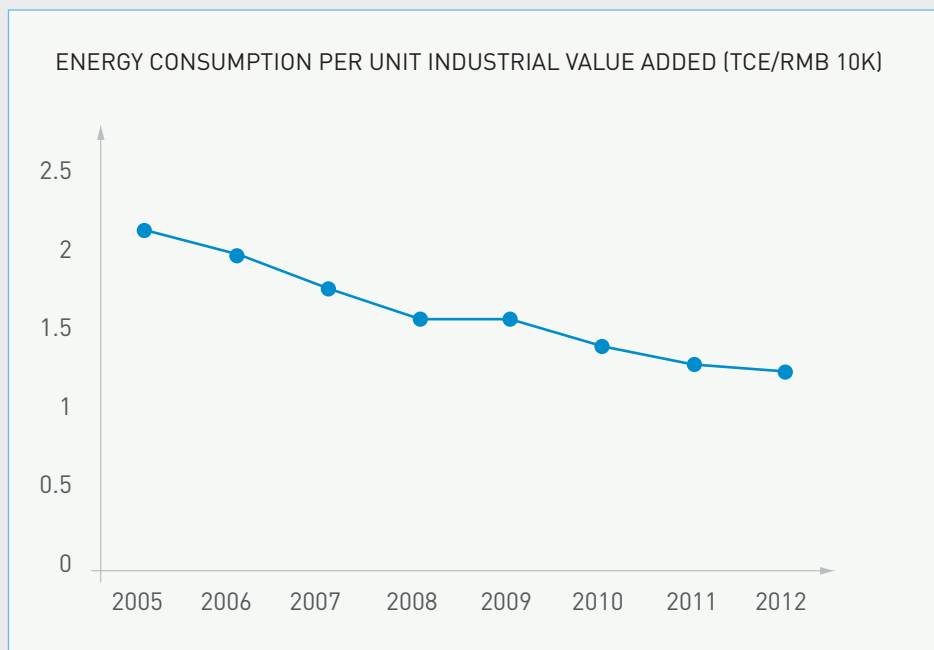
## Box 1: The Challenge of Green Development in China

Environmental damage poses significant risks to the country's quality of life, economic competitiveness, resilience and long-term growth. The estimated cost of pollution damage is between 3 per cent and 6 per cent of GDP and rising (World Bank/SEPA, 2007).

China became the world's second largest economy in 2010, but has been the number one emitter of conventional pollutants since 2005, and by 2011 it was also the largest carbon dioxide emitter. The risk of major environmental accidents, and daily concerns about air, water and soil quality make environmental issues a widespread concern. Only three out of 74 cities monitored for air quality met minimum standards in 2014. An estimated 60 per cent of underground water monitoring sites have poor quality, and 19 per cent of arable land is badly polluted.

China is actively pursuing industrial restructuring; it is identifying dirty and inefficient industries to be restricted and eliminated, and high-tech, high value-added sectors to be encouraged. However, despite these policies, the fastest-growing sectors from 2005–2011 were the “restricted” industries such as coal, minerals, metals and chemicals. The country has succeeded in cutting the energy intensity of the economy, but there are fewer opportunities for further savings from simple energy conservation (NDRC, 2011).

FIGURE 1: CHINA'S INDUSTRIAL ENERGY CONSUMPTION LEVEL, 2005–2012



At the same, China's development continues to require natural resources. At present, China's per capita energy consumption is only one seventh of that of the United States and one quarter of the average of Organisation for Economic Co-operation and Development (OECD) states. Consumption of some important resources has not reached the peak. The dilemma of reconciling production and consumption with energy conservation and emission reduction is the challenge for green development in China.

 See Chapter 3: Environmental and Industrial Policy Environment for the Development of Green Finance in China

## 1.1 CHINA'S FINANCIAL SYSTEM<sup>1</sup>

China's financial system is dominated by banking, providing about three fifths of total credit to the market economy. The banking system is fairly concentrated, with half of the total loan market originated by five banks.

There is strong government involvement, with the central bank setting maximum interest rates for deposits, previously setting minimum interest rates for loans, and often setting target levels for loan volumes. The five largest banks are majority-owned by the central government and there is significant government ownership in other banks. The major banks tend to lend predominantly to large, state-owned enterprises, and rebalancing the financial system to allow smaller, private firms to gain access to capital has been a key focus of ongoing debates and reforms.

Loans between state-owned banks and enterprises are seen as carrying implicit guarantees. Private guarantees from other companies, individuals and dedicated guarantee companies have also played a large role in fuelling credit expansion, underpinning about a quarter of total outstanding loans. It is feared that risk assessment by banks has relied excessively on these guarantees, and that undercapitalized guarantee chains could be a source of financial instability.

Bond markets are a source of credit mainly for larger firms. The market is growing rapidly, although it remains smaller and less sophisticated than in the United States and Europe. Banks are the largest holders of corporate bonds. Net issuance of corporate bonds increased by 65 per cent in 2012, according to The People's Bank of China figures and represents about 16 per cent of net new credit.

Stock markets are also growing, but tend to be dominated by short-term trading rather than long-term investors, with the annual turnover rate reaching a recent high of 293 per cent. The size of the stock market is limited through very close control of Initial Public Offerings. There are few institutional investors, with assets under management in 2012 equivalent to only about 5.1 per cent of GDP (compared to 240 per cent in the United States).

## 1.2 THE DEVELOPMENT OF GREEN FINANCE IN CHINA

China first adopted an environmental protection law in 1989. The initial approach relied largely on administrative enforcement and fines (Zhang & Zhao, 2003). However, over the past 15 years, the government has begun to approach environmental issues through a more comprehensive set of legal, economic, financial and technological measures, including those directly focused on mobilizing green finance from the financial system (see Box 2).

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<sup>1</sup> This section is based on Elliot and Yan. (2013) *The Chinese Financial System An Introduction and Overview*



## Box 2: Green Finance in China

**“Green credit” has been the key policy for green finance in China’s banking-dominated system** (China Banking Regulatory Commission [CBRC], 2011). In 2006, the China Industrial Bank together with the International Finance Corporation (IFC) established the first “green credit” product in China—a loan fund for energy conservation and emission reduction projects.

In 2007, the former State Environmental Protection Administration and the People’s Bank of China and CBRC jointly released the *Opinions on Implementing Environmental Protection Policies and Rules and Preventing Credit Risks*, calling on banks to make compliance with environmental laws and regulations a necessary condition for loan approval, to actively offer credit support for “encouraged” industries and disallow credit for projects in “restricted” and “to-be-eliminated” industries (SEPA/CBRC, 2007).

In 2012, the CBRC issued the Green Credit Guidelines, stipulating that banking financial institutions shall increase their support to the green, low-carbon and circular economy and adopt stronger environmental and social risk management for clients in the “restricted” industries category (CBRC, 2012).

Three policy-based banks—the Agricultural Development Bank of China, the China Development Bank and the Export-Import Bank of China—have each been tasked with supporting environmental protection and efficiency improvement in relation to their own areas of investment focus.

**Compulsory environmental liability insurance for high-risk industries is being piloted.** Since the 1990s, local government environmental protection departments have explored the use of environmental liability insurance.

In 2007, the former State Environmental Protection Administration and CIRC jointly released the Guiding Opinions on Environmental Pollution Liability Insurance to actively promote environmental pollution liability insurance.

In 2008, pilots of national environmental pollution liability insurance started in Jiangsu, Hubei, Hunan, Chongqing and Shenzhen.

In 2013 the Ministry of Environmental Protection and CIRC jointly released the Guidance on Pilots of Compulsory Environmental Pollution Liability Insurance to guide local governments to promote the pilot work of compulsory environmental pollution liability insurance in industries such as heavy metals and petrochemicals. Pilot projects have been carried out in more than 10 provinces and more than 2,000 enterprises have purchased the insurance with total amount insured close to RMB 20 billion.

**Companies seeking finance through the capital markets are required to undertake environmental audits.** As China’s capital market is growing rapidly, more and more enterprises have pursued IPO-based financing pathways. A “green securities” policy has been developed, which requires high-pollution and energy-intensive enterprises to undertake environmental audits in order to access the capital markets.

In 2008 the former State Environmental Protection Administration together with the China Securities Regulatory Commission released the Guiding Opinions on Strengthening Supervision and Management of Environmental Protection by Listed Companies, requiring these audits, and since then standards have been developed.

**A carbon market is developing.** China’s emissions trading market has developed rapidly over the past 20 years, from demonstration pilots to setting up of broader systems and trading platforms (Du et al., 2013). Pilots have been initiated in seven provinces and cities, including Shenzhen, Shanghai, Beijing, Guangdong, Tianjin, Hubei and Chongqing, testing different operational methods. Overall these pilots have distributed one billion tonnes of carbon emission quotas to around 2,000 emission-control enterprises (Chen and Reiley, 2014). Commercial banks are moving into the country’s fledgling carbon markets, developing financial products to help clients hedge carbon-trading risks and finance new investment using carbon certificates as collateral.

**Private equity and venture capital funds** have gradually increased investment in green sectors including renewable energy and clean technology.

**Intermediary service institutions and green non-governmental organizations** have also been developed to provide information and advice, and to undertake public interest prosecutions and campaigns.



See Chapter 4: Lessons from the Development of Green Finance in China.

See also Jun & Yu (2014); Xiang (2012).

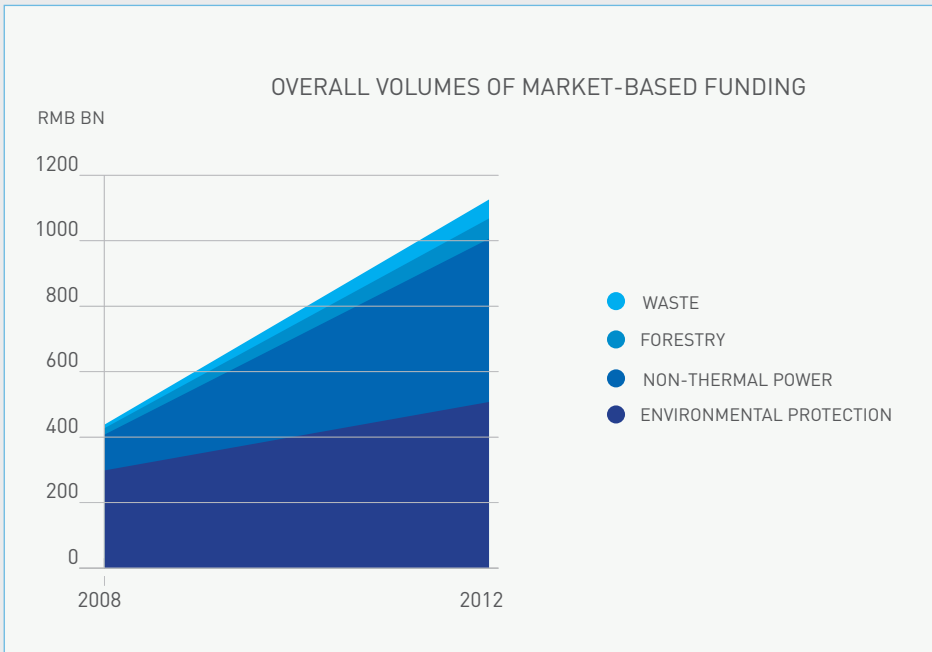
Overall, these early developments in green finance have had some success in supporting economic restructuring by influencing the allocation of financial resources, with increasing investment identified as market-based green finance (see Box 3).

### Box 3: Scale of Green Finance

Using a definition of green investment that includes environmental pollution control, waste management, forestry and all forms of renewable energy including nuclear power, the DRC estimates that green investment in China exceeded an estimated RMB 1,261.4 billion (USD 200 billion) in 2012, or about 2.43 per cent of the GDP.

Around RMB 1,126 billion (USD 180 billion) (70 per cent of the total) was mobilized through market-based channels (mainly bank loans). In 2008 the figure was RMB 438 billion (USD 70 billion) or 67 per cent of the total.

FIGURE 2 : MARKET-BASED GREEN FINANCE 2008 AND 2012



In banking, the number of energy conservation and environmental protection projects supported by loans increased from about 2,700 in 2007 to over 14,000 in 2013, and the loan balance rose from about RMB 340 billion (USD 54 billion) in 2007 to about RMB 1,600 billion in 2013 (USD 256 billion) (CBRC, 2011). In the field of insurance, the number of enterprises purchasing environmental liability insurance increased from about 700 to over 2000 by the end of 2012, with risk securities of RMB 56.8 billion (USD 8.7 billion) by June 2014. By June 2014 over 700 enterprises in these sectors had issued debt-financing tools, raising an estimated RMB 968.58 billion (USD 155 billion). A total number of 15 environmental protection-themed funds have been released since 2010, including seven funds in 2014. Seven regional carbon emission pilots are in operation and a national carbon emissions exchange is expected to be established in 2016 (Chen & Reklev, 2014).

Although market-based finance makes up a large share of green investment, it should be noted that users of these commercial loans are largely state-owned enterprises or investment and financing platform companies that use government fiscal support to provide credit enhancement. The solvency of the investment projects are linked with the fiscal strength of local governments.

See Chapter 2, Demand for Green Finance.

Green credit policies have, to some degree, restricted the proportion of loans going to high pollution-generating and energy-intensive projects, and also provided support to emerging industries engaged in environmental protection (Yunwen et al, 2014). Many provincial and municipal governments have formulated strategies for green finance development, and are developing frameworks to support financial institutions to allocate capital towards energy conservation and environmental protection industries.

### 1.3 FUTURE DEMAND FOR GREEN FINANCE

This project estimates that around RMB 2,900 billion (USD 465 billion) will be needed for investment in green sectors in China each year, amounting to RMB 17.4 trillion (USD 2.8 trillion)<sup>2</sup> over the period from 2015 to 2020. This amounts to over 3 per cent of GDP. These estimates should be regarded as somewhat conservative and can be taken as the minimum investment demand.

In China, as in other countries, green investments often are, or are perceived to be, high risk, involving larger early investment (with associated lower operating costs) and slower returns than conventional, resource-intensive and high-polluting investments. Particularly where environmental costs and benefits are not adequately internalized through pricing, many of these investments remain unattractive to the private sector and are carried out by the public sector or with explicit or implicit subsidy.

Overall, the financing requirement for green investment is equivalent to about 14 per cent of estimated fiscal revenues for the period, far exceeding the capacity of the public budget. Mobilizing finance beyond the fiscal budget—that is, private capital—is therefore required. From 2015 to 2020, China’s demand for such market-based green finance is estimated to be RMB 2 trillion each year (USD 320 billion).

As Chapter 3, Environmental and Industrial Policy Environment for the Development of Green Finance in China, highlights, the imperative of developing market-based green finance channels is not just to remove the overall fiscal burden from the public budget, but to improve decision making and capital allocation (see Box 4)

### 1.4 PROBLEMS CONSTRICTING GREEN FINANCE

At this stage, green finance products are emerging but remain limited by type and coverage, with bank loans providing the main source of financing, followed by environmental liability insurance.

Though China has made progress in the development of green finance, there are still a number of obstacles to meeting the financing needs for its transition to a green economy.

#### **Need for clear green finance definitions and strategy**

China still lacks a complete, unified and explicit conceptual framework, as well as a detailed definition of green finance. Policy-making institutions therefore use a range of definitions, which can lead to a narrowed understanding and conceptual conflicts. China has set out a national strategy for sustainable development, but needs to develop a complete framework for implementation and inter-agency coordination. A clear definition of green finance and a coherent implementation framework are crucial to translating this high-level strategic commitment into laws, policies and practice.

#### **Problems related to real economy environmental laws, regulations and systems**

While China’s environmental regulations have been strengthened, they remain incomplete, with unspecified accountability and weak operability. While China has formulated environmental protection laws, rules, regulations and standards, the relationship between the relevant authorities is not clearly specified. There is a degree of institutional redundancy, functional overlap and at times contradictions between different rules and

<sup>2</sup> See Chapter 2, Demand for Green Finance for details.

responsibilities, which leads to weak implementation. These weaknesses in real economy regulations translate into perverse incentives against green investment, with resulting increased risks to financial institutions and to the overall health of the economy (see Box 5). Resource- and energy-intensive industries remain attractive to commercial banks, offering high returns to their investment.

#### Box 4: The Case for Strengthening Green Finance in China

China's current green financing is dominated by green credit through banking, backed by implicit public funding and guarantees. When the Chinese economy was at the "catching up" stage of industrial development, direct government intervention enabled rapid, large-scale financing of the leap forward in infrastructure and traditional industries, following a clear technological path and leveraging state-owned banks and enterprises.

However, green projects involve complex technology, as well as market and policy risks, and do not have a clear technological path to follow. Relationship managers and credit officers in banks often lack the specialized knowledge required to assess innovative green projects and tend to direct loans to state-owned enterprises and to businesses backed by guarantee. Government also lacks the information advantage needed for industries at the technological frontier. As a result, rapid, large-scale, long-duration financial allocation induced by direct intervention could easily result in the mismatching of finance at the industry level, as well as the subsequent systematic financial risks.

Direct financing through green equity, green bonds and the development of a market for collateralized loans would provide a greater diversity of perspectives from institutional investors, intermediaries and risk investors to evaluate green projects, as well as strengthen risk pricing and expand the financial service supply.

Therefore, the Chinese government's intervention in green finance is seeking to support the use of more market-oriented mechanisms such as capital reserve ratios, differentiated capital risk weights, and environmental information disclosure to guide the green finance market into taking on the tasks of price discovery, information identification and risk management.

Currently, the Chinese government provides implicit guarantees for green development projects in areas such as clean energy, which is reflected as local fiscal relief and administrative debt restructuring. Implicit guarantees can certainly mitigate risks for investors, but they can also cut off the "creative disruption" mechanism of the market and prevent sound risk pricing. Enterprises and banks are prone to developing an expectation that the government will step in as a "last resort" so that the soft budget commitments take shape, which is not good for the sustainability or efficiency of green finance.

An effective green finance system would still involve government support, but it would be turned from implicit to explicit through policy-based credit guarantee institutions and credit enhancements.

 See Chapter 3, Environmental and Industrial Policy Environment for the Development of Green Finance in China

### Problems in the operation of green finance policies

Incomplete and overlapping regulations also create problems for the specific rules relating to green finance. For example, the major foundations for China's development of environmental liability insurance are the two ministerial-level regulations jointly issued by the Ministry of Environmental Protection and the insurance regulator. But there is no effective mechanism for ongoing communication between the different regulators. Another example is in the emissions-trading market, where the legal status of emission rights and the supervision, reporting and authentication systems for carbon markets are still being set up. In banking, a lack of unified and clear standards for information disclosure on green credit implementation results in poor comparability of data. While there are requirements for companies to undertake environmental audits in order to be approved to issuing shares as an IPO, once companies are listed companies these requirements are weaker.

## Box 5: Environmental Supervision and Real Economy Investment Incentives

Strong environmental laws but weak supervision allows pollution to go uncontrolled, resulting in widespread, illicit discharges to air, water and soil. For example, in 2011 between 50,000 and 250,000 tonnes of raw sewage was discharged each day into the Qinghe River in Beijing. Although the strengthening of the capability of sewage treatment plants had reduced such discharges to tens of thousands of tonnes daily by 2013, this still represents serious and unsustainable levels of pollution.

At present, the highest penalty for secret sewage discharge is only RMB 30,000 (less than USD 5,000) in Beijing, making the incentive for compliance low. It is estimated that from 2001 to 2011, secret discharges have therefore helped enterprises make excessive profits of between RMB 1.5 trillion to 4.4 trillion (USD 240 billion to \$720 billion). The excessive profits are a strong incentive to continue carrying out secret discharges, and against investing in environmental protection.

 See Chapter 3, Definition and Role of Government in Promoting Green Finance.

A key implementation challenge is the tension between the interests of the central government and those of local governments and market actors. Effective implementation of environmental policies depends to a large extent on local government. Yet they face a serious conflict between the need for environmental improvement and the demand to meet targets for short-term economic growth. This situation results in contradictory policies that, on the one hand, support emerging green industries, while on the other hand, provide inadequate supervision of environmental pollution by existing enterprises. Levels of awareness and priority given to environmental issues vary, with more developed regions generally giving it greater emphasis. Competition among local governments that share environmental resources such as river basins can lead to fragmented administration. More broadly, the development of China's green finance is mainly supported by administrative promotion and has not developed through the active behaviour of market actors.

### **Need for policies to stimulate development of green financial products and capacity in financial institutions**

Policies to stimulate the development of green finance through subsidies and taxes have been slow to develop. While investment in environmental protection from central government budgets has increased, there is often poor integration and a lack of long-term planning, with funds mainly responding to emergent events, often with inadequate, effective supervision. There is little focus on environmental protection as an investment and an indifference to profits in the management of these funds.<sup>3</sup>

While green finance is firmly established as a policy area, there is not yet a strategy for developing the institutional capacity, professional skills, and intermediary markets and service institutions needed (Pricewaterhouse Coopers, 2013). For example, implementation of the appraisal system for environmental liability insurance has been held back by insufficient human and material resources, as well as a lack of institutions dedicated to appraisal and inspection of environmental pollution damages.

## 1.5 CHINA'S ROLE IN PROMOTING GLOBAL SUSTAINABLE DEVELOPMENT

China's efforts in green finance have international as well as domestic significance. Through its scale and significance, China plays an important role in promoting regional and global sustainable development through the transformation of its own economic development. Increasingly, the government is also playing a role in developing global frameworks for sustainable development.

<sup>3</sup> See Chapter 4, Lessons from the Development of Green Finance China

China's emerging experience with green finance development can provide an example for other countries, especially developing countries. Because of the strategic importance of sustainable social and economic development, China is placing particular emphasis on the development of green finance.

At the same time, the Chinese government has realized that in order to fulfil this strategy, it must be integrated with environmental and economic policies, with coordination and cooperation from the concerned parties, an approach promoted during the 12th FYP.

China can play a leadership role in promoting sustainable development, especially by strengthening the international policies and regulation of green finance. In November 2014, for example, China and the United States formally announced their respective emission reduction plans in the third *China-US Joint Announcement on Climate Change*.<sup>4</sup> This will be an important contribution to the United Nations Framework Convention on Climate Change Conference of the Parties in Paris in late 2015. At the same time, China has been gradually promoting the formation of several strategic cooperation agreements. For example, the “one belt and one road” regional cooperation strategy proposed by President Xi Jinping, and the China-ASEAN New Strategic Partnership proposed by Premier Li Keqiang on the 17th ASEAN-China Summit. In relation to green finance specifically, China is actively participating in international policies and regulatory activities and will actively promote the spreading of international best practices and experience through international exchange and the formulation of international green finance standards.

<sup>4</sup> China committed to raising the consumption proportion of non-fossil in primary energy to 20 per cent by 2030, and proposed for the first time to stop increasing carbon emissions before 2030; while the United States added the emission reduction target of 2025 on the basis of the emission reduction target of 2020 previously released (i.e., emission reduction by 17 per cent from the level of 2005), and proposed to reduce emissions by 26-28 per cent on the level of 2005, which is equal to the emission reduction by 16 per cent from the 1990 level (NRDC, 2013).

# 2 INTERNATIONAL EXPERIENCE

Internationally, the need to better align the financial system with sustainable development is also receiving increased attention. This applies not only to individual financial institutions that are sensitizing their investment practices to environmental factors, but to broader questions of how the overall framework of regulations, rules and standards may need to change.<sup>5</sup>

Estimates of the investments needed internationally for the transition to a green economy indicate a need for large-scale shifts in asset allocation (ICESDF, 2014). The Global Commission for a New Climate Economy estimates that over USD 13 trillion of additional investment is needed between 2015 and 2030 just for energy efficiency and clean energy. Notably, this increased cost would be largely offset by reduced need for fossil fuel and other high-carbon infrastructure, leaving an overall net additional investment requirement of USD 4 trillion (Global Commission on the Economy and Climate, 2014).

Sustainable development is not, however, only about low-carbon infrastructure. Overall, there is concern that long-term investment is too low to drive balanced global growth and close the employment gap. The Group of Thirty estimates that by 2020 major economies (Brazil, China, France, Germany, India, Japan, Mexico, the United Kingdom and the United States) will require USD 19 trillion a year of long-term investment, in equipment, software and real-estate, infrastructure, training and R&D, up from the current USD 12 trillion (Group of Thirty, 2013). According to forecasts by UNCTAD (2014), developing countries alone have an investment gap of USD 2.5 trillion each year in order to achieve the development goals after 2015. In addition, there is an USD 3.5 trillion investment gap for SME finance (Stein, Goland, & Schiff, 2010).

Today's financial system underinvests in sustainable development and overinvests in unsustainable economic activities (UNFCCC, 2014). Natural resource and carbon-intensive investments continue to rise despite a growing chorus of voices that their value will decline in the face of technology, policy, catastrophic weather events and citizens' choices. (Brown, 2013). Annual capital expenditure on oil, gas and coal extraction, transportation and oil refining has more than doubled in real terms since 2000 to surpass USD 1 trillion per year in 2013. By comparison, clean technology investment has increased dramatically over the last decade, but remains small by comparison and insufficient, reaching USD 250 billion investment in renewables and USD 130 billion to improve energy efficiency (International Energy Agency, 2014).

A number of important market and policy failures can be identified in the real economy including: global annual subsidies for fossil fuels that exceed USD 0.5 trillion (Whitely, 2013), inadequate pricing of emissions and pollution; public procurement that rarely accounts for full life-cycle costs; and environmental law enforcement that is not always stringent.

After the global financial crisis in 2008, there has been growing recognition that market failures in the real economy are only part of the problem, and that while it is imperative to correct these pricing and policy failures, this alone may not be enough (Alexander, 2014). Financial policy-makers, central banks, financial regulators, and financial and capital market standard setters are increasingly recognizing that effective and efficient financial systems must also be green financial systems. In addition, there is growing interest in establishing financial regulations and policies in pursuit of sustainable development.

## 2.1 INTERNATIONAL TRENDS

International experience highlights three overall trends:

- **Institutional investors have been an important force to drive green finance in developed countries.** In developed countries, the institutional investors (pension funds, insurance companies, etc.) have

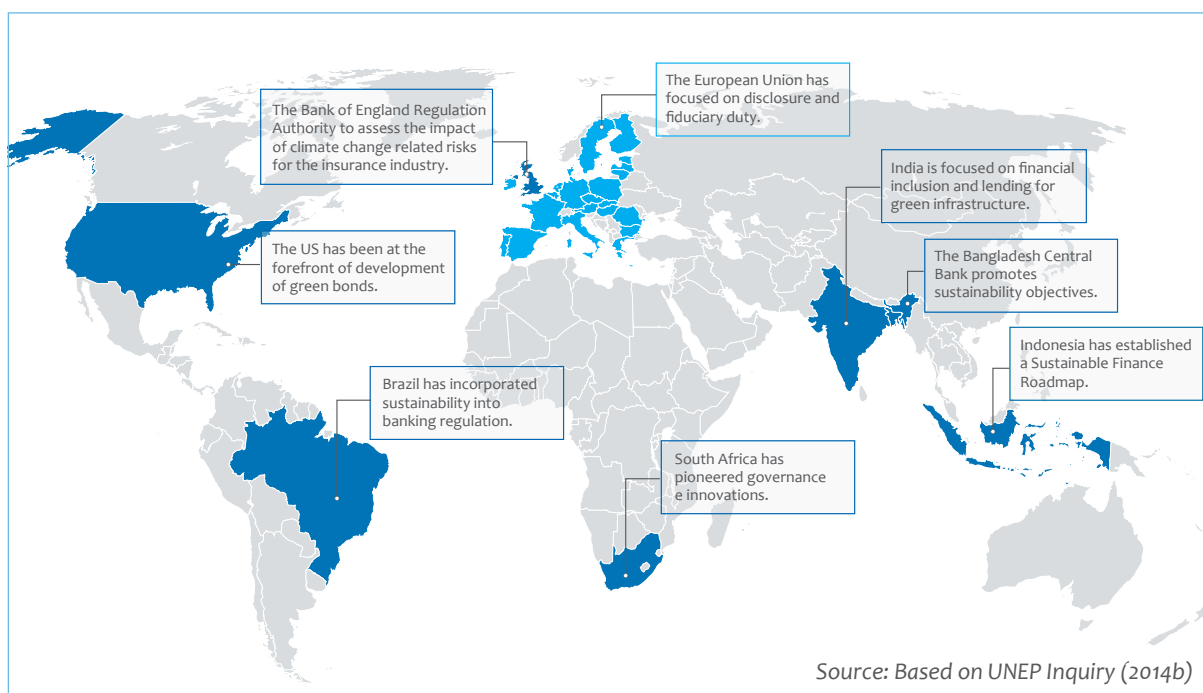
<sup>5</sup> This section draws extensively from the work of the UNEP Inquiry into the Design of a Sustainable Financial System (2014a, 2014b, 2014c).

played a key role in exerting influence on companies by such means as shareholders' voting rights and by excluding companies not in conformity with sustainability concepts from their investment portfolio through "shareholder activism."

- **More and more countries have started to integrate green finance into their policy systems in both developed and developing countries.** Both developing countries—including Bangladesh, Brazil, Kenya, Uganda, South Africa and India—and developed countries are turning their attention towards regulations and policies to scale up green finance. Internationally, organizations such as UNEP and the World Bank are actively promoting the planning and implementation of green finance.
- **The concept of green finance is expanding to a greater scope.** With the popularization of green finance in recent years, many countries have started to take measures to promote green finance development across banking, insurance and institutional investment, but also increasingly considering monetary policy and the relationship between environmental risks and economic stability.

A growing number of financial rule-makers have introduced—or are considering introducing—the integration of sustainability factors into regulation. For example, the Central Bank of Brazil released new regulatory measures in 2014, requiring commercial banks to implement environmental and social risk management. At the same time, the EU demanded the large listed companies to disclose information on their environmental and social policies. Eighty per cent of the foreign assistance projects of the U.S. Department of Treasury now have green requirements. The Bank of England has also started to assess the vulnerability of insurance companies to climate risk, while Norway will give more consideration to climate change-related risks in its investments, taxation and developing countries funds. The Central Bank of Bangladesh has specifically listed the enhancement of financial inclusion as a specific aspect of the monetary policy of the central bank. In South Africa, regulations require enterprises to disclose their finance and sustainability policies and Securities Commission Malaysia issued rules for institutional investors in 2014, making an explicit requirement that institutional investors shall include corporate governance and sustainable development considerations into their investment decision process. In 2014 the Australian Securities Exchange issued new requirements for governance reports of listed companies, requiring that they disclose whether they are facing substantive economic, environmental and social sustainability risk exposure, and how to manage these risks.

FIGURE 3: SOME INTERNATIONAL (NON CHINA) EXAMPLES OF INNOVATION IN FINANCIAL SYSTEM REGULATION AND POLICIES






## Policy Insights and Innovation Examples<sup>6</sup>

**Sustainable development can be shown to be an integral part of financial regulators' policy objectives, and aligned to long-term investors' goals.** A range of actions are already taking place, for example:

- **Disclosure on sustainability impacts and exposure** – the EU, South Africa and the United States have all issued requirements or guidance to companies on reporting on environmental risks and/or carbon exposure.
- **Policies on institutional investment** – South Africa's pension regulations require prudent investing, giving appropriate consideration to any factor that may materially affect the sustainable long-term performance of a fund's assets, including factors of an environmental, social and governance character. The French Foreign Minister called for asset owners to allocate 10 per cent of their portfolios to climate-friendly investments.
- **Directed lending** – The European Central Bank has introduced a Targeted Long Term Refinancing Operation (TLTRO) seeking to direct lending into the real economy, particularly small and medium-sized enterprises. The Reserve Bank of India sets targets for lending to preferential sectors. The Bank of Bangladesh calls for financial institution to allocate at least 5 per cent of their loan portfolio to green finance.
- **Environmental risk management by banks** – Among others, the central bank in Bangladesh and the Brazilian banking association have already taken steps to incorporate environmental risk into banking regulations. Indonesia has set out an ambitious Road Map for Green Finance.

 See Chapter 8, **Internalizing Climate Mitigation for Financial Policy-Makers** and Chapter 11, **Alignment of Investment Strategies with Climate Scenarios: Perspectives for Financial Institutions**

**The transition to a green economy will have an impact on existing asset values across a wide range of sectors.** This stranding of assets through the rise and fall of different technologies, products and businesses is central to well-functioning markets, but could lead to systemic financial risks if financial institutions are not far-sighted enough to anticipate them

- **Stress tests** are used to assess the resilience of financial institutions in the face of “unlikely but plausible” scenarios. This approach could be extended to environment-related risks for banks, insurers and institutional investors.
- **Systemic risk evaluation.** In the United Kingdom following a high-profile correspondence between a group of investors and the Bank of England, the governor has asked the Financial Policy Committee whether exposure to polluting and environmentally damaging investments might pose a systemic risk to the U.K. financial system.


 See Chapter 6, **Greening China's Financial Markets: The Risks and Opportunities of Stranded Assets**

**Insurance is fundamentally about managing risks, including risks due to natural disasters and aging populations.** The contribution of the insurance industry to sustainable development relates to its three roles: i) as a financial loss “shock absorber,” ii) in reducing real risks to assets, safety and health and iii) as a significant investor in the real economy. Key innovations include:


- **The UN's Principles for Sustainable Insurance** provide a global insurance industry framework to address environmental social and governance issues and have been adopted by insurers representing 15 per cent of world premium volume.
- In the United States, the National Association of Insurance Commissioners has adopted a requirement that insurance companies **disclose to regulators the financial risks they face from climate change**.
- In the United Kingdom, the government invited the Bank of England's Prudential Regulation Authority to **assess the impact of climate change-related risks** for the insurance industry.

**Building greater understanding of the relationship between monetary policy is crucial**, in areas such as:

- **Target setting** – The relationship between inflation goals, commodity prices and sustainable development outcomes, and environmentally related stranded assets and financial stability are areas for further analysis.


 **See Chapter 9, A Systemic View of the Insurance Industry and Sustainable Development: International Developments and Implications for China**

- **Central bank balance management** – A central bank's decision to buy and sell certain types of assets, accept them as collateral, or use them to define borrowing limits and prices, may have significant repercussions for green finance.
- **Differentiated reserve requirements** provide further illustration of sector support that some central banks already provide—and that could possibly be aligned further with the objectives for a green and inclusive economy.

 **See Chapter 7, Monetary Policy and Green Finance: Exploring the Links**

**Green Bonds** are a rapidly growing response to the need for green finance for infrastructure. While they were initially led by international development banks, the size of the bonds have grown and they are increasingly being issued by corporations and other actors. New developments include:

- **Issuance of green city and muni bonds**, with bonds from, among others, Ile de France (Paris), Massachusetts, Gothenburg, Stockholm and Johannesburg.
- **Domestic development banks issuing green bonds to kick-start domestic markets**. Most recently, the German development bank KfW issued its first green bond in July 2014, a EUR 1.5 billion bond, earmarked for financing renewable energy.
- **Green bonds issued as asset-backed securities** are packaging fragmented renewable energy and energy efficiency assets such as rooftop solar.
- **Development of standards for green bonds**. The Climate Bonds Standards Scheme is developing standardized, science-referenced definitions of green investments for the global bond market. The Green Bond Principles are a set of voluntary guidelines for the design and reporting characteristics of green bonds.

 **See Chapter 10, Greening China's Bond Market**

## 2.2 EMERGING LESSONS

International experience and debate highlights that interventions in the financial system in pursuit of sustainability outcomes may be appropriate under two broad circumstances:

- **Investor and/or systemic risk:** where investment-specific biases in risk pricing need to be corrected in pursuit of efficient markets and fair trading; or where there may be correlated, and thus systemic, risks associated with specific environmental factors (such as the effects on bank balance sheets of policy responses to air pollution or the development of carbon markets), requiring macro-prudential intervention.
- **Policy alignment and coherence:** where there are government policies to promote green finance and where central banks and financial regulators need to align their policies accordingly within their mandates to ensure policy coherence.

Early work by the UNEP Inquiry highlights five key areas of high potential:

- **Integrating sustainability into financial risk management.** Sustainability factors have the potential to impair financial assets and trigger a disorderly market response. Banks and other financial institutions need to be able anticipate the potential for asset impairment and volatility in valuations from environmental and social factors. Stress tests are already used by regulators to assess the resilience of financial institutions in the face of “unlikely but plausible” scenarios (Douglas, 2014). There is increasing interest in extending this approach to environmental factors to encourage financial institutions to enable better anticipation of the risks posed by climate, pollution, energy and water stress, and to assess systemic risk.
- **Institutional investment.** Institutional investors control the largest assets pool in the capital allocation. Individual institutions have been incorporating sustainability factors into their operations, in some cases for decades. Leading institutions are increasingly recognizing a set of market and policy failures that constrain their ability to deliver sustainable value creation for their beneficiaries. These problems include: classic incentive problems (principal agent problem, externalities); inadequate transparency and accountability along the investment chain; market bottlenecks that disable innovation; and insufficient sustainability expertise in the financial system. Critically, in the post-crisis landscape, long-term responsible investors have also recognized that core financial regulations are insufficient to mobilize a sufficient flow of funds towards long-term sustainable development, and there are emerging calls to integrate the critical sustainability dimension in financial reforms.
- **Green bonds.** Bonds are an important instrument for green finance. They can be easily included in the investment portfolio as mid- and long-term financial products by institutional investors. The European Investment Bank issued the first green bond in 2007, and since then the global green bond market has been rapidly developing at the compound annual growth rate of over 50 per cent and the total raised through green bonds had reached USD 50 billion in 2014. Critical issues emerging to enable this market to grow to potential include the need for common standards to ensure market integrity, tax incentives to encourage inflows and credit enhancement to enable institutional allocations. Equally important is the slow, but accelerating incorporation of environmental risk into the routine assessment of creditworthiness by credit rating agencies. This trend has involved market leaders such as Standard & Poor’s, as well as small new entrants focused on sustainability.
- **Monetary policy.** Considering the extensive influence of monetary policies on the whole economy and society, the role of central banks in the development of green finance is increasingly gaining attention. Examples of tools used by central banks include minimum credit quotas for specific sectors (e.g., as applied by the Reserve Bank of India under its Priority Sector Lending guidelines), as well as maximum debt-to-equity ratios that vary for specific products (e.g., as applied for car loans by Bangladesh Bank). Future investments by central banks, as they seek to keep their balance sheets

at current levels and reinvest the proceeds from securities that mature, may not only provide a significant opportunity to promote green finance, but also be warranted to ensure policy coherence. A thorough analysis of further monetary policy instruments with regard to their impact on green finance is equally important.

## 2.3 IMPLICATIONS FOR CHINA

The international experience of green finance development suggests several high-level principles for China:

### 1. INTEGRATE GREEN FINANCE INTO ECONOMIC STRATEGIES.

Since 2007 China has developed frameworks for “green credit” that have gained recognition from the international community. Furthermore, green financial products including corporate bonds and environmental liability insurance have emerged. At the same time, green finance concepts have not been adopted among all government departments and financial institutions. Too often, the environment-oriented ideas of green finance development are still perceived as incompatible with the economic development. There remains a long road to greening the overall financial system, and it is imperative to integrate green finance concepts into economic strategies and build up conceptual, theoretical and empirical research.

### 2. DEVELOP GREEN FINANCE IN FINANCIAL REFORM AND OPEN UP.

Establishing a mechanism for systematically appraising the state of green finance and strengthening the institutional development of green finance are critical foundations. For example, efforts could be made to strengthen and improve the information disclosure requirements of the financial institutions on environmental performance, develop the green bond market, and strengthen the financial infrastructure including institutions for appraisal and data analysis. The design of the BRICS Development Bank and Asian Infrastructure Investment Bank could also specify the principle of green finance and conduct business.

### 3. ACTIVELY PARTICIPATE IN INTERNATIONAL COOPERATION.

Developed and developing countries share a common interest in a sound and sustainable financial system, although each with their own particular concerns and priorities. Developing countries have immediate concerns for financial inclusion, and energy access and efficiency, while both developed and developing countries have a common interest in addressing climate change. China started early in the development of green finance and has gained the recognition of the international community; it could actively participate in international cooperation projects related to sustainable finance development, and endeavour to reach consensus in the process of defining and designing the future international green finance framework and standards (Shouzun, 2011).

# 3

## DEFINITION AND ROLE OF GOVERNMENT IN PROMOTING GREEN FINANCE

Dialogue between Chinese and international experts on green finance promoted through this initiative has supported specific technical discussions on the experience of instruments such as green bonds, and environmental reporting requirements. It has also enabled two broader questions to be discussed relevant to green finance internationally and in China: the definition of green finance and the role of government.

### 3.1 DEFINITIONS OF GREEN FINANCE

Greening a country’s financial system is not an “additional” performance requirement, but rather concerns the efficiency and effectiveness of the whole system. A lack of green financing, after all, delivers poor allocation of capital, mispriced risks and weaker long-term economic growth, creating stresses that ultimately lead to financial market instability and underperformance. Ultimately achieving sustainable development requires all financial flows to be “greened” to respond to environmental risks.

In order to implement policies and regulations and apply stimulus to green finance, specific and well-recognized definitions are needed. At present, there is no widely accepted definition of green finance on the global level (Inderst et al., 2012). Rather, there are hundreds of different and overlapping definitions of green finance (as well as sustainable finance, climate finance, responsible finance and green investment). The ambiguity of the definition is becoming an impediment to the scaling-up of green finance, leading to growing efforts to unify relevant definitions and standards.

To make sense of the different definitions, it can be useful to look at the division between a narrow or broad approach.

TABLE 1: APPROACHES TO DEFINING GREEN FINANCE

Narrow Definitions	Broad Definitions
Which specific financial flows and instruments can be considered green?	What would it mean for the financial system as a whole to be considered green?
<ul style="list-style-type: none"> <li>Process criteria for assessing environmental management, life-cycle impacts</li> <li>Priority sectors/technologies and issues</li> </ul>	<ul style="list-style-type: none"> <li>Purpose criteria – a financial system that supports sustainable development</li> <li>Substantive criteria for economic transformation, stability, growth etc.</li> </ul>

The purposes and emphases of these two types of definitions are different:

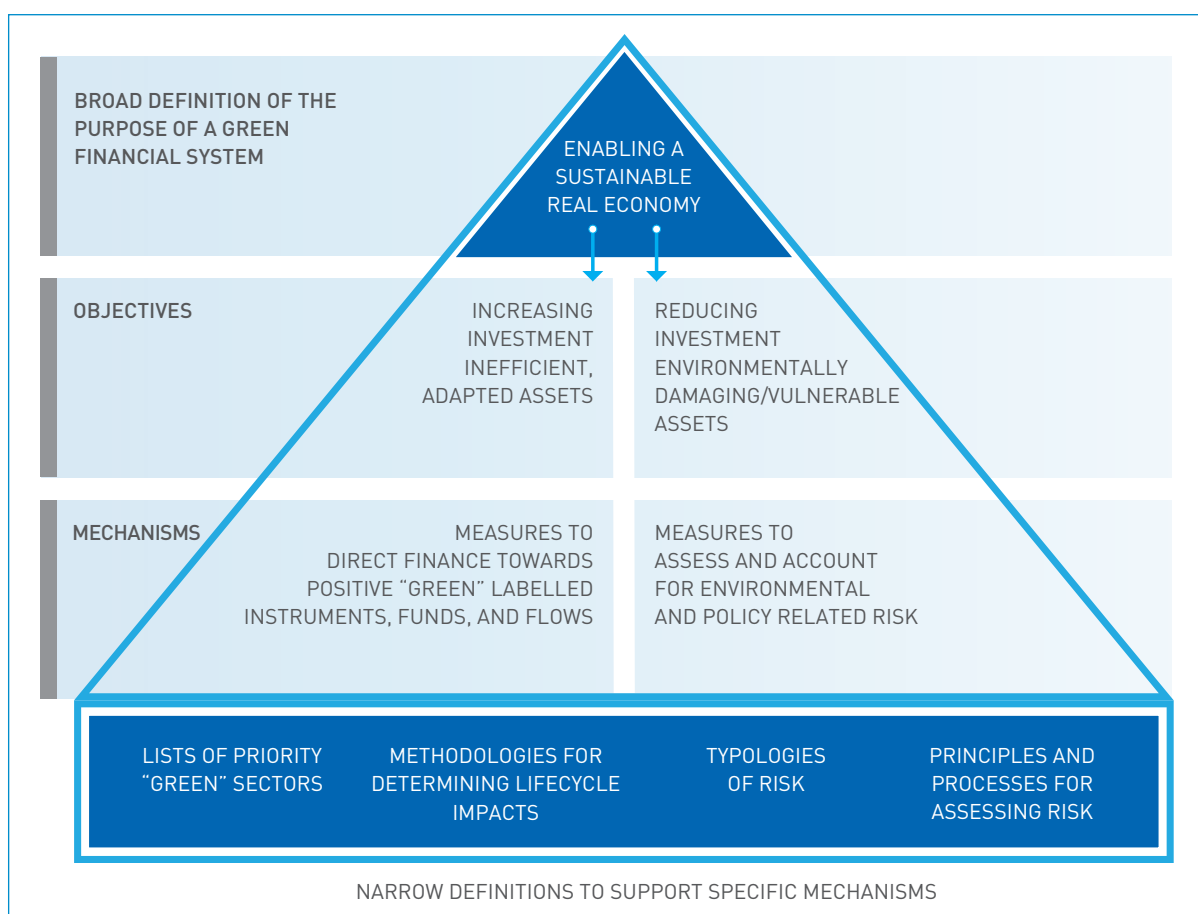
**Narrow definitions** seek to identify what proportion of a particular set of financial assets or institutions can be considered green—for example, to measure volumes of “green investment” or to act as eligibility criteria for particular labels such as for “green bonds.” They include both *process criteria* (such as for assessing the quality of environmental, social and governance management) and sector criteria based on ex-ante lists of *priority green and non-green sectors and technologies* (such as renewable energy, recycling, waste management and environmental protection).

**Broad definitions** seek to define the overall goal of the financial system in terms of sustainability and provide a means to assess its effectiveness. They set criteria in terms of the *purpose* of the financial system in allocating capital efficiently and effectively in light of environmental risks. The focus of broad definitions is the stability of the whole financial system and macro-economy.

In setting narrow criteria and definitions for identifying green finance, different countries may reflect different priorities. For example, developed countries tend to attach more importance to carbon emissions. Under some definitions, all uses of fossil fuel energy are ruled out in the criteria for the issuance of green bonds. For developing countries including China, the investments that improve the efficiency of fossil fuel use and reduce the energy consumption per unit product may be regarded as “green” (for example, the development of high-speed rail).

Agreeing on a single definition of “green finance” for all circumstances is unlikely to be possible. Nevertheless, specific standards for green finance need to be set for different uses. Increasing coherence between definitions of green finance will surely be beneficial to the development of green finance.

FIGURE 4 : FRAMEWORK OF THE DEFINITION OF GREEN FINANCE



### 3.2 THE ROLE OF GOVERNMENT

Green finance in developed countries has tended to reflect the greater emphasis placed on market mechanisms. For example, institutional investors have played a key role in many developed countries, through the use of shareholders’ voting rights and investment choices. Developing countries, on the other hand, tend to rely more on governmental administration and financial regulation to guide financial institutions (Daoxu, 2014).

There are advantages and disadvantages to both of these two modes, and there are signs of integration (Zhenmin, 2013). In developed countries, there are debates on whether self-initiated adjustment within markets is too slow and limited given the scale and urgency of sustainable development challenges. The

approaches taken in emerging economies, including China and Brazil, of integrating environmental risk factors in banking regulations is gaining international attention. On the other hand, the effectiveness of administrative intervention by the governments of the developing countries is being questioned and greater focus is being put on creating a sound policy environment to allow markets to operate without too much direct intervention.

Based on the existing practice, key roles for government are to:

- 1. Determine the definitions, standards, principles and framework of green finance** (Tongyu, 2014).
- 2. Support the development of green finance through fiscal measures.** These measures include consciously choosing green products, greening governmental procurement, requiring state-owned financial institutions to develop and sell green finance products, demanding policy-based financial institutions play a leading role in the fields of green credit and green insurance, enhancing the green investment standards for overseas development assistance and raising green requirements for the portfolios of government-backed institutional investors.
- 3. Guide green finance development through financial policies.** These policies need to target different financial sectors. For example, green credit policies and risk regulation in banking, disclosure requirements for securities, and in relation to insurance, intensifying the environment risk control of the enterprises.
- 4. Foster awareness of environment risks.** Governments are increasingly requiring listed companies to submit environmental risk reports (or include environment-related disclosure in the annual report) and financial institutions to submit sustainable development reports and conduct environmental stress tests.
- 5. Establish effective coordination and information sharing.** This calls for enhancing communication between financial regulatory authorities and government administrative departments, as well as promoting the wider recognition and practice of the green finance ideas across government.
- 6. Establish the infrastructure to develop green finance.** Ultimately, markets respond to the prices. It is for governments to resolve how to effectively define the property rights for carbon emissions and how to reward environmental protection. They can also support the development of third party institutions to appraise impacts, costs and risks, and guide the existing professional service institutions (such as credit rating, assets appraisal, accountancy firms, legal service firms, consulting companies and data service companies) to develop specific skills.
- 7. Increase the weight of environmental factors in the performance evaluation of local governments,** and induce local governments and local financial institutions to support and promote green finance development.
- 8. Intensify publicity and education on the ideas of green finance,** support skills development in such fields as environmental risk appraisal and green finance product innovation, and increase the cooperation with overseas institutions.

# 4 ACTION FRAMEWORK

This section proposes a framework of actions that could be taken by the Chinese government to promote the systematic development of green finance.

## 4.1 ESTABLISH AND STRENGTHEN LEGAL FRAMEWORKS

*Legal frameworks are necessary both to directly support the development of green finance and to strengthen enforcement of environmental law—stimulating the business case for investing in environmental protection and pollution control, and creating greater demand for green finance. Measures that could be taken include:*

1. **Integrate green elements into the revision of financial regulations and laws** such as the Law on Commercial Banks, Securities Law and Insurance Law, etc.
2. **Improve environmental protection-related laws, rules and regulations**, with detailed rules for implementation and clear responsibilities for environmental polluters.
3. **Encourage the development of local laws, rules and regulations** to promote green and sustainable economic development in the context of their specific conditions.
4. **Strengthen law enforcement** by responsible governmental agencies to pursue civil, criminal and administrative enforcement of environmental violations.

## 4.2 IMPROVE COORDINATION AND INFORMATION SHARING

*The development of green finance involves the powers and responsibilities of multiple subjects, including the People's Bank of China, China Banking Regulatory Commission, China Securities Regulatory Commission, China Insurance Regulatory Commission, National Development and Reform Commission, in addition to other fiscal and taxation authorities, environmental protection authorities, financial institutions, and private standard setters and intermediaries. Measures that could be taken include:*

1. **Establish a stable coordination mechanism between environmental, financial and industrial regulators** to ensure the uniformity and stability of green finance policies and enable two-way communication and information sharing on technical information, industrial standards and handling of violations of laws and regulations.
2. **Establish a cooperation mechanism with third-party institutions** to take advantage of private standard setters and intermediaries as a complement to legal and policy approaches.

## 4.3 DEVELOP COMPREHENSIVE POLICY SUPPORT FOR GREEN FINANCE

*An overall system of policy support could accelerate the development of green financial products and encourage investors to adjust their investment portfolios to meet the need for green development. This could include fiscal and taxation policies, monetary policies, credit policies and industrial policies.*

### A. MONETARY POLICY

*Monetary policies have extensive influence on the economy and the whole society. The actions taken by the central bank for interest rate levels, inflation targets and exchange rates are the key elements for investment decision making. Measures that could be taken include:*

1. **Identify and eliminate sector biases in current monetary policy that are misaligned with the objectives for a green economy.** For example, identifying and mitigating biases in conventional monetary policy tools, such as deposit reserve ratio, interest rate, Short-term Liquidity Operations and Standing Lending Facility that are not neutral for the environment.



2. **Establish targeted green refinancing facilities.**
3. **Assess the feasibility of steering asset purchases in the context of quantitative easing into green investments (e.g., through green bonds).**
4. **Include environment-related risks in the models for “stress testing” in relation to financial stability.** This framework can help regulators examine the implications of environment-related risks across the financial system over time and guide macro prudential regulation.
5. **Further explore the relationship between monetary policies and green finance,** including developing a better understanding of the potential aligning of existing monetary policy tools to green finance, and the possible effects of environmental degradation and resource scarcities on price and financial stability.

## B. BANKING

*China’s financial system is dominated by banking, which has been the key focus area to date. To continue integrating green finance into banking regulatory policies, measures that can be taken include:*

1. **Allow eligible green loans to be excluded from the loan-to-deposit ratio indicators** in banking risk management.
2. **Introduce environmental stress tests** as part of banking regulations and develop standardized methodologies for different types of financial assets mixes.
3. **Establish preferential treatment for green assets in use as collateral** against loans.
4. **Build up securitization channels for green credit** through cooperative warehousing arrangements for asset-backed securitization issuance, aggregating assets across several banks, to build up these securitization channels to scale.

## C. SECURITIES

*Beyond banking, other financing channels also hold potential for green finance. One key area is advancing the green bond market:*

1. **Agree to a set of criteria for green bonds** with a government-endorsed system or third-party assurance system for the green claims of corporate bond issuers.
2. **Provide a price differential for green loans compared to “brown” loans.** A significant flow of green loans is needed to create the necessary deal flow for a mainstream green bond market. Providing a price differential for green loans compared to “brown” loans is one policy option to increase green lending. Policy-makers can achieve this by supporting differential interest rates for green bonds, using different bank capital ratio requirements for green debt products, or offering targeted refinancing for green loans through the central bank at lower rates.
3. **Provide credit enhancements for green securitization.** A certain size deal is required for bond issuance. To tap mainstream bond markets for green finance, smaller loans and assets need to be aggregated and packaged appropriately. Asset-backed securitization issuance can address this need.
4. **Provide tax credits for green corporate bonds.** There is scope to support investment in green bonds by allowing tax-free interest income from green bond investments. This can be put in place by making green bondholders eligible for tax credits equal to the total amount of the interest, or a share of the interest.
5. **Establish dual recourse for green municipal bonds.** Governments and government entities can issue green dual resource bonds or revenue bonds with a government guarantee as a backstop.

The primary function of such green dual recourse bonds is to give investors experience in analyzing the performance of green assets, without exposing them to higher risks. As the investors become familiar with the green assets' performance, the market can move to green asset-backed securities.

6. **Issue green city bonds.** Municipal green bonds can be used to finance a wide range of green projects. The key categories for cities in China are rail transport, renewable energy or clean water. They can be issued on the domestic markets, or denominated in RMB in the offshore bond market to attract a wider range of investors.

Another key area is increasing the supply of information on environmental performance related to listed securities to enable better decision making by investors and intermediaries.

1. **Establish a compulsory environmental information disclosure mechanism** for the listed companies and bond-issuing enterprises.
2. **Develop environmentally friendly benchmark equity and bond indices** that are both connected to policy goals and enjoy public sector incentives by collaborating with index providers and stock exchanges. Implementation would require improved data reporting and accounting.
3. **Promote the establishment of a green investor's network** and improve the investors' social responsibility system.

## D. INSURANCE

The existing definition and scope of green insurance is narrow and restricts the potential of insurers to better understand, prevent and reduce environmental risks. Key measures that can be taken include:

1. **Expand the scope of green insurance** to form a set of comprehensive methods and insurance solutions (e.g., the performance insurance for solar panels and wind turbines, building insurance for energy and water efficiency and usage-based insurance).
2. **Strengthen the environmental pollution liability insurance system**, including: improving legal liability frameworks, involving local governments in the development of environmental liability insurance, and providing fiscal and taxation support.
3. **Strengthen the appraisal and inspection mechanism for environmental pollution damages** and improve the environmental damage compensation system. The insurance industry could provide technical support and services for environmental risk appraisal and other insurances.

## E. FISCAL POLICIES

Fiscal incentives can provide a critical catalyst to green finance, both within the real economy and through direct financial sector-facing incentives. The following measures could be taken:

1. **Give tax preferences for green finance business lines** as part of the progress of the reform program to replace the business tax with a value-added tax in the sector.
2. **The People's Bank of China and China Banking Regulatory Commission** could develop a discount loan system form for green investment projects, perhaps building on the system of energy conservation prizes as eligibility criteria.
3. **Reduce and exempt the tax on the returns on investment in green bonds** to support the investment in green bonds and the development of the green bond market.
4. **Use government procurement** to support the development of green enterprises and increase the stability of demand for green finance.

## 4.4 FOSTER THE DEVELOPMENT OF THE INFORMATION INFRASTRUCTURE

*Appraising green finance requires specialist knowledge about technologies and environmental risks, which in turn requires the support of professional technical evaluation. Measures to foster the development of the necessary independent third-party appraisal include:*

1. **Establish an environmental cost information system to provide a reference for the decision-makers and investors.** This could build on the concept of Natural Capital Liabilities developed by Trucost, which quantifies the environmental costs caused by air pollution, water pollution and waste generation.<sup>6</sup>
2. **Establish a green credit rating system** based on assessment of the studying relationship between green factors and the solvency of sovereign governments, local governments and enterprises.

## 4.5 GREEN THE POLICY BANKS

*China's policy banks can play a key role both in directly providing capital for green investment and in establishing markets and best practices for commercial banks. Key measures could include:*

**Establish a state-level special fund for green finance**, combining investment from government (drawing funds from fines on pollutions, environmental taxes or from the general public budget) and from market institutions including the social insurance funds, insurance companies and long-term investors.

1. **Require that policy-based banks further green their existing loans (including syndicated loans), and adopt the Equator Principles.** Policy banks would need to establish specialist green finance departments to assess loans based on green finance standards.
2. **Mandate that existing government-backed funds adopt environmental and social responsibility commitments and processes for their investment activities.** This would include, for example, social security insurance funds, medical insurance funds and housing provident funds.

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<sup>6</sup> See [http://www.trucost.com/environmental\\_data](http://www.trucost.com/environmental_data)

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GREENING  
CHINA'S  
FINANCIAL  
SYSTEM

# SECTION 2: CHINESE EXPERT PERSPECTIVES



# GREENING CHINA'S FINANCIAL SYSTEM

## CHAPTER 1:

# A FRAMEWORK FOR GREEN FINANCE: MAKING CLEAR WATERS AND GREEN MOUNTAINS CHINA'S GOLD AND SILVER

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# EXECUTIVE SUMMARY

The existence of externalities has made it hard to quantify the intrinsic value of the “green mountains and blue water” of the natural environment. This has led to a dysfunction in traditional financial markets, which are delivering an insufficient supply of capital for green development and an oversupply of capital for highly polluting activities.

As a new financial development paradigm, green finance seeks to internalize these externalities in financial decision making. Systems for allocating and trading emission rights are a critical foundation, creating price signals that transmit information about scarcity and the value of environmental assets. These are complemented by other government policies focusing on enhancing risk assessment and information analysis, and providing targeted financial support for green investment through monetary and fiscal support.

This paper lays out a framework for considering the design of a green financial system in China, encompassing:

1. **The policy system** for internalizing environmental costs and benefits.
2. **The financial actors**, including the policy-based financial institutions (FIs), commercial FIs and Internet-based FIs that respond to these signals.
3. **The financial products**, such as green credit, green insurance, green bonds and green venture capital funds, which serve as instruments for managing risk and intermediating capital.

While green finance is a topic of increasing interest around the world, the context in China differs from that of the developed economies, not only in the different industrial needs, but also in the existing state of development of the financial system. The development of a green financial system is not an “additional” requirement, but is intrinsically linked to other core and ongoing reforms in China’s financial system, namely strengthening capital markets, shifting from administrative interventional measures to market regulatory tools and turning implicit guarantees into explicit guarantees.

# INTRODUCTION

The global financial system has been a key enabler of accelerated economic development over the past 100+ years, dramatically changing the outlook of global economic and social development through the course of the industrial age. It is at the core of modern economies. However, it is struggling to adapt to the need to rapidly transform into a greener and less resource-intensive mode of development. For example, while clean energy investment grew to about USD 250 billion in 2012, it represented barely one third of the USD 674 billion invested in fossil fuel exploitation in the same year (United Nations Environment Programme [UNEP], 2014).

The challenge of green financing is often expressed in terms of project viability: green technologies are in their incubation period and green projects require large-scale financing with a long payback period, which makes them unattractive for private finance. Underlying this barrier is the failure to internalize the costs and benefits of green versus brown investment, due to such reasons as the lack of property rights and pricing systems for emission rights, pollution reduction and biodiversity. It is very hard to realize the optimized allocation of financial resources through market-based activities if these benefits cannot be demonstrated, monetized and included in financial decision making. The externalities constrain the capacity of the profit-seeking financial system to provide support to the field of green development.

The development of a modern system of green finance is indispensable to the development of a modern green economy. Ultimately, the aim is to steward, protect and better manage our use of the green mountains and blue water, blue sky and white clouds. This requires that environmental costs and benefits are internalized into financial decision making, reducing the flow of financing to activities that exert negative influences on the environment and increasing the flow of financing to activities that play a positive role. The key question is what policies, institutions and financial instruments can effectively support this internalization?

This topic has gained significant attention internationally and in China in recent years, under the heading of “green finance.” However, there is no clear-cut definition of the term, nor is there clarity on the rationale for promoting it or the relevant research needs to determine how best to do this. A conceptual framework is useful to help us understand green finance theory, practice, policy and regulation.

# 2

## DEVELOPING A CONCEPTUAL FRAMEWORK

### 2.1 DEFINING GREEN FINANCE

A clearly demarcated and explicit definition of “green finance” is critical for any working use of the concept and, in particular, is necessary to enable targeted policy design, statistical monitoring and assessment of the effectiveness of regulation. However, in practice, there is no single agreed definition of green finance.

Some define green finance in terms of processes that guide and monitor financial flows: “Green finance [in the banking sector] is defined as financial products and services, under the consideration of environmental factors throughout the lending decision making, ex-post monitoring and risk management, provided to promote environmentally responsible investments and stimulate low-carbon technologies, projects, industries and business” (Pricewaterhouse Coopers, 2013). Others use a range of specified environmental objectives or sectors related to climate change mitigation and adaptation, biodiversity conservation, waste management and pollution control (Höhne, Khosla, Fekete, & Gilbert, 2012).

Often “green finance” is used to denote finance associated with greenhouse gas emission reductions; however, it is clear that it should address a broader range of environmental issues. Some argue for a broader concept of “green and inclusive” finance addressing environmental, social and economic aspects of sustainable development (UNEP, 2014). In our case, however, while recognizing that green finance indirectly promotes economic and social sustainability through realizing environmental benefits, we prefer to define green finance as **a financial system targeted to realize environmental sustainability.**

In considering how to green China’s financial system, we are concerned not simply with measuring volumes of investment tagged as “green” in any particular statistical definition. We also seek to understand the dynamics of the system that can help to **reduce the financing of activities or assets that exert negative influences on the environment and help to increase financing to the assets or activities (including energy conservation, emission reduction and pollution control) that play a positive role for the environment.**

### 2.2 A FRAMEWORK FOR INTERNALIZING EXTERNALITIES

The problem of externalities is central to the challenge of aligning investment flows with sustainability. Clear skies, clean air, blue water and green mountains have an intrinsic value that is hard to quantify and that cuts across existing property rights and market transactions as “public goods.” The benefits that flow from the environment, and the costs imposed on it by pollution, are rarely monetized. This makes it difficult for the traditional financial system to recognize value and to allocate funds adequately.

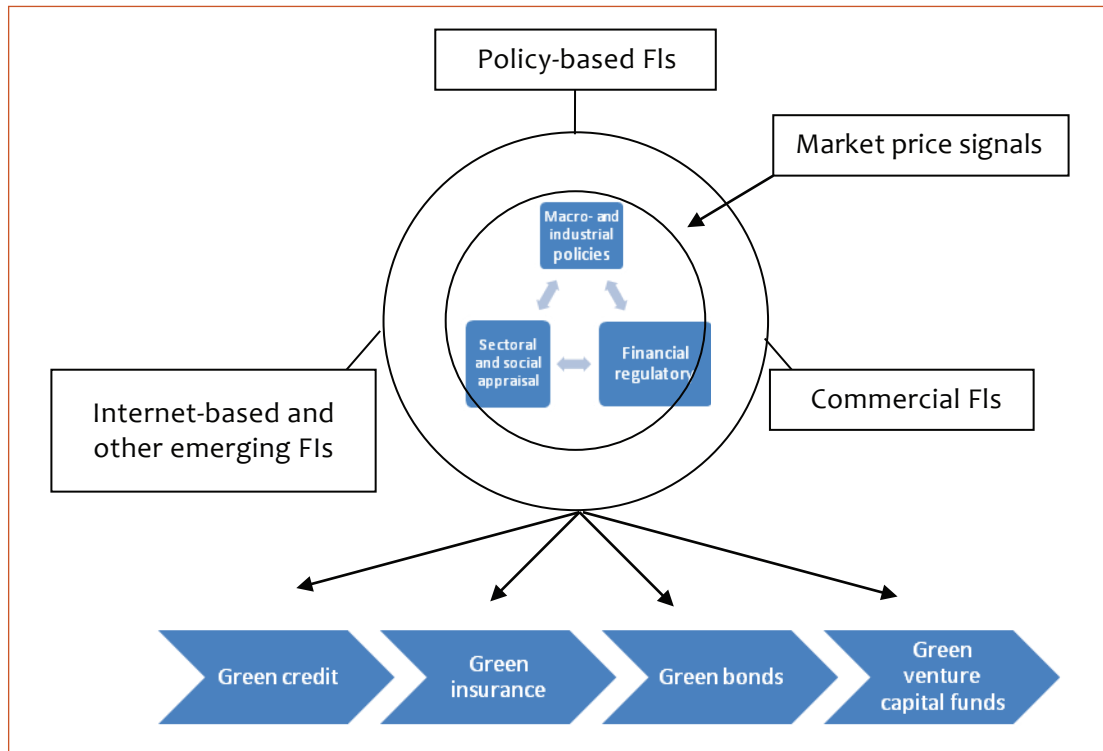
Green finance is not a corporate social responsibility for financial institutions; rather, it is a new policy-driven space for development of the financial industry. A new financial paradigm is needed—one that makes explicit the benefits of green mountains and blue water and the costs of pollution through policies and market signals; enhances the liquidity of environmental assets; ensures adequate environmental risk management; and improves corporate governance. Ultimately, the new paradigm should affect the relative values of different assets and the behaviour of investors and their agents.

A focus on green finance, at its broadest, encompasses:

1. **The policy system** for internalizing environmental costs and benefits, including governmental macro-economic and industrial policies, and financial regulations and standards.
2. **The financial actors**, including the policy-based financial institutions (FIs), commercial FIs and Internet-based FIs that respond to these signals.

3. **The financial products**, such as green credit, green insurance, green bonds, and green venture capital funds, that serve as instruments for managing risk and intermediating capital.

FIGURE 1: FRAMEWORK FOR GREENING THE FINANCIAL SYSTEM



The rest of this chapter outlines each element of this framework.

# 3

## THE POLICY SYSTEM

### 3.1 MACRO AND INDUSTRIAL POLICIES

#### 3.1.1 MONETARY POLICY

The Central Bank may adopt **sectorally targeted monetary policies** to shift the preference of FIs toward green projects. Window guidance is an informal mechanism by which a central bank issues loans to specific industrial sectors or companies. However, as a voluntary mechanism, it may not be effective enough. Policies could be trialled that replace moral suasion with market-based means that directly interface with the cost-benefit models of the financial institutions by changing the relative cost of capital. For example, the use of direct conventional monetary policy tools such as deposit reserve ratio, interest rates, short-term liquidity operations and standing lending facility can be targeted towards green economy sectors, including energy conservation, clean energy and environmental protection.

#### 3.1.2 FISCAL AND TAXATION TOOLS

Fiscal and taxation tools can be used as levers for a greater volume of green investment through the financial system. One key approach is **green public procurement**. Long-term and large-scale procurement of products and services such as hybrid electric city buses, renewable electricity and green energy-conserving buildings can provide these green industries with stable cash flows in the future and enhance their credit for financing. A second approach is **discounted green credit**, where governments provide direct support to enable discounted loans—for example, to small and medium-sized enterprises (SMEs) in the environmental protection field. A third tool is **tax exemption for green bonds**. By lowering income tax for investors, governments can increase the after-tax returns on the investment of green projects, making them more attractive. Finally, **green funds** use funding from public balance sheets directly to capitalize green investment funds, which are then used to attract additional private capital into green industry.

#### 3.1.3 ENVIRONMENTAL POLICIES

Governments' environmental policies constitute the foundation to demarcating emission rights and quantify externalities. By establishing clear property rights and emission limits, the government can enable the development of prices that reflect the scarcity true value of environmental assets and services. Such environmental policy tools include regional and sectoral **quotas on energy (e.g., coal) consumption and on major pollutants, payment for ecosystem services policies, resource and environmental taxes**, and administrative regulation through examination and approval of **environmental impact assessments** on projects. The common orientation of these policy tools is to create the scarcity of the right to pollute or use natural resources through the mandatory power of the government. This then changes the calculation of costs and benefits for investment in energy conservation and pollution control.

### 3.2 FINANCIAL REGULATIONS

#### 3.2.1 REGULATORY STANDARDS

In a society where environmental protection is enforced, environmental damages caused by debt-financed projects will lead to the failure of the projects and impede the repayment of loans. Thus, environmental risks become an important variable for the banks' risk management. To encourage this recognition and increase its effect, financial regulatory authorities can **lower the risk weighting applied to projects that meet environmental standards** and increase the levels of risk-based capital charges for assets assessed as environmentally high risk. The financial regulatory authorities can also introduce **environmental stress**

**testing** and **publish the risk exposures** of the financial assets caused by the changes in environmental policies. They can use them as the basis to judge whether they are sources of systematic risks and make a mandatory requirement that FIs failing to pass the test increase their risk capital buffers.

Moreover, the financial regulatory authorities may adopt directive-type policies on the FIs by, for example, **including environmental impacts in the governance framework** for FIs (including commercial FIs and policy-based FIs); using **directed credit policies** that require FIs to allocate an agreed proportion of credits and/or credits to the target clients (such as farmers or rural enterprise) or specific asset classes (for example green bonds); or **allowing FIs to adopt targeted fundraising for special purposes** (for example, FIs could conduct dedicated refinancing for renewable energy fields on the capital market).

### 3.2.2 INFORMATION DISCLOSURE

Lack of standardized, usable information is another important external restraint to developing green finance. Asset valuation is the core function of the capital market, and the accurate valuation is only possible based on complete information disclosure. Information on enterprises' environmental costs should change their financing costs and valuation by investors. Financial regulatory authorities can make disclosures on emissions of major pollutants, pollutant control measures and other aspects of environmental performance **mandatory** for listed companies and bond-issuing. It can also support the development of **credit rating frameworks that incorporate environmental risks**, issue **environmental cost information** and require the enterprises to **assess environmental impacts**.

### 3.2.3 SELF REGULATION AND PUBLIC SCRUTINY

Sectoral self-regulation and independent third-party appraisals by social organizations have become an important influence in decisions concerning the allocation of financial capital, by shifting the balance of costs and benefits (including reputational benefits) for investment in green versus polluting projects. In recent years, international social groups, including industry bodies and non-governmental organizations, have increasingly focused their attention on quantifying environmental damages or benefits through **environmental appraisal of project investments** and establishing **standards and awards** to recognize good practice. Examples include various **socially responsible investment frameworks**, tools for assessing the **carbon footprint of “financed emissions”** and other **natural capital assessment tools** (for example, assessing the ratio of green to brown investment, the environmental costs of polluting emissions, water resource consumption and waste generation, etc., of enterprises and projects). Guided by these metrics, there may be **divestment** from the brown sectors or investments guided by environmental standards. Governments can **support the development of information sources and standards** that provide information to FIs for making investment decisions.

## 3.3 EMISSION TRADING

Putting a price on environmental resources, including the limited ability to absorb pollution, is central to transmitting information about scarcity to decision-makers. From this perspective, **a market for emissions rights** is the operational foundation of a green financial system. In this case, we focus on the carbon market. The global carbon exchanges comprise two trading systems. The first is based on trading emission rights quotas acquired under **cap-and-trade** rules. The other is trading project-based emission reduction certificates (Certified Emission Reductions and Emission Reduction Units) generated through the **Clean Development Mechanism** and **Joint Implementation** respectively.

Trades take place through both spot and futures markets. A mature and robust emission rights trading market can not only provide financing for emission reduction, but also enable price discovery, allowing emission reduction costs to be minimized and emission rights to be used for activities with the highest

utilization efficiency. This reduces the overall cost to society of achieving emission reduction goals. By providing a price on emissions, the market gives a signal that green industries can demonstrate returns, influencing investment decision making to support economic restructuring.

Emissions trading across national boundaries enables developed countries to reduce emission reduction costs and developing countries to obtain extra funds and advanced technologies. Standardized emission rights certificates enable liquidity and cross-sectoral transactions; for example, new energy enterprises may trade emission reductions with traditional iron and steel enterprises.

Emission trading exchanges provide liquidity and an exit mechanism for investors in green finance by enabling emission rights to be readily monetized and price volatility risks to be managed through financial derivatives.

# 4 KEY INSTITUTIONS

A green financial system will involve diverse institutions and players. In emerging spheres of green finance and technology, policy-based FIs may act as the first pioneers of financial service supply, withdrawing as the market matures and being replaced by commercial FIs. Internet finance also offers new opportunities for innovative financial instruments and services to meet the needs of green finance.

## 4.1 POLICY-BASED FIS

Green development projects tend to be characterized by technology risk due to early-stage technology adoption (such as offshore wind power and waste-to-energy) and often involve long payback periods (such as urban infrastructure for energy conservation). Under the influence of stringent post-crisis regulations and short-term commercial targets, these investments are often unattractive to commercial institutions (Working Group on Long-term Finance, 2013). This can lead to a negative feedback “trap,” where difficulty in obtaining large-scale financing holds back the prospects of making technology breakthroughs that would bring down risk and cost. This “valley of death” for investment is often bridged by policy-based FIs, which are not driven by short-term commercial interests and can develop the capacity to judge the development prospects of green projects from a longer-term perspective with information accumulated in the field. Policy-based FIs can use public funds and raise quasi-public debt to provide long-term and large-scale capital support to green projects. The rationale for public risk taking is that, by taking the lead to invest in green development projects, policy-based FIs will generate the information spillover effects for the whole financial market, overcoming the wait-and-see mood of commercial FIs and “crowding in” follow-up investments of private capital (Du, Zhang, & Wang, 2013). The U.K. Green Investment Bank (2014) reports that GBP 1.00 invested by the bank mobilizes GBP 2.81 of private capital (see Table 1). Policy-based FIs can be supported by a country’s sovereign credit (e.g., China Development Bank) or trans-sovereign international organizations (e.g., the International Finance Corporation, BRICS Development Bank or Asian Infrastructure Investment Bank).

TABLE 1: GREEN INVESTMENT BANK’S INVESTMENT PERFORMANCE

	2013–14	2012–13	Overall
Number of projects	18	8	26
Capital committed (£m)	668	635	1,303
Private capital (£m)	1,879	1,630	3,509
Total funds mobilised (£m)	2,547	2,265	4,812
Mobilization ratio (%)	2.81	2.57	2.69

Source: Green Investment Bank (2014)

## 4.2 COMMERCIAL FIS

Commercial FIs account for the majority of the USD 225 trillion in assets held by the financial system, and must therefore be the main players in greening investment. Measures such as discount loans and guarantees, price signals and liquidity provided by carbon markets, as well as the catalytic investment of policy-based FIs, are all developed to influence and enable commercial FIs to green their investment portfolios. Green finance should not be seen as a corporate social responsibility expectation, but rather a response to a shift in the commercial environment for FIs, in which there are “new opportunities for financial services and an expanding space for financial innovation” (Yan, 2010). No doubt, there are more uncertainties and risks in the green financial field than in the traditional financial field. But for the FIs and investors who obtain



profits through the operation and management of risks, it means greater space for product innovations and broader boundaries for financial services. By innovating new instruments and commercial strategies aligned to green development, commercial FIs can enhance their competitiveness, expand their client base, find new profit growth areas and improve their corporate governance, risk management and business procedures.

### 4.3 INTERNET-BASED FIS

New flexible investment and financing tools are needed to solve the market failures that prevent green investment. Internet-based finance offers a new pattern of finance and may develop the creative financial instruments needed in such fields as payment settlement, financing, investment, financial planning and insurance. There are several key ways in which the characteristics of Internet-enabled FIs may serve the needs of green finance. First is the sophisticated use of data analysis to assess creditworthiness of enterprises and individuals. This can help to solve the issue of information asymmetry in the field of green development. Second, new mechanisms such as crowd-funding lower the barriers to financing and create a trial-and-error process that further lowers information asymmetry. Third, by reducing the thresholds for investment and increasing the number of participants, Internet-based finance can effectively disperse the risks caused by the uncertainties in the field of green development, and also hedge the risk premium generated by the large-scale and long-term investment of green projects.

Finally, the operation of the green financial system depends on concrete financial instruments. While government incentives, regulations and emission pricing can partially solve the problem of externalities, market players still need to find ways to overcome other market failures and manage the inherent risks and long payback periods of green projects. The design of financial contracts is critical to enabling commercially sustainable green finance that supports economic sustainability.

### 5.1 GREEN CREDIT

FIs for green credit enable current bank deposits to be allocated towards green projects by reducing information asymmetry in mortgage and guarantee methods. The measures outlined in Section 2 for restricting credit allocation for polluting projects and granting preferential loan rates for green projects fall under the category of green credit *policies*. Green credit *instruments* put more emphasis on financial innovation to unlock the value of emission rights and increase in energy utilization, replacing traditional loans based on collateral with loans based on an information analysis of the future returns from green projects. Specifically, green credit products include financing under the Clean Development Mechanism, financing under energy management contracts, financing for energy conservation and emission reduction technologies, and buyers' credit financing by suppliers of energy conservation and emission reduction equipment.

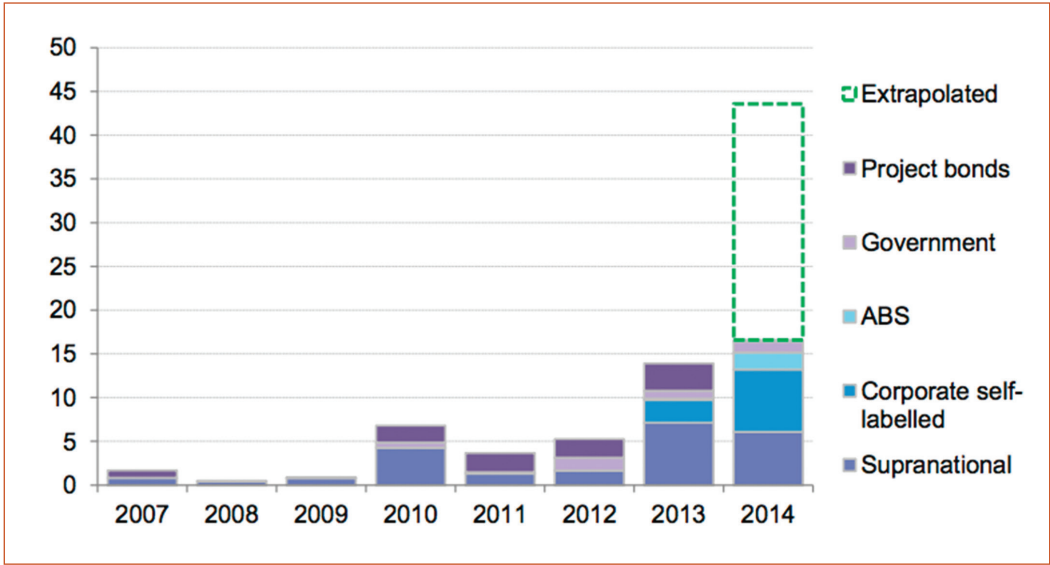
### 5.2 GREEN INSURANCE

Green insurance is the financial instrument adopted to enhance environmental risk management by making explicit the implicit costs and internalizing the negative externalities of pollution. Currently, the most common green insurance instrument in China is environmental liability insurance. Polluting sectors are required to buy insurance to indemnify them against the expenses associated with a pollution event, such as clean up and fines, loss of real estate value, legal charges and medical expenses. Environmental liability insurance makes these environmental costs explicit, reducing the relative attractiveness of investments with overly high environmental risks, providing incentives for risk management and securing rapid responses to pollution events. In addition, green insurance can provide an effective mechanism for managing the long-term risks, such as those associated with natural disasters, floods and windstorms exacerbated by climate change.

### 5.3 GREEN BONDS

Green bonds are a direct financial instrument issued by the international organizations, governments or FIs to support green projects at preferential interest rates. After issuers such as the World Bank and Asian Development Bank obtain financing, they use the raised funds to invest in the selected projects and support the green project at low interest rates, relying on their high credit ratings or entitlement to such governmental policies as tax exemptions. The green bonds attract investors as: (1) they usually have shorter terms than the terms of the projects to which they provide financing support (usually 3–7 years) and have better liquidity on the secondary market (Ma, 2014); and (2) many green bonds are entitled to the preferential policies of tax exemption and have very good returns on investment. Green bonds have attracted diversified investors including pension funds and global asset management institutions, blue chip companies and central banks. One example is the floating rate green bond issued by World Bank in January 2014, which was bought by institutions including Blackstone Group, TIAA-CREF and Private Wealth Management Company of Goldman Sachs Group. By June 2014 global issuance of green bonds had reached USD 16.6 billion (see Figure 2) and it was expected to exceed USD 40 billion within the year (Bloomberg New Energy Finance, 2014).

FIGURE 2: GLOBAL ISSUANCE SIZES OF GREEN BONDS IN LAST 8 YEARS



Source: Bloomberg New Energy Finance (2014).

Note: For 2014 data, the shaded box indicates the data by June 2014 and the dashed line box indicates the forecast of the latter half year.

### 5.4 GREEN VENTURE CAPITAL FUNDS

A green venture capital fund is the financial instrument that guides funds to the SMEs that have started green projects but are not qualified to be listed. Most green venture capital funds invest in green projects as equity stakes and make investment in resource-saving enterprises with large market risks and environment-oriented, high-tech enterprises. After guiding the invested enterprises to grow and reach the stage of Initial Public Offering on the stock markets, the funds exit from the venture and continue to invest in other green venture capital projects. The initiators of the green venture capital funds include the New Ventures project of World Resources Institute, Climate Change Capital and other international FIs.

## THE DEVELOPMENT OF CHINA'S GREEN FINANCIAL SYSTEM

The background and conditions for the development of green finance in China are different from those of developed economies. As China is still a developing country, green finance needs to focus not only on areas such as clean energy, low-carbon transport and energy-efficient buildings, but also provide financial support to industrial restructuring, the energy efficiency of traditional enterprises and environmental pollution control. At the same time, China's financial system is different from the mature financial system of developed economies in terms of the degree of financial deepening and credit environment.

For China, establishing a green financial system is not an “additional” demand on the financial system, but is targeted at providing the long-term financing to meet the development demand of the healthy and robust real economy. The formation and evolution of green finance in China is aligned to three larger areas of core reform of the whole financial system:

- **Develop capital markets.** China's financial system remains banking-dominated with bank loans providing 55 per cent of the RMB 17.29 trillion aggregate financing to the real economy in 2013. Banks also are directly or indirectly involved in the bond market, trust market and shadow banking market, taking their true share of financing even higher. Banks are poorly placed to finance green development projects that are characterized by technological, market and policy-related uncertainties that account managers and credit approval specialists, constrained by their knowledge and capacities, are not able to adequately assess. Therefore, green credit alone is far from meeting the need for green finance. Efforts should be made to vigorously develop direct financing markets covering **green stocks, green bonds** and **green derivatives**, and to broaden the range of intermediaries including **institutional investors, venture capital investors** and **Internet users** to contribute their judgment, realize accurate pricing on project risks and expand the space for financial service supply.
- **Shift administrative measure to reliance on market forces.** Chinese government intervention into industrial financing has traditionally taken the form of direct intervention through sectoral support policies, window guidance on credit and local financing platforms. During the period in which the country was pursuing the developed countries as a late starter, this intervention was positive in meeting the large-scale, long-term financing needs of infrastructure and traditional sectors with explicit technological roadmaps. In the green development period, however, China is working on the technological frontier in many fields, so the government does not have information advantages on the prospects of the innovation of green projects. On the contrary, the large-scale, high-speed and long-term financial allocation caused by direct intervention will more easily result in capital misallocation and directly lead to a systematic financial crisis (for example, the financing risks of the photovoltaic industry emerging in recent years). Therefore, Chinese government intervention in green finance should rely on market-based tools including **fiscal discount interest, structural reserve ratio, differentiated venture capital ratios** and the **improvement of environmental protection information disclosure** to guide the green financial market to play its roles in price discovery, information screening and risk management.
- **Shift from implicit to explicit government guarantees.** The Chinese government has adopted implicit guarantees for new energy and other green development projects, represented by the local fiscal support, administrative debt restructuring and forced mergers and acquisitions after the breakout of the regional financial crisis. Though implicit guarantees can solve temporary risks, they also prevent the creative destruction mechanism of the market, and give enterprises and banks the expectation that the government will foot the bill on the losses, thus constituting off-budget contingent liabilities and jeopardizing the sustainability of green finance. Unlike many developed economies, China's credit system has been dominated by the commercial guarantee, with profit-seeking commercial guarantee

institutions using high interest rate financing and illegal credit granting as common practice. Due to the frequent breakout of risks, over 400 finance guarantee institutions went out of business in 2013. Explicit government guarantees for the green development sector should replace these destabilizing implicit guarantees through two channels: first, policy-based guarantee institutions can directly provide guarantees for enterprises engaged in green projects; and second, a government-dominated green reinsurance system should be established to provide reinsurance services to green projects and enhance credit throughout the project cycle.



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# GREENING CHINA'S FINANCIAL SYSTEM

## CHAPTER 2:

# DEMAND FOR GREEN FINANCE

ZHENG ZHENG, NATIONAL DEVELOPMENT AND REFORM COMMISSION



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## EXECUTIVE SUMMARY

This paper reviews the statistics on investment in fixed assets of key green sectors in China to date and estimates the demand for green finance over the next five years, from 2015 to 2020.

The sectors it focuses on are: environmental pollution control (waste gas, wastewater and solid wastes), forestry, recycling and waste management, low-carbon power generation (including nuclear power) and urban environmental infrastructure, such as sewage treatment. It also looks at future demand in areas such as green buildings and green transport.

We estimate over 3 per cent of GDP—RMB 1,642 billion (USD 260 billion)—was invested into these core green sectors in 2012. Market-based green finance (from loans, bonds, equities other private financing) contributed around 70 per cent of these funds, approximately RMB 1,126 billion (USD 180 billion), with the rest coming from public budgets and the self-owned capital of enterprises.

The policy targets of China's green development for the period from 2015 to 2020 are likely to intensify focus on industrial pollution control and greenhouse gas emission reduction. We estimate that demand for green investment to meet China's green policy goals will be growing to approximately RMB 2,908 billion (USD 465 billion) a year, requiring approximately RMB 2,000 billion (USD 320 billion) of market-based green finance each year.

Increasingly, government fiscal support should stimulate the development of market-based green finance, instead of directly meeting the demand for green investment on behalf of the financial system.

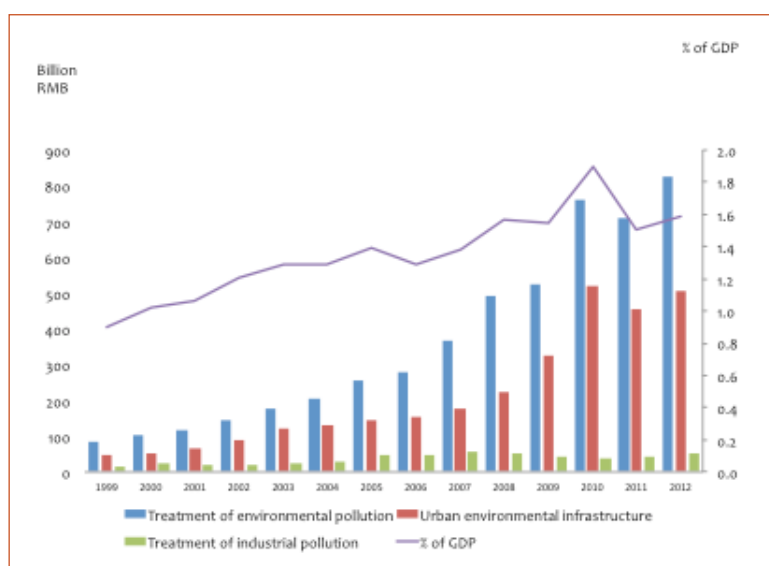
# GREEN INVESTMENT AND FINANCING IN CHINA TO DATE

In order to assess the scale of green investment, this paper looks at official statistics on investment into core “green sectors”: environmental protection (including pollution control, water treatment and urban environmental infrastructure and green spaces), low-carbon electricity generation (including hydro, nuclear, solar and wind) and forestry. Although these sectors do not cover the full scope of green investment in China, they are important areas linked to policy targets and on which there is macro data available.

## 1.1 DEVELOPMENT OF GREEN INVESTMENT

Investment in pollution control in China can be traced back to 1973 (Zhang & Zhao, 2003). Between 1973 and 1981, public investment in pollution control was low, amounting to RMB 504 million over 8 years (around USD 40 million a year <sup>1</sup>) accounting for only 0.05 per cent of the national fiscal expenditures (Twenty Years of Environmental Protection Administration in China Committee, 1994). After environmental protection was formally included in China’s Sixth Five-Year Plan in 1982, investment levels rose, reaching RMB 16 billion (USD 3 billion) by 1991. By 1999 environmental protection amounted to 1 per cent of GNP, equivalent for the first time to the level that many developed countries had reached in the 1970s (China Environment Yearbook Committee, 2001). By 2012 investment in pollution control had reached RMB 825.3 billion (USD 132 billion) or 1.6 per cent of GDP.

FIGURE 1: INVESTMENT IN ENVIRONMENT POLLUTION CONTROL

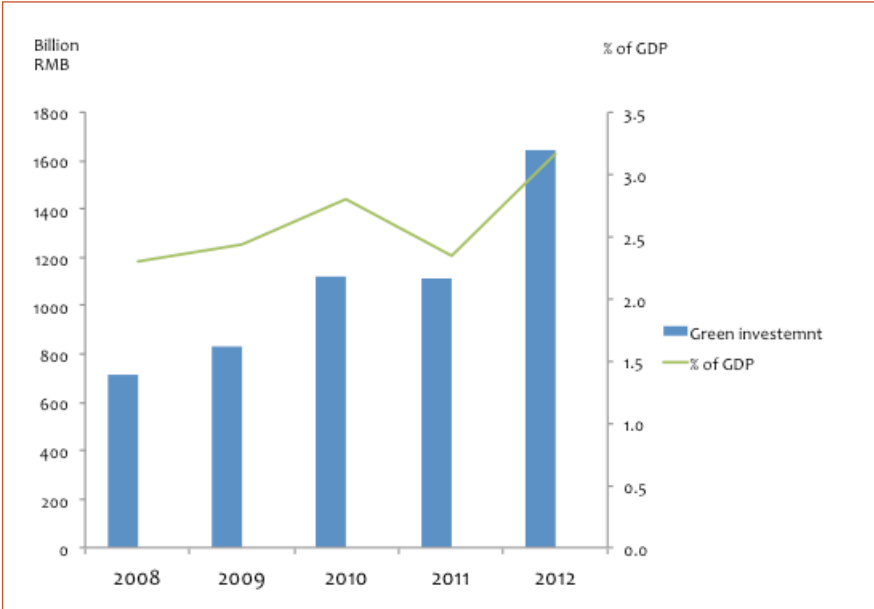


Source: CEIC (n.d.)

<sup>1</sup> All historic exchange rates from: [http://en.wikipedia.org/wiki/List\\_of\\_renminbi\\_exchange\\_rates](http://en.wikipedia.org/wiki/List_of_renminbi_exchange_rates)

However, green investment goes beyond pollution control. If we include investment in waste management, forestry and low-carbon electricity generation and look at more recent years, we can see that China’s green investment overall increased from RMB 717 billion (USD 104 billion) in 2008 to RMB 1,642 billion (USD 260 billion) in 2012 with an annual growth rate of 23 per cent, and the share in the GDP increasing from 2 to 3 per cent, as shown in Figure 2.<sup>2</sup>

FIGURE 2: OVERALL GREEN INVESTMENT



Source: CEIC (n.d.)

## 1.2 FINANCIAL STRUCTURE

Sources of funds for investment in fixed assets in China are categorized as coming from the state budget, domestic loans, foreign investment, self-raised funds and other, as outlined in Table 1.

TABLE 1: CATEGORIES OF FINANCING SOURCES

<sup>2</sup> The statistical data on environmental pollution control in the CEIC database is in line with the statistics of *China Statistical Yearbook on Environment*, including data on investment in urban environment infrastructure from Ministry of Housing and Urban-Rural Development. This mainly includes gas supply, centralized heating, drainage works, gardening and greening, and environmental sanitation. The treatment of industrial pollution includes the treatment of wastewater, treatment of waste gas, treatment of solid wastes, treatment of noise pollution, and others. However there are some discrepancies. The main reason is how the data on water pollution control and wastewater control and reuse is treated. According to *China Statistical Yearbook 2013*, the investment in the environmental treatment industry was RMB 841.059 billion, which was RMB 825.3 billion according to CEIC statistics, including a RMB 93.41 billion investment in sewage.

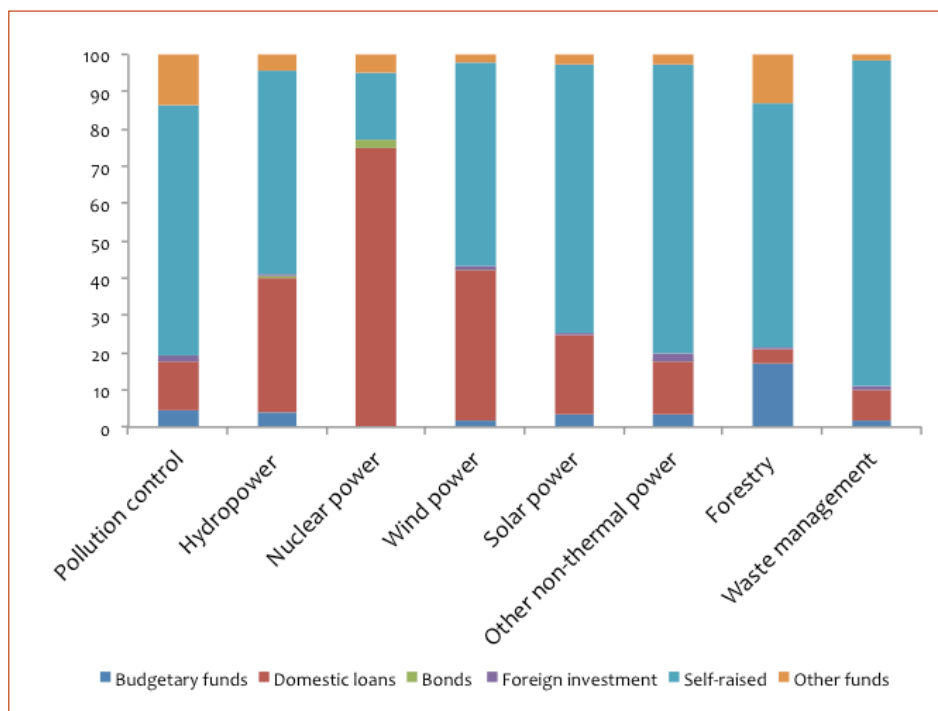
According to *China Statistics Yearbook 2013*, the investment in Wastewater Treatment and Recycling Industry under the Water Production and Supply Industry was RMB 94.9 billion, while the investment in the Treatment of Water Pollution under Environmental Treatment was RMB 43.8 billion in 2012. For the sake of caution, we did not recalculate the sum based on the data of *Statistical Yearbook of the Chinese Investment in Fixed Assets* for the total data on environmental control and directly re-quoted the data of the Ministry of Environmental Protection.

Category	Description
<b>State budget</b>	General budget, government fund budget, state-owned capital operation budget and social insurance fund budget. Government bonds at all levels shall also be included in state budgetary funds
<b>Domestic loans</b>	Loans borrowed by investing units from banks and non-bank financial institutions, including loans issued by banks from their self-owned funds and deposits, special loans by government, and loans arranged by local government from special funds
<b>Foreign investment</b>	Overseas (including Hong Kong, Macao and Taiwan) funds including loans from governments, international financial organizations, export credit, commercial loans from foreign banks, bonds and stocks issued in foreign exchanges, foreign direct investment and other foreign investment
<b>Self-raised funds</b>	Funds received and raised by enterprises including self-owned funds and funds raised from other enterprises and institutions, but excluding the various types of fiscal funds, fund borrowed from various types of financial institutions (FIs) and foreign funds
<b>Other</b>	Funds not included in the above-mentioned sources, including mass financing, individual funds, donations

Source: National Bureau of Statistics of the People's Republic of China (2014)

Using these categories, the sources of investment for different green sectors in 2012 are shown in Figure 3 (also see tables 1 and 2 in the Appendix)

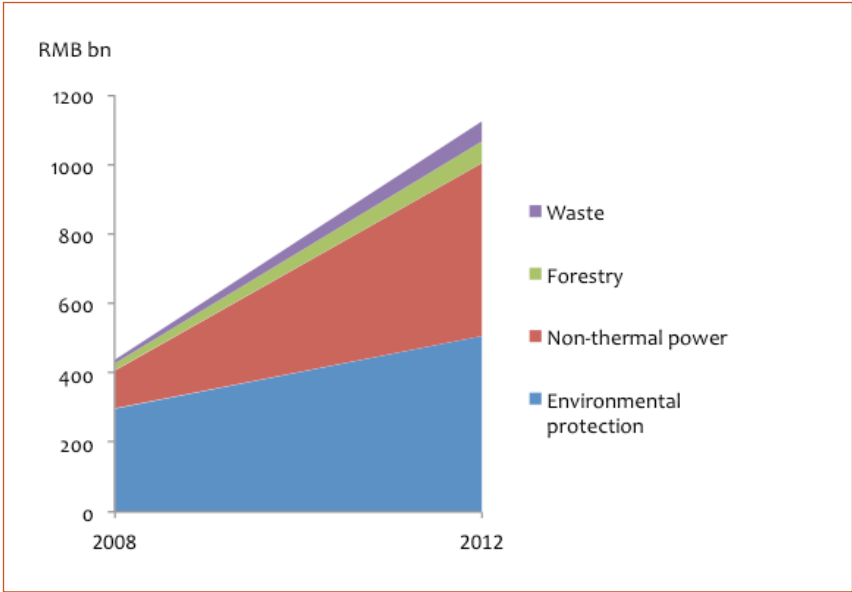
FIGURE 3: PROPORTIONS OF FUNDING SOURCES FOR GREEN INVESTMENT, 2012



Source: National Bureau of Statistics (2013).

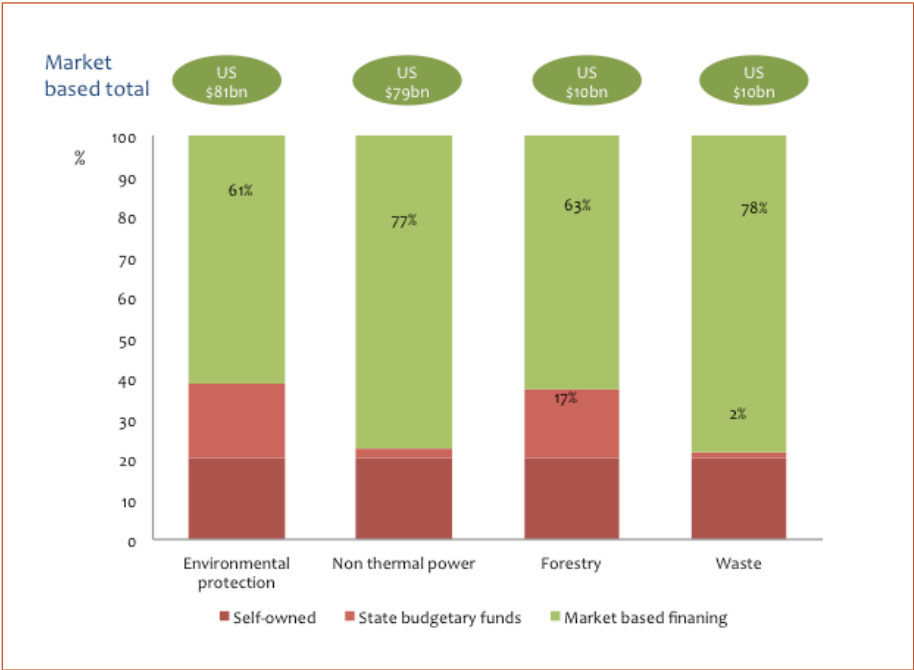
As shown in Figure 4, and in Table 3 in the Appendix, overall we estimate that market-based financing mobilized RMB 438 billion of green investment (USD 70 billion) in 2008 (67 per cent of the total), rising to RMB 1,126 billion (USD 180 billion) in 2012 (70 per cent of the total).<sup>3</sup>

FIGURE 4: OVERALL VOLUMES OF MARKET-BASED FUNDING



As shown in Figure 5, market-based financing provided the greatest proportion of investment in each sector; ranging from 78 per cent in renewable power projects to 61 per cent in environment protection.

FIGURE 5: MARKET-BASED AND NON-MARKET-BASED FINANCING BY GREEN INVESTMENT SECTOR



<sup>3</sup> Market-based financing covers loans, bonds and equity investment sourced from financial institutions and through capital markets, and from other private sources. Within the existing statistical categories, these are mainly captured as data on domestic loans, foreign investment, self-raised funds and others. The Notice of the State Council on Adjusting the Capital Ratios for Fixed Asset Investment Projects sets minimum ratios for self-owned versus externally raised funds for different sectors ranging from 40 per cent for iron and steel; 35 per cent for cement projects; 30 per cent for coal, airports, ports, coastal and inland water transport projects; 25 per cent for railway, expressway, urban rail transit; 20 per cent for housing and regular commercial residence projects; and 20 per cent for other projects. For simplicity we use 20 per cent as an estimate for self-owned capital across all sectors.

## FUTURE DEMAND FOR GREEN INVESTMENT

### 2.1 POLICY TARGETS OF CHINA'S GREEN DEVELOPMENT

The green development aspirations of China's government are reflected in commitments and goals at various levels.

- **Strategic resolutions by the Chinese Communist Party (CPC)** without specific targets. The Eighteenth National Congress of the CPC resolved that: “we must raise our ecological awareness of the need to respect, accommodate to and protect nature. We must give high priority to making ecological progress and incorporate it into all aspects and the whole process of advancing economic, political, cultural, and social progress, work hard to build a beautiful country, and achieve lasting and sustainable development of the Chinese nation” (Hu, 2012).
- **High-level targets set within the national Five-Year Plans.** The 12th Five-Year Plan (2009–2015) includes targets to increase the share of non-fossil fuel resources to 11.4 per cent of primary energy consumption; reduce energy consumption per unit of GDP by 16 per cent and carbon dioxide emissions per unit of GDP by 17 per cent; reduce chemical oxygen demand (COD) and sulphur dioxide emission by 8 per cent; and reduce both ammonia nitrogen and nitrogen oxide emissions by 10 per cent. The forestry target is to increase forested areas by 600 million cubic metres, reaching a coverage rate of 21.66 per cent. Further targets on solid waste utilization, air quality, urban noise and sewage treatment were also set (National People's Congress, 2011).
- **Technical targets in the specific development plans formulated for the implementation of the Five-Year Plan.** Relevant plans include the 12th Five-Year Plan for Environmental Protection Work Plan for Greenhouse Gas Emission Control, Guiding Opinion of Resource Comprehensive Utilization during the 12th Five-Year Plan Period, National Implementation Plan for Clean Energy Initiative and other plans, all of which have specific targets.
- **Commitments made to the international community,** mainly including the carbon dioxide emission target set in 2009 at the United Nations Climate Change Conference in Copenhagen (National Development and Reform Commission, 2013). This commitment has been integrated into the National Climate Change Plan (2014–2020) recently approved by the State Council. It states that by 2020, effort will be made to reduce carbon dioxide emissions per unit of GDP by 40–45 per cent compared to that of 2005, increase the ratio of non-fossil fuel energy in primary energy consumption to about 15 per cent, and increase the forest area and national forest stocks by 40 million hectares and 1.3 billion cubic metres respectively compared with 2005 (State Council, 2014a).

For accuracy of analysis, the specific development targets are more reliable, but for the purpose of generating an estimate of the general scale of demand for green investment, the high-level targets are mainly used in this analysis.

### 2.2 EVOLUTION OF CHINA'S GREEN DEVELOPMENT POLICIES

China's green development policies have tended to have the following characteristics.

1. **The pursuit of green and ecological development is gradually becoming one of the core themes for China's development.** This is reflected in its progression from a technical sub-component of previous Five-Year Plans, to the development of a comprehensive environmental protection system, to high-level targets on ecological improvement being placed at the forefront of the most recent Five-Year Plan.
2. **The scope of green targets has grown, reflecting shifting domestic concerns as well as international responsibilities and obligations.** China's green development targets have developed from the simple concept of pollution control to broader environmental protection and to the joint

efforts to deal with global climate change. The scope and influence of the targets has expanded along with a deepened understanding of environmental issues on one hand and international engagement on the other.

3. **The development targets based on each five-year period are important binding developments.** We can clearly see that China's green development targets, up to now, are broken down and implemented by stage in five-year periods. Therefore, we believe that the development targets of the next five years shall be the more operable policy targets under the practical national conditions and the major prediction interval for the analysis of this report.

## 2.3 FUTURE REQUIREMENTS FOR GREEN INVESTMENT

We conducted an analysis of progress towards China's green policy targets, as outlined in Table 2.

TABLE 2: CHINA'S GREEN DEVELOPMENT TARGETS AND PROGRESS

Area	Actual values			Targets	
	2005	2010	2012	2015 (over 2010)	2020 (over 2005)
State budget					
Carbon dioxide emissions (billion tonnes) <sup>1</sup>	5.51	7.00	7.95	Emissions per CNY 10,000 of GDP shall decrease by 17%	Emissions per CNY 10,000 of GDP shall decrease by 40–45%
Emissions (Kg/CNY 10,000 of GDP)	0.30	0.18	0.15		
Proportion of non-fossil energy consumption <sup>2</sup>	2.50%	3.50%	3.90%	11.40%	15%
Forest area <sup>3</sup>	Na	na	195.45 million hectares (20.36%)	21.66%	Additional 40 million (hectare)
State forest stocks	Na	na	13.72 billion cubic meters	Increase by 600 million cubic metres	Increase by 1.3 billion cubic metres
Recycling rate of solid industrial wastes <sup>4</sup>	57%	67%	61%	72%	tbd
Treatment rate of urban sewage <sup>5</sup>	56% (2006)	82%	na	85%	tbd
Municipal solid waste harmless treatment rate <sup>6</sup>	52%	78%	84%	80%	tbd

Expected to exceed Target ■ Expected to meet target ■

(1) Carbon dioxide emissions are estimated according to the consumption of coal, petroleum and natural gas; using the General Principles for Calculation of Total Production Energy Consumption (GB/T 2589-2008) and the Guidelines for Preparation of Provincial-level Greenhouse Gas Inventories (F.G.B.Q.H. [2011] No.1041); energy data come from China Energy Yearbook and GDP from China Statistics Press (2014).

(2) Non-fossil energy mainly includes hydropower, nuclear power and other sources of power; data are taken from China Energy Statistical Yearbook 2013 (China Statistics Press, 2014).

(3) Data of forest area and coverage rate are up to 2008. Data are taken from China Statistics Press (2014).

(4) Recycling rate of solid industrial wastes is calculated based on the data of the CEIC database.

(5) Treatment rate of urban sewage is quoted from the Report on Drainage and Waste Water Treatment in China's Urban Areas (2006-2010). See the Ministry of Housing and Urban-Rural Development's website for the Chinese version of this report: [www.mohurd.gov.cn](http://www.mohurd.gov.cn)

(6) Municipal solid waste harmless treatment rate is taken from the CEIC database.

Based on this we made qualitative predictions of future trends, finding that:

1. **Current low-carbon policy targets are readily achievable, but further efforts will be needed if more ambitious targets are agreed.** The current targets for the GHG emissions intensity of the economy can be accomplished based on the existing energy structure, energy technologies and energy consumption efficiency. It is likely that these targets can be accomplished, but further efforts might be needed for more ambitious targets to keep the global temperature increase at less than two degrees Celsius.
2. **Renewable energy will be a major policy focus of China's future low-carbon and green development.** To reduce fossil fuel use, key investments are likely to be in nuclear, hydro, wind and solar energy. Although there is significant uncertainty, it is likely that the growth rate of investment in the non-thermal power in the 13th Five-Year Plan shall at least exceed the average growth rate of the 12th Five-Year Plan period.
3. **There is a substantial likelihood of accomplishing the targets of forestry development and there is not much space to set higher or novel targets in the future.** Starting from 2005, China's newly added forest land has been growing by 4,924 thousand hectares annually; since 2010 it has grown by over 5,500 hectares annually. With such a growth rate, it is anticipated that the forestry targets for 2015 and 2020 will be achieved. The 13th Five-Year Plan might not raise higher development targets because of a lack of further areas suitable for forest development. Maintaining the existing forest with slow-level growth is the expected reasonable target. However, the total investment in forestry will not see a high growth rate.
4. **The planned targets for the recycling of solid industrial wastes and resources are expected, but more development targets will focus on the treatment and control of other industrial discharges and emissions in the future.** Recycling of metal, paper and plastics are well developed, and we believe the recycling of solid wastes will maintain the current trend of development, without seeing higher targets. There is greater pressure for the control and treatment of other industrial discharges. With the implementation of more stringent laws on environmental protection, stronger targets might be raised during the 13th Five-Year Plan period, and there will be greater demands for the investment in the corresponding control and treatment of pollution discharge.
5. **The development targets on the treatment of urban sewage and wastes have been accomplished, but the development of the urban environmental infrastructure will be further enhanced with the progress of urbanization.** The targets in the national urban sewage and waste treatment plans have been largely accomplished. It is predicted that, with the continued growth in urbanization, demand and investment will continue to grow. There are also great differences in the treatment of urban sewage and domestic refuse in different areas, and significant investment will be needed to improve underdeveloped areas.

In addition to the these areas, which were already explicitly listed as the targets of national policy development, China is also likely to continue to promote the development of such fields as **green buildings, electric vehicles and urban rail transit**. Therefore, the investment requirements for China's green development in the future is likely to extend into broader fields.

TABLE 3: ANALYSIS OF THE FACTORS INFLUENCING CHINA'S GREEN INVESTMENT, 2015–2020

Green investment area		Prediction
Pollution control	Urban environmental infrastructure	Stable
	Industrial pollution control	Enhanced
Electric power	Nuclear power	Enhanced
	Hydropower	Stable
	Solar power	Stable
	Power of other sources	Stable
Forestry		Stable
Waste recycling		Enhanced
Green building		Enhanced
Electric vehicles		Stable
Urban rail transit		Stable

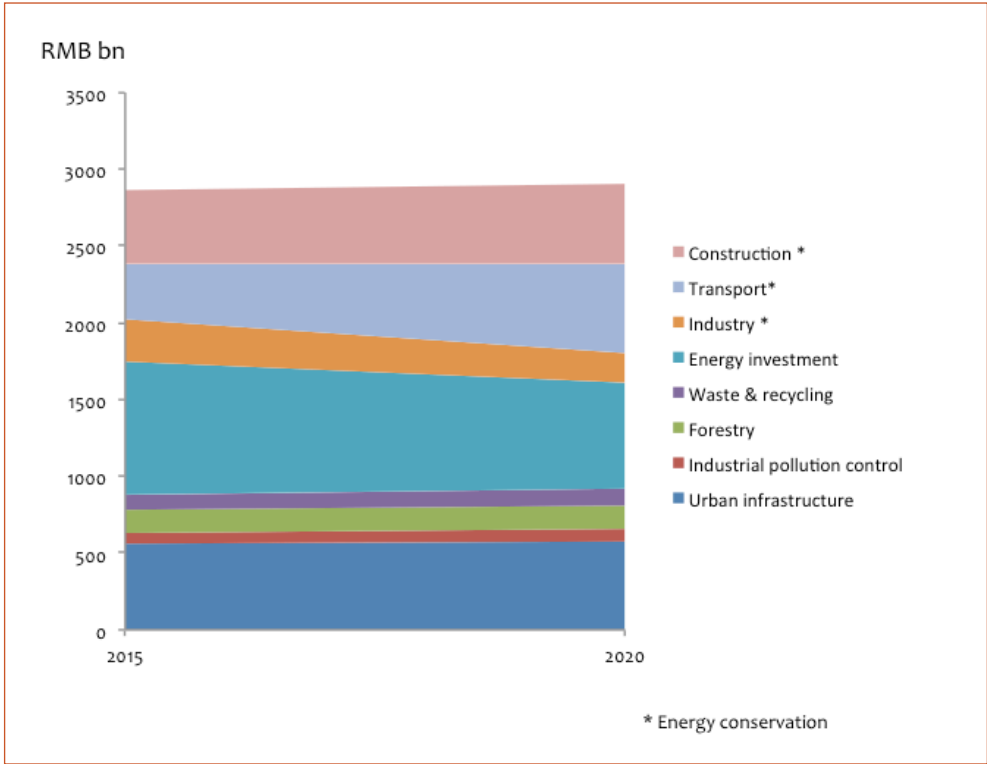


## 2.4 ESTIMATES ON GROWTH OF GREEN INVESTMENT DEMAND

We extrapolated current trends to estimate investment in urban environmental infrastructure, industrial pollution control, forestry and recycling of waste resources, while at the same time considering possible factors that might change the trend. The main modifications to the extrapolation were in industrial pollution control and urban environmental infrastructure. For low-carbon investments (renewable energy and energy conservation investment in electric vehicles, rail transit and green buildings), we based demand estimates on the low-carbon scenario developed by the Energy Research Institute, National Development and Research Commission of China (Jiang, 2013).

Overall, we estimate China’s green investment demand in 2015 at RMB 2,867 billion (USD 450 billion), growing to RMB 2,908 billion (USD 465) by 2020 (see Figure 6 below and Table 4 in the appendix).<sup>4</sup> Although the annual growth rate is not large, the average size of the annual investment is high, exceeding 3 per cent of GDP.

FIGURE 6: PREDICTED DEMAND FOR GREEN INVESTMENT



These estimates should be regarded as somewhat conservative and can be taken as the minimum investment demand.

The slowdown of China’s GDP growth rate and reforms to local government debt financing are putting pressure on the availability of fiscal funds for infrastructure development (State Council, 2014b). While government funding is not likely to increase, green investment and infrastructure will remain a key focus for the provision for “special debts” of local governments. Therefore, we estimate that the overall drop in public funding will not be large. We assume that the proportion of investment provided by public budgets shall remain at the average of 10 per cent of the total as in 2012.

<sup>4</sup> There might be some double counting between investment for energy conservation investment and industrial pollution.

Based on this and assuming that self-owned capital will continue to provide 20 per cent, we estimate that around RMB 2,007 billion (USD 320 billion) of market-based green finance is needed in 2015, rising to RMB 2,036 billion (USD 326 billion) by 2020.

Within this, the proportions of market-based financing of different types of green investments are different. One of our basic assumptions is that, as for all the fields with high proportions of state budgetary funds currently, when the budgetary funds drop, they will be replaced with market-based financing.

# INSTITUTIONAL CONSTRAINTS AND DIRECTION OF IMPROVEMENT IN GREEN INVESTMENT AND FINANCING

## 3.1 INSTITUTIONAL CONSTRAINTS

The largest portion of market-based financing to date comes through commercial loans. This is reflected both in the “loans” category, and also we believe through the “self-raised funds,” since in practice a substantial part of self-raised funds, excluding the project capital fund involved, are obtained through bank loans.<sup>5</sup>

Therefore, as a whole, self-raised finance, commercial loans and state budgetary funds are currently the most important financing channels. Other market-based financing channels such as bonds and equity markets are less well developed.

Compared with the demands for green investment and financing, we believe the existing financial infrastructure is inadequate. For example, in relation to the construction of urban environmental infrastructure, urban sewage treatment facilities and pipelines have reached a very high coverage, but the operation and utilization rates of the treatment facilities are quite low. One of the reasons for this is that during the 11th and 12th Five-Year Plan periods, central government promoted their development through its economic stimulus plan. However, due to the various institutional issues related to the operation, management and maintenance expenditures, local governments have not been using the facilities they constructed to their full capacity. An important reason for this is that the cash flow generated by these facilities is relatively low and cannot fully cover their operation costs, so that fiscal subsidies must be provided to keep the discharges and emissions to national and local standards.

Although commercial loans contribute a large share of green investment, it is noteworthy that most of the users are state-owned enterprises or investment or financing companies that are backed by additional capital from the state budget. These commercial loans always carry with them high financial risks. Though most of these investments will generate environmental benefits and make major contributions to the achievement of green development targets, the debt-paying capacity of these investment projects are always connected to the fiscal capacity of the local governments of the place where the projects are located. The most developed areas, therefore, have a relatively higher proportion of debt financing than the areas with underdeveloped economies, but they have the approximately same possibility of the breakout of debt risks caused by the fiscal capacity of the local governments.

Given existing technological and market conditions, green investments tend to have large up-front investment needs and low cash flow. Investment by governments, especially of the local governments, therefore, plays an important role. The existing structure of investment and financing subjects is the second-best choice for the current fiscal system, especially the fiscal system of local governments. Local governments therefore operate with institutional restrictions that conflict with their need to finance green investment. Therefore, further institutional innovation is needed to balance the risks and stimulate green development institutionally.

<sup>5</sup> We compared the loans issued in the current years published by the People’s Bank of China in the past and the banking loans recorded in the fixed assets of the corresponding year and found that during the period from 2006 to 2008, the former was about 1.4 larger. It can be concluded that significant bank loans are recorded as “self-raised” funding, a substantial part of which were the loans obtained through the fiscal credit of the local governments, with some funds directly falling under fiscal funds. The major subjects realizing such financing are the financing platform companies of the local governments.

### 3.2 DIRECTION FOR INSTITUTIONAL IMPROVEMENT OF SUPPLY OF GREEN FINANCE

Overall, the supply of finance through dependence on commercial loans and fiscal funds does not adequately meet the investment needs for green development, and more diversified market-based financing will be needed to meet the targets.

As can be seen in Figure 1, in the practice of China's green investment, the scale of investment in urban environmental infrastructure is significantly higher than in industrial pollution control. State-owned enterprises are the major users of capital in this sector. Fiscal credit plays a key role in their investment and financing activities.

The majority of users of capital for industrial pollution control are non-state-owned enterprises. However, according to the official statistics, a high proportion of the funds for industrial pollution control come from public funds, given as direct investment or another subsidy, to support and encourage the enterprises' treatment of pollution. Moreover, even banking loans in the investment and financing for the industrial pollution control are often entitled to preferential policies backed by governmental credit.

In other words, although market-based pricing appears to contribute a large proportion of green investment, little in the areas of urban environmental infrastructure and industrial pollution control is purely market-driven.

It is clear that purely market-guided green financing faces great difficulties, and the support of government-subsidized credit and other fiscal funds have been a key factor in green investment. A key driver for reform and innovation is the need to better and more efficiently use public funds, and more reliably avoid fiscal liability risks, while guiding private funds to support the development of green investments with greater efficiency.

Our basic assumption is that, while continuing to encourage and support green investment through fiscal, price and land policies, the scale of the need for green financing will overcome the capacity of government budgets. Therefore, government funding will shift from providing direct investment as a substitute for private finance to seeking to catalyze the expansion and innovation of market-based green finance.

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# APPENDIX A

TABLE 1: PROPORTIONS OF FUND SOURCES FOR GREEN INVESTMENTS, 2012

Green investment area		Proportion of funding by source (%)						Total (Bn RMB)
		Budgetary funds	Domestic loans	Bonds	Foreign investment	Fundraising	Other funds	
Environmental pollution control	Environmental pollution control	18.54	9.99	0.25	0.24	65.25	5.74	
	Urban appearance management	18.53	4.09	0.21	0.34	63.88	12.94	
	Urban environmental sanitation	28.51	7.47	0.00	0.57	56.22	7.23	
	Water pollution treatment	20.02	8.15	0.00	0.27	64.86	6.71	
	Hazardous wastes treatment	22.97	31.28	0.00	0.00	44.52	1.23	
	Other environmental pollution control	16.32	10.04	0.57	0.00	28.60	3.77	
	Urban gardening and greening management	23.68	5.00	0.00	0.14	63.11	8.06	
	<b>Total</b>							825.35
Non-thermal power	Hydropower	3.92	35.95	0.77	0.32	54.62	4.43	
	Nuclear power	0.00	75.07	1.95	0.00	18.00	4.98	
	Wind power	1.78	40.14	0.43	0.64	54.71	2.28	
	Solar power	3.69	20.78	0.00	0.77	71.74	3.01	
	Power of other sources	3.45	14.26	0.05	1.84	77.71	2.69	
	<b>Total</b>							644.12
Forestry	Forestry	17.14	3.67	0.00	0.39	65.77	13.03	
	<b>Total</b>							98.59
Waste	Waste resources recycling and processing	1.52	8.48	0.00	1.23	87.30	1.47	
	<b>Total</b>							73.76
<b>Total investment</b>		<b>4.74</b>	<b>12.83</b>	<b>0.28</b>	<b>1.12</b>	<b>67.17</b>	<b>13.87</b>	<b>1641.82</b>

Source: National Bureau of Statistics (2013)

TABLE 2: PROPORTIONS OF FUND SOURCES FOR GREEN INVESTMENT, 2008 (%)

Green investment area		Budgetary funds (%)	Domestic loans (%)	Bonds (%)	Foreign investment (%)	Fundraising (%)	Other funds (%)	Total (Bn RMB)
Environmental pollution control	Environmental pollution control	19.58	8.72	0.04	2.01	61.93	7.72	
	Urban appearance management	19.46	7.35	0.00	0.26	66.10	6.84	
	Urban environmental sanitation	22.36	7.43	0.17	2.61	59.05	8.39	
	Water pollution treatment	18.85	12.10	0.00	3.90	58.02	7.12	
	Hazardous wastes treatment	11.78	8.24	0.00	1.27	75.90	2.80	
	Other environmental pollution control	19.44	6.45	0.01	0.22	64.94	8.94	
	Urban gardening and greening management	16.26	10.92	0.00	0.02	66.01	6.79	
	<b>Total</b>							<b>493.70</b>
Non-thermal power	Hydropower							
	Nuclear power							
	Wind power	-	-	-	-	-	-	-
	Solar power	-	-	-	-	-	-	-
	Power of other sources							
	<b>Total</b>							<b>139.57*</b>
Forestry	Forestry	27.80	3.06	0.13	1.53	50.84	16.65	
	<b>Total</b>							<b>39.26</b>
Waste	Waste resources recycling and processing	0.98	3.31	0.03	3.02	88.31	4.34	
	<b>Total</b>							<b>13.83</b>
<b>Total investment</b>		<b>4.65</b>	<b>16.06</b>	<b>0.41</b>	<b>2.96</b>	<b>61.70</b>	<b>14.21</b>	<b>686.36</b>

Source: National Bureau of Statistics (2013)

NB: The National Bureau of Statistics started to provide statistics on investment in wind and solar power in 2012, therefore statistics on energy investment are not included here.

TABLE 3: GREEN INVESTMENT AND MARKET-BASED FINANCE, 2008 AND 2012

	Green investment (RMB billion)		Market-based finance (RMB billion)		Proportion of market based finance (%)	
	2008	2012	2008	2012	2008	2012
Environmental pollution control	493.70	825.34	298.29	507.28	60.42	61.46
Electric power	139.57	644.12	109.56	498.74	78.50	77.43
Forestry	39.26	98.59	19.72	61.97	52.20	62.86
Waste resources recycling	13.82	73.76	10.92	57.89	79.02	78.50
Total	686.35	1641.81	438.49	1125.88	63.38	68.57

TABLE 4: ESTIMATE OF DEMAND FOR FUTURE GREEN INVESTMENT

	2015 (2010 billion RMB )	2020 (2010 billion RMB)
Urban environmental infrastructure	559.1	580.0
Industrial pollution control	71.0	78.8
Forestry	145.4	151.0
Recycling of waste resources	105.1	108.4
Energy investment	868.9	692.5
Energy conservation investment	1117.7	1297.5
Include: Industries	267.7	192.8
Transport	367.5	585.0
Construction	482.5	519.7
Total	2867.2	2908.2

Source: DRC estimates based on extrapolation and Jiang (2014).



## CHAPTER 3:

# ENVIRONMENTAL AND INDUSTRIAL POLICY ENVIRONMENT FOR THE DEVELOPMENT OF GREEN FINANCE IN CHINA

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# EXECUTIVE SUMMARY

This paper outlines the frameworks of Chinese law and policy concerning *environmental protection, public investment, financial policy and industrial policy* and the challenges they face.

**Policy and Legal Frameworks:** Over the past 20 years, China has built up a comprehensive system of laws, regulations, rules, standards and guidance on environmental protection. These policies stimulate demand for green investment. However, key challenges to the implementation of the legal and policy framework include: (i) an inadequate institutional and legal system, (ii) tensions between the national environmental protection system and local implementation, (iii) fragmentation of regulation and management across watersheds and ecological regions and (iv) weak standards encouraged by ambiguous rules. Overall, this results in poor enforcement and supervision of existing rules, reducing effective demand for green investment and failing to abate demand for environmentally damaging investment.

**Public Investment:** China has also developed a system for direct public financing of environmental works, made up of on-budget fiscal expenditure, ecological compensation systems and special funds. Key challenges here are (i) fragmentation of funding channels, (ii) reactive funding lacking a long-term strategy and (iii) weak supervision and performance management.

**Financial Policies:** In recent years, attention has turned to the role of financial institutions and markets in supporting environmental protection and industrial transformation. Starting in the 1990s, China has developed policies to establish systems for carbon markets as well as green credit, green securities and green insurance. Financial institutions have developed policies and products to support environmental protection in response to these policies. But some challenges and limitations have also been revealed, including: (i) unattractive risk: return rates for green investments; (ii) a lack of environmental competency within commercial banks; (iii) green finance being overly dependent on the government; and (iv) green finance being overly dependent on bank finance.

**Industrial Policies:** Industrial policy is a key feature of China's economic development model, with the aim of upgrading industries developing strategic emerging industries. New industries to be encouraged include energy conservation, environmental protection, bio-technology, new energy, new materials and new-energy automobiles, while out-of-date production capacity, techniques, equipment and products are to be phased out. However, in practice, resource-intensive industries have continued to grow. This leaves the economy vulnerable to the volatility of international resource prices and places it at the lower end of the industrial value chain with low added value.

This chapter sets out the following recommendations in each of these areas:

## **Environmental legal and policy frameworks:**

- Remove ambiguous policy objectives
- Base standards and fees on environmental criteria
- Strengthen supervision and management of compliance with discharge standards
- Tighten discharge standards and implementation
- Strengthen regional pollution caps and a system of discharge permits
- Reinforce pollutant discharge control in rural areas
- Include more pollutants under control

**Public investment:**

- Coordinate between the different funding channels
- Provide performance-related guarantees on the provision of special fiscal funds
- Diversify environmental financing channels
- Innovate financing models and actively roll out the public-private partnership model

**Financial policy:**

- Enable development of green capital markets
- Shift from reliance on administrative instruments to enabling market forces
- Shift from implicit to explicit support and guarantees

**Industrial Policy**

- Support and align with environmental policy
- Encourage technology innovation
- Promote strategic environmental industries
- Require environmental impact assessments for industrial policy

# INTRODUCTION

Since the reform and opening up, China's economy has grown rapidly. By 2010 its overall GDP exceeded Japan's for the first time and ranked second in the world. However, increasingly severe environmental problems are associated with China's economic growth.

Since 2005, China has become the world's top polluter. In 2013 sulphur dioxide, nitrogen oxide, organic pollution (measured by Chemical Oxygen Demand) and ammonia nitrogen emissions were respectively 20.44 million, 22.27 million, 23.53 million and 2.46 million tonnes (Huidian Research, 2015). Pollutants discharged in many regions have exceeded the carrying capacity of the local environment. In 2011 China became the nation with the highest carbon dioxide emissions in the world.

Among 74 cities monitored, based on recent ambient air quality standards, only three of them meet the required standard. Some reaches in the watersheds of Dianchi, Yangtze River, Haihe River, Huaihe River and Yellow River are seriously polluted, and 60 per cent of underground water monitoring sites have poor or very poor water quality (RT, 2015). Regarding soil pollution, 16 per cent of soil pollution monitoring sites exceed national limits and 19 per cent of arable land has excessively polluted soil. Heavy metal pollution, including mercury and persistent organic pollutants, are environmental problems of high concern (Ministry of Environmental Protection, 2014a). In addition, environmental accidents happen too frequently and environmental pollution damages people's health, causing major impacts on social welfare.

China is implementing a development strategy that seeks to transform its economic development model and build a resource-conserving and environmentally friendly society. There is broad recognition that the previous extensive development model, which centred on "three-high" industries (high investment, high energy consumption and high pollution) is not sustainable and must be transformed into intensive development of "two lows and one high" (low investment, low energy consumption and high growth).

## 1.1 THE NEED FOR GREEN INVESTMENT

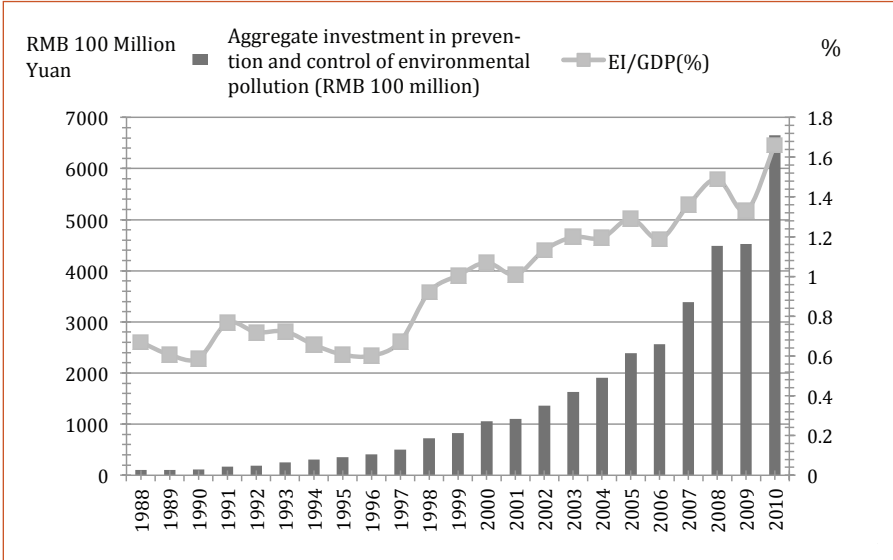
It is clear that achieving this transformation entails major shifts in both public and private investment, away from the most resource-intensive and polluting activities, towards more efficient and cleaner technologies. Associated opportunities for investment and new industrial development should be promoted in areas such as land remediation, clean energy performance contracting and renewable energy (see Annex III for estimates of investment need in key areas).

Although there is no single, common definition of environmental investment in China, or globally, broadly it includes investment in:

- **Prevention and control of environmental pollution.** This includes urban environmental infrastructure, prevention and control of legacy pollution, and investment in new waste management capacity to match new construction and industrial development.
- **Conservation and sustainable natural resource management.** This includes conservation of biodiversity and environmental systems in relation to marine, freshwater, land, forestry, grassland, desert and wetland ecosystems. It includes broad rural environment protection as well as protection of special ecological areas and nature reserves and environmental conservation related to relevant industries such as minerals, tourism, forestry and agriculture.
- **Environmental management and technology.** This includes developing the administrative capacity of public institutions; departments and agencies with environmental protection responsibility; investment in pollution prevention, control technologies, and research and development relevant to pollution prevention and control; and environmental management.

Available existing aggregate statistics tend to capture the first of these categories, urban and industrial pollution prevention and control. As seen in Figure 1, from 1988 to 2000, China’s aggregate investment in environmental protection climbed from RMB 10 billion (USD 1.6 billion) to RMB 665 billion (USD 107), displaying a stable growth tendency. During the same period, the proportion of aggregate environmental investment to overall GDP also increased from 0.7 to 1.7 per cent.

FIGURE 1: CHINA’S ENVIRONMENTAL INVESTMENTS (EI) AND THEIR PROPORTIONS TO OVERALL GDP DURING 1988-2010



Source: China Statistical Yearbook on Environment (1989–2013) and China Statistical Yearbook (1989–2013)

Investment in urban environmental infrastructure is even greater. State-owned enterprises (SOEs) are the main investors and draw on government-owned financing platform companies. Fiscal credit therefore plays a vital role.

In contrast, for industrial pollution prevention and control, investors and those involved in financing are chiefly non-SOEs. Nevertheless, a considerable portion of funds for industrial pollution control have come from state budgetary funds during the 11th Five-Year Plan period, in the form of direct investment, government subsidies and allowances, as well as credit guarantees through banks, to provide support and encouragement for enterprises’ pollution prevention and control.

This paper outlines the frameworks of law and policy concerning *environmental protection, public investment, financial policy and industrial policy* that seek to influence public and private funding investment decisions about green investment. In each case, it looks at the challenges and limitations of current policy frameworks. The final section presents a set of recommendations.

# 2

## ENVIRONMENTAL POLICIES

### 2.1 ENVIRONMENTAL LAWS, REGULATIONS AND STANDARDS

Over the past 20 years, China has formulated and released laws, regulations, rules, standards and guidance on environmental protection, which have built up to form a comprehensive policy system for environmental governance. This system includes provisions on public funding and fiscal support for environmental investment, as well as regulations to eliminate the most polluting technologies and pricing, and pollution fees and fines for non-compliance designed to incentivize and encourage businesses to invest in resource conservation, environmental protection and clean industrial upgrading. Key elements are outlined in Table 1, with more detail in Annex I.

TABLE 1: SUMMARY OF CHINA'S FRAMEWORK OF LAWS, REGULATIONS AND STANDARDS

<b>The Environmental Protection Law</b>	Basic legal framework for environmental protection in China, and includes several provisions on the role of public finance.
<b>Special laws on pollution prevention and control</b>	Laws focused on pollution control in relation to freshwater, air and sea and to noise, radioactivity and solid waste. In each case the laws include provisions on (1) fines and pollution pricing, (2) encouragement advanced green processes and materials, (3) phasing out of backward production techniques and equipment and (4) ecological compensation mechanisms.
<b>Circular economy and clean production</b>	Circular economy refers to the efficiency of materials and energy use. Relevant laws address (1) industrial, fiscal and taxation policies; (2) supervision of polluting and high-resource industries; (3) encouragement for the development of technologies for resource recycling, regeneration and re-use; and (4) public-private funding mechanisms.
<b>Energy conservation, emission reduction and renewable energy</b>	Key laws include the Law on Energy Conservation, the Renewable Energy Law, the Electric Power Law, and the Law on the Coal Industry. These laws create a framework for industrial policies to encourage energy conservation; restrict the development of high-energy-consumption and high-pollution industries; and develop energy-saving and environmentally friendly industries, including through the use of fiscal funds, taxes and subsidies, and guidance to financial institutions.
<b>Administrative regulations</b>	While the preceding laws provide overarching policy frameworks, there are also detailed rules for prescribing the specific measures for implementation in individual industries such as electronics, agriculture, sewage treatment and for particular environmental areas such as specific watersheds. In many cases, implementation is carried out by provincial governments and other local government agencies, so the administrative regulations of the State Council require and encourage action by local government to regulate industries, collect pollutant discharge fees and manage them as financial resources for environmental protection.
<b>Standards</b>	Standards for environmental quality are at the heart of the environmental governance system, and are set through a combination of national and local authorities. They are the basis for setting pollutant discharge standards, fees and permits and evaluating environmental impacts. Standards are set through a combination of national and local government bodies.
<b>Environmental prices</b>	Traditionally, the pricing of water, coal, electricity, natural gas and urban heat supply has not reflected the true cost of scarcity of natural resources and has acted as a subsidy for resource use. Increasingly, reforms are seeking to bring these prices into line with market principles.

The overarching Environmental Protection Law (2014) lays out several provisions in relation to public and private financing for investment in environmental protection and green technologies, including:

- **An increase in government spending** on environmental protection and pollution control (Article 8).
- **Government bodies to make budget allocations** for rural drinking water protection, domestic sewage and other waste disposal, pollution control for the livestock industry, prevention of soil pollution, and treatment of industrial and mining pollution (Article 50).
- **Use of economic levers to support the development of environmental protection industries**, through targeted finance, taxation, price and government procurement (Article 21).

- **Use of economic levers to encourage enterprises to reduce pollution beyond basic compliance requirements**, through targeted finance, taxation, price, government procurement (Article 22).
- **Strengthening pollution fees** to prevent and control of environmental pollution (Article 43).
- **Fiscal support for ecological protection** through a system of national and local fiscal support, and guidance from national to local level on the operation of a system of compensation for ecologically protected areas (Article 31).
- **Green procurement where** state authorities and other institutions financed by fiscal funds target energy, water and materials-saving products, equipment and facilities in their own operations. (Article 36)
- **Encouragement for the use of environmental pollution liability insurance** (Article 52).

Underlying these direct fiscal and financial measures, China's environmental management system stipulates that environmental quality standards and pollutant discharge standards should become increasingly rigorous over time. Such policies should continuously stimulate the expanding demand for investment in greener and more efficient products, processes and infrastructure, which is the basis for the development of green finance.

## 2.2 RESPONSIBILITIES AND MANAGEMENT OF ENVIRONMENTAL POLICY

**The Ministry of Environmental Protection** is the key competent authority under the State Council with responsibilities laid out in the Provisions on the Main Functions, Interior Institutions and Staffing of the Ministry of Environmental Protection (2008):

- **Decision making:** establish and improve basic system for environmental protection and develop environmental protection planning and budgeting
- **Coordination:** plan and coordinate major environment problems and ecological preservation as a whole
- **Regulation:** supervise and manage pollution and ecological damage

Other government agencies responsible for environmental protection include natural resource development and management agencies for water, forestry, land, mineral and marine resources; and economic and industrial management agencies for fishery, agriculture, industry and transportation. These agencies coordinate environmental protection planning and management in their sector; guide and supervise agencies, public institutions and enterprises within their sector; execute environmental protection laws, regulations and policies; organize the implementation of major projects in environmental protection; and promote clean production, technologies and techniques.

In China, local environmental protection work is managed locally. The superior (e.g., regional and national) environmental protection authority is only responsible for guidance for its direct subordinates. Staff, property and materials of subordinate environmental protection departments are managed by the finance department of the government at the same level. As a result, local governments retain staffing power and financial authority. This type of financial system will often result in local protectionism.

There are three main models for coordinating the roles of different bodies in public environmental protection:

1. **Integrated and separate departmental management model:** Multiple government departments manage separate components of one item, and the law establishes one comprehensive management department to enable coordination (e.g., the case of nature reserves).



2. **Centralized and supportive management model:** A structure of competent administrative department and relevant supporting departments for a certain item are clearly defined by law and regulation (e.g., in Article 5 of the Law on Desert Prevention and Control prescribes that the administrative department in charge of forestry of the State Council is responsible for the organization, coordination and direction of the desert prevention and transformation of the whole country).
3. **Centralized and level-based localized management model:** Where administrative authorities under the State Council exert management and supervision on a certain item centrally, administrative authorities under local governments at various levels are responsible for regulation of the same item in their respective jurisdictions (e.g., in the case of pollution control).

## 2.3 ENVIRONMENTAL POLICY: ANALYSIS OF CHALLENGES

As the central government seeks to advance its environmental protection work, problems and limitations in the existing legal and policy framework are emerging, including:

- **An inadequate institutional and legal system.** Among China's legislation for environmental protection and regulation, there is considerable overlap of institutional responsibilities and authority, without clear division of responsibilities for each department in the process of law enforcement and, in fact, some contradictions between different legal documents. For example, in relation to water pollution, the roles of the departments of environmental protection, the maritime administrative body, the departments in charge of water administration, state land and resources, health, construction, agriculture and fishery are not clearly defined.
- **Tensions between the national environmental protection system and local implementation.** Central government departments are responsible for nationwide environmental protection, developing policies and technical standards, and monitoring implementation. But the interests of local government responsible for environmental protection within their jurisdiction are often not aligned with these goals. For example, there are resource conservation agencies established for the seven major river basins; however, they do not have the power to intervene in local water management, and the functional departments at the central government level have not imposed restrictions on local governments' water-use policies. Local government policies are driven by local and short-term economic interests rather than conservation of the overall resource, leading to conflicts about water use among different departments.
- **Fragmentation of regulation and management of watersheds and ecological regions.** Existing regional environmental management systems fail to effectively solve the intergovernmental competition that cuts across boundaries. Within the scope of major river basins in China, there are many instances of cross-boundary pollution of water environments. In many cases, local governments at the upper reaches of rivers have not carefully fulfilled their regulation responsibilities, but it is the people and economies in the lower reaches that suffer loss due to water pollution.
- **Weak standards encouraged by ambiguous rules.** Environmental laws state that economic development must be considered in parallel with environmental objectives and that pollutant discharge standards must take into account environmental, economic and technical conditions (People's Republic of China, 1984). When setting resource fees, affordability to enterprises must be taken into account. These factors tend to weaken the economic incentives for resource users to invest in conservation and pollution control, as the prices they are paying do not reflect the true costs. For example, in 2011 the average industrial water resource fee was RMB 0.13/tonne, only equal to 8 per cent of actual water intake costs (RMB 0.4-1.6/tonne); the average pollutant discharge fee of industrial sewage was RMB 0.12/tonne, only equal to 2 per cent of actual disposal costs (RMB 5-10/tonne); while the average industrial sewage treatment fee was RMB 1.28/tonne, only equal to 20 per cent of actual disposal costs (Ma, 2014). In 2013 profits of large-scale industrial enterprises amounted

to RMB 6.3 trillion, but their water bill was only RMB 60 billion, less than 1 per cent of their profits (Ma, 2014). Rather than affordability being a true concern, low environmental standards offered a financial bonus for companies that did not shoulder environmental costs.

- **Poor enforcement and supervision.** Supervision plays a fundamental and critical role in environment resource pricing and enforcement. Currently, environmental supervision under the pollutant discharge system is limited to certain businesses and excludes, for example, smaller commercial businesses. Supervision is inadequate, without timely investigation and penalty for secret discharges and leaking emissions; therefore, the benefits from illegal behaviour are higher than the costs of legal violation, undermining the economic incentive to prevent leaking emissions and promoting secret and illicit discharges. In 2011 there were between 50,000 and 250,000 tonnes of sewage discharged along the middle reaches of Qinghe River in Beijing each day. Even after strengthening the disposal capability of sewage treatment plants, there were still several tens of thousands of tonnes of undisposed domestic sewage going into Qinghe River in 2013. In a series of special drainage rectification campaigns launched in Beijing in February 2014, among 20 pollutant dischargers, there were 15 units suspected to have engaged in excessive discharge and the other 5 units had no discharge permit at all. That is to say, the rate of secret sewage discharge is up to 100 per cent. At present, the highest penalty for secret sewage discharge is only RMB 30,000 in Beijing. It is estimated that between 2001 and 2011, low water price and undisposed discharge had helped enterprises make excessive profits in the accumulative amount of about RMB 1.5 trillion to 4.4 trillion (Ma, 2014).

The main channels for direct public financing comprise on-budget fiscal expenditure, ecological compensation systems and special funds.

### 3.1 ON-BUDGET EXPENDITURE

Fiscal environmental funding from the budgets of central government includes ongoing expenditure on environmental administration and protection, and allocations of capital (including as loans) for construction and retrofitting projects. The amount of investment in capital construction from the state budgetary fund is decided by the central government, and allocated by the National Development and Reform Commission (NDRC), as assigned by Ministry of Finance.

In accordance with provisions in *Budget and Measures for Administration of Capital Construction Expenditure Budget*, departments and competent authorities submit their capital construction expenditure budget each year to the finance department. The environmental protection department is therefore liable to report the allocation of fiscal funds for environmental protection to the finance department. In 2006 the state fiscal budget first established a specific category “211” for environmental protection. It includes a breakdown of expenditures into various subcategories, including environmental protection management, environment monitoring and supervision expenditure, expenditures for pollution prevention and control, natural ecological preservation, natural forestry protection, prevention and control of desertification and rehabilitation of grassland.

During the 11th Five-Year Plan period (2006–2010), capital construction funds for environmental protection from the state budget amounted to RMB 82 billion (USD 13 billion). In addition, the RMB 4 trillion (USD 600 billion) 2008–09 economic stimulus included energy conservation, emission reduction and ecological environment protection as the important areas for additional investment support.

In addition to funds received from central government, local authorities are able to invest extra-budgetary “self-raised funds” within quotas prescribed by the state. Self-raised funds include local fees and taxes, retained earnings from local SOEs, municipal debt and revenues from land sales.

In China, there is a sub-category of environmental investment termed “environmental input.” This relates to the direct use of revenues from pollution levies and from ecological compensation systems to fund pollution control and environmental protection by industry. The fees are accumulated into funds that are earmarked for pollution abatement projects in the form of soft loans available to individual enterprises and funding for local environmental protection authorities.

### 3.2 ECOLOGICAL COMPENSATION

China’s developing system of “ecological compensation” covers nature reserves, key ecological functional areas, mineral resources development and watershed management. It aims to provide transfer payments that compensate regions for the opportunity cost of conserving protected areas, and for investments (e.g., in reforestation and watershed management) whose benefits accrue to those down river. It is mainly carried out through fiscal payments, although there are efforts to develop it more towards a “payment for ecosystem services” system between users and stewards of natural resources.

Since 2008, the Ministry of Finance has started to implement transfer payment for key ecological functional areas, such as the Sanjiangyuan National Nature Reserve. In June 2012, the Ministry of Finance released Method of Transfer Payment to National Key Ecological Functional Areas at Local Level from Central

Treasury, offering ecological compensation to counties and cities where development is restricted by protected areas established through the National Main Functional Area Plan.

### 3.3 SPECIAL FUNDS

Special funds are a key mechanism for providing for environmental protection, law enforcement and pollution control. The funds are allocated from central fiscal departments to provincial environmental protection departments under the control of provincial treasuries. Examples include:

**“Three Rivers and Three Lakes.”** In 2005 a major environmental pollution accident took place in Songhua River and in 2007 a large bloom of blue algae caused serious pollution of Lake Taihu. In response, the Ministry of Finance established a special fund for prevention and control of water pollution in the watersheds of Three Rivers and Three Lakes and Songhua River. It provides funds for construction of waste treatment facilities and pollution prevention from industry and livestock. Payments are transferred from central to provincial governments based on a formula, and projects are determined and managed by provincial governments.

**Air Pollution.** In 2013 the Ministry of Construction consolidated various funds for air pollution control into a single special fund. RMB 5 billion (USD 0.8 billion) was granted for controlling atmospheric pollution in Beijing, Tianjin, Hebei, Shandong and neighbouring areas. In 2014 the central treasury allocated a further RMB 10 billion (USD 1.6 billion) to the fund (People’s Republic of China, 2014). Many local governments are planning to establish local funds. Beijing is establishing a fund of RMB 1.25 billion; Hebei is establishing a fund of RMB 0.1 billion; and Shandong is establishing a fund of RMB 1.2 billion.

**Rivers and lakes.** In November 2013 the Ministry of Finance and the Ministry of Environmental Protection released Provisions for Management of Funds for Ecological Environment Protection Projects of Rivers and Lakes. It established a special fund to support and reinforce the guidance and supervision of local government work to protect rivers and lakes. The fund applies to every level, from local to provincial governments. Industry is also encouraged to participate in investment.

**Agriculture and rural environment.** Pollutant run-off from agricultural sources reached 11.538 million tonnes, accounting for 48 per cent of the total organic matter discharge. Particularly, livestock and poultry breeding is a significant contributor to the problem. In 2011 the Central Treasury arranged a special fund of RMB 8 billion for comprehensive improvement of the rural environment. Local governments also contributed around RMB 15 billion through special funds and by attracting industry investment (Jun, Huiyuan, & Bo, 2012).

**Green Energy.** In 2011 the Energy Administration, the Ministry of Finance and the Ministry of Agriculture released Interim Provisions for Management of Subsidy Fund for Model Counties for Green Energy to promote rural use of green energy and regularize management of subsidy funding for constructing “model counties” for green energy. The subsidy funding is allocated from the central fiscal budget and used to support methane, biomass gasification, biomass and other renewable energy development, utilization projects and energy service systems in rural areas. Funds are provided in the form of subsidies, awards and discounted loans.

Special funds play an important guiding role in strengthening environmental investment at the local level. As well as providing direct resources, they play a guiding role for local governments, enterprises and society. They provide a partial subsidy but require local governments and enterprises to also provide inputs. For example, the Central Treasury allocated RMB 25 million to the special fund for environmental protection in rural areas from 2008–2014, to support environmental improvements in 59,000 villages, with a population of over 110 million people (Ministry of Environmental Protection, 2014b). This mobilized active inputs from

local treasury and self-raised funds by villages and towns for rural environmental protection. In some cases, funding allocation is performance-based, linking the release of funds to actual achieved reductions in pollution levels.

### 3.4 FISCAL FUNDING: ANALYSIS OF CHALLENGES

Fiscal inputs into environmental protection are increasing annually, and special funds have played a key role in mobilizing additional funding from local government. However, key issues emerging are:

- 1. Fragmentation of funding channels:** There are a variety of channels supporting different but overlapping priorities, so there is the possibility of repetitive investment. Special funds for environmental protection are fragmented and the total amount of funds is small, so it is hard to form an effective joint force between national and local funds.
- 2. Funding is mainly reactive and lacks of long-term strategy:** At present, the establishment and scope of special funds tends to be emergency oriented, focusing on solving major environmental problems as they emerge, such as the Three Rivers and Three Lakes clean up. In terms of source of funding, there is no stable funding and therefore management of the funds is characterized by contingency, provisionality and isolation rather than long-term and systematic consideration of environmental protection.
- 3. The use of funds and performance of projects is not well supervised:** The implementation and performance of projects supported by special funds is not routinely assessed, meaning that funds are not used in a cost-effective way. Priority is placed on releasing funds for investment. But without adequate supervision, projects may not be fully funded, and it is common for construction to be delayed and operations ineffective.

# 4

## FINANCIAL INSTRUMENTS AND POLICIES

In recent years, attention has turned to the role of financial institutions and markets in supporting environmental protection and industrial transformation. Starting in the 1990s, China has developed policies to establish systems for carbon markets as well as green credit, green securities and green insurance.

### 4.1 CARBON FINANCE

*Carbon finance* refers to investment and financing activities related to carbon trading, which has been fostered initially by the Kyoto Protocol to the United Nations Framework Convention on Climate Change. It includes direct investment and financing, emissions trading and bank loans directed at preventing greenhouses gas (GHG) emissions and monetizing these emission reductions.

The Kyoto Protocol established mechanisms for international emissions trading (IET), the Clean Development Mechanism (CDM) and joint implementation (JI) to enable signatory states to achieve emission reduction targets in a flexible manner. Carbon finance includes both direct trading of various emissions quotas on the spot market and associated financial derivatives, such as options and futures.

China's carbon finance market is still at the initial stage. Exchanges have been established in Beijing, Shanghai, Tianjin and Shenzhen, where they are mainly trading certified emissions reductions (CERs) based on CDM projects. China has accounts for over half of the projects developed under the global CDM market. By August 2013, the NDRC had approved a total of 4,934 CDM projects, among which 3,699 projects had been successfully registered with the CDM Executive Board, accounting for 51.3 per cent of global CDM projects (Manyi & Yanjiao, 2015).

The outlook for China's carbon finance market is promising, as China's industrial restructuring and economic transformation are continuing in the direction of reduced carbon intensity. The Chinese government has also committed to reducing the emissions intensity of the economy by 40–45 per cent between 2005 and 2020, which is included in the mid- to long-term plan for national development, as well as being an international pledge under the Copenhagen Climate Accord.

Along with the deepening of the emissions market, emissions rights will be increasingly monetized and further evolve into a financial derivative with stronger liquidity. Monetizing emissions rights offers an exit for investors and enables market players to carry out active and effective carbon asset management and enhance the attractiveness of the green finance sector for investors.

Since 2007 the Ministry of Finance has successively approved 11 provinces and cities including Tianjin, Jiangsu, Zhejiang and Shaanxi as the national pilot regions for exploring an emissions quota trading scheme. Starting in 2014 the Ministry of Finance will promote the establishment of emissions quotas and trading across the whole country, striving to set up pilots in all major provinces and cities within 2–3 years. By 2014 China had established carbon emissions trading markets in Shenzhen, Shanghai, Beijing, Guangdong, Tianjin, Hubei and Chongqing (Tao, Li, & Maosheng, 2014).

The Guiding Opinions of the General Office of the State Council on Further Advancing the Pilot Work for the Paid Use and Trading of Emission Rights issued by the State Council in 2014 calls for the gradual roll out of pollutant permits and charges. Relevant departments under the State Council shall study the formulation of financial and taxation policies encouraging emissions trading and financing, and encourage the participation of the private sector in pollutant discharge reduction and emissions trading.

## 4.2 GREEN CREDIT

China's financial landscape is dominated by banking. In 2013 aggregate bank financing to the real economy was RMB 17.29 trillion, making up 55 per cent of RMB and foreign currency-denominated loans (People's Bank of China, 2013). However, banks directly or indirectly also control financing and transactions in the bond, trust and shadow banking markets, so their overall ratio of financing is likely to be even higher. The main focus on green finance has therefore been on banking through "green credit."

In May 2006 China Industrial Bank (CIB) cooperated with the International Finance Corporation (IFC) to develop the first "green credit" product in China—a loan product for energy conservation and emission reduction projects. By the end of 2012, the financing balance for green finance by CIB amounted to RMB 113 billion (USD 18 billion), including a loan balance for green finance of RMB 71 billion (USD 11 billion). By the end of 2012, the energy savings of the projects financed by CIB amounted to 256 million tonnes of coal per year, and an annual carbon dioxide emission reduction of 67 million tonnes; an annual Chemical Oxygen Demand (COD) reduction of 887,000 tonnes; an annual ammonia nitrogen emission reduction of 15,000 tonnes; an annual sulphur dioxide emission reduction of 44,000 tonnes; and an annual nitrogen oxide emission reduction of 6,900 tonnes (Renjie, 2013).

In July 2007, in order to curb the expansion of energy-intensive and high-pollution industries, the former State Environmental Protection Administration, the People's Bank of China (PBC) and the China Banking Regulatory Commission jointly released the Opinions on Implementing Environmental Protection Policies and Regulations and Preventing Credit Risk, stipulating that banks should regulate credit on the basis of environmental compliance and establish necessary risk assessments as part of their process for loan approval. The Notice on Several Issues about Implementing the Credit Policy and Strengthening Environmental Protection Work issued by the PBC sets out requirements for environmental issues to be integrated into loan review, origination, monitoring and management of loans.

The Guiding Opinions on the Credit Work for Energy Conservation and Emission Reduction and the Guidelines on the Risk Management of M&A Loans of Commercial Banks issued by CBRC urge banking financial institutions to carefully implement national macroeconomic control policy, fulfill the social responsibilities of the financial sector, innovate in loan provision services, develop "green credit" business, reduce credit origination to energy-intensive and high-emission industries, and support industrial restructuring.

The Green Credit Guidelines issued by CBRC in 2008 require banks to increase the support to the green, low-carbon and circular economies and identify the directions and priority areas for green credit support. They should customize credit-granting guidelines, adopt differentiated underwriting policies and implement risk management.

Green credit policies have also been adopted for key areas. For example, in order to strengthen prevention and control of watersheds pollution, the State Council has organized banks to originate special funds for prevention and control of water pollution in the Huaihe River basin to support the construction of sewage treatment plants and prevention and control of major pollution source within the basin. Fujian has developed the Guidelines on Financial Support for Energy Conservation and Emission Reduction in Fujian requiring a streamlined loan procedure, preferential interest rate and prioritized credit support for "encouraged" energy conservation and emission reduction projects.

### 4.3 ENVIRONMENTAL INSURANCE

Environmental insurance, or green insurance, is a financial instrument that gives prominence to facilitating environmental risk management, enabling the hidden cost of pollution and other negative externalities to be internalized into decision making. The most common green insurance vehicle is environmental liability insurance to address environmental pollution accident risk. In some countries, industries of a polluting nature are mandated to buy this insurance. If pollution incidents occur, indemnities from the insurance company not only include the sum required to clean up the pollution, but also include fines, loss of real estate value, related legal expenses and medical expenses. The insurance mechanism makes the environmental cost explicit and encourages a reduction in investment behaviours involving excessive environmental risk. In addition, green insurance can also provide an effective mechanism for building resilience to long-term risks, such as natural disaster risks, exacerbated by climate change, including sea-level rise, floods and windstorms.

As early as the beginning of the 1990s, environmental protection departments, including in Dalian, Shenyang and Changchun, had started to explore the use of such insurance instruments. In 2007 the former State Environmental Protection Administration and CIRC jointly released the Guiding Opinions on Environmental Pollution Liability Insurance to actively promote environmental pollution liability insurance. In 2008 pilots of national environmental pollution liability insurance started in Jiangsu, Hubei, Hunan, Chongqing and Shenzhen.

In February 2013, the Ministry of Environmental Protection and CIRC jointly released the Guiding Opinions on Carrying out Pilots of Compulsory Environmental Pollution Liability Insurance to guide local governments to promote the pilot work of compulsory environmental pollution liability insurance in heavy-metal-related industries and industries with high environmental risks like petrochemical.

### 4.4 GREEN SECURITIES

Efforts towards green securities include establishing requirements for environmental audits as part of the process of issuing Initial Public Offerings (IPOs), additional issues and ongoing performance reporting. On the basis of research and pilots of green securities market, a set of auditing standards for securities market entry and environmental performance assessment methods has been set up for high-pollution and energy-intensive enterprises.

In February 2008, the former State Environmental Protection Administration together with the China Securities Regulatory Commission and other departments released the Guiding Opinions on Strengthening Supervision and Management of Environmental Protection by Listed Companies, that is to say the “guiding opinions on green securities,” which made environmental auditing a compulsory IPO requirement.

### 4.5 PUBLIC-PRIVATE PARTNERSHIPS

At the end of 2002, the former Ministry of Construction introduced the Opinions on Accelerating the Marketization Process of Urban Public Utilities, which called for market-oriented reform of urban public utilities. This heralded the breaking up of exclusive monopolies of SOEs and public institutions, opening them up to private investment in water, gas and heat, sewage and waste disposal services.

Since 2003 relevant departments have introduced a series of policies to encourage private and foreign capital to enter the urban public utilities sector. In 2004 the former Ministry of Construction introduced the Measures for Administration on the Franchise of Urban Public Utilities, which opened up the sector to private concessions and separated plant and network operations. For example, the Chishui River basin, which has



been designated a national nature reserve for rare and endemic fishes, in the upper reaches of Yangtze River, has been polluted by coal mining and electricity, brewing, chemical and paper making industries. RMB 2.6 billion has been allocated for pollution prevention and control by the relevant authorities. However, out-of-date environmental infrastructure, incompetent environmental supervision and inadequacy of funding remain major challenges. In 2014 Guizhou Province launched the pilot project of ecological progress system reform in the Chishui River basin and introduced the Work Plan for Pilot of Ecological Progress System Reform in Chishui River Basin in Guizhou. It estimated that funding demand for construction projects to protect the river basin had exceeded RMB 5 billion and is seeking to attract green private investment, including through the development of a payment for ecosystem services system within the river basin, and improve the investment and financing system for ecological environment preservation.

## 4.6 FINANCIAL INSTRUMENTS: ANALYSIS OF CHALLENGES

Financial institutions have developed policies and products to support environmental protection in response to these policies. But some challenges and limitations have also been revealed:

- 1. Unattractive risk: return rates for green investments.** Besides social responsibility, the drive for investors and lenders to be concerned with environmental protection is to avoid risks (such as risk of pollution fines or of destroying one's own assets), and to seize the opportunity to make returns through efficiency savings, and premiums for environmental services and green products. However, due to system and technology factors such as low pollution fees, in practice many of the risks and costs are not borne by the enterprise. Meanwhile, these enterprises causing pollution may outperform due to avoidance of the pollution control costs. Moreover, some environmental protection projects have long investment durations and high operation costs compared to the economic benefits to investors; therefore, under the pressure of profitability and market share, the commercial banks lack the momentum to support environmental protection.
- 2. Lack of environmental competency within commercial banks.** Technical expertise involved in originating green finance is very complex and continuously evolving. But with only a few technical specialists, the commercial banks have limited capabilities in technical identification and risk assessment in specialized areas; therefore, there is a tendency towards directing loans towards more readily understood traditional economic areas. Green credit criteria are mainly broad and principle-based, rather than providing specific guidance that can be directly implemented in relation to particular industries.
- 3. Green finance is overly dependent on the government.** Though commercial loans make up a large share of green investment, users of these commercial loans, or subjects of green investment, are largely SOEs or investment and financing platform companies that are guaranteed through government fiscal support. Such types of commercial loans are characterized by high financial risks, ultimately borne by the public balance sheet. Although most of the investments will generate good ecological effects and make great contributions to the goal of green development, solvencies of these investment projects are always linked with fiscal strength of local governments.
- 4. Lack of diverse funding channels.** In China, the investment fund in environmental protection is largely dependent on bank loans, which are not ideal for long-term investment. The lack of adequate alternative financing channels and financial instruments is not caused by a preference of credit-users for bank loans, but by system constraints imposed on other financing channels such as bonds, equities and trusts.

Industrial policy is a key feature of China's economic development model, implemented through investment, fiscal, taxation, financial, land, import and export policies. Its aim is to upgrade and restructure traditional industries and foster and develop strategic emerging industries. The key document is the *Guiding Catalogue for the Adjustment of Industrial Structure*, which was issued in 2005, and then updated in 2011 and 2013.

The catalogue provides the focus for upgrading and optimization of industrial structure and improving the competitiveness of industries, and divides industries into “encouraged,” “restricted” and “to-be-eliminated” categories.

The catalogue is updated periodically to reflect technological innovation, and to provide greater detail and boundaries where needed. For example, some technologies encouraged by the 2005 version have become sophisticated and widespread, so there is no need for them to be included on the “encouraged” list in future editions. Some varieties encouraged in the 2005 catalogue within steel, nonferrous metal and building materials have seen serious overcapacity, and in later versions consolidation is encouraged. For textiles, where the industry is concentrated in the East, the catalogue encourages elimination of out-of-date capacity and upgrading in the East at an accelerated pace, and the shifting of textile production capacity to the central and western regions. In the 2011 catalogue, 14 categories are newly added to the encouraged category, including new energy, urban mass transit equipment, comprehensive transportation, public security and contingency products. The 2013 update included new products under combined heat and power and offshore wind.

### 5.1 ENCOURAGEMENT OF NEW INDUSTRIES

Strategic new industries to be encouraged include energy conservation and environmental protection, biotechnology, new energy, new materials and new-energy automobiles. The largest distinction between the 2011 and 2005 versions of the catalogue is that new energy covering solar, wind, biomass, ocean and geothermal energy is included in the “encouraged” category for the first time in the newer edition.

Fiscal subsidies are a key public policy measure to encourage the development of green industries. For example, in 2013 a subsidy was developed to promote the uptake of energy-efficient and low-emission vehicles. This is aimed both at improving air quality and supporting strategic emerging industries in China. In the short term, new-energy-vehicle-related industries are expected to obtain excessive return under the stimulus policy. Moreover, with continuous increase of the market size, mid- to long-term investment value may also be improved.

Wind power is another industry that has received significant subsidy that enabled it to benefit from the global increased demand for wind power technology, bringing down prices through localization, scale and technology advances. Many believe that wind power in China will be profitable without subsidies by 2015. Wind farm building, grid-connected power generation and wind-power equipment manufacturing are hot spots for investment with promising outlook, while offshore wind power is potentially the next growth engine (which was added to the “encouraged” category the 2013 catalogue).

China is also pursuing the development of shale gas, signing the Memorandum of Cooperation with the United States in 2009 and including shale gas development in the 12th Five-Year Plan. The official document, titled *Policy for the Shale Gas Industry*, stipulates that the shale gas industry shall be totally open for private (local and foreign) investment and adopt market-based pricing.

“Encouraged” green industries have traditionally focused on end-of-pipe pollution control, but have expanded into ecosystem restoration and preservation in agriculture, water, nature reserves, petroleum and natural gas development, urbanization, mining and eco-tourism. In agriculture, for example, the working session of national agricultural policies and regulations held in April 2014 put forward to study eco-friendly agriculture, carry out pilots of agricultural resource rehabilitation and reinforce subsidies for natural resource protection. At the same time, stress is placed on restricting development in ecologically vulnerable areas.

In terms of encouraging environmental protection industries, policy guidance has been continuously expanded to advance financing and investment. On October 24, 2014, an executive meeting of the State Council chaired by Premier Li Keqiang decided to innovate the investment and financing mechanism in key areas and create more room for effective investment from the industry. The results include plans to further introduce social capital to participate in hydropower and nuclear power projects and build cross-regional power transmission passage, regional main grid, distributed power grid interconnection projects and electric vehicle charging and battery swap facilities, while encouraging social capital to invest in urban water and heat supply, and sewage and waste disposal.

## 5.2 REFORM OF EXISTING INDUSTRIES

“Restricted” industries and products are mainly production capacity, techniques, equipment and products that are out of date and need to be transformed or prohibited from new installation and production. By setting up the limits via “to-be-eliminated” techniques and products, the purpose is mainly to prevent low-level repetitive construction and avoid vicious competition caused by excessive oversupply of capacity, so as to promote a healthier environment for industrial development.

Specific standards support environmental protection and resource conservation in existing industries. For example, in the steel industry, the National Development and Reform Commission, the Ministry of Environmental Protection and Ministry of Industry and Information Technology released the Clean Production Evaluation Index System for Steel and Cement Industries (NDRC No. 3 Announcement in 2014), guiding and promoting the implementation of clean production of steel and cement companies.

In the 2011 version of the *Guiding Catalogue for the Adjustment of Industrial Structure*, the section on the nonferrous metal industry encourages innovation in smelting techniques and new material production for information, new energy industry, transportation and advanced manufacturing.

The catalogue also encourages consolidation of small-scale production in industries such as coal, electricity, steel, building materials, petrochemical, nonferrous metal, gold, light-industry and textile industries into larger enterprises, where efficiency is greater and environmental impacts can be more closely managed. This is also in line with environmental policy such as the Action Plan for Atmospheric Pollution Prevention and Control, released by the State Council in September 2013, which requires small coal-fired boilers to be eliminated and replaced with larger more efficient central heat and power cogeneration units.

In some cases, advances in technology can result in changes in the environmental basis for products and processes to be included in the catalogue. For example, disposable polystyrene tableware was included in the “to-be-eliminated” category in the 2005 version, but in the 2013 update it was removed because of advances in recycling this material. Meanwhile electro-plating using toxic and harmful cyanide was added to the “to-be-eliminated” category because a substitute process using gold potassium citrate had been found. After treatment, this results in a non-toxic chemical, which meets the Pollutant Discharge Standards for Electroplating, solving the pollution problem faced in the gold plating industry.

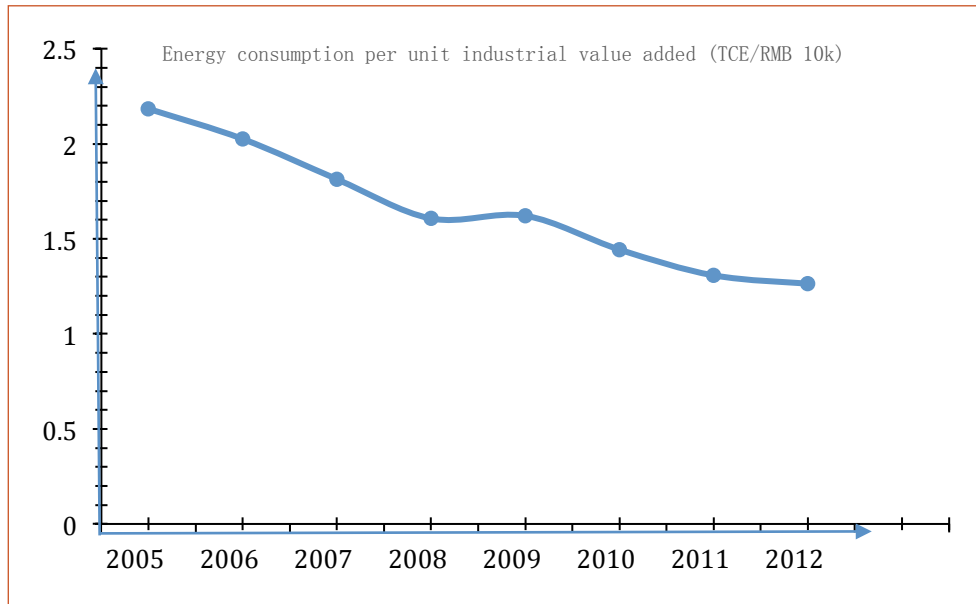
However, gaps in environmental policy, such as the lack of clear standards for environmental impact assessments make it difficult or impossible to prevent and control environmental problems. This can be seen in the National Economic and Social Development Plan for the 12th Five-year Plan period, which shows that China's industry is still oriented towards energy-intensive chemical and basic materials and lags in efficiency.

### 5.3 INDUSTRIAL POLICY: ANALYSIS OF CHALLENGES

China's industrial policy has imposed restrictions on the development of high-pollution and energy-intensive industries, but in practice these industries have continued to grow. China's industrial development is faced with the dilemma of gradually decreasing production levels, rising energy consumption and pollution, and reduced room for energy conservation and emission reduction, which pose an unprecedented challenge for green development.

- **Energy, resource- and pollution-intensive sectors continue to dominate the economy.** Driven by the pace and pattern of urbanization, and the associated demand for construction materials and automobiles, resource-hungry sectors such as metals, chemicals and minerals continue to maintain their dominance in the economy. Most of the fastest-growing sectors are those included in the "restricted" industries prescribed by industrial policy, such as coal mining and dressing, nonmetal mineral products, ferrous metal smelting and extrusion, chemical materials and chemical product manufacturing, and ferrous metal mining and dressing.
- **The demand for these sectors is likely to continue.** In the 2014 *Report on the Work of the Government*, Premier Li Keqiang indicated three tasks to focus on, each concerning 100 million people: granting urban residency to around 100 million rural people, rebuilding rundown city neighbourhoods where around 100 million people live and guiding the urbanization of around 100 million rural residents of the central and western regions. At the same time, according to Medium and Long-Term Railway Network Plan (revised in 2008) the operational mileage of railways will reach over 120,000 km by 2020, including 12,000 km of express lines. By the end of the 11th Five-Year Plan period, China's automobile output had amounted to 18 million units, almost a quarter of world total output. According to the forecast in the 12th Five-Year Plan, by end of the 12th Five-year Plan period (2017), China's automobile output will reach 25 million units. Development of these industries has created huge demands for the development of heavy industry in China.
- **China's traditional economic model is increasingly vulnerable.** Economic dependence on a heavy industry base has not only brought about large resource-environmental pressure, but also left the economy vulnerable to the volatility of international resource prices, and placed it at the lower end of the industrial value chain with low added value. China's low-cost model for economic competitiveness is also becoming hard to sustain as labour, land, environment and other factor costs have risen rapidly. Although the low-cost advantage will not disappear completely within the short term, a new competitive advantage must be developed. Between 2005 and 2012, gross industrial profits grew by 320 per cent, but between 2010 and 2012 they only increased by 0.8 per cent (National Bureau of Statistics of China, 2006–2013).
- **Further reductions in energy intensity will be harder to achieve.** As is seen in Figure 4, although energy consumption per unit of industrial value added has decreased from 2.18 all lower case: tonnes of carbon equivalent (TCE) emitted per CNY 10,000 in 2005 to 1.26 TCE per CNY 10,000 in 2012, the room for further reduction has been very limited. Average annual reduction of industrial energy consumption level was 8.7 per cent during 2005–2008, while the corresponding figure is only 5.4 per cent during 2008–2012. The reduction of industrial energy consumption level only decreased by 3.8 per cent in 2012. Energy conservation and consumption reduction under the traditional industrial development model is reaching its limits and a change of gear is needed.

FIGURE 2. CHINA'S INDUSTRIAL ENERGY CONSUMPTION LEVEL, 2005-2012



National Bureau of Statistics of China (2006, 2007, 2008, 2009, 2010, 2011, 2012, 2013)

This analysis highlights the complementary nexus between environmental policy, public investment, mechanisms for encouraging private finance and industrial policy. The following recommendations are complementary for promoting the development of green finance to serve demand for green investment.

### 6.1 ENVIRONMENTAL POLICY

Laws and regulations are the basis for environmental management, and to be effective, existing laws related to environmental protection require comprehensive amendment. The *National 12th Five-Year Plan for Environmental Protection* puts forward the need for amendments to the environmental quality and pollutant discharge standards and the norms for setting, managing and monitoring standards. Areas where the frameworks of environmental policy should be strengthened include:

- **Remove ambiguous policy objectives:** The objectives of promoting economic and social development and adapting to the requirements of national economic and social development should be removed from environmental protection laws. They create ambiguity and may become the rationale for promoting economic development at the cost of damaging the resource environment.
- **Base standards and fees on environmental criteria:** The stipulations to “consider economic and technical conditions” or “consider affordability of pollutant discharge” while formulating pollutant discharge standards and levies should be removed. These should be replaced with a clear principle of “user pays” and “polluter pays,” requiring enterprises to shoulder total resource environment costs. Pollutant discharge standards should be formulated for different regions based on the local environment and environmental quality standards, and set at a level that prevents degradation. Levies for breaching the discharge standard should fully reflect market supply and demand, resource scarcity, costs of ecological environment damage and benefits of restoration. Competitive markets should be encouraged to maximize efficiency and realize the triple benefits of saving resources, reducing emissions and cutting costs.
- **Strengthen supervision and management of compliance with discharge standards:** Tighten the standards and define the responsibilities of enterprises. For example, in order to implement the Action Plan for Atmospheric Pollution Prevention and Control, at the end of 2013 the Ministry of Environmental Protection and General Administration of Quality Supervision jointly released three standards on air pollution related to cement manufacturing. This led to 400 cement companies needing to go through renovation. Investment in dedusting and denitration facilities for a single cement company can cost up to RMB 19 million. Merely improving the pollutant discharge standard in the cement industry therefore brought about investment of nearly RMB 8 billion (Xiong, 2013).
- **Tighten discharge standards and implementation:** If the discharge standard was improved and the sewage discharge fee increased, higher fees could be collected on non-compliant enterprises. This would effectively increase the price of environmental damage to them and incentivize resource saving and reduction of pollutant discharge, so as to further technological advancement and improve efficiency. Tightening the standard does not mean an inevitable increase in production costs, but it encourages high efficiency, improved environment and resource saving. Under such preconditions, demands for environmental investment will be enhanced.
- **Strengthen regional pollution caps and system of discharge permits:** The system of regional pollution caps and discharge permits is one of the major management means to cascade and implement pollution cutting. This should be based on environmental quality standards, with discharge permits issued and supervised. Implementing the discharge permit system would support the elimination of backward production capacity, the upgrading and renovating of existing production facilities and the standard of newly built production facilities.

- **Reinforce pollutant discharge control in rural areas:** Pollutant discharge control from agriculture is of great urgency, in particular, pollution from livestock and poultry breeding. This has been addressed with special funds, and in the 12th Five-Year Plan for National Prevention and Control of Pollution from Livestock and Poultry Breeding, jointly issued by the Ministry of Environmental Protection and the Ministry of Agriculture, targets were set to reduce CDO and ammonia nitrogen discharge from livestock and poultry breeding by 8 per cent and 10 per cent, respectively, compared to 2010. Efforts should continue through fiscal funds and economic instruments, including taxation, credit and fees to attract industry investment in prevention, and control of pollution from livestock and poultry breeding.
- **Include more pollutants under control.** At present, types of pollutants under control are limited. Standards and targets have been introduced for pollutants such as PM<sub>2.5</sub>, sludge, nitrogen oxide and heavy metals, which will require increased efforts and investment to meet.

## 6.2 FISCAL FUNDING

In order to advance the role of green finance and solve the current problem of insufficient environmental investment, investment can be supported through special fiscal funds, and through “polluter pays” regulations, so that these industrial enterprises become core users of green finance.

- **Coordinate between the different funding channels:** Special funds focus on national key ecological functional areas and basic environmental public services. Formulas used to determine ecological compensation should take these two factors into account. Meanwhile, when the state is making transfer payments to local governments, it should provide the source of supporting funds, specify the targeted use for environmental protection and strengthen supervision.
- **Provide performance-related guarantees on the provision of special fiscal funds:** The Ministry of Finance, the Ministry of Environmental Protection and relevant local governments should sign agreements for environment quality improvement or pollution control that specify timely targets. Funds should be allocated on the basis of those targets, with a timetable of monitoring the drawdown of funds based on achieving improvements. Where funds are provided in advance, there may be a provision for them to be returned if targets are not met.
- **Diversify environmental financing channels:** On the one hand, the existing system that provides drivers for green investment should be improved, for example through the “three synchronizations” of planning waste management alongside construction projects: implementing the deposit system for enterprises’ pollution control, ensuring pricing policy reflects environmental costs and implementing preferential fiscal and tax policy. On the other hand, listed companies should be actively encouraged to raise investment funds for pollution prevention and control via stock market financing.
- **Innovate financing models and actively roll out the public-private partnership model:** to make social and government investment complement each other. This follows the decision of the executive meeting of October 24, 2014, chaired by Premier Li Keqiang, which called for opening up private-public partnerships and breaking through unreasonable monopoly and market barriers to private investment. This private investment could be in hydropower and nuclear power projects, power transmission and electric vehicle charging, railways, harbours, inland waterway transport facilities, airports, urban utilities, public transport and in ecological construction projects like farmers’ cooperatives and family farms.

## 6.3 FINANCIAL POLICIES

In general, bank loans and fiscal funding are not adequate means to realize the goal of green development. The need for investment in urban environmental infrastructure and industrial pollution prevention and control during the 13th Five-Year Plan period will require more diversified financing models.

The broad direction for environmental finance reform is to limit the direct use of government balance sheets and fiscal credit to provide financing while continuing to leverage fiscal, tax, price and land policies. This will encourage and support enterprises' green investment, to be met through increasingly market-oriented green finance supply.

The context in which China is developing green finance is different from other developed economies. As an emerging economy, China's financial system is at a critical stage of transformation and reform, and lacks the depth and sophistication of finance and credit systems. Therefore, green finance in China should not be developed by patching up the existing financial system, but by exploring a new financial development model.

- **Government should enable development of green capital markets.** The demands of green finance development cannot be satisfied by simply relying on green credit. China's financial system remains dominated by banking. In order to improve the operation, management and transaction risk management capabilities of the green financial system, the capacity for green investment through capital markets must be increased, including equities, bonds and derivatives, in order to multiply perspectives from a great number of institutional investors, intermediaries, risk investors and even Internet users to evaluate the outlook of green projects and realize an accurate pricing of project risks.
- **Government's intervention in green finance should shift from reliance on administrative instruments to enabling market forces.** In many areas, green industries are now at the technological frontier in China, which means that government does not have an information advantage on the innovation outlook of green projects. On the contrary, large-scale, high-speed and long-duration financial allocation of the kind that was used for industrial catch up may easily result in mismatching of funds at the industry level as well as the subsequent systematic financial risks. Providing support through discounted loans, differentiated structural reserve ratios and risk-based capital, weightings and environmental information disclosure can enable the market to play its role of price discovery, information identification and risk management.
- **The government's guarantee for green development should be transformed from implicit to explicit.** Green development projects such as new energy have tended to be supported by implicit guarantees, reflected in local bailouts. Such implicit guarantees may help companies get through hard times, but cut off the "creative disruption" mechanism of the market. The expectation of "last-resort" funding offered by the government implies a contingent liability that faces soft budget constraints, which is not good for the stability of green finance. By providing explicit guarantees for green projects through policy-based credit guarantee institutions, on-budget partial-credit guarantees and a re-guarantee system, the government could enhance credit availability while better sharing risk and maintaining stability.



## 6.4 INDUSTRIAL POLICY

Environmental-related industries are typically regulation- and policy-driven industries, and the key to promoting the development of the industry is getting this framework right. If environmental standards are well implemented, environmentally related industries have huge potential in terms of continuously expanded scale and significantly increased efficiency. On the other hand, weak execution of environmental protection and energy conservation policies leads to deformed development of industries and impedes the adjustment, transformation and upgrading of industrial structure. Industrial policy should:

- **Support and align with environmental policy.** This will promote the principle of eliminating backward and encouraging advanced industries (as emphasized in China's industrial policy strategy), leveraging complementary legal, economic and administrative instruments that incentivize energy conservation and emission reduction. Energy pricing and green taxation policies are important, as are mechanisms for encouraging market entry and the elimination of backward production capacity.
- **Encourage technology innovation.** Encouraging technological innovation is a key role for industrial policy. Chinese enterprises have weak technology development capacity, but key enterprises can become technology innovation and engineering centres to serve for the whole industry, mobilizing innovation along the industrial chain. Strategic alliances for developing technologies, knowledge, skills and production capacity together are crucial in generating breakthroughs in new industry. This was seen in the 1990s, in the United States with the industrial alliance for a new-energy vehicle, the U.S. Council for Automotive Research, which became the vehicle for government support (Zifeng, 2012).
- **Promote strategic environmental industries.** Industrial policy support for innovation should focus on environmental industries, with better effects on economic aggregates and structural adjustment; be significant to technological innovation; and have strong and sustained market demands favourable for sustainable development. Strengthening regulations on pollution prevention and control, as well as energy conservation, will also create opportunities for development of new service and support industries in areas such as urban sewage and waste disposal, industrial pollution control and environment remediation (see Annex III).
- **Require environmental impact assessments for industrial policy.** As China's economy is developing rapidly, addressing environmental problems caused by regional and industrial development policies is urgent. Industrial policy involves many areas with large uncertainties, and there are no clear procedures to assess and consider policy alternatives and impacts. Introducing clear requirements of environmental impact assessments for official policies, formal programs, action plans and specific projects would strengthen alignment with the environmental goals of industrial policy and would enable greater scientific and democratic inputs. To implement this, a full set of environmental impact assessment systems should be established. Environmental impact assessments on policies should consider natural environment impacts and constraints and also political, social and psychological impacts. A system and methodology for analysis should be developed involving both scientific analysis and public involvement, and should be applied with adequate support.

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# ANNEX 1: LEGAL AND POLICY FRAMEWORK FOR ENVIRONMENTAL PROTECTION

## ENVIRONMENTAL PROTECTION LAW

The **Environmental Protection Law** revised in 2014 forms the basic legal framework for environmental protection in China, and includes several provisions on the role of public finance as well as the use of economic levers to promote environmental protection:

- **Increase in government spending** on environmental protection and pollution control (Article 8).
- **Government bodies to make budget allocations** for rural drinking water protection, domestic sewage and other waste disposal, pollution control for the livestock industry, prevention of soil pollution, and treatment of industrial and mining pollution (Article 50).
- **Use of economic levers to support the development of environmental protection industries**, through targeted finance, taxation, price and government procurement (Article 21).
- **Use of economic levers to encourage enterprises to reduce pollution beyond basic compliance requirements**, through targeted finance, taxation, price and government procurement (Article 22).
- **Strengthening pollution fees** to prevent and control environmental pollution (Article 43).
- **Fiscal support for ecological protection** through a system of national and local fiscal support, and guidance from national to local level on the operation of a system of compensation for ecologically protected areas (Article 31).
- **Green procurement** where state authorities and other institutions financed by fiscal funds to target energy, water and material-saving products, equipment and facilities in their own operations (Article 36).
- **Encouragement for the use of environmental pollution liability insurance** (Article 52).

## SPECIAL LAWS ON POLLUTION PREVENTION AND CONTROL

In addition to the basic framework, there are six special laws focused on pollution control in relation to freshwater, air and sea and to noise, radioactivity and solid waste. In each case the laws include provisions to (1) toughen fines and pollution pricing; (2) encourage the use of clean materials and processes in industrial production; (3) establish lists of backward production techniques and equipment, to be prohibited from use or sale within a time limit; and (4) set up ecological compensation mechanisms.

TABLE A1: KEY MEASURES UNDER EACH LAW.

Special Law	Key measures in relation to green finance and investment	Year
Water Pollution	<ul style="list-style-type: none"> <li>• Compensation mechanism for preservation of water sources, rivers, lakes and reservoirs</li> <li>• Elimination of backward production capacity</li> <li>• Adoption of clean techniques by enterprises</li> <li>• Strengthen administration to reduce the generation of water pollutants</li> </ul>	2008
Atmospheric Pollution	<ul style="list-style-type: none"> <li>• Elimination of backward production capacity</li> <li>• Measures to encourage adoption of clean production techniques by enterprises</li> <li>• Economic and technical policies to encourage clean utilization of coal</li> <li>• Measures to encourage the production and use of low-emissions motor vehicles and ships</li> </ul>	2000
Marine Environment	<ul style="list-style-type: none"> <li>• Strengthen research and development on marine pollution control and environment</li> <li>• Elimination of backward production capacity</li> <li>• Development of oil pollution civil liability scheme requiring owners of vessels and cargoes to take out insurance covering their liability</li> </ul>	2000
Environmental Noise	<ul style="list-style-type: none"> <li>• Elimination of backward production capacity and technologies</li> </ul>	1997
Radioactive Pollution	<ul style="list-style-type: none"> <li>• Regulation of products to national standards on radioactive pollution</li> <li>• Requirements for plans on the decommissioning of uranium and thorium mines, to be included in the fiscal budget of the State</li> </ul>	2003
Solid Waste	<ul style="list-style-type: none"> <li>• Support for the adoption of centralized treatment of solid wastes</li> <li>• Promotion of industrial development of the waste management industry</li> <li>• Research, development and promotion of production techniques and equipment for solid waste management</li> <li>• Elimination of backward production techniques and equipment.</li> <li>• Improve the composition of fuel, and develop coal gas, natural gas, liquefied gas and other clean energy sources for use in urban areas</li> <li>• Decommissioning expenses for facilities for disposal of hazardous wastes to be drawn in advance and incorporated into budget.</li> </ul>	2005

## LAWS PROMOTING CIRCULAR ECONOMY AND CLEAN PRODUCTION

**Circular economy** is a strategy that has been adopted by the Chinese government that aims to improve the efficiency of materials and energy use in the economy. Relevant laws have formed a new branch in the legal framework of environmental protection. Currently, there are two main laws in this field: the Clean Production Promotion Law and the Circular Economy Promotion Law. Provisions on source of funding and expansion of financing in these laws include provisions for the State Council, the relevant administrative departments under it and the people's governments of provinces, autonomous regions and municipalities directly under the central government to:

1. **Formulate industrial, fiscal and taxation policies** promoting clean production and circular economy.
2. **Strengthen supervision on key polluting and high-resource industries** such as steel and other metals, coal, electricity, petroleum processing, chemicals, building materials, construction, paper mills, printing and dyeing.
3. **Encourage the development of technologies, techniques and equipment** for resource recycling, regeneration and comprehensive utilization.
4. **Require fiscal input from central and local governments** and encourage a local fiscal fund to guide private capital into the area of resources recycling and utilization.

## LAWS RELATED TO ENERGY CONSERVATION AND RENEWABLE ENERGY

There are four laws related to energy conservation, emission reduction and renewable energy: the Law on Energy Conservation, the Renewable Energy Law, the Electric Power Law, and the Law on the Coal Industry.

The Law on Energy Conservation, effective since January 1998, provides for the state to implement industrial policies to encourage energy conservation and environmental protection, restrict the development of high-energy-consumption and high-pollution industries, and develop energy-saving and environmentally friendly industries. It requires governments at or above the county level to strengthen their energy conservation work in agriculture and rural areas, and increase investment into deployment of energy conservation technologies and products in agriculture and rural areas. Financial measures include:

1. **Establishment of energy conservation funds** by central and local treasuries.
2. **Preferential taxes and fiscal subsidies** for production and sale of energy-efficient products such as lighting.
3. **Trade-related tax and price policies** to encourage the import of advanced energy conservation technologies and control the export of highly energy-consuming and serious-pollution products.
4. **Guidance to financial institutions** to increase credit availability for energy conservation projects, and to encourage and guide relevant sectors to increase investment into energy conservation and accelerate technological transformation of energy conservation.

The Renewable Energy Law stipulates that the state shall give priority to the development and utilization of renewable energy in energy development, including through a national target for renewable energy use, and focus on rural areas. Financial measures include:

1. **A renewable energy fund** for supporting research, development and deployment of renewable energy and the development of local production of equipment.
2. **Fiscal support for financial institutions to give discounted loans** for renewables projects.
3. **Preferential tax policy** for projects that are listed in the renewable energy industry development guidance catalogue.

## ADMINISTRATIVE REGULATIONS OF THE STATE COUNCIL

While the preceding laws provide overarching policy frameworks, detailed rules prescribe the specific measures for implementation. For example the Regulation on the Administration of the Recovery and Disposal of Waste Electrical and Electronic Products, which took effect in January 2011, includes provisions to establish a budgetary fund for the disposal of waste electrical and electronic products, and to subsidize the expenses for recovering and disposing of waste electrical and electronic products. The fund is managed by the public finance of the State Council in conjunction with the relevant departments.

The Regulation on the Prevention and Control of Pollution from Large-scale Breeding of Livestock and Poultry, effective January 2014, offers public funding, preferential taxation and subsidies for investments in prevention and control of pollution by livestock, the purchase and use of organic fertilizer and biogas generation.

The Regulation on Urban Drainage and Sewage Treatment, effective January 2014, encourages private investment construction and operation of urban drainage and sewage treatment facilities through government concessions and purchase of services. Sewage treatment costs should be provided for in local fiscal budgets, with fees sufficient to cover costs.

The Rules on Urban Water Supply, issued by the State Council in 1994, prescribe that urban water pricing should allow for cost recovery and a small profit for profit water utilities.

The Rules on Collection and Use of Pollutant Discharge Fee, effective July 2003, seeks to address the misappropriation of pollution fees and establish budget management. It says that pollution fees will be ringfenced for environmental protection, but requires that pollution fees be turned over to the treasury, with environmental protection costs budgeted for by environment authorities, with prices through national standards.

Specific regulation of drainage basins include Regulation on the Administration of the Taihu Lake Basin and Interim Regulations on the Prevention and Control of Water Pollution in the Huaihe River Valley, which require provincial governments to encourage and support enterprises to voluntarily shut down and relocate factories, change the line of production and carry out technical transformation for reducing water pollutant discharge through measures in terms of financial, credit and government procurement.

## ENVIRONMENTAL STANDARDS

Standards for environmental quality are the basis and rationale for implementing a series of environment management systems, including the pollutant discharge standard, pollutant discharge fee, pollutant discharge permit, environmental impact evaluation, etc. It is prescribed in Article 9 of the Environmental Protection Law that “the competent department of environmental protection administration under the State Council shall conduct unified supervision and management of the environmental protection work throughout the country. The people’s governments of provinces, autonomous regions and municipalities directly under the Central Government may establish their local environmental quality standards for items not specified in the national standards for environmental quality and report to the competent department of environmental protection administration under the State Council for the record” (Article, 7, People’s Republic of China, 1989).

The Environmental Protection Law stipulates that national standards for environmental quality shall be established by the competent department of environmental protection administration under the State Council; local standards for environmental quality can be more stringent than national standards, and shall be enacted by local governments.

## STANDARDS FOR POLLUTANT DISCHARGE

It is stipulated in the Environmental Protection Law (1989) national standards for pollutant discharge shall be established “in accordance with the national standards for environmental quality and the country’s economic and technological conditions. ... The people’s governments of provinces, autonomous regions and municipalities directly under the Central Government may establish their local standards more stringent than the national standards.” (Article 10).

Compliant discharge is a way imposed by the State to control pollutant discharge. Units discharging pollutants into the environment must comply with corresponding pollutant discharge control standards. There are relevant provisions in the Environmental Protection Law, the Law on Prevention and Control of Water Pollution, the Law on Prevention and Control of Atmospheric Pollution, and the Law on Prevention and Control of Environmental Pollution by Solid Waste, etc. Discharge standards shall be compulsorily imposed by law; however, in environment legislature, there is no provision about excessive discharge violating the law.

Standards for environmental quality and pollutant discharge are closely linked and form the basis for polluter levies and controls. For example, in 2010, in the Guiding Opinions on Pushing Forward the Joint

Prevention and Control of Atmospheric Pollution to Improve Regional Air Quality put forward to “develop and implement special emission limits for air pollutants for key industries in key regions” (State Council, 2010). In 2013 the Clean Air Alliance of China’s *12th Five-Year Plan on Air Pollution Prevention and Control in Key Regions* stipulated:

Newly built projects must be supported with advanced pollution control facilities; thermal power, steel works sinter machine and other projects shall be equipped with high-efficiency dedusting, desulfurization and denitration facilities; newly built cement production lines must adopt low-nitrogen combustion technique, install bag filters and fuel gas denitration devices; newly built coal-fired boilers must install high-efficiency dedusting and desulfurization facilities, adopt low-nitrogen combustion or denitration technique and meet the discharge standard requirement. Newly built heavy-pollution projects including thermal power, iron & steel, petrochemical, cement, ferrous metal, chemical projects and so on, and industrial boilers in key emission control areas must satisfy the special emission limit requirement in the discharge standard of air pollutants; such requirement will be applied to thermal power projects since the release of the Plan and for other industries, the time of implementation is in synchronization with the time of discharge standard release.

By implementing the new *Emission Standard of Air Pollutants for Cement Industry*, particulate matter (PM) emissions from the cement industry will be reduced by around 35 per cent and nitrogen oxide emissions will be reduced by 50 per cent (Ministry of Environmental Protection, 2013) .

## ENVIRONMENTAL PRICES

Traditionally the pricing of water, coal, electricity, natural gas and urban heat supply has not reflected the true cost of scarcity of natural resources and has acted as a subsidy for resource use. Increasingly, reforms are seeking to bring these prices into line with market principles.



Resource	Pricing system
<b>Water</b>	According to the Notice of General Office of the State Council on Promoting Water Price Reform to Promote Water Saving and Water Resources Protection, released April 2004, the objective of implementing water price reform in China is to establish a water price mechanism that fully reflects the scarcity of water in China and focuses on water saving, reasonable allocation of water resources, an increase in water efficiency and the promotion of sustainable utilization of water resources. Integrated water prices include water resource fees paid by water supply operators to the government; water supply prices paid by water users to supply operators' sewage treatment fees paid by polluters and used for the construction and operation of sewage treatment plants; and sewage discharge fees collected from enterprises, public institutions and individual business owners discharging pollutants into the water body directly. Sewage discharge fees belong to a budgetary fund to be used for pollution prevention and control.
<b>Coal</b>	China's coal price mainly depends on supply and demand in the domestic market, the government's regulatory policies and impacts on coal production costs. The Notice on Doing a Good Job in Inter-Province Coal Production, Transportation and Demand Linkage in 2007, issued by the National Development and Reform Commission (NDRC), put forward three basic principles for coal product pricing: market-oriented reform based on supply and demand, quality-based pricing and electricity price reform that reflects the underlying cost of coal.
<b>Electricity</b>	Electricity prices have long been subsidized, which hampers energy efficiency. Recent reforms in residential electricity include peak load pricing and tiered pricing policy for high- and low-electricity-use households. For industrial energy, targeted pricing offers differentiated pricing between "to-be-eliminated," "restricted" and "encouraged" categories of energy production. The feed-in tariff for small thermal power units has been reduced to expedite their shutdown. The government offers subsidies for thermal power plants based on air pollution reduction
<b>Natural gas</b>	Currently, the government chiefly sets the natural gas price in China, at a lower rate than the international price, but the aim is for greater market and dynamic adjustment linked with alternative energy prices and scarcity. Factory gate and pipeline transmission prices are set by NDRC. The Opinions of NDRC on Priorities in Deepening Economic Structure Reform in 2013, endorsed by the State Council, promotes natural gas price reform where prices at the city level will be negotiated based on supply and demand, and managed by competent pricing authorities of the local government, within a capped range prescribed by the state. Subsidies shall be offered to natural gas prices for public transit and taxis, which play an important role in daily life of residents.
<b>Urban heat supply</b>	The price of urban heat is guided by the heat-price-setting authorities of the local government. Urban heat price is divided into factory gate price, pipeline transmission price and sales price. On June 3, 2007, NDRC and the former Ministry of Construction jointly released the Notice on Issuing the Interim Measures for the Price Control of Urban Heat Supply, which stipulates that market supply and demand for heat supply and use shall be established by following the principle of market economy. The commercialized mechanism is applied for heat use. Heat price shall be able to cover all reasonable costs, ensure profit for investors and realize profit making for whoever invests in it. Price at a loss can neither attract market capital nor promote marketization of the heat supply industry.

## ANNEX II: DATA ON INDUSTRIAL SECTORS

TABLE A2: CHINA'S TOP 10 INDUSTRIAL SECTORS, 2005 AND 2011

Rank	Top 10 industrial sectors in 2005	Ratio to all sectors (measured by gross industrial output value) in 2005	Top 10 industrial sectors in 2011	Ratio to all sectors (measured by gross industrial output value) in 2011
1	Communications devices, computers and other electronics manufacturing	10.73%	Ferrous metal smelting and extrusion	7.59%
2	Ferrous metal smelting and extrusion	8.53%	Communications devices, computers and other electronics manufacturing	7.56%
3	Production and supply of electric power and heat	7.07%	Transportation equipment manufacturing	7.49%
4	Chemical materials and chemical products manufacturing	6.50%	Chemical materials and chemical products manufacturing	7.20%
5	Transportation equipment manufacturing	6.25%	Electrical machinery and equipment manufacturing	6.09%
6	Electrical machinery and equipment manufacturing	5.52%	Production and supply of electric power and heat	5.61%
7	Textiles	5.04%	Agricultural and sideline food processing	5.23%
8	Petroleum processing, coking and nuclear fuel processing	4.77%	General equipment manufacturing	4.86%
9	Agricultural and sideline food processing	4.22%	Nonmetal mineral products	4.76%
10	General equipment manufacturing	4.22%	Petroleum processing, coking and nuclear fuel processing	4.37%

Source: National Bureau of Statistics of China (2006, 2012).

TABLE A3: TOP 10 INDUSTRIAL SECTORS SHOWING THE FASTEST GROWTH DURING 2005–2011

	Ratio to all industrial sectors (measured by industrial output value) in 2005	Ratio to all industrial sectors (measured by industrial output value) in 2011	Increase
Transportation equipment manufacturing	6.25%	7.49%	1.24%
Coal mining and dressing	2.27%	3.43%	1.16%
Nonmetal mineral products	3.65%	4.76%	1.11%
Ferrous metal smelting and extrusion	3.15%	4.25%	1.10%
Agricultural and sideline food processing	4.22%	5.23%	1.01%
Chemical materials and chemical products manufacturing	6.50%	7.20%	0.70%
Special equipment manufacturing	2.42%	3.10%	0.68%
General equipment manufacturing	4.22%	4.86%	0.64%
Electrical machinery and equipment manufacturing	5.52%	6.09%	0.57%
Ferrous metal mining and dressing	0.39%	0.94%	0.55%

Source: National Bureau of Statistics of China (2006, 2012).

## ANNEX III: KEY GREEN INDUSTRIAL DEVELOPMENT OPPORTUNITIES

China's environmental challenges are also opportunities for green industrial development. Key areas include:

**Environment remediation.** Before 2010 there were less than 20 enterprises involved in heavy metal pollution and soil restoration, but in 2013 the number exceeded 300. Since 2009 the number of land restoration projects has experienced exponential growth. There were less than 20 land restoration projects in 2010, but the number was more than 100 in 2013. The overall size of China's land restoration market is expected to reach over RMB 1 trillion by 2020 and the relevant third party environmental monitoring market size is expected to be between RMB 5 billion and RMB10 billion. The central treasury will allocate RMB 30 billion for contaminated soil restoration across the country; for legacy-polluted land in cities, the central government will offer 30-45 per cent fiscal subsidies.<sup>1</sup>

In recent years, mine ecological restoration has experienced rapid growth in China. During the 11th Five-Year Plan period, the central treasury made a total investment of RMB 12.9 billion and brought along inputs of RMB 50 billion from local treasury, enterprises and social capital (Han, 2011). During the 12th Five-Year Plan period, average funds invested in ecological restoration for mining area annually amounted to RMB 85.78 billion (National Bureau of Statistics of China, 2012).

Various types of contaminated sites that originated from petroleum, chemical, coal, steel and iron industries, as well as landfills, farms and slaughterhouses, are in urgent need of reclamation for reuse. If over RMB 100 million needs to be invested in the reclamation of one contaminated site, it is estimated that the overall investment for site reclamation in China could reach RMB 500 billion–600 billion.

Large areas of arable land are contaminated. Given the existing over 0.7 million hectares of contaminated arable land, their funding demands are especially huge. However, compared to the potentially generous return from real estate development based on site reclamation, remediation of arable land generally involves a long cycle. As the income from crop planting is limited, to remediate one hectare of arable land, it may need to take dozens of years to recover the cost, which makes it difficult to attract social capital inputs.

**Green mining** is an emerging innovative concept of ecological restoration that considers resource efficiency and environmental impact in a comprehensive manner. It follows the principle of green industry to develop a kind of mining technology in alignment with the environment with low impacts, high utilization and low emissions.

**Underground water** supplies nearly 70 per cent of the Chinese population's drinking water and 40 per cent of farmland irrigation. Remediation expenses for underground water pollution are huge. The California Underground Storage Tank Cleanup Fund, for example, offers USD 1.5 million for underground water remediation of a contaminated site related to a fuel station. For other sources of pollution, for example from refineries, military bases, waste yards etc., the remediation expenses for underground water pollution are significantly larger. In the future, China will make a total investment of RMB 34.66 billion in six types of projects for prevention and control of underground water pollution, including:

<sup>1</sup> Source: data provided by Chinese Professional Committee for Prevention of Heavy Metal Pollution and Solid Remediation of the China Association of Environmental Protection Industry

- An underground water pollution survey,
- A demonstration of prevention and control of pollution for underground sources of drinking water
- A demonstration of prevention and control of underground water pollution in typical sites
- A demonstration of remediation of underground water pollution
- A demonstration of prevention and control of non-point source pollution in agriculture and underground water environment supervision capability building

The National Groundwater Pollution Prevention and Control Plan (2011–2020) provides for some RMB 1.43 billion for demonstration projects (Ministry of Environmental Protection, 2011). The National 12<sup>th</sup> Five-Year Technological Development Plan for Environmental Protection states in the investment in technological development plan for the environment, that RMB 5 billion will be used for prevention and control of water pollution. In future decades, various segments, including underground water quality monitoring, industrial sewage treatment etc., will enter the underground water remediation market and generate huge demands for funding.

**Innovation in new energy technology** is accelerating and energy conversion efficiency is substantially improved. New energy has entered the stage of scaled and accelerated development, which plays a vital role in additional energy supply and has gradually transformed into the major alternative energy from the original status of supplementary energy. China has abundant renewable energy resources. Technically feasible installed capacity for hydropower resources is 0.54 billion kilowatt hours (kWh), ranking number one in the world. Onshore available wind energy capacity is 0.3 billion kWh, and when combined with the available wind energy capacity in offshore area, the total capacity is about 1 billion kW. Solar power resources are plentiful and for about two thirds of the national territory area, annual average sunshine hours exceed 2,200. The potential for biomass resources to be converted into energy is about 1 billion tonnes of coal equivalent (TCE) (Jingyi, 2013). In 2012 total development and utilization of renewable energy, including wind, solar, biomass energy etc., only accounted for less than 1 per cent of overall energy consumption. In the long run, China's new energy industry is poised with the conditions, market and policy environment of rapid development.

**Green building materials** are an effective measure and path for the building materials industry to vigorously solve overcapacity and prevent and control atmospheric pollution. MIIT and Ministry of Housing and Urban-Rural Construction have established the cross-ministry coordination mechanism for green building materials promotion and application. Meanwhile, technical requirements for major varieties of green building materials are being researched. MIIT and Ministry of Housing and Urban-Rural Construction will issue *Action Plan for Development of Green Building Materials and Methods for Administration of Green Building Materials Evaluation and Labeling*. This document will formulate the technical requirements for green building materials to be promoted in the first batch, carry out green building material evaluations and release a catalogue of green building materials. The green building materials industry will surely make tremendous progress in the future.

**Electric vehicles** may not only be an important means of economic stimulation, but also realize the multiple goals of guaranteeing energy security and responding to climate change. China has the basis and conditions to accelerate and promote the research, development and industrialization of electric vehicles. If the strategic objective is clearly defined and policies and measures are properly put into place, China may experience technological leapfrogging and create a competitive edge in electric vehicles, similar to Japan's experience in establishing global competitive advantage with energy-efficient compact vehicles after the oil crisis.

**Bio-technology** is a strategic industry of mid- to long-term significance. The Organisation for Economic Co-operation and Development point out in their report, *The Bioeconomy to 2030: Designing a Policy Agenda*, that by 2030, industrial application will account for 39 per cent of gross output of bio-technology; 36 per cent

for agricultural application and 25 per cent for pharmaceutical and healthcare application, among which industrial application has the largest potential. China's bio-industry has undergone faster development in the hi-tech area in terms of technology, talent and scientific research base and has abundant bio resources, making it the most promising area to realize the leapfrog development. As seen by industrial maturity, China's bio-agriculture takes the lead and its industrialization may be accelerated if genetically modified technology policy can be properly adjusted in good time. Bio-medicine takes the second place; all told, bio-industry (including bio-energy, bio manufacturing etc.) has great potential.

**Energy performance contracting** shall be earnestly promoted. After signing a technology and energy management service contract with the client, the energy service company will be responsible for financing, shouldering the technological and financial risks, implementing and managing energy conservation projects on behalf of the client and sharing the benefits of energy conservation with the client according to contract provisions within the contract term. Energy performance contracting, on the one hand, enables enterprises to accelerate the implementation energy-efficient projects with good economic benefits that currently exist in the enterprises under the precondition of zero input. On the other hand, energy service companies will seek for customers to implement energy conservation projects. As advance payment is needed for all investment, the major bottleneck for energy performance contracting is a shortage of funds, which also demands for the development of green finance.

**Recycling industry.** The State Council printed and distributed the *Circular Economy Development Strategy and Near-term Action Plan* in January 2013. It states that the total output value of the resource-recycling industry shall substantially increase to RMB 1.8 trillion in 2015 from RMB 1.0 trillion in 2010. However, by the end of 2013, the corresponding figure was only RMB 1.3 trillion. Demands for green finance from the circular economy cannot be underestimated. Through promoting circular production of the enterprise, circular development of industrial parks and circular combination of industries, and creating the circular industrial system, by 2015, energy consumption per unit of industrial value added and water consumption shall be reduced by 21 per cent and 30 per cent respectively compared to 2010. The comprehensive utilization rate of industrial solid wastes will reach 72 per cent, and over 50 per cent of national industrial parks and over 30 per cent of provincial industrial parks will implement circular-oriented renovation.

**High-efficiency energy** is an area of huge potential. In 2013 total consumption of primary energy reached 3.75 billion TCE, where coal consumption amounted to 2.475 billion TCE and its ratio in total primary energy consumption was still as high as 66 per cent, in spite of a 0.6 percentage point decrease compared to 2012. Gross power generation in China was 5.32 trillion kWh in 2013, including 4.2 trillion kWh from thermal power, while hydropower, nuclear power, wind power, solar power and biogas generation totalled 1.163 trillion kWh<sup>2</sup>. Several decades into the future, the ratio of coal and petroleum in the primary energy structure will be gradually reduced, but they shall still be dominant. Therefore, efficient and clean use of fossil energy is of immediate significance. High-efficiency and low-pollution use of coal resources is strategically important for securing the stability of the energy structure for a coal-reliant nation like China, as well as future application of carbon capture and storage technology.

In the working session for the national 13<sup>th</sup> Five-Year Energy Plan in 2014, it was put forward that the position of coal as a principal energy will not change, and that clean and efficient use of coal is the important cornerstone to guaranteeing energy security. Consequently, China shall continue to increase the ratio of coal use in power generation and implement the action plan for energy conservation, emission reduction, upgrading and renovation of coal power. For newly built coal-fired units, net coal consumption is lower than 300 grams standard coal/kWh and the level of pollutant emission is similar to that of a gas generator. For 600,000 kWh and above units in active service, China will strive to reduce the net coal consumption to 300 grams standard coal/kWh. Therefore, developing high-efficiency energy through clean coal and clean thermal power will create a huge market demand for green finance.

<sup>2</sup> Source: National Bureau of Statistics of the P. R. China: <http://www.stats.gov.cn/>.

# GREENING CHINA'S FINANCIAL SYSTEM

## CHAPTER 4:

# LESSONS FROM THE DEVELOPMENT OF GREEN FINANCE IN CHINA

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## EXECUTIVE SUMMARY

With the initial progress of China's green finance market, some lessons are emerging that are useful both for the further development of the green finance system and for other emerging market countries embarking on green finance development.

- **Strategic political commitment** has been the key driver for China's development of green finance, but translating this into effective implementation remains a challenge.
- **Reconciling diverse interests** between central and local governments and between state and market players has been the critical challenge.
- **An initial, loosely defined approach** to the scope of green finance has enabled experimentation; however, to scale-up the development further requires clear and comparable definitions.
- **Mechanisms for coordination and cooperation** between departments are a critical success factor, but need continued strengthening.
- **Supporting policies are critical** to translating high-level commitments into action, but are not yet fully in place.
- **China's green finance system is at an early stage** of innovation and development and is not yet balanced across different channels, investors and products.<sup>1</sup>

## INTRODUCTION

China has made progress in its efforts to explore and develop the market practice and policy system of green finance (as outlined in other chapters in this volume), but it still has far to go before it completes the transition to a green economy. Nevertheless, there are already many experiences and lessons, both positive and negative, that are worth highlighting. These can help to inform the next steps in China and other countries, in particular in other emerging markets.

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<sup>1</sup> China's green finance policies have attracted the attention of the national governments of many other emerging market countries. The governments of such countries as Vietnam and Bangladesh have sent multiple delegations to China and green credit policies have been repeatedly mentioned as an important practice in promoting sustainable development in foreign exchange activities. When the Nigerian government learned of China's green credit policies in its visit to China, the Central Bank of Nigeria also vowed to promote environmental and social risk management policies in Nigeria.

## LESSON I: STRATEGIC POLITICAL COMMITMENT

Strategic political commitment has been the key driver for China's development of green finance, but translating this into effective implementation remains a challenge.

*Actions follow ideas. For many emerging market countries, establishing green and sustainable development as their national strategy with support at the highest levels has been a crucial step to popularizing the ideas of green development and environmental protection. China has promoted sustainable development to a national strategy and given it unprecedentedly high importance, providing a boost for the development of green finance.*

Starting with the Sixth Five-Year Plan (1981–1985), a National Environmental Protection Plan was included as a chapter in the Plan for National Economic and Social Development, and work was initiated to begin to implement it. The goals of the environmental protection plan were also listed separately, starting in the Ninth Five-Year Plan (1996–2001). However, up to the 10th Five-Year Plan, the focus remained on pollution prevention and control aspects only. In the 11th Five-Year Plan (2006–2011), the Environmental Protection Plan was upgraded to a separate State Council publication. This showed that it was extending beyond a single governmental department and beginning to be considered in national-level planning. In 2013 the 18th Communist Party of China (CPC) National Congress incorporated ecological progress alongside economic development, political development, cultural development and social development as a core goal for “five-in-one” development. The latest revised Environmental Protection Law of the People's Republic of China released in April 2014 stated that environmental protection is the basic national policy of the state. Green and sustainable development has become one of China's national strategies. On the level of local governments, increasing attention has been attached to green and sustainable development in recent years. Many provinces have released separate documents in support of ecological progress, and many provinces have worked with regulatory authorities to release documents on green finance. For example, Jiangxi Province released Twenty Policy Measures for Accelerating the Development of Energy-Saving and Environmental Protection Industry in September 2013, which included plans to enhance the fiscal, taxation and financial frameworks for energy-saving and environmental protection. In February 2014, the Peoples Bank of China Huhehaote Central Sub-branch collaborated with the seven governmental authorities in Inner Mongolia to jointly release Guiding Opinions on Supporting the Promotion of Ecological Progress in Inner Mongolia with Finance. This document stated that efforts should be made to leverage the resource allocation functions of finance in the promotion of ecological progress, including green credit and green insurance.

*On the other hand, the lesson for China is that the national strategy for green and sustainable development has not been fully and effectively implemented in the development of financial policies. That is to say, the strategy has not been effectively linked to tactics for the development of green finance.*

For example, efforts to support access to finance for rural enterprises and small and medium-sized enterprises (SMEs) have used a wider range of monetary, fiscal and taxation, credit and capital market development policies than have been used for green finance. This indicates that China's green finance policy system still has lots of space for expansion.<sup>2</sup>

<sup>2</sup> See Chapter X in this volume on Problems and Difficulties in the Development of Green Finance (Wang, 2014)

# 2

## LESSON 2: RECONCILING DIVERSE INTERESTS

Reconciling diverse interests between central and local governments and between state and market players has been the critical challenge.

*Green finance concerns many governmental entities, including the central government and its departments, local governments and financial regulatory authorities' financial institutions, as well as market players such as banks, insurance companies, securities companies, private equity/venture capital institutions, and institutional and individual investors and businesses. The differing interests of these stakeholders can result in policies not being fully implemented or resulting in perverse consequences or slow uptake. Therefore, the coordination of governmental interests and market interests is critical.*

China has some positive experiences in this regard. By harnessing the interests of the various parties through local pilot projects, local governments are encouraged to conduct experiments within a broader framework set by the central government. Another example is that the People's Bank of China (PBC) offices in some provinces have graded commercial banks on their administration of green credit, giving mention or criticism in the public circular based on the scoring.

*However, there are also negative lessons demonstrated in China's coordination of the interests of various parties. The lessons are mainly demonstrated through two examples.*

The first example is the deviation between the intentions of the central government and the intentions of local governments. Some local governments view GDP growth as the single most important target and downgrade the importance of environmental protection goals. They pressure financial institutions and environmental protection institutions to ignore policies that restrict loans to heavy industries or that stipulate that they must meet environmental criteria before launching an initial public offering (IPO). This deviation can be seen in the statistics on official environmental protection verifications, where provincial environmental authorities give a 100 per cent pass rate.

TABLE 1: STATUS OF ENVIRONMENTAL PROTECTION VERIFICATION APPLICANTS 2010–2012

Authority	Status of Applications (% of applicants)					
	Pass	Fail	Suspended	Terminated	Pending	Turned down
Ministry of Environmental Protection	82%	1%	2%	1%	13%	1%
Provincial environmental protection authorities	100%	0	0	0	0	0

Source: Based on Wang (2013, pp. 77–88)

An important reason for the deviation between the intentions of the central government and local governments is the way that the performance of government officials is evaluated. Officials are mainly evaluated on factors such as economic growth and inward investment. The environmental performance evaluation is often viewed as a formality that provides a low proportion of the grade. However, this situation might change soon. According to the Decision of the Central Committee of the Communist Party of China on Some Major Issues Concerning Comprehensively Deepening the Reform released by the Third Plenum of the 18th CPC Central Committee, there will be steps to strengthen the environmental performance evaluation system for leaders and officials by exploring and establishing a “natural resources balance sheet; officials will receive audits on natural resources when leaving office; and a lifelong responsibility system for bio-environmental damages will be established” (China Daily, 2013).

The second reason is the deviation between the intentions of the governments and the market. Green finance has been promoted through administrative powers rather than through the active behaviour of the market. Many commercial banks still view heavy industries with their high profits and high investment returns as the best prospects for loans, and do not view SME-dominated energy conservation and environmental protection enterprises as viable due to their lack of collateral or guarantee. The result is that a high proportion of loans still go to projects in the “two highs and one excessive”<sup>3</sup> industries, although those numbers have fallen slightly. Similarly, although a majority of provinces have initiated pilots of environmental pollution liability insurance, business uptake has been weak.

An important factor influencing the deviation of the intentions of the governments and the market are the low fines for environmental violations, which reduces the effective demand for green finance and further dampens the motives for financial institutions to develop and operate green finance business. This is expected to change with the implementation of the new Environmental Protection Law. Under the previous law, polluting enterprises were only fined once; under the new law, if enterprises fail to rectify their violations, the fine will accumulate day by day, with no ceiling on the total amount payable. This regulation will definitely increase the cost of environmental violations for enterprises by a large margin (Dong et al., 2013).

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<sup>3</sup> This phrase refers to energy and resource intensive industries with excessive capacity, and is a core part of China’s industrial policy.

An initial, loosely defined approach to the scope of green finance has enabled experimentation; however, to scale-up the development further requires clear and comparable definitions.

*Defining the criteria for green finance is crucial. Which type of enterprises or projects should be excluded from loans, and which must purchase environmental pollution liability insurance? What standards must an enterprise meet to access the benefits of the green finance policy framework? What statistics should the regulatory authority collect to assess progress?*

China has explored many definitions. For example, although China Banking Regulatory Commission's Green Credit Guidelines, released in 2012, failed to define green credit, the Green Credit Statistics System of 2013 classifies green credit in 12 defined categories: green agriculture; green forest; industrial energy conservation; water saving and environmental protection; conservation/ecological restoration and disaster prevention; recycling; waste treatment and pollution prevention; renewable energy and clean energy (including solar energy, wind power, biomass, hydropower and smart grid); rural and urban water; building energy conservation and green building; green traffic and transportation; energy conservation and environmental protection; and overseas projects aligned with international standards. CBRC also requires that banks submit statistics on the annual energy conservation and emission reduction impacts of these green-credit financed projects, including indicators on carbon emission reductions, organic pollutants (chemical oxygen demand), ammonia nitrogen, sulfur dioxide, nitrogen oxides and water savings (Ye & Li, 2014). However, the conceptual framework and detailed definition of green finance remain incomplete, resulting in many problems in practice.

**Narrow understanding of green finance can limit the development of the policy support system and market practice.** This is notable in the insurance field. Internationally, green insurance includes a wide range of insurance plans related to environmental risk management, including aspects of climate change, pollution and environmental destruction. By comparison, China's current definition of green insurance is much narrower, and it usually refers to environmental pollution liability insurance alone. It does not address climate change or other long-term environmental risks within the scope of environmental pollution liability insurance. This may be understandable during the early period of development; however, the narrow focus will undoubtedly restrain the expansion of green insurance. For example neither regulators nor insurance companies in China see any link between car insurance and green insurance, despite the policy support directed at electric cars. There is no difference between the insurance policies on electric cars and cars that burn fossil fuel, and policy articles, premiums and prices do not encourage green energy cars. Multiple ambiguous conceptual frameworks can make people confused and indecisive.

**Conceptual frameworks have not been clearly specified.**

China has several conceptual frameworks in the real economy that are relevant for green finance, for example:

1. **“Two high and one excessive” industries.** The “two highs” refers to pollution and energy consumption and the “one excessive” refers to industries with overcapacity. Similar expressions include “two highs and one resource,” which refers to highly polluting, highly energy consuming and resource-based industries.
2. **Emerging industries of strategic importance.** This is a concept raised in the Decision of the State Council on Accelerating the Fostering and Development of Strategic Emerging Industries of 2010. It highlights these seven industries as the industries of strategic importance: energy saving and environmental protection, new generation of information technology, biology, high-end

equipment manufacturing, new energy, new material, and new energy vehicles. Development efforts are focused in these key industries and policies are adopted to support them.

3. **Low-carbon economy.** This refers to the economic development pattern where, under the guidance of the idea of sustainable development, measures such as technology innovation, institutional innovation, industrial transformation and new energy development are adopted to reduce fossil fuel use and greenhouse gas emissions, while achieving socioeconomic development and ecological and environmental protection. In August 2010, the National Development and Reform Commission (NDRC) announced plans to conduct pilot projects for low-carbon industry development in five provinces and eight cities.

While these concepts give broad and simple guidance, it is not clear how they relate to each other or to green finance, and whether they are comprehensive. They do not provide an adequate basis for statistical analysis. For example, the NDRC released data on RMB 3204.4 billion of accumulated funds raised from bond issues they approved from 2000 to 2013. They broke this down into: (i) transportation projects, including railway, expressway, ports and airports; (ii) energy projects, including hydropower, firepower, solar energy, wind energy and coal mines; (iii) municipal infrastructure projects, social housing construction and slum upgrading; (iv) upgrading and transformation of traditional industries; (v) water service projects, including control projects for rivers and lakes; (vi) infrastructure projects in the industrial parks; (vii) public transport projects; (viii) agriculture projects; and (ix) tourism projects. It is not clear which of these bonds could be classed as green bonds, which relate to emerging industries of strategic importance, or whether any should not have been supported due to involvement in “two high and one excessive” industries.

#### ***The concepts lack detailed regulations and practical guidance.***

There are possible conflicts among the concepts as criteria for support. For example, energy conservation and environmental protection are core sectors for green finance. However, production in the solar photovoltaic industry, especially in the early stages of its development, is often energy and pollution intensive. Another example is the question of whether upgraded heavy-industry plants operating at the highest environmental and energy-efficiency standards for their sector should be considered green.

The lack of common standards means that data are not comparable—individual commercial banks each have their own standards for green credit. For example:

- The Industrial and Commercial Bank of China (ICBC) summarized 90 green credit standards and 125 national industry policy standards in its industry-specific credit policies.
- China Development Bank’s (CDB) evaluation manual sets out a policy on the credit access and evaluation conditions for “two high and one excessive” industries and released a series of policies concerning energy conservation and environment protection industries.
- China Construction Bank’s green credit development strategy focuses on energy conservation and environmental protection industries and emerging industries of strategic importance.

With different standards, not only are statistics not comparable, projects may be able to shop around to get loans from banks with lower green credit standards.

# 4

## LESSON 4: COORDINATION

**Mechanisms for coordination and cooperation between departments are a critical success factor, but need continued strengthening.**

*Green finance requires coordination between government departments of ecological protection and financial reform as well as other supervisory authorities.* China's experience is demonstrated through two examples: joint policy documents and green securities.

**Government authorities jointly issue policy documents.** Some relevant policy documents were issued before 2007, but only by individual departments or ministries (e.g., PBC or the Ministry of Environmental Protection [MEP]). After 2007 the financial regulatory authorities began to strengthen cooperation with the Environmental Protection (EP) authorities to jointly release policies. It was then that the green finance system was formally established. For example, PBC first released relevant documents concerning green credit as early as 1995, but they had little influence. In June 2007 PBC released the Guiding Opinions on Improving and Enhancing Financial Services in Energy Conservation and Environmental Protection Fields. That document's influence was relatively weak compared with Opinions on Implementing Environmental Protection Policies and Rules and Preventing Credit Risk, which was jointly released by PBC, the State Environmental Protection Agency and the China Banking Regulatory Commission (CBRC) in July 2007. The latter document carried more influence because the participation of the State Environmental protection Agency (SEPA) and CBRC further enhanced its authority; in particular, CBRC was able to supervise the commercial banks.

**Another example concerns green securities.** SEPA began to assess the environmental performance of heavily polluting listed companies in 2003 after issuing the Notice of the State Environmental Protection Administration on the Inspection and Verification of Environmental Protection of the Corporations Applying for Listing and the Listed Corporations Applying for Refinancing in 2003. In 2007 the General Office of SEPA issued the Notice on Further Regulating the Inspection and Verification of Environmental Protection of the Production and Operation Corporations of Heavily-polluting Industries Applying for Listing and the Listed Corporations Applying for Refinancing. However, inspection and verification systems for the EP performance of listed companies achieved substantial progress only after January 2008 when CSRC issued the Notice on Documents to be Submitted When Production and Operating Companies in Heavily Polluting Industries Apply for IPO to answer relevant questions.

Similarly, the two key documents for green insurance were also jointly released by MEP in collaboration with the China Insurance Regulatory Commission. All of these documents are the concrete manifestation of interdepartmental cooperation.

Interdepartmental environmental supervision and information communication are built into a number of policies. In the 2007 document concerning green credit, EP authorities and financial regulatory authorities were explicitly required to strengthen mutual communication and coordination and establish an information-communication mechanism. The EP authorities are required to provide information on environmental violations by companies for banking credit management. Moreover, the document also called on the EP authorities, financial regulatory authorities and relevant commercial banks to establish joint meetings and contact points. Since it was established, the environmental performance information-sharing mechanism has been strengthened with information not only on violations but also on environmental protection facilities and compulsory clean production evaluations (Yang & Shen, 2013)

However, problems remain with inter-department coordination:

- **The information-sharing mechanism as set out in the policy design has not been fully implemented.** Though the information-sharing mechanism between the EP authorities and the financial regulatory authorities has been established by the central government, as well as some by provincial governments, there are still many provinces and cities that have not established the mechanism. Beijing did not set regulations to include violation information in the bank credit scoring system until 2013. Furthermore, even where the information-sharing mechanism has been established, often it is not used in a full and timely way when it comes to concrete implementation.
- **The information-sharing mechanism only allows for information flowing in one direction.** The current policy documents only require that the EP authorities provide environmental violation information on enterprises to the financial regulator, not credit information about the enterprises concerned. This one-directional flow of information does not enhance EP's supervision functions; moreover, it negatively influences the mutual trust between the authorities, thus blocking the establishment of a long and effective cooperation mechanism.
- **Lack of effective external supervision.** The general public has not been given a right to know how polluting enterprises have been financed, even if the environmental violation activities of such enterprises have seriously threatened the lives, health and safety of the general public.

A pollution case in Henan Province demonstrates the problem of lack of coordination between the financial regulatory authorities and EP authorities. In June 2011, after an environmental pollution incident caused by an enterprise, non-governmental organization Green Watershed filed an information disclosure application to find out which banks provided loans to the responsible enterprise, as well as the information coordination status between the financial regulatory authorities and EP authorities. This request was refused on the basis of commercial confidentiality. Yunnan Environmental Protection Department replied that “though China has by now established the green credit mechanism and this department has initiated this mechanism with PBC Kunming Central Sub-branch, but no fixed and usable information sharing channel for inquiry has been established due to such issues as network technology and the scope of banks' financing information. Currently, this department only reports to the banking system the information about the enterprises which are noted as under supervision due to special EP actions or under administrative punishment or fining. The banking system has never provided to the EP authorities or inquired our opinion as far as the enterprise's loan and financing information is concerned.” Against the backdrop of the poor interdepartmental communication of EP information and lack of public supervision, though the EP authorities adopted the strict administrative punishment (i.e., MEP adopted regional restricted approval on Qujing, the place where the enterprise is located), the enterprise responsible for the pollution incident resumed some part of its production soon after the EP authorities granted their punishment and before the pollution had been removed.

Poor interdepartmental coordination is connected to the lack of clear definition of the functions and division of labour of some governmental agencies. For example, PBC and CBRC lack explicit and systematic rules to define their functions and division of labour on the formulation, implementation and supervision of credit policies, and the energy conservation and environmental protection work concerns multiple departments including the NDRC, the Ministry of Foreign Trade and Economic Cooperation, MEP, etc. Under this pattern, the interdepartmental shuffling of and argument over the responsibilities or fighting for power or protection over key issues are not surprising.



# 5

## LESSON 5: SUPPORTING POLICIES

Supporting policies are critical to translating high-level commitments into action, but are not yet fully in place.

*On a positive note, green finance is increasingly being integrated into China's plan for overall environmental economic policy.* According to the 12th Five-Year Plan, the environmental economic policy system covers 10 fields and 33 specific tasks, including environmental taxes and subsidies, environmental pricing, environmental levies, green trade policy, ecological compensation mechanism and pollution damage fees, as well as specific green finance measures. The interplay of pricing, incentives, sanctions and restrictions creates the economic environment on which the development of green finance relies.

At the same time, China still has many problems supporting policies for green finance. These problems translate into valuable lessons for China.

First, the supporting mechanisms for green finance have been developing slowly. The first green credit guidelines were established in 2007, but a workable system for enterprise credit risk evaluation was only formally implemented in 2014. In some cases, supporting systems have been initiated, but they are restricted to isolated trials at the local level and do not have much influence. For example, the “rational environmental damage cost-sharing mechanism,” which includes environmental and resource pricing, has not come into being. As a result, market players have insufficient incentive to increase their investment in environmental protection and invest in controlling environmental risks, therefore reducing demand for financial products such as green credit and environmental pollution liability insurance.

Second, the fiscal and taxation incentives aimed directly at green finance are not in place. The current fiscal and taxation incentive policies are mainly targeted at energy conservation and environmental protection enterprises or projects, but the financial institutions lack relevant supporting incentive policies to provide loans to these projects. For example, measures such as fiscal interest discounts, taxation rebates, pretax calculation and withdrawal of reserve, and independent writing off of bad debts are not available for green credit. In addition, green insurance does not receive a premium subsidy.

Third, some supporting mechanisms, like professional capacity, still need to be developed in the area. Green finance is a highly professional and technical profession and requires knowledge in both environmental protection technologies and finance. Currently, China's financial institutions do not have particular strategies for developing and recruiting people with such integrated skill sets.

# 6

## LESSON 6: BALANCE

China's green finance system is at an early stage of innovation and development and is not yet balanced across different channels, investors and products.

Factors characterizing a balanced market system include:

1. **Capital intermediation channels**, including both banks and other deposit-taking institutions, but also capital markets and institutional investors. For many energy conservation and environmental protection projects, stocks, bonds, private equity/venture capital and leasing can be more appropriate means of financing than traditional bank credit.
2. **Investors**, which should not be dominated by one particular group and result in high concentration risks.
3. **Financial institutions** encompassing capital providers, including banks and insurance companies, but also intermediary institutions providing other market services—for example, independent environmental damage assessment and evaluation institutions, environmental risk evaluation institutions and data service companies, as well as consumer protection regulations.
4. **Financial products** to satisfy the demands of various green finance investors, financiers and environmental risks managers.

China has some positive experience in the development of green finance markets—for example, the current green finance policies cover green credit, green insurance and green securities. However, in practice, China's green finance market remains unbalanced.

**Unbalanced financing channels:** While capital markets are growing, bank loans remain dominant. In 2013 the aggregate financing scale was RMB 17.3 trillion, made up of 51 per cent RMB loans, 3 per cent loans in foreign currencies, 15 per cent entrusted loans, 11 per cent trust loans account, 5 per cent undiscounted banks' acceptance bills, 10 per cent corporate bonds and just 1 per cent domestic stock issuances. Banks directly or indirectly control the key links of capital collection, underwriting transactions in the bond market, trust market and financing lease market.

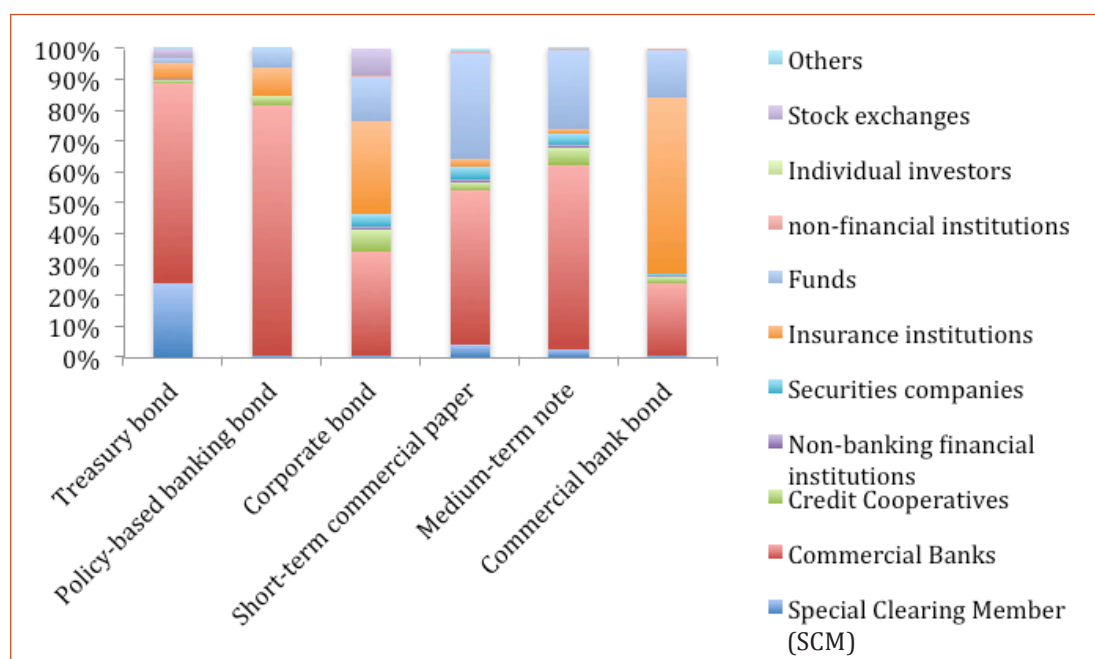
The insurance industry's assets reached RMB 8.29 trillion by the end of 2013, while the banking industry's assets during the same period reached RMB 151.35 trillion. The banking industry's assets are 20 times those of the insurance industry. It is this bank-dominated financial system that has resulted in the current green-credit-dominated green finance market in China.

**Unbalanced investor structure:** Institutional investors are not well developed compared to the developed markets. Institutional investors manage RMB 10.13 trillion in assets, accounting for 18 per cent of GDP, of which the insurance industry manages RMB 8.29 trillion, the national social security fund RMB 1.24 trillion and the enterprise annuity fund RMB 603.471 billion per year. There are no college endowment funds or large private foundations.

Due to their small scale and weak strength, institutional investors have a relatively low degree of participation in the financial market. In the stock market, investment trading has been dominated by medium and small investors. At the end of 2013, the market capitalization of total A-shares held by nine types of professional institutional investors represented by fund managers, insurance institutions and Qualified Foreign Institutional Investors was RMB 2.6 trillion, accounting for only 11 per cent of the total market capitalization of the two markets.

In recent years, China's bond market has developed rapidly. Banks are the largest investor (although bonds do not make up a large proportion of their overall assets).

FIGURE 1: INVESTOR STRUCTURE OF MAJOR BONDS MEASURED BY THE AMOUNT OF TRUSTEESHIP ON THE BOND MARKET (2011)



Source: [www.chinabond.com.cn](http://www.chinabond.com.cn)

China's financial market has not been fully open to foreign investors, and there are still very strict controls. There are restrictions on foreign involvement in banking, insurance and securities, and the market share of foreign-funded financial institutions has been low.

In terms of investment portfolios, more efforts have been made to open the market to foreign investment. By the end of 2013, 138 overseas institutions<sup>4</sup> had been approved to enter the inter-bank bond market. However, as a whole, the participation of foreign investment in China's capital market has been very low, mainly because China has adopted a quota system for overseas investors. Currently, the maximum quota for Qualified Financial Institutional Investors (QFII) is about USD 1 billion. Moreover, China sets restrictions on the transfer and remittance of QFII funds, which increases the difficulty for investors. The total combined approved quota of QFII and Renimi Qualified Financial Institutional Investors (RQFII) in early 2014 was about USD 94 billion, which accounted for less than 3 per cent in the A-share market with the market capitalization of USD 3.3 trillion.

**Imbalance of the products and services:** In terms of products, traditional bank loans predominate. Despite the innovation in recent years of such newly developed products as green financing leases, carbon finance products and Clean Development Mechanism accounts-receivable financing, these are isolated explorations and have not become mainstream in the market. Asset-backed securitization of green credit has not yet been developed. Similar problems also exist in the fields of green insurance and green securities.

In terms of services, there is a shortage of professional service institutions for green finance, including environmental risk assessment, damage identification, etc.

<sup>4</sup> Institutions include overseas central banks, international financial institutions, sovereign wealth funds, business clearing banks in Hong Kong and Macao SARs, overseas participating banks, overseas insurance institutions, Renimi Qualified Financial Institutional Investors (RQFII) and Qualified Financial Institutional Investors (QFII) etc.

**The role of market mechanisms has not been brought into full play:** The government still plays an important role in China's financial market as owner, regulator and industry promoter. The conflicts and overlapping of functions have distorted the financial market. This distortion is also reflected in the green financial market, where governmental promotion and domination prevail and prevent market mechanisms from operating effectively. This is mainly demonstrated in:

- The lack of clear boundaries between the functions and role of commercial financial institutions and policy-based financial institutions.
- Unnecessary administrative examination and approval procedures for the stock and bond markets.
- Insufficient information disclosure and low transparency in the capital markets.
- Corporate governance frameworks that continue to require improvement.
- Weaknesses in the financial regulatory framework and investor protection system.

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# GREENING CHINA'S FINANCIAL SYSTEM

## CHAPTER 5:

# PROBLEMS AND DIFFICULTIES IN THE DEVELOPMENT OF CHINA'S GREEN FINANCE

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## EXECUTIVE SUMMARY

In recent years, financial market policy-makers and regulators in China have shown leadership in advancing their roles in creating a green financial system. However, the impacts to date have been constrained by countervailing forces. In particular, the performance criteria on which local government officials are assessed still prioritizes economic growth over environmental compliance. The positive externalities of green projects and negative externalities of pollution are still not yet fully monetized to provide an incentive for green investment, while weak implementation of environmental regulations provides perverse incentives for investing in polluting enterprises.

Green finance can help to counteract these pressures, but it suffers from an incomplete policy and legal system, with legislation still at the stage of guideline policies and declaratory documents that lack a system of accountability for violations or failure to implement. They offer only general policy principles instead of specific implementation rules. Comparing this with measures for access to finance for rural enterprises, where financial policy measures have been more extensive, suggests there is lots of space to expand China's policy support system for green finance. In addition to legal rules and financial incentives, there is a need for greater coordination within government in the development of specific technical knowledge and skills within the financial sector. While it is clear that there are many problems and limitations in the current development of green finance in China, the foundations have been laid, and there is significant room for advancement.



# 1

## INTRODUCTION

Over recent years, financial market policy-makers and regulators in China have shown leadership in creating a green financial system. China's four financial regulators have all made progress in greening the parts of the financial system for which they are responsible, and have acknowledged their mandates to ensure that financial markets fulfill their purpose in supporting China's transition to a sustainable economy (e.g., Zadek & Chenghui, 2014; Jun & Yu, 2014). The volume of green finance in China has grown, alongside the establishment of the market infrastructures and related policies (Xiang, 2012). China has taken the lead in the development of green credit policies. However, China must still overcome a series of problems and barriers to green finance to effectively support the strategic targets of making ecological progress as proposed at the Third Plenum of the 18th Communist Party of China Congress. This report looks at the barriers and problems in the policy system, their repercussions for the current state of development of green financial markets, and the potential lessons and considerations for the ongoing development of the green financial system.

# 2

## POLICY SYSTEM BARRIERS

### 2.1 DIVERGENT INTERESTS OF KEY PLAYERS

Green finance involves many players, including various levels of governments, financial institutions (FIs), investors and financiers, and other stakeholders, each with their own interests. The promotion of green finance must take into account the interaction of the governments' goals and those of market players. In practice, the large deviation between interests within governments and market players has resulted in the underdevelopment of green finance in China (Xian & Liping, 2014). Key factors are:

- **Performance evaluations create a gap between the interests of central government and local governments.** Although GDP growth is no longer the single highest priority in the evaluations of local leaders and officials, environmental protection still accounts for a very low percentage of their score, and is often seen as a mere formality. Some local government officials therefore still regard GDP growth as their main target, overwhelming environmental factors. Local governments can pressure financial and environmental authorities to give companies loans or progress to an initial public offering (IPO), even if they fail the environmental tests.
- **Uncosted environmental externalities make investing in greener production and products uncompetitive.** The development of green finance largely comes from the strong support and promotion of administrative power and fails to effectively encourage the active behaviours of market players. The root of the large gap between the interests of government and market players is the failure of policy and institutional arrangements to enable the positive externalities of green projects and negative externalities of pollution to be monetized and to provide an incentive for green investment.
- **Weak implementation of environmental regulations provides perverse incentives for investing in polluting enterprises.** Enterprises are often able to reduce their costs by skirting environmental regulations, reducing the demand for green finance and weakening the momentum for financial institutions to operate green financial business. As far as green credit is concerned, “two high and one excessive” enterprises are still attractive for commercial banks, as they still offer high profits and high returns on investment.<sup>1</sup> Small and medium-sized enterprises in the energy conservation and environmental protection sectors find it hard to obtain credit due to the lack of a track record, high technological risks and the lack of a collateral or guarantee mechanism. Therefore a high proportion of loans still go to “two high and one excessive” projects despite some drops.

### 2.2 INCOMPLETE LEGAL SYSTEM

Green finance depends on laws and regulations. China's legislation of green finance started in 1995 with the Notice on Relevant Matters of Implementing Credit Policies and Enhancing Environmental Protection by the People's Bank of China (PBC), and many regulations and regulatory documents have been promulgated since then (see Table 1).

Although China has been active in legislating to promote green finance, the legal framework is not complete. The major defects include:

- **Low legislative level.** In general, the State Council and the State Council's ministries and commissions have issued green-finance-related laws, rather than the National People's Congress and its Standing Committee. Most legal documents of lower orders function as guideline policies and declaratory documents and lack the coercive force and authority required for laws.
- **The lack of provisions on legal liabilities.** The existing green financial legislation is composed largely of recommendations and declarations that financial institutions are encouraged to implement,

<sup>1</sup> “Two high and one excessive” is a phrase used in China's industrial and green finance policies to indicate energy-intensive, highly polluting and excessive-production-capacity industries.

but that lack a system of accountability for violations or failure to implement. Without substantive legal liability backed up by enforcement, this only puts weak pressure on enterprises, investors and financial intermediaries.

- **Lack of specific requirements.** The existing legislation is composed mainly of opinions and guidelines offering general requirements that are hard to enforce and put into effect in practice. For example, the Green Credit Guidelines only stipulate general policy principles, directions and framework, and do not provide specific performance standards in areas such as energy and water use, which makes it hard for the banks to implement.

To sum up, the opinions and guidelines issued to date do not yet articulate a complete system of implementable and robust green financial laws. It is unlikely that they will provide sufficient financial and legal guarantees and institutional support to enable the full development of green finance to meet China's needs for investment that enables sustainable development.

TABLE 1: CHINA'S SYSTEM OF GREEN FINANCIAL LAWS

<b>Narrow Definitions</b>	
Notice on Relevant Matters of Implementing Credit Policies and Enhancing Environmental Protection (PBC, 1995)	<ul style="list-style-type: none"> <li>● Strengthen the environmental management of the banks to avoid environmental risks and encourage commercial banks to invest in environmental protection products.</li> </ul>
Opinions on Implementing Environmental Protection Policies and Rules and Preventing Credit Risks (SEPA, PBC, CBRC, 2007)	<ul style="list-style-type: none"> <li>● Establish a communication mechanism between the State Environmental Protection Agency (SEPA), People's Bank of China (PBC), China Banking Regulatory Commission (CBRC) and Financial Institutions.</li> <li>● Restrict credit support for projects that have failed environmental evaluation approval or criteria.</li> <li>● Banks should issue categorized loans according to national industry policies.</li> <li>● Restrict working capital loans for enterprises that discharge pollutants or emissions in violation of the laws.</li> </ul>
Green Credit Guidelines (CBRC, 2012)	<ul style="list-style-type: none"> <li>● Banks to introduce sustainability into loan application procedures.</li> <li>● Banks to adopt differentiated and dynamic credit policies.</li> <li>● Banks to implement risk exposure management system and establish relevant statistics system.</li> </ul>
Green Credit Statistics System (CBRC, 2013)	<ul style="list-style-type: none"> <li>● The system classifies green credit into 12 types.</li> <li>● Banks required to collect statistics on the annual energy conservation and emission reduction capacity of green credit projects.</li> </ul>
<b>Green insurance</b>	
Guiding Opinions on Environmental Pollution Liability Insurance (SEPA, CIRC, 2007)	<ul style="list-style-type: none"> <li>● Identifies industries, enterprises and areas with serious environmental risk to conduct pilot projects of environmental pollution liability insurance.</li> </ul>
Guidelines for the Pilot Projects of Compulsory Environmental Pollution Liability Insurance (MEP, CIRC, 2013)	<ul style="list-style-type: none"> <li>● Compulsory environmental pollution liability insurance system to be launched in industries with high environmental risks.</li> </ul>
<b>Green securities</b>	
Notice on Documents to be Submitted When Production and Operating Companies in Heavily Polluting Industries Apply for IPO (CSRC, 2008)	<ul style="list-style-type: none"> <li>● Enterprises engaged in heavily polluting industries that apply for IPO to be required to submit to review by SEPA.</li> </ul>
Guiding Opinions on Strengthening the Regulatory Work of Listed Companies in Respect of Environmental Protection (SEPA, 2008)	<ul style="list-style-type: none"> <li>● Environmental review to be made a compulsory requirement for IPO or refinancing.</li> </ul>

### Green finance

Opinions of the State Council on Accelerating the Development of the Energy-Saving and Environmental Protection Industry (State Council, 2013)

- China will expand investment and financing channels; vigorously develop green credit; strengthen support for energy conservation and environmental protection projects according to the principles of risk control and commercial sustainability; actively innovate financial products and services; explore the practices of including franchise into the scope of mortgage (pledge) collaterals for loans; support green credit and financial innovation; establish the green bank rating system; support financing guarantee agencies to provide more and higher guarantees to energy conservation and environmental protection enterprises; support issuance of green bonds of various types; take steady measures to develop the sink trading; and encourage private investment in the field of energy conservation and environmental protection.

## 2.3 NATIONAL STRATEGY NOT YET TRANSLATED INTO COMPLETE LEGAL SYSTEM

Embedding “ecological progress” in China’s development has meant putting social and economic sustainability at the heart of the national strategy (Zheqiang, 2012). This creates the space and opportunity for the development of a green financial system. However, it should be noted that, to date, measures have been fragmented and tactical, and are not yet effectively connected to each other and into a policy system that successfully internalizes environmental externalities to provide sufficient stimulus for investment.

The development of measures to support green finance can be compared to measures that have been undertaken to address rural and small and micro enterprises’ lack of access to finance. The State Council and concerned ministries and commissions have enabled preferential support through monetary policies, fiscal and taxation policies, credit policies, capital market policies and insurance policies, which go beyond the limited policy support and recognition given to green finance. As Table 2 shows, this comparison reveals that there is lots of space to expand China’s policy support system of green finance.

TABLE 2: COMPARISON OF POLICY SUPPORT FOR FINANCIAL INCLUSION AND GREEN FINANCE

Policy-makers	Rural Finance & Financing for Small and Micro Enterprises	Green Finance
State Council	<ul style="list-style-type: none"> <li>• <b>Several Opinions of the General Office of the State Council on Financial Services Facilitating the Development of Agriculture, Rural Areas and Farmers</b> (April 2014).</li> <li>• <b>Guiding Opinions of the General Office of the State Council on the Financial Support for Economic Restructuring, Transformation and Upgrading</b> (July 2013) integrates financial resources to support small and micro enterprises and enhancing credit support for agriculture, rural areas and farmers.</li> <li>• <b>Guiding Opinions of the General Office of the State Council on Taking Various Measures to Effectively Reduce the High Costs of Corporate Financing</b> (August 2014) provides strong support for agriculture, rural areas and farmers and small and micro enterprises.</li> <li>• <b>The Opinions of the State Council on Supporting the Healthy Development of Small and Micro Enterprises</b> (November 2014) provides for 10 policies and measures in such aspects as fiscal support, taxation preferences, financial support, public services and policy information connection to promote targeted support, enhance the survival rate and quality of small and micro enterprises, and support their healthy development.</li> </ul>	<ul style="list-style-type: none"> <li>• <b>The Guiding Opinions of the General Office of the State Council on Taking Various Measures to Effectively Reduce the High Costs of Corporate Financing</b> (August 2014) “provide[s] strong support for such key fields as energy conservation and environmental protection,” but there have been no special support policies up to now.</li> </ul>

PBC	<ul style="list-style-type: none"> <li>Re-lending for agriculture and small businesses issued specially to rural financial institutions and small city commercial banks.</li> <li>Targeted lowering of reserve requirement ratio for commercial banks with a certain proportion of loans for agriculture, rural areas and farmers, and small and micro enterprises.</li> </ul>	<ul style="list-style-type: none"> <li>Not entitled to relending support and not included in the scope for targeted lowering of reserve requirement ratio.</li> </ul>
CBRC	<ul style="list-style-type: none"> <li>Lending related to loans to agricultural households and small and micro enterprises shall not be included in the performance evaluation index of loan-to-deposit ratio.</li> </ul>	<ul style="list-style-type: none"> <li>The adjustment of loan-to-deposit ratio does not cover green finance.</li> </ul>
Capital market	<ul style="list-style-type: none"> <li>Commercial banks are allowed to issue special financial bonds for agriculture, rural areas, and farmers and special financial bonds for the development of small and micro enterprises.</li> </ul>	<ul style="list-style-type: none"> <li>No similar products as special green financial bonds.</li> </ul>
Insurance market	<ul style="list-style-type: none"> <li>High importance is attached to the development of agricultural insurance, and special regulations on agricultural insurance have been issued.</li> </ul>	<ul style="list-style-type: none"> <li>No special regulations on green insurance.</li> </ul>
MOF	<ul style="list-style-type: none"> <li>Relevant subsidies provided to businesses related to the development of agriculture, rural areas and farmers, and small and micro enterprises, including business operation subsidies of FIs, and agricultural insurance premium subsidies and corresponding preferential taxation policies.</li> </ul>	<ul style="list-style-type: none"> <li>FIs operating green finance and other relevant businesses are seldom directly entitled to fiscal and taxation incentive policies.</li> </ul>

## 2.4 LACK OF CLEAR CONCEPTS AND DEFINITIONS

The lack of a complete, explicit and detailed conceptual framework for green finance in China has led to various issues in practice, including:

- Narrow understanding of green finance may restrict the development of policies and market practice.** For example, green insurance is understood internationally to include the range of insurance plans concerning environmental risks, including climate change, pollution and environmental damage. In China, green insurance at the current stage is seen more narrowly as involving environmental pollution liability insurance. Opportunities for addressing issues such as climate change, for example, are not currently considered with the green insurance field, restricting the application of insurance as a tool for sustainable development.<sup>2</sup>
- Fragmented concepts and disparate definitions do not support coordinated policy-making.** For example, the majority of green credit in China goes to traditional heavy industries for much-needed technological upgrading to control pollution and increase energy efficiency. This is in line with industrial goals. However, statistical methods for monitoring bank lending do not differentiate between green credit and overall volume of loans by sector. Therefore, paradoxically, if banks issue more green finance, primarily to heavy industry, they will be assessed as giving greater finance for restricted industries.
- Lack of a systematic assessment framework for the macro and micro effects of green finance.** The existing monitoring system fails to accurately assess the adequacy of the green finance supply in relation to China's environmental targets. In order for the authorities to assess progress and gaps in relation to environmental policy targets, they need a standard environmental assessment methodology as a means for transforming these overall goals into quantitative directives for the financial institutions, including the banks.

## 2.5 LACK OF HIGH-LEVEL COORDINATION

The development of a green financial system involves a range of supervisory authorities concerned with both environmental protection and economic performance. Therefore, it is necessary to strengthen high-level coordination. Although there has been some progress in establishing communication mechanisms between authorities involved in developing the green financial system, the level of coordination remains insufficient.

<sup>2</sup> For example, vehicle insurance is not seen as part of "green insurance" in China; therefore, national policy support towards electric vehicles has not been translated into insurance regulatory policies, and the practices for vehicle insurance do not make a distinction between electric vehicles and fuel vehicles.

- **Information-sharing mechanisms have not been fully implemented.** Many provinces and cities have not established or fully operationalized communication mechanisms between environmental and financial regulators, as is called for in the legislation.
- **The information-sharing mechanism relies on one-directional information flow.** For example, in relation to green credit, the current policy documents only require that the environmental authorities provide information on environmental violations to the financial regulators and do not require that financial regulators share the credit information of the enterprises with the environmental authorities. This one-directional flow of information does not help to enhance the supervision function and enable mutual trust among the authorities, thus blocking the establishment of effective cooperation.
- **Lack of clear regulatory frameworks of rights and responsibility in the management of green finance laws.** The lack of operable working standards after the issuance of the policies has left the financial institutions at a loss as to what to do and reduced the effects of the policies.
- **No effective external supervision from the general public.** Issues relating to green finance and environmental security are in the public interest, but the general public has no right to know the relevant financing information related to the environmental violations of polluting enterprises.

## 2.6 INSUFFICIENT SUPPORTING POLICIES

The development of a supporting mechanism has started late and, to date, has not played a strong role in promoting green finance.

- **Complementary and necessary parts of policy systems have not been developed.** For example, the requirements for risk assessment under the green credit system were established initially in 2007, but the credit risk evaluation system was only formally established in 2014. Pricing and charging mechanisms for internalizing environmental damage costs and reflecting scarcity of environmental resources have not yet been adequately formed, leading to weak incentives for market players to increase their diligence in managing environmental risk or their investment in environmental protection.
- **Fiscal and taxation incentive policies are not being directed at financial institutions.** The current fiscal and taxation support policies are mainly targeted at energy conservation and environmental protection enterprises or projects, but there are no corresponding supporting incentive policies for the financial institutions themselves to develop products and capacities to support the development of such enterprise or projects. For example, there are no such preferential policies such as fiscal discounts, tax reduction or exemption, pretax provisioning, independent write-off of bad loans in the field of green credit, or premium subsidies from the central treasury (e.g., for green insurance).
- **Little attention has been given to capacity building in the financial sector.** Green finance requires specific technical knowledge and skills, beyond those of general finance. There are no special plans in the financial institutions for the professional development needed to assess green projects and carry out environmental risk evaluation.

## 2.7 UNDERDEVELOPMENT OF MARKET SERVICE INTERMEDIARY SYSTEMS

Green finance requires expertise in environmental risk evaluation and carbon trading and the ability to assess diverse businesses. Professional service providers are needed to provide supporting services for the financial institutions to conduct green financial businesses. However, most of the professional service providers, including the credit rating agencies, asset appraisal institutions, accounting firms, law firms and consulting companies have not entered the field of green financial services. Other specialist intermediary service providers, such as environmental damage assessment agencies, environmental risk evaluation agencies and data service companies, have not been established. The absence and underdevelopment of the professional intermediary service system is one of the key factors that restrict the rapid development of green finance.

## LIMITATIONS IN THE DEVELOPMENT OF GREEN FINANCIAL PRODUCTS AND SERVICES

China's green financial system remains characterized by insufficient overall volumes and the domination of banking “green credit” as the channel for green finance, while the green insurance and green securities markets are still in rudimentary stages. Within banking, traditional working capital loans remain the primary channel for green finance, while such new products as green financial leasing, carbon financial products and Clean Development Mechanism (CDM) factoring financing are just fragmentary explorations at this stage. Specifically, there are some concrete and critical problems in the various types of green financial services.

### 3.1 GREEN CREDIT

Undoubtedly, green credit has accounted for the principal part of China's green financial business. According to statistics from the China Banking Association, the balance of the energy conservation and environmental protection loans reached RMB 1.6 trillion (USD 259 billion) and the green credit balance of 21 major banks approached RMB 5.2 trillion (USD 839 billion) by the end of 2013 (China Banking Association, cited in Xinhua Economic New Service, 2014). However, there are a series of practical issues restricting the development of China's green credit.

- **The relevant policies are not strongly operable.** Up to now, the Green Credit Guidelines and their supporting statistical regulations have not given concrete standards for implementation—for example, for discharges and emissions, energy efficiency and recycling performance expected for green industries or the technologies that should be considered. The policies do not enable early risk prevention, but instead rely on problems being reported by the environmental protection authorities. They also do not cover the whole life cycle of a loan—for example, environmental behaviours of the enterprises before and after receiving the credit.
- **The supervision on green credit is inadequate and lacks sufficient and effective incentive and assessment.** Currently, the promotion of green credit still mainly relies on the consciousness and social responsibility of the banks, and no explicit sanction and reward system has been established.
- **There is not a unified approach to information disclosure by the banks.** As different banks have their own definitions of green and “two high and one excessive” industries, the information disclosed by different banks lacks comparability and cannot be simply aggregated or compared.<sup>3</sup>
- **Traditional working capital loans still dominate** and there are no tailored special green financial products.
- **Commercial and political pressures make it hard to effectively implement green credit policies.** On the one hand, banks are under pressure from local governments to issue loans to non-green projects; on the other hand, they also face pressures to make short-term profits under the existing performance evaluation mechanism. In green project investments, long-term large risks and low returns are not commercially attractive.

### 3.2 GREEN INSURANCE

Currently, the major green insurance product in China is environmental pollution liability insurance, which indemnifies enterprises against the cost of cleaning up of major environmental accidents or site remediation. Environmental pollution liability insurance has started to play its role in using the market mechanism to prevent and disperse environmental risks. However, the relatively narrow guarantee scope compared with developed countries has restricted the understanding of its potential in preventing and reducing environmental risks and supporting environmental sustainable development. In addition, green insurance still faces the following questions in its development:

<sup>3</sup> The Green Credit Statistics System (《绿色信贷统计制度》) taking effect in 2013 has, to a certain degree, alleviated the above issues.

- **Companies offering environmental liability insurance have not developed professional attractive products.** Insurance companies do not have the specific knowledge needed, and most insurance policies are not tailored to meet clients' needs. In many cases, policies have many exclusion clauses and barriers to compensation.<sup>4</sup>
- **A compulsory environmental pollution liability insurance system has not been established.**<sup>5</sup> Two ministerial-level regulations jointly issued by the State Environmental Protection Agency (SEPA) and China Insurance Regulatory Commission (CIRC) provide the major foundations for the development of environmental liability insurance. But they have limited powers. Even though the 2013 Guidelines for the Pilot Projects of Compulsory Environmental Pollution Liability Insurance mentioned the establishment of the compulsory environmental liability insurance system, it was only a guiding opinion and not legally binding. In practice, most environmental liability insurance policies are purchased voluntarily, but there is a low level of uptake at present, giving little coverage to ensure equitable compensation to victims in the event of an accident.
- **The implementation of key supporting mechanisms is still difficult.** A special assessment and appraisal institution for environmental pollution damages has not yet been established in most regions of China.

### 3.3 GREEN SECURITIES

Though the basic framework of China's green securities system has been defined, relevant regulations and rules are not complete, and there are also many issues in their implementation. For example:

- **Limited coverage by environmental audits and supervision systems.** Environmental protection audit opinions are required only for the IPO application of heavily polluting industries and not for all the IPO applications of all industries. At the same time, there are no environmental audit requirements for the refinancing of listed enterprises. It is noteworthy that the environmental audit system has failed to prevent the frequent occurrence of environmental pollution events by Chinese listed companies.
- **Weak information disclosure system requirements.** The disclosure requirements do not adequately cover the emission or discharge of major pollutants by enterprises and the measures and effects of the pollutant control.
- **Implementation remains at pilot stage.** Implementation of the system for environmental performance assessment of listed companies has only been carried out in a few pilot areas. As yet, there is no nationwide and complete standard for the environmental performance assessment of listed companies.

### 3.4 EMISSIONS QUOTAS AND TRADING

Despite years of development, China has not yet established a national emission allowance trading system, and the current emission allowance trading market is still small with limited market liquidity and trading infrastructure. Key problems are:

- **Lack of relevant laws.** Relevant existing laws, including the Law on the Prevention and Control of Atmospheric Pollution and the Law on the Prevention and Control of Water Pollution, mention pollutant control licenses, but have not specified the legal status of tradable emission allowances.
- **Lack of monitoring, reporting and verification systems.** The precondition for the implementation of emission allowance trading is the accurate monitoring of enterprises' emissions. Monitoring and measurement of emissions and energy are functionally scattered among different governmental agencies in China, with inconsistent approaches to definitions, statistics and data quality assurance.

<sup>4</sup> Currently, a majority of the environmental pollution liability insurance products only cover the third party's direct property loss and casualties, as well as the cleanup expenses and legal fees caused by the unexpected pollution accidents, and exclude indirect and ecological losses.

<sup>5</sup> Article 52 of the Environmental Protection Law, newly revised in 2014, only stipulates that "the state encourage the purchase of environmental pollution liability insurance," which falls far behind the expectations of the insurance sector.



- **A true market has not been established.** Many enterprises participating in emission allowance trading pilots are not market players in the true sense. Moreover, the transactions have been of the forced-marriage type arranged by the administrative authorities, where prices are also subject to government intervention. This is one of the important reasons restricting the promotion of China's emission allowance trading after over 20 years of practice.
- **Design questions remain in setting up the emission allowance system.** No method for the reasonable allocation of quotas has been agreed, and emission reduction quotas have tended to be allocated hierarchically. This system design itself has restricted the development of the carbon market.

## CONSIDERATIONS FOR THE ONGOING DEVELOPMENT OF CHINA'S GREEN FINANCIAL SYSTEM

It is clear that, while there are many problems and limitations in the current development of green finance in China, the foundations have been laid, and there is significant room for advancement.<sup>6</sup> Through an analysis of international and Chinese experience, this report asserts that green financial mechanisms can play a key role in sustainable development.

Demand for green finance is policy driven by and depends on environmental costs and benefits becoming material to enterprises and their investors, through a combination of environmental regulations; macro-economic, fiscal and industrial policies; regulatory standards; disclosure standards; and governance standards. Market actors, including policy-based FIs, commercial FIs and Internet-based FIs, should respond to these regulations, price signals and credit guarantees by developing financial products such as green credit, green insurance, green bonds and green venture capital funds that support green investment.

Green investment includes both financing new green industries (in areas such as research and development, environmental protection facilities, new energy, resource recycling, green manufacturing and ecological agriculture) and also financing energy- and resource-efficient investments in traditional heavy industry. These two approaches are not mutually exclusive.

More broadly, green investment entails a fundamental enhancement of the efficiency and effectiveness of the financial system in assessing risk and allocating capital. As such, green finance should occupy a core position in financial market reform in China. It is not an additional requirement to be imposed, but should be seen as a core driver of efficiency and effectiveness. If environmental factors are not considered in investment, this will lead to irrational allocation of funding, higher risks, weaker and more volatile economic growth, and profit taking and instability in financial markets.

The demand to drive green finance is shaped by public policies that make environmental costs and benefits explicit and salient throughout the investment supply chain. Three clusters of policies can be identified (as laid out in the recent report by the Green Finance Task Force (2015) convened by the People's Bank of China and the United Nations Environment Programme's Inquiry: Design of a Sustainable Financial System):

- **Real economy policies to shift the relative balance of risks and returns to green investment.** These measures increase the returns on investment of clean products by increasing the revenues from clean products (for example, by providing subsidies to clean energy) and reducing the returns on investment of polluting products by reducing the price support to these products.
- **Financial system policies to shift the balance of risks and returns to green investment.** These measures increase the returns on investment by reducing taxes and loan interest rates and other costs to investors in green projects and by reducing the returns on investment of pollution products by increasing the taxes and loan interest rates associated with investments that increase environmental damage.
- **Policies to enhance the sensitivity of enterprises and decision-makers.** These policies increase the importance given to social responsibility in the management and performance of enterprises and turn them from passive to active mode in their awareness of environmental risks and opportunities.

Environmental pollution has strong negative externalities and results in market failures. Traditional solutions tend to focus on sanctions against polluters. However, sanctions can be undermined by governmental failure due to ineffective institutions and asymmetric information. The purpose of green finance is to help solve the double failures of the market and government by incorporating environmental factors into risk

<sup>6</sup> See also the discussion in Yuping & Yuanpeng (2014); Tongyu (2014).

management on investments that are supported by diversified financial instruments, market mechanisms and the analytical capacity of the financial sector (see, e.g., Zhenmin, 2013; Daoxu, 2014).

However, green finance cannot replace the need for effective environmental regulations; rather, it provides early risk prevention and middle-stage supervision to prevent violations before they happen. Ultimately, however, strong regulations are needed to provide the signals that enhance the attractiveness of energy conservation and emission reduction enterprises. They need to simultaneously turn investment away from enterprises and projects that are at greater risk of sanction through industrial policies or violations of the environmental laws.

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GREENING  
CHINA'S  
FINANCIAL  
SYSTEM

# SECTION 3: INTERNATIONAL EXPERT PERSPECTIVES



# GREENING CHINA'S FINANCIAL SYSTEM

## CHAPTER 6:

# GREENING CHINA'S FINANCIAL MARKETS: THE RISKS AND OPPORTUNITIES OF STRANDED ASSETS

BEN CALDECOTT, SMITH SCHOOL OF ENTERPRISE AND ENVIRONMENT AND NICK ROBINS, UNEP INQUIRY INTO THE DESIGN OF A SUSTAINABLE FINANCIAL SYSTEM



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## EXECUTIVE SUMMARY

The rise and fall of different technologies, products and businesses are central to rising productivity in healthy, well-functioning markets. This process can result in “stranded assets”—assets that have suffered from unanticipated or premature write-downs, devaluations or conversion to liabilities (Caldecott, n.d.). Stranded assets are therefore a regular and necessary feature of dynamic economic systems, a phenomenon inherent in the “creative destruction” of economic growth, transformation and innovation.

Over the course of the last two decades, the issues surrounding technological innovation, investor behaviour and business resilience have become magnified in the context of environmental change. The advent of international climate policy and movement towards pricing environmental externalities has raised concerns about “locking in” carbon-intensive technologies (Unruh, 2000). This has helped to bring forward the issue of stranded assets as a sustainability concern beyond regulatory action on competition policy.

Evidence shows that asset values have been affected across a wide range of sectors and geographies as local and global environmental boundaries are breached. The drivers range from physical climate change and natural capital degradation to new environmental regulations, developments in clean energy technology, resource constraints, evolving social norms and litigation (Caldecott & Mcdaniels, 2014a). These current and emerging risks related to the environment could represent a major discontinuity, able to profoundly alter asset values across a wide range of sectors (Caldecott, n.d.). For example, air pollution and water scarcity in China threaten coal-fired power generation, which has changed coal demand and affected global coal prices (Caldecott, Tilbury, & Ma, 2013); the shale gas revolution in the United States has put downward pressure on coal prices in Europe, stranding new high-efficiency gas plants (Caldecott & Mcdaniels, 2014b); and the fossil fuel divestment campaign threatens to erode the social licence of some targeted companies and could increase their cost of capital (Ansar, Caldecott, & Tillbury, 2013).

China’s strategic decision to move away from a high-pollution and high-resource-intensive economy and build an “eco-civilization” will clearly have implications both for existing assets and the trajectory of future capital investment. This will be problematic for some firms and sectors, but need not hinder China’s economic development; it could actually work to support China’s multiple interlocking objectives of addressing inequality, ensuring sustainable growth, increasing domestic consumption and improving social infrastructure.

One opportunity is to secure an optimal rate of asset stranding given China’s level of economic development, targeted rate of economic growth and sustainability concerns. Too little asset turnover could leave China with insufficiently productive assets far from technological frontiers, while too much could result in unmanageable losses for companies and financial institutions, as well as challenging social issues due to job losses and displaced industries. However, allowing polluting, inefficient assets to continue to operate will undermine sustainability and long-term growth.

Another dimension related to this is the avoidance of lock-in. China should avoid investing in technologies and infrastructure that might quickly become outdated or inappropriate from a societal perspective. An example could be new-build sub-critical coal-fired power stations, given ever-increasing concerns over air pollution and water scarcity, as well as the availability of cost-competitive alternatives. Lock-in of this kind is expensive for society as a whole and ties up capital that could be deployed productively elsewhere.

The profile of a transition pathway is also important. The value lost through asset stranding should ideally be more than offset by new value creation in other areas, and this should happen smoothly over time. Without a smooth and gradual profile, it will be harder to secure political and societal support. An analysis of stranded assets can help to reveal the potential profile of a transition pathway and, additionally, help to



identify winners and losers across sectors. Identifying the groups affected, particularly those negatively affected, can allow for the provision of targeted transitional help—another way of ensuring support is sustained throughout a transition that might involve painful losses for some firms.

In terms of the financial system, better understanding the materiality of environment-related risks driving stranded assets and the levels of exposure in different parts of the financial system will help regulators manage scenarios that could result in financial instability. Within financial institutions, revealing environment-related risks and providing better pricing will improve risk management and hedging, potentially improving system resilience as well as portfolio performance. Higher-risk premiums for assets more exposed to environment-related risks may also have the added benefit of shifting capital allocations away from sectors that could be considered environmentally unsustainable, and towards assets more in line with China's vision for a cleaner and more sustainable economy.

To encourage financial institutions to take a precautionary approach, stress tests required by regulators could be extended to environment-related risks driving stranded assets. For example, a carbon stress test could involve assessing the impact on portfolios of the rapid introduction of effective carbon pricing (see Kapoor, Oksnes, & Hogarth, 2011.). Additionally, given that environment-related risks are likely to affect underlying asset bases of financial institutions (to the degree that they lend to clients in vulnerable/high-risk industries), there could be merit in higher capital requirements for assets with greater levels of exposure to such risks.

In addition to the implications for financial markets, environment-related risks and stranded assets will affect company strategies. Companies exposed to environment-related risk factors or dependent on clients exposed to these risks may need to adapt their business models, and firms better able to manage emerging environment-related risks could secure significant competitive advantages over time.

# STRANDED ASSETS AND THE TRANSITION TO A GREEN ECONOMY

The rise and fall of different technologies, products and businesses are central to rising productivity in healthy, well-functioning markets. This process can result in “stranded assets”—assets that have suffered from unanticipated or premature write-downs, devaluations or conversion to liabilities (Caldecott, n.d.). Stranded assets are therefore a regular and necessary feature of dynamic economic systems, a phenomenon inherent in the “creative destruction” of economic growth, transformation and innovation. This dynamic process poses risks to individuals and firms and, due to macroeconomic dimensions, may have sectoral or potentially systemic implications.

Regulatory changes are one driver of asset stranding: in regulated markets, policy-makers and regulators have the ability to change the “rules of the game” and to quickly create winners and losers, with significant implications for invested capital. This has proven to be a significant issue in the case of the electricity sector, where large-scale, capital-intensive infrastructure investments with long operational life expectancies are often affected by such changes. The introduction of competition into U.S. and European Union utilities sectors in the 1990s presented significant challenges to regulatory economic theory (Baumol & Sidak, 1995; Cearley & McKinzie, 1994; Kolbe & Tye, 1996; Michaels, 1994). Whether or not sunk costs should be considered legitimately “stranded” proved important in evaluating whether or not it was economically or socially desirable to compensate firms for unrecoverable investments. Regulatory developments following the introduction of competition policy—including renewable energy deployment and climate policy—have taken the issue of stranded assets in the context of the power sector beyond these initial questions.

Over the course of the last two decades, the issues surrounding technological innovation, investor behaviour and business resilience have become magnified in the context of environmental change. The advent of international climate policy and movement towards pricing environmental externalities has raised concerns about “locking in” carbon-intensive technologies (Unruh, 2000). This has helped bring forward the issue of stranded assets as a sustainability concern beyond regulatory action on competition policy. Asset values have been affected across a wide range of sectors and geographies as local and global environmental boundaries are breached. The drivers range from physical climate change and natural capital degradation to new environmental regulations, developments in clean energy technology, resource constraints, evolving social norms and litigation (Caldecott and Mcdaniels, 2014a). Current and emerging risks related to the environment could represent a major discontinuity, able to profoundly alter asset values across a wide range of sectors (Caldecott, n.d.). For example, air pollution and water scarcity in China threatens coal-fired power generation, which has changed coal demand and affected global coal prices (Caldecott, Tilbury, & Ma, 2013); the shale gas revolution in the United States has put downward pressure on coal prices in Europe, stranding new high-efficiency gas plants (Caldecott and Mcdaniels, 2014b); and the fossil fuel divestment campaign threatens to erode the social licence of some targeted companies and could increase their cost of capital (Ansar, Caldecott, & Tilbury, 2013).

These risk factors and others related to the environment could have a significant impact on the ability of different asset classes to generate value in the future, including physical, financial, natural and intangible assets (Caldecott, n.d.). The prospect of stranded assets as a result has recently emerged as an area of concern, and this has been flagged by academic institutions, financial institutions and advocacy organizations.<sup>2</sup>

Beyond direct financial losses, stranded assets may have implications for decision making as well. As the nascent discourse has demonstrated, the real and potential impacts of environment-related risks are starting to be noticed, and this could have long-term implications for asset allocation decisions and risk management—all the way from the individual and the firm through to fund managers, asset owners and governments.

<sup>1</sup> A term popularized by Schumpeter, see Reinert & Reinert (2006).

<sup>2</sup> For example: Caldecott (2011); Caldecott (n.d.); Carbon Tracker Initiative (2011); Generation Investment Management (2012, 2013); HSBC (2012, 2013); McKibben (2011); Standard & Poor’s Ratings Services (2013).

## 1.1 STRANDED ASSETS, UNBURNABLE CARBON: THE DEVELOPMENT OF CARBON ASSET RISK

From the late 1980s and accelerating rapidly from 2000, individuals and organizations working on climate and sustainability issues began to acknowledge the possibility that environmental policy and regulation could negatively influence the value or profitability of fossil fuel companies to the point that they could become impaired (Intergovernmental Panel on Climate Change, 2001; International Energy Agency, 2008). With the concept of a global “carbon budget” (Krause, Backh, & Koomey, 1989)—the 1 trillion tonnes of cumulative atmospheric carbon dioxide emissions allowable for 2 degrees of global warming—there was a way to determine when this might happen. When the amount of fossil fuels combusted plus the amount of carbon accounted for in reserves yet to be burned exceeded the carbon budget, either the climate or the value of fossil fuel reserves, along with the associated high-carbon infrastructure, would have to give.

This largely academic discussion has risen up the investment and policy agenda, particularly following the 2011 publication of the report by the Carbon Tracker Initiative (2011), entitled *Unburnable Carbon: Are the World’s Financial Markets Carrying a Carbon Bubble?*, the findings of which were popularized by environmentalist Bill McKibben (2011). The concept of “unburnable carbon” (Carbon Tracker Initiative, 2011)—the proportion of fossil fuel reserves that must remain in the ground in order to stay within the carbon budget—quantified the disconnect between the value of the listed equity of global energy firms and their potential commercialization under a strict carbon constraint introduced by climate policy.

The idea that “unburnable” fossil fuel reserves could become stranded assets has been taken up by a number of high-profile actors and helped spark a significant discussion on the risk of investing in fossil fuels (Ansar et al., 2013). For example, HSBC research concluded in 2012 that a global peak in coal consumption in 2020—a necessary condition for the transition to a low-carbon economy—would devalue existing share prices of coal assets on the London Stock Exchange by 44 per cent. Though the thesis of a multi-trillion-dollar “carbon bubble” with potentially systemic implications for the global economy has inspired divergent responses—from qualified support to outright opposition (Climate Change Capital, 2012; Environmental Audit Committee, 2014a; King, 2012; Weyzig et al., 2014)—it has spurred the development of the fossil fuel divestment campaign, as well as high-level investor engagement with major listed fossil fuel companies (Ansar et al., 2013).

## 1.2 TOWARDS A SPECTRUM OF ENVIRONMENT-RELATED RISK

Recent developments illustrate that other environment-related risks, and not just those related to an atmospheric carbon constraint enforced by policy, can have a significant impact on assets today. These are likely to increase in significance over time. Caldecott et al. (2013) propose a typology for these different environment-related risks that could cause stranded assets, which are set out below. The risks have been grouped together as “environment related,” as each is connected with environmental protection and environmental change, and there are potential correlations and connections between each set of risks—though the extent of these interdependencies is yet to be determined and is an important area for future research.

FIGURE 1: TYPOLOGY OF ENVIRONMENT-RELATED RISK

SET	SUBSET
<b>Environmental change</b>	Climate change; natural capital depletion and degradation; biodiversity loss and decreasing species richness; air, land and water contamination; habitat loss; and freshwater availability.
<b>Resource landscapes</b>	Price and availability of different resources such as oil, gas, coal and other minerals and metals (e.g., shale gas revolution, phosphate availability, and rare earth metals).
<b>Government regulations</b>	Carbon pricing (via taxes and trading schemes); subsidy regimes (e.g., for fossil fuels and renewables); air pollution regulation; voluntary and compulsory disclosure requirements; changing liability regimes and stricter license conditions for operation; the “carbon bubble” and international climate policy.
<b>Technological change</b>	Falling clean technology costs (e.g., solar photovoltaic, onshore wind); disruptive technologies; genetically modified organisms; and electric vehicles.
<b>Social norms and consumer behaviour</b>	Fossil fuel divestment campaign; product labelling and certification schemes; and changing consumer preferences.
<b>Litigation and statutory interpretations</b>	Carbon liability; litigation; damages; and changes in the way existing laws are applied or interpreted.

Source: Based on Caldecott et al. (2013)

There are many examples of assets affected by the above environment-related risks, either separately or from a combination of risks being present simultaneously (Caldecott, Tilbury, & Carey, 2014). Evidence from different domains, such as the insurance sector (Munich RE, 2014) and studies on specific risks, such as the emergence of climate regulation (Nachmany et al., 2014) suggest that these risks are growing in significance and the speed at which they are emerging is accelerating.

There are a number of different reasons why investors, firms, regulators and policy-makers may want to explore stranded assets from an environment-related risk perspective:

**Political economy:** Environment-related risks are likely to create winners and losers across sectors, and may do so in potentially unexpected ways. Understanding how firms may respond to stranded assets in terms of corporate strategy may be useful in examining potential implications for climate policy and environmental regulation.

**Value at risk:** The size of potential value at risk and risk at a variety of levels (e.g., investments, business models, development strategies), sectors and geographies is significant.

**Socially inefficient asset stranding:** Lock-in and inefficient transitions can be undesirable from a societal and policy perspective. Optimizing the process of transition to a more sustainable global economy (e.g., smooth profile of value destruction being offset by value creation) is an important point of analysis in the debate around stranded assets.

**Risk management and hedging:** Understanding potential risks may facilitate improved risk management and hedging capabilities of firms, which is important for asset owners and fund managers. More clearly understanding the role of stranded assets in firm value may bolster portfolio resilience under certain scenarios.

**Business strategy:** Companies exposed to these risk factors or dependent on other companies exposed may need to consider implications for business models.

A critical issue for policy-makers and financial institutions is to understand how a spectrum of factors ranging from local to international environmental regulation, the nexus of physical resource stress, as well as technological innovation and shifts in societal expectations could converge to imperil valuable assets.

# 2

## INTERNATIONAL EXPERIENCE OF STRANDED ASSETS

Firms in different sectors may experience significant competitiveness impacts from environment-related risks, either from direct impacts on their asset base or from impacts on the asset bases of their competitors. Asset stranding may affect firm value in different ways. Assets held by firms can include capital stock investments (such as extraction, production and transport infrastructure) as well as current asset inventory (such as oil or mineral reserves, agricultural land or natural resource inputs) that determine how firms may be valued. In this context, stranded assets may have unpredictable and counter-intuitive implications for the value of firms exposed to environment-related risks. This section summarizes five examples of environment-related risks stranding or threatening to strand assets in different sectors.

### 2.1 CASE STUDY 1: COAL ASSETS IN THE UNITED STATES

On June 2, 2014, the U.S. Environment Protection Agency (EPA) unveiled a new proposal to reduce carbon dioxide emissions from U.S. power plants by 30 per cent from their 2005 levels by 2030. The proposal gives targets on a state-by-state basis, allowing each state to choose how to meet them. Although current emissions are already around 15 per cent below 2005 levels, the proposal is expected to have a significant impact on the U.S. energy industry—particularly coal, as the U.S. coal fleet currently produces 74 per cent of power plant U.S. emissions (Energy Information Administration, 2013, Table 12.6), but only 39 per cent of U.S. electricity (Energy Information Administration, 2014, Table 7.2a). Even before the EPA proposals, however, coal assets had started to become uneconomical for several reasons.

In 2013, Brayton Point Station, which is one of the leading sources of emissions in Massachusetts, was announced for closure in 2017, in spite of a determination by ISO New England (an independent Regional Transmissions Organisation that oversees the operation of New England's bulk electric power system and transmission lines) that it is needed to help meet demand (ISO New England, 2014). Its previous owner had spent USD 1.1 billion to install new pollution controls, but it was predicted to lose over USD 3 million in 2014, mainly because of low natural gas prices, showing how, even with major capital investments, many old coal-fired plants have become uneconomical (Fleischman et al., 2013). This early retirement is part of a wider trend in the United States. Between 2009 and 2013, 20.8 gigawatts (GW) of coal-fired power plants, 6.2 per cent of the 2009 U.S. coal fleet, were retired and another 30.7 GW were slated for retirement, with most estimates indicating that there will be further coal retirements of between 25 and 100 GW by 2020 (Fleischman et al., 2013). The EIA, for instance, predicts 60 GW of coal retired by 2020 and a study by Fleischman et al. (2013) indicates that 59 GW of coal units are “ripe for retirement,” in addition to the 28 already announced for retirement before 2025. One study by Synapse Energy Economics (2013) estimates a significantly higher figure, between 228 and 295 GW, as vulnerable, having considered a wider range of costs including cooling water, water effluent controls and coal ash (Knight et al., 2013).

One of the principal reasons for this stranding of U.S. coal assets is the shale gas boom, which has provided a cheaper and cleaner alternative to coal. A Bloomberg New Energy Finance (BNEF, 2013) report predicts that U.S. natural gas prices will remain low (less than USD 5 per million BTU) until 2024, forecasting that the U.S. fleet of gas-fired power stations will rise to 134 GW by 2030. A further challenge to coal comes from the advent of increasingly attractive renewables: wind costs have fallen by about 80 per cent in the last three decades (Fleischman et al., 2013), and the costs of solar photovoltaic energy generation (PV) has also been falling rapidly because of a steep drop in manufacturing costs. As a result, PV capacity in the United States has reached 8.9 GW (Fleischman et al., 2013), and rooftop solar PV installations are predicted to grow to a 10 per cent share of the U.S. capacity mix by 2030 (BNEF, 2013).

The Obama administration has said that it still expects 30 per cent of U.S. electricity to come from coal in 2030 (Jopson, 2014). However, significant investment has already been stranded, and the coal industry has

recognized that even more is at risk: the chairman and CEO of American Electric, Nick Atkins, admitted in May 2014 that “it’s a critical issue for us not to strand all that investment that we made and secondly to make sure the grid can operate in a reliable fashion through this transition” (cited in Chegiak & Polson, 2014).

## 2.2 CASE STUDY 2: EUROPEAN POWER SECTOR TRANSFORMATIONS AND COMBINED CYCLE GAS TURBINES<sup>3</sup>

Over the course of 2013, a large number of recently built, high-efficiency combined cycle gas turbine (CCGT) power plants across the EU were prematurely closed or mothballed, while coal retained or gained market share. Motivated by the combined effects of decreased electricity demand from the financial crisis, the merit order effects of renewable energy implementation on capacity needs and price volatility, the lack of a carbon price incentive and cheap coal from the U.S. shale boom, gas-fired power plants’ profits fell to the point of being uneconomic in comparison to coal power.

Responding to poor market conditions, utilities have been rapidly mothballing CCGTs. Estimates suggest that 51 GW of the EU’s generation capacity is currently mothballed and 60 per cent of EU gas-fired capacity is not recovering fixed costs and possibly facing closure within three years (IHS CERA, 2013). Importantly, a significant amount of recently mothballed gas capacity has been built or acquired over last 10 years: new high-efficiency units—such as Statkraft’s 430 megawatt (MW) Knapsack 2 plant and Vattenfall’s 1300 MW Magnum unit—have been immediately mothballed upon commissioning (IHS CERA, 2013).

Mothballing actions have resulted in significant write-downs on gas-fired power assets. The top 16 EU utilities reported €14.6 billion in impairments on generation assets over the course of 2010–2012 (EY, 2013), while notable actions in 2013—including GDF Suez’s impairment of EUR 2 billion and Vattenfall’s impairment of EUR1.7 billion—have stemmed mostly from EU gas assets. Recent instances of stranding have exacerbated downward trends in total utility equity and market capitalization since the financial crisis, as evidenced by the MSCI Utilities index loss of EUR 500 billion since 2008 (Economist, 2013). Along with credit downgrades and the revision of dividends to preserve balance sheets, major utilities have significantly curtailed planned capacity investments, contributing to increasing fears about system security and the risk of blackouts in different EU countries.

Although it remains unclear what the long-term impacts of stranded CCGTs will be on EU energy markets, recent proposals to develop capacity mechanisms make clear the importance of stranded assets on both utility behaviour and policy-making. The cascading impacts of stranded CCGT assets on firm balance sheets, shareholder returns, credit and overall company value is a potent reminder of how rapidly a diverse range of sustainability-related risk factors—including technological innovation (shale gas), social norms (regarding nuclear energy) and regulation (renewable energy targets and air pollution regulations)—may result in unexpected outcomes.

## 2.3 CASE STUDY 3: CARBON SUPPLY COST CURVES

The upstream oil industry<sup>4</sup> could be facing a dual challenge: a “carbon crunch” driven by actual and potential climate regulation and a “cost squeeze” driven by a shift toward expensive and difficult-to-extract reserves, increased technical risks and renewed geopolitical risks. These factors could lead to the stranding of investment in the development of new reserves.

In order to have an 80 per cent chance of limiting global warming to 2°C above pre-industrial levels, the Carbon Tracker Initiative (CTI) estimates that, with assumptions about the reduction of non-carbon dioxide emissions, the global “carbon budget” through 2050 is 900 gigatonnes (Gt) of carbon dioxide (CTI, 2013, p. 4). If oil is kept at its current share of global emissions, around 40 per cent, this implies an oil-specific budget of 360 Gt of carbon dioxide. CTI (2014, p. 32) estimates that oil reserves are capable of supplying 1.8

<sup>3</sup> This case study is drawn from Caldecott and McDaniels (2014b)

<sup>4</sup> “Oil” includes crude oil, condensates and natural gas liquids here: see Carbon Tracker Initiative (2014, p. 26).

times this amount by 2050 and argues that, if a global climate change agreement is reached, a substantial proportion of these reserves will become stranded assets.

Meanwhile, production costs and capital expenditures have been rising rapidly. Since 2000, the oil industry's investments have risen by 180 per cent, with global oil supply increasing by just 14 per cent (Ahmed, 2014). An EY study of 75 oil companies found that global capital expenditures increased by 13 per cent in 2012, while combined profits fell by 16 per cent (Chazan & Crooks, 2013). This reflects the increase in production of "unconventional" oil, such as shale oil, tight liquids and oil sands, as well as a shift toward deep-water projects in the production of "conventional" oil. Even lower-cost projects are seeing higher levels of technical and geopolitical risk. Goldman Sachs identifies five criteria for technical risk: water depth, environment/geography/climate, technology dependence, geological issues and infrastructure dependence. They find technical risk in their database of new projects will "rise to never-before-seen levels of risk" (Goldman Sachs, 2013, pp. 120–123). Furthermore, through 2025, oil companies have USD 215 billion of capital expenditure planned in countries with geopolitical risk that Goldman Sachs rates as "high" or "very high" (2013, p. 126).

The 2014 CTI report analyzes this cost squeeze using Carbon Supply Cost Curves, which plots cumulative oil production against life-cycle emissions. This allows them to analyze projects using the break-even oil price (BEOP): the oil price at which an asset yields a net present value of zero, with a 10 per cent internal return. CTI is then able to estimate key BEOP levels by combining demand projections with global supply curves and examine the marginal BEOP of oil under different demand scenarios (CTI, 2014, p. 16). Projects that have a BEOP over USD 80 per barrel (USD 95/barrel + market price) are most vulnerable to stranding in a low-carbon demand scenario (CTI, 2014, p. 46). The report also examines the categories and locations of projects, to allow investors to better understand their exposure to risk (CTI, 2014, p. 39).

The oil majors' own projections of oil demand are higher than the low-carbon demand scenarios suggested by CTI, but there is a range of emissions scenarios that should be considered, and the assumptions underlying demand projections should be stress tested. For instance, Mark Lewis (2014, pp. 4–5) of the financial services company Kepler Chevron criticizes ExxonMobil's recent report, *Energy and Carbon: Managing the Risks*, as too dismissive of the possibility of coordinated global policy and too binary in the assessment of the climate-policy risks faced.

## 2.4 CASE STUDY 4: AGRICULTURAL COMMODITY VALUE CHAINS<sup>5</sup>

The recent boom in agricultural commodity prices has sparked interest in agriculture as an asset class. This has contributed to an increase in the value of underlying assets such as farmland, and seen capital flow into much needed productivity-enhancing investments. However, this boom has coincided with unprecedented levels of environment-related risk in agricultural systems.

The report *Stranded Assets in Agriculture* maps out a typology of environment-related risks that could strand assets along the agricultural supply chain and completes an assessment of each (Caldecott, Howarth, & McSharry, 2013). The report also provides a high-level value-at-risk analysis quantifying environment-related risk. As the report makes clear, environment-related risks in the agriculture sector are currently insufficiently assessed and incorporated into investment decisions. The absence or inadequacy of regional, national and trans-national governance arrangements intended to manage these risks and address collective action problems further compound these problems.

There is a range of environment-related risks that may affect different agricultural assets. Weather variability is the most important driver of both yield and resilience risk for crop-based agriculture and can have significant consequences for animal agriculture. Degradation of natural capital stocks, including land and soil resources, biodiversity loss and associated provisioning ecosystem services, may significantly affect the value of physical assets such as farmlands. An increasing prevalence of agricultural diseases, pest

<sup>5</sup> This case study is drawn from Caldecott, Howarth, & McSharry (2013)

species, ecosystem fragility and the geographic distribution of these risks may also negatively affect value in unexpected ways.

The value of different agricultural assets may also be negatively affected by economic drivers, including the price and availability of agricultural inputs (e.g., phosphate-based fertilizers) and the proliferation and maintenance of water infrastructure, as well as political drivers such as property rights regimes, land-use regulations, trade policy and industrial policies. Changing social norms may increase exposure of firms with unsustainable assets and supply chain practices to stigmatization and increasing costs. For example, eco-labelling, voluntary standards and international regulation may represent competitiveness impacts for some firms and opportunities for others.

At a macro-level, assets at risk from physical impacts include high fixed or sunk cost assets of low liquidity closely linked to land value, including natural assets (farmlands) and physical assets (including multi-year crops, processing and transport infrastructure). Irrigated crops and related infrastructure may prove to be especially vulnerable in areas relying heavily on seasonal water availability.

## 2.5 CASE STUDY 5: SOCIAL NORMS AND THE DIVESTMENT CAMPAIGN<sup>6</sup>

Divestment is a socially motivated activity of private wealth owners, either individuals or groups, such as university endowments, public pension funds or their appointed asset managers (Kaempfer, Lehman, & Lowenberg, 1987). Owners can decide to withhold their capital—for example, by selling stock market-listed shares, private equities or debt—from firms engaged in a reprehensible activity. Tobacco, munitions, corporations in apartheid South Africa, provision of adult services and gaming have all been subject to divestment campaigns in the 20th century. The fossil fuel divestment campaign, a recent and extant social phenomenon, is one such campaign that could affect the value of fossil fuel assets. Ansar et al. (2013) test whether the divestment campaign could affect fossil fuel assets and, if so, how, to what extent and over what time horizons.

Worried about the impact of climate change, civic group 350.org launched a campaign in 2012 encouraging “institutions to immediately freeze any new investment in fossil fuel companies, and divest from direct ownership and any commingled funds that include fossil fuel public equities and corporate bonds within 5 years” (Fossil Free, 2013). 350.org is a not-for-profit organization that aims to address climate change through online campaigns, grassroots organization and mass public actions.

The analysis conducted by Ansar et al. (2013) shows that the direct impacts of divestment on fossil fuel equity are likely to be limited—the maximum amount of capital that could be divested from fossil fuel companies represents a small amount of funds, and share prices are unlikely to suffer significant declines as other alternative investors step in. Potential direct impacts on coal are more likely than oil and gas firms, as alternative investors may not be as readily available.

Although direct impacts may be insignificant in the short term, the stigmatization of different energy firms with especially poor environmental performance and risk management efforts are likely to have much more significant impacts over the long term. Importantly, different classes of firms—including pure-play coal miners—may be especially vulnerable to the impacts of increasing public awareness and stigmatization, including impacts on trading multiples.

Increasing shareholder pressure to manage environment-related risks looks set to become more important. In 2013, there were a number of notable shareholder actions on high-carbon assets, including Storebrand’s divestment from 24 coal and oil sands firms and SWIP’s divestment from pure-play coal producers (Riseborough & Biesheuvel, 2013), as well as increasing pressure for investor coalitions on global energy firms to disclose carbon-related risks (Ceres, 2013).

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<sup>6</sup> This case study is drawn from Ansar et al. (2013)



## FINANCIAL MARKET RESPONSES

The prospect of stranded assets induced by environment-related risks will prompt a range of responses from policy-makers, regulators and financial institutions alike. The financial system implications of stranded assets are significant, and this section provides a non-exhaustive overview of some of the responses that have taken place or might develop in the future.

### 3.1 PUBLIC POLICY AND REGULATION

There has been a wide range of research on the micro and macro implications of various public policy and regulatory responses to different environment-related risks. However, this work has not been focused on the financial system. Here we focus specifically on recent research and analysis pertinent to finance, banking, insurance and investment in order to derive specific implications for the financial system.

#### 3.1.1 MONETARY POLICY RESPONSES

To date, there is little evidence suggesting that governments implement monetary policy actions explicitly in response to environment-related risks, though governments have implemented monetary policy actions in response to changes in the value of natural capital stocks (i.e., discoveries or depletion of resource wealth), losses of natural capital (i.e., natural catastrophe events), and changes in the value of market goods and services predicated upon natural capital stocks and flows (i.e., price volatility within international commodity markets).

Much of the analysis in this area relates to the management of natural resource extraction rents, including energy resource discoveries (Wills, 2013) and the management of long-term resource depletion.<sup>7</sup> Instead of expanding on this discussion, here we focus on recent findings from analyses of monetary policy responses to i) natural catastrophe events and ii) commodity price volatility. We concentrate on these areas of research as these processes may serve as partial proxies for the impacts of environment-related risks.

##### 3.1.1.1 MONETARY POLICY RESPONSES TO NATURAL CATASTROPHE EVENTS

Natural catastrophe events (NCEs) have major direct and indirect costs at the macroeconomic level (Hallegatte & Przulski, 2010) and within different sectors across the economy (Loayza et al., 2012.). These costs may constitute significant issues for public finance and debt, as NCE impacts necessitate increased government spending concurrent with a decrease in fiscal revenues (Melecky & Raddatz, 2014). Monetary responses to NCEs are often aimed at stimulating the economy in advance of a long-term economic slowdown; for example, the Thai central bank reduced interest rates from 3.5 to 3.25 per cent in anticipation of significant output declines from flood damage in 2011 (Yuvejwattana, 2011). Governments implement monetary responses to NCEs in order to stabilize the economy and mitigate losses from environmental damage, but there has been less focus on the use of such instruments to manage interrupted flows of natural capital to the economy.

Beyond monetary policy, there is an increasing volume of analysis of broader macroeconomic and fiscal policy responses to NCEs and physical climate impacts, with studies examining the fiscal impacts of Hurricane Sandy (Mantell et al., 2013), Caribbean hurricanes (Ouattara & Strobl, 2013), floods (Cunado & Ferreira, 2014) and other catastrophes. Many different fiscal policy tools and combinations of responses to NCEs have been implemented, with varying effects on macroeconomic growth and financial stability. While these lessons are pertinent to implications for financial stability stemming from responses to natural capital degradation, many dimensions of such policies relate to broader macroeconomic issues and are thus hard to disaggregate as specific actions with environmental objectives.

<sup>7</sup> Studies include Leigh & Olters (2006); Collier et al. (2010); Cologni & Manera (2013)

### 3.1.1.2 MONETARY POLICY RESPONSES TO COMMODITY MARKET VOLATILITY

Governments may introduce monetary policy responses to commodity market volatility based upon either changes in the value of export-based capital inflows or exposure of domestic consumers to significant shifts in the consumer price index, leading to inflation. Changes in values of exports of primary natural commodities (such as oil, agricultural products or other natural resources) can significantly affect capital inflows. Inflationary impacts from increased prices for exports can be exacerbated by the pro-cyclicality of bank lending, increasing the risk of systemic negative consequences during major price downturns (Masson, 2014). For example, oil-based capital inflows and loose monetary policy in Nigeria led to a severe credit-based financial crisis. Following a cumulative real growth in private sector credit of 235 per cent over 2006–2008, the fall in oil prices stemming from the 2008 financial crisis led to a rapid increase in non-performing loans, bank failures and eventual monetary policy actions by the Central Bank of Nigeria (Masson, 2014).

### 3.1.2 REQUIRING PREVENTIVE ACTION BY FINANCIAL INSTITUTIONS

Stress tests are used by regulators to assess the resilience of financial institutions in the face of “unlikely but plausible” scenarios. This approach could be extended to environment-related risks to encourage banks to take a precautionary approach to climate, energy, water and other resource factors. For example, a carbon stress test could involve assessing the impact on portfolios of the rapid introduction of effective carbon pricing (Kapoor et al., 2011). Importantly, the price of carbon could be set at the full external damage cost rather than the current market price, where this exists, to incentivize anticipatory action.

This approach could also be extended to other institutions, such as institutional investors, building on international progress on investor stewardship. The Organisation for Economic Co-operation and Development (OECD) has stated that “financial regulators and supervisors also have a role to play in encouraging long-term, active investment. They can support national or international codes of good practice (such as the Stewardship Code which is gaining widespread support in the UK) and issue guidance themselves of how they expect institutional investors to behave.” They propose that “in order to nudge investors to follow such guidance, supervisors can shift the focus on their investigations, enquiring as to the turnover of funds, the length of mandates given to external managers, how fees are structured, voting behaviour etc” (Della Croce, Stewart, & Yermo, 2011).

The OECD argues that if supervisors believe that investors may be acting in too short-term a manner, they could increase their oversight of the institution. Such actions could help address the agency problem, making institutional investors aware of their fiduciary duties and that they are the ultimate owners of the companies in which they invest, with the consequent responsibilities this entails. Supervisory authorities could also help to foster a focus on longer-term performance by releasing or requiring comparative data on returns over longer time periods (Della Croce, Stewart, & Yermo, 2011).

### 3.1.3 EVALUATING SYSTEMIC RISK IMPLICATIONS

The systemic risk potentially associated with carbon exposure and “unburnable carbon” has recently been raised with regulators, particularly in the U.K. In January 2012, a group of investors began a high-profile correspondence with the Financial Policy Committee of the Bank of England by urging it “to investigate how Britain’s exposure to polluting and environmentally damaging investments might pose a systemic risk to the UK financial system and prospects for long term economic growth” (Abberley et al., 2012). The bank governor at the time, Sir Mervyn King, recognized in a response from February 2012 that there “is clearly scope for further evaluation of these issues, in particular the potential scale of the risk and transmission mechanisms through which it might impact UK financial stability” (King, 2012). He then set out three conditions that would need to be met for this to be considered a systemic risk by the bank: 1) that exposure

to carbon-intensive sectors is large relative to overall assets, 2) that the policies and technologies working to reduce returns in high-carbon areas are not already priced by the market and 3) that any subsequent correction would not give sufficient time for financial institutions to adjust their portfolios in an orderly manner (Environmental Audit Committee, 2014a).

The Environmental Audit Committee of the House of Commons in a February 2014 report, and then in a July 2014 letter, also subsequently recommended that the “Financial Policy Committee of the Bank of England should regularly consult with the Committee on Climate Change to help it monitor the risks to financial stability associated with a carbon bubble” (Environmental Audit Committee, 2014a). The Greens/European Free Alliance, a political grouping within the European Parliament, also published research in February 2014 estimating that the exposure of EU financial institutions to at-risk fossil fuel assets was EUR 1 trillion and that, under a “shock” scenario, losses could amount to EUR 350 billion–400 billion, enough to merit a systemic risk to the EU financial system (Weyzig et al., 2014).

Despite these developments, future macro-prudential regulations remain an uncertainty with respect to stranded assets. Currently, it is unclear how environment-related risks may be explicitly addressed (if at all) in such regulations, but analysts have suggested that a potential “Basel IV” could result in “tougher requirements on the leverage ratio, risk-weighted assets and stress testing” (KPMG, 2014). But given that environment-related risks are likely to affect the underlying asset bases of banks (to the degree that they lend to clients in environmentally vulnerable/high risk industries), there may be implications for asset risk weighting, potentially leading to higher capital requirements for assets with greater levels of exposure to such risks.

### 3.1.4 OTHER POLICY RESPONSES

There is a range of policy drivers (including conservation, trade, industrial and social policies) that have the potential to increasingly affect the relationship between environment-related risk and the financial sector.

#### 3.1.4.1 POLICIES TO CONSERVE/SUSTAIN NATURAL CAPITAL, INCLUDING INVESTMENT

It is becoming increasingly accepted that well-designed policies to support natural capital resilience and conservation are considered positive for long-run economic competitiveness, as they help to drive resource productivity (HSBC, 2014). Regulatory and legislative responses to mitigate, abate or manage natural capital degradation and other environment-related risks comprise a significant body of response measures, including:

- Conservation policy
- Protected areas and knock-on effects
- Investments in ecosystem restoration and rehabilitation
- Investments in natural infrastructure
- Investments in ecosystem resilience

#### 3.1.4.2 TRADE POLICIES, INDUSTRIAL POLICIES AND SOCIAL POLICIES

Impacts on financial stability may arise from national-level regulations and policies that affect business competitiveness and trade. The most important of such actions include production restrictions, import restrictions and export restrictions implemented to control, abate or maintain natural capital (such as key environmental resources). As these policies may often be directly designed to affect trade flows, they may have ripple effects across the economy that pose sector-wide or potentially systemic financial risks.

Finally, policies in response to significant social or civil society concern could also have financial implications. Examples of this can be seen in the recent campaign to divest from fossil fuels in the United States and the EU (Ansar et al., 2013), as well as public protest in response to air pollution in China. As social norms around natural capital may change rapidly if human health and human environmental quality are negatively affected, governments are likely to respond rapidly (and potentially unpredictably) to social issues with policies that may significantly affect financial markets.

## 3.2 FINANCE SECTOR

### 3.2.1 STRESS TESTING, DISCLOSURE AND INTEGRATED REPORTING

Financial stakeholders are implementing a range of responses to environment-related risks, but most fall into what can be understood as very preliminary risk assessments. A standard progression of “assessment/transparency/management” can be seen in the responses of financial stakeholders, with many only taking initial steps towards proactively managing environment-related risks. Key mechanisms in this space include stress testing, risk analysis, risk disclosure and integrated reporting. A significant number of new industry bodies providing guidance in this area have been established, including standards boards, councils and various coalitions among industry, regulators and international organizations. While it is beyond the scope of this paper to review each of these in detail, we can make a number of general observations:

- Established financial sector standard setters (such as the International Accounting Standards Board and the Financial Accounting Standards Board) are taking steps towards requiring greater transparency of environmental footprints in general, as well as specific actions on water, biodiversity and other natural capital risks. In addition, these standards are implementing actions to assess various climate-related exposures, including carbon footprint accountability/exposure and exposure to sea-level rise.
- The wide range of standards and guidance bodies (including the Global Reporting Initiative, World Business Council for Sustainable Development, Sustainability Accounting Standards Board, Carbon Disclosure Standards Board, and others) have begun to implement new frameworks to improve the rigour and utility of sustainability, climate and natural capital disclosure outputs. Some of these bodies have also targeted new financial stakeholders in the investment chain, including asset owners (Asset Owners Disclosure Project, 2013).
- According to Ceres (2014), investor demand for mandatory environmental and social disclosure is pushing environment, social and government (ESG) reporting into the mainstream. Seventeen countries already require some form of corporate sustainability disclosure, and there is increasing support for similar requirements in the United States.
- Recent developments in established reporting systems and channels (such as climate risk within the Securities and Exchange Commission) suggest that uptake is a potentially long and slow process, that has little impact in the short run (Ceres, 2014).
- Beyond specific firms or financial stakeholder groups, actions on natural capital may be implemented through exchanges, as illustrated by the preliminary progress towards carbon reporting requirements for stock exchanges. Some of the recent work in this area is being coordinated by the UN’s Sustainable Stock Exchange Initiative (Sustainable Stock Exchange, 2014).
- An ongoing letter campaign organized by the Principles for Responsible Investment (PRI), Ceres and the United Nations Environment Programme Finance Initiative (UNEP-FI) requests that the International Organization of Securities Commissions work closely with regulators, stock exchanges and other related parties to improve the disclosure of ESG information in the global marketplace. The campaign suggests that IOSCO take action in a variety of ways in order to bring about more consistent disclosure rules, develop accountability mechanisms, and help issuers and capital market influencers better understand the benefits of ESG disclosure.

### 3.2.2 SECURITIZATION OF ENVIRONMENT-RELATED RISKS

Many insurers, reinsurers and other financial stakeholders are undertaking efforts to reduce environment-related risk exposure through the issuance of financial securities. The use of catastrophe bonds (“cat bonds”) and other insurance-linked securities (ILSs) are becoming increasingly prevalent in transferring environment-related risks and potential stranded assets to capital markets, often via indexed approaches to valuing damages from natural catastrophe events. Cat bonds are a private sector mechanism that are related to a wider group of public and private disaster risk financing mechanisms, which are outlined in Figure 2. The Intergovernmental Panel on Climate Change’s (IPCC) recent *Fifth Assessment Report* (WGII AR5) supports cat bonds and risk securitization as key tools for the diversification of climate-related disaster risk across capital markets. New instruments that may operate as capital market risk transfer mechanisms include weather derivatives and hybrid products linking parametric climate-based and capital market loss triggers, acting as a hedge against a “double hit: from direct disaster losses and losses incurred within asset management portfolios and capital markets (IPCC, 2014, Ch. 10). Changes in the dynamics of these markets call attention to the potential for systemic risks arising across the financial system in response to increased exposure to NCE damages and stranded assets.

FIGURE 2: NON-TRADITIONAL DISASTER RISK FINANCING MECHANISMS

Mechanism	Financing issue	Description	Stakeholders	Example
Catastrophe bonds	Need for insurers to transfer catastrophe-related underwriting risk to capital markets in order to de-risk portfolios	ILS (often fully collateralized) whereby investor receives return premium when specified NCE (often measured via indices) does not occur; when NCEs occur, investors sacrifice interest premium	Private insurers and reinsurers, institutional investors	Wide range of catastrophe bond issuances (Artemis, 2014)
National insurance programs/pools	Reluctance of private insurers to offer insurance for high-risk and high-cost NCEs, due to covariant dynamics affecting solvency	Insurance pool based on mandatory private capital contributions designed to reduce public fiscal exposure to disaster events; often guaranteed by government/donors	National governments	Turkish Catastrophe Insurance Pool (Gurenko, 2004)
Contingent credit	Inability to secure access to credit at appropriate rates in period of fiscal illiquidity following disaster events	Credit access agreement whereby governments pay a premium for a call option on a guaranteed loan at a predetermined rate, contingent on a disaster or some other defined event occurring	National governments, International Financial Institutions, Development Banks	Colombia contingent credit agreement with the World Bank (Cummins & Mahul, 2008)
International insurance pools	Regional standards for disaster risk insurance pricing may be subject to fluctuations that effectively de-link premiums with recorded damages	International insurance risk sharing facility that allows governments to pay into a pool in order to access immediate liquidity at a lower cost than private insurance within capital markets	National governments	Caribbean Catastrophe Risk Insurance Facility; Pacific Catastrophe Risk Assessment Financing Initiative
Alternative mechanisms	Various	Index-based micro-insurance	Various	Various
		Public sector risk transfer		
		Insurance of international donors		

Source: Adapted from Linnerooth-Bayer and Hochrainer-Stigler (2014)

# 4

## IMPLICATIONS FOR CHINA

China's strategic decision to move away from a high-pollution and high-resource-intensive economy and build an "eco-civilization" will clearly have implications both for existing assets and for the trajectory of future capital investment. Shifts already well underway in China are a serious concern over air pollution, a desire to reduce greenhouse gas emissions and a desire to reduce exposure to volatile international commodity markets. This has resulted in the massive deployment of non-fossil energy driven by new policy frameworks, falling technology costs and the emergence of carbon pricing, which are trends set to continue and grow. Increasing water scarcity could also adversely affect polluting sectors, while domestic shale gas and changing international gas markets will result in more coal-to-gas switching.

These and related changes, while problematic for some firms and sectors, need not hinder China's economic development and could actually work to support China's multiple, inter-locking objectives of addressing inequality, ensuring sustainable growth, increasing domestic consumption and improving social infrastructure.

One opportunity is to secure an optimal rate of asset stranding, given China's level of economic development, targeted rate of economic growth and sustainability concerns. Too little asset turnover could leave China with insufficiently productive assets far from technological frontiers, while too much could result in unmanageable losses for companies and financial institutions, as well as challenging social issues due to job losses and displaced industries. Leaving polluting, inefficient assets in place will undermine sustainability and long-term growth.

Another dimension related to securing an optimal rate of asset stranding is the avoidance of lock-in. China should avoid investing in technologies and infrastructure that might quickly become outdated or inappropriate from a societal perspective.<sup>8</sup> An example could be new-build sub-critical coal-fired power stations, given ever-increasing concerns over air pollution and water scarcity, as well as the availability of cost-competitive alternatives. Lock-in of this kind is expensive for society as a whole and ties up capital that could be deployed productively elsewhere.

The profile of a transition pathway is also important. The value lost through asset stranding should ideally be more than offset by new value creation in other areas, and this should happen smoothly over time. This is preferable to a transition that is staggered or "lumpy" and one where value destruction overwhelms value creation, even if only temporarily. Without a smooth and gradual profile, it will be harder to secure political and societal support. An analysis of stranded assets can help to reveal the potential profile of a transition pathway and, additionally, help to identify winners and losers across sectors. Identifying the groups affected, particularly those negatively affected, can allow for the provision of targeted transitional help—another way of ensuring support is sustained throughout a transition that might involve painful losses for some firms.

In terms of the financial system, a better understanding of the materiality of environment-related risks and the levels of exposure in different parts of the financial system will help regulators manage scenarios that could result in financial instability. Within financial institutions, revealing and better pricing environment-related risks will improve risk management and hedging, potentially improving system resilience as well as portfolio performance. Higher risk premia for assets more exposed to environment-related risks may also have the added benefit of shifting capital allocations away from sectors that could be considered environmentally unsustainable, and towards assets more in line with China's vision for a cleaner and more sustainable economy.

<sup>8</sup> The corollary is that in some cases it might be better to "sweat" existing assets until viable long-term replacements can be found. In other words, instead of investing in an intermediate option that may need to be replaced relatively quickly, it could be better to defer investment.

In addition to the implications for financial markets, environment-related risks and stranded assets will affect company strategies. Companies exposed to environment-related risk factors or dependent on clients exposed to these risks may need to adapt their business models. Exporters, particularly those exposed to environmental regulation in key export markets, could be particularly vulnerable. Those dependent on imported resources that could be affected by more price volatility in international commodity markets due to environmental change might also be at risk. Firms that are better able to manage emerging environment-related risks could also secure significant competitive advantages over time.



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# GREENING CHINA'S FINANCIAL SYSTEM

## CHAPTER 7:

# MONETARY POLICY AND GREEN FINANCE: EXPLORING THE LINKS

PIERRE MONNIN AND ALEXANDER BARKAWI, COUNCIL ON ECONOMIC POLICIES



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## EXECUTIVE SUMMARY

**Monetary policy has been largely neglected in the worldwide discussions on green finance.** Similarly, most central banks have not even started thinking about their role in helping society reach its environmental objectives and about the potential implications of environmental degradation for their mandates.

**Bringing light to this blind spot is critical. The following report aims to make a contribution in this direction. Its starting point is the recognition that the conduct and effects of monetary policy are shaped by myriad factors.** Rules and structures of the international monetary system (IMS) (Section 2), mandates and objectives of central banks (Section 3), as well as the instruments they apply (Section 4), define their policy space and framework of reference. Understanding these building blocks and how they relate to each other is critical in exploring the links between monetary policy and green finance.

**The IMS stands at the core of the global financial architecture. Recommendations for its reform cover a large range of domains,** such as exchange rate regimes, capital flow management, reserve currencies, the structure of the banking sector and capital markets, financial regulation, money creation processes as well as alternative currencies. Calls for a greater use of the International Monetary Fund (IMF) Special Drawing Rights (SDRs) as a global reserve currency are a case in point. In that context, suggestions have also been made to use SDRs for the capitalization of green funds. Moreover, proposals to strip private banks of the ability to create money and to assign that responsibility exclusively to central banks have hit headlines across the world. At the same time, alternative currencies that are being used alongside official currencies are getting more attention. While these developments are at early stages, some economists believe they may be critical pillars for a green and inclusive economy.

**Within the current IMS, central bank mandates differ widely across countries. Several central banks in the G20 economies have a mandate covering two or more objectives, for example, price stability, financial stability, full employment and output growth. Others only focus on price stability.** A similarly diverse picture emerges from looking at central banks in developing countries. Potential changes to these mandates constitute an area for intense debates. The inclusion of financial stability in central bank mandates provides an example in this context. To what extent monetary policy can and should play a role in the prevention, management and resolution of financial crises remains a controversial topic. The impact that such crises can have on the housing market, for example, as well as the distortions that they create with regard to resource and land use, underlines the relevance of this debate for a green and inclusive economy.

**Whether one advocates for expanded or narrow mandates will depend significantly on whether one sees trade-offs between the different objectives.** To clarify objectives *ex ante*, and thus reduce the risk of *ex post* policy challenges, explicit goals may be warranted. Such clarification may also be key to dealing with potential trade-offs between explicit and implicit objectives—also with regard to green finance.

**Translating objectives into measurable targets is of critical importance. Central banks often have significant discretion in this regard. In setting their targets, they should account for possible interdependencies with the objectives of a green and inclusive economy.** Most central bank mandates, if not all of them, include price stability as an objective. Some leave the quantitative definition of this objective undetermined and within the exclusive responsibility of the central bank itself. Others stipulate that the central bank and the government must coordinate in setting a numerical inflation goal. Whether such targets should be raised, whether they should be defined in terms of headline or core inflation, whether central banks should target inflation rates or price levels, and across what time horizon inflation rates should be returned to the target if they deviate, are questions that call for a thorough evaluation of the implications for a broader sustainability agenda.

**The impact of resource scarcities on commodity prices, and thus inflation, is a case in point.** The appropriate reaction to changes in commodity markets is a key task for central banks and critical for a country's food and energy security. In that context, the economic models of many central banks assume that commodity prices are exogenous variables. Research, however, reveals that decisions by central banks have an impact on resource prices and thus on the inflation rates that they have targeted in the first place. A better understanding of these feedback loops and spillover effects is critical for policy formulation.

**Similarly, climate change, environmental degradation and related mitigation policies may have important consequences for financial stability.** Particularly, fossil fuel companies may face extensive write-downs of their assets when climate policy turns the reserves on their balance sheets into “stranded assets.” The fall in valuations may have significant repercussions for the stability of financial markets—a scenario that central banks should and are taking notice of.

**Setting policy rates is at the core of central bank toolkits to pursue their objectives.** By defining the rates at which they provide liquidity to the financial system, central banks influence an extensive range of market rates. The decision to increase or decrease interest rates and the magnitude of changes belongs to the key leverage points they have.

**The potential impact of interest rates on green investments is significant.** Net present value calculations that help to determine whether a government policy should be pursued, as well as discounted cash flow calculations based on which investment opportunities are assessed, depend greatly on the chosen discount factor and thus on interest rate levels. Against this background, low interest rates may provide a welcome opportunity to increase long-term investments for a green economy. The lower the interest rate, the more attractive are projects that require investments today to reduce costs and seize benefits in the future. Renewable energy projects are a case in point for this. They demand high capital spending as they are started, but have low running costs from thereon. Power generation based on fossil fuel also requires high investments upfront, but also high running costs over time. The higher the interest rate, the more these future costs are discounted and the better fossil fuel looks compared to renewable energy. By influencing interest rates, monetary policy affects a key factor in this calculation and thus investment decisions.

**A central bank's decision to buy and sell certain types of assets, accept them as collateral or use them to define borrowing limits and prices may have significant repercussions for green finance as well.** It may provide particular support, as in the case of the purchase of mortgage-backed securities in the United States, to the housing industry. It may offer targeted help, as intended by the European Central Bank's targeted longer-term refinancing operation to the non-financial sector. Or it can concentrate on particular sectors, such as solar energy, biogas and effluent treatment plants, which are the focus of a dedicated refinancing facility at a concessional rate by the central bank of Bangladesh. Further measures of “credit guidance,” such as differentiated reserve requirements, provide further illustration of sector support that some central banks already provide—and that could possibly be aligned further with the objectives for a green and inclusive economy.

**For a thorough exploration of the links between monetary policy and sustainability, let alone for making policy recommendations, additional research—in particular at a country level—is essential.** Nonetheless, this report suggests the following eight directions for further analysis that may provide initial guidance for future action:

1. Analyze historical and international experience with credit guidance in order to apply similar schemes for green finance.
2. Identify and mitigate biases in current monetary policy that are misaligned with the objectives for a green economy.
3. Expand central bank reporting to reflect environmental considerations in a key publication.
4. Assess the feasibility of steering asset purchases in the context of quantitative easing into green investments (e.g., through green bonds).
5. Develop a better understanding of the impact of interest rate levels on the long-term investments needed in the fields of energy, water and resource security.
6. Improve the knowledge base about the possible effects of environmental degradation and resource scarcities on price and financial stability.
7. Evaluate the possible use of SDRs to fund green investments.
8. Study international suggestions for the introduction of “sovereign money” and alternative currencies.



# INTRODUCTION

Monetary policy has been largely neglected in the discussions on green finance worldwide. Similarly, most central banks have not even started thinking about their role in helping society reach its environmental objectives and about the potential implications of environmental degradation for their mandates. Across the world, we are today scrutinizing every possible policy field—tax policy, energy policy, trade policy, education policy and others—to explore how these fields can be better aligned with the objectives of a green economy in general and green finance in particular. But we have not done the same with monetary policy.

This is particularly striking as the global financial crisis has significantly increased the influence of central banks and the policies they enact. It is also surprising in view of the risk that growing environmental degradation poses to the real economy and thus to price and financial stability. The potentially drastic reduction in the value of fossil fuel companies as a result of climate change policies and the shock to financial markets that this may bring about provides an illustration. Central banks that do not take these issues into account may be neglecting a key risk with regard to their mandate.

Bringing light to this blind spot is critical. As central banks transfer billions of dollars into the global economy on a monthly basis, we urgently need a solid understanding of the effects that their actions have on the green economy, as well as a thorough analysis of policy alternatives and their environmental impacts.

The following report aims to make a contribution in this direction. Its starting point is the recognition that the conduct and effects of monetary policy are shaped by myriad factors. Rules and structures of the IMS, mandates and objectives of individual central banks, as well as the instruments they apply, define their policy space and framework of reference. Understanding these building blocks and how they relate to each other is critical. Against this background, Section 2 provides a short historical overview on the development of the IMS and reviews five areas that have received particular attention in current debates on IMS reform. Section 3 explores different mandates and objectives that central banks have across the world and identifies their potential relationship with the goals of a green and inclusive economy. Section 4 focuses on the instruments and transmission mechanisms used by central banks to pursue their monetary policy goals and identifies their potential impacts for a green economy. Section 5 concludes with eight suggestions that may provide initial guidance for future action.

# 2

## INTERNATIONAL MONETARY SYSTEM

The IMS—“the rules and institutions that shape how international payments are handled” (IMF, 2011a)—stands at the core of the global financial architecture and is a significant factor for the policy space of central banks. This section provides a short historical background of the IMS and reviews five areas that have received particular attention in current debates on IMS reform.

### 2.1 HISTORICAL BACKGROUND

The IMS has been subject to permanent change. Often crises were the triggers for reform. The First World War caused many countries to abandon the gold standard. Some reintroduced a link between their currencies and gold in the interwar period, only to abandon it again in the 1930s following the Great Depression, using devaluations to improve their competitive position in the years before World War II. In 1944, the Agreements of Bretton Woods established a monetary order among the world’s major industrial nations that pegged the U.S. dollar to gold, and all other key currencies to the U.S. dollar at fixed exchange rates. The U.S. dollar became the world’s reserve currency.

Since the end of the Bretton Woods system in 1971, the IMS has become increasingly decentralized. With the United States suspending the convertibility of the U.S. dollar into gold in 1971, the Bretton Woods system came to an end. The U.S. dollar became a pure fiat currency, and a new era started in which many economies initially experimented with free-floating currencies, but eventually introduced alternative regimes (The Economist, 2014). Since then, the IMS has been characterized by nations choosing their own monetary policies, exchange rate targets and actions to safeguard financial stability. The U.S. dollar continued to be the world’s reserve currency. Capital flows increased. Current account and capital stock imbalances between countries grew dramatically. Exchange rate volatility went up. So did the average number of banking and currency crises (Bush, Farrant & Wright, 2011, p. 5; IMF, 2011b).

TABLE 1: INCIDENCE OF CRISES

		Banking crises (Number per year)	Currency crises (Number per year)
Pre-Gold Standard (1820–1869)		0.6	-
Gold Standard (1870–1913)		1.3	0.6
Interwar Period (1925–1939)		2.1	1.7
Bretton Woods (1948–1972)		0.1	1.7
memo	1948–1958	0.0	1.4
	1959–1972	0.1	1.9
Current (1973–2009)		2.6	3.7
memo	1973–1989	2.2	5.4
	1990–2009	3.0	2.4

Source: Bush et al. (2011), p. 7.

The recent financial crisis highlighted the deficiencies of the post-Bretton Woods system—called a “non-system” (see, e.g., Lin, Fardoust, & Rosenblatt, 2012; Mateos y Lago, Duttagupta, & Goyal, 2009; Ocampo, 2013) by some—and moved the debate on its reform up policy agendas. The renewed interest in IMS reform also put a spotlight on the role of central banks and the question of to what extent they should move beyond their current mandates and take further responsibilities in safeguarding macroeconomic and

financial stability. In 2008, French President Nicolas Sarkozy and U.K. Prime Minister Gordon Brown called for a “New Bretton Woods” and a redesign of the global financial architecture (Hall & Eaglesham, 2008). In 2009, the Governor of the People’s Bank of China (PBC), Zhou Xiaochuan, called for “an international reserve currency that is disconnected from individual nations” and suggested to give particular consideration to the IMF Special Drawing Rights in this context (Zhou, 2009). Further recommendations for reform include proposals from the Commission of Experts of the President of the United Nations General Assembly on Reforms of the International Monetary and Financial System, and the Palais-Royal Initiative, as well as further suggestions such as those from the Committee on International Economic Policy and Reform, the Reinventing Bretton Woods Committee, and Farhi, Gourinchas and Rey (2011; United Nations, 2009; Palais-Royal Initiative, 2011; Committee on International Economic Policy and Reform, 2011; Reinventing Bretton Woods Committee, 2009).

The evaluation of such proposals for IMS reform from a sustainability perspective is critical. Understanding their effects on growth, inflation and financial stability is important, but not enough—that needs to be complemented by a thorough review of potential reform impacts on sustainability goals such as job creation, inequality moderation, resource security and climate change mitigation.

## 2.2 EXCHANGE RATE REGIMES AND CAPITAL FLOW MANAGEMENT

Exchange rate regimes are a key aspect of the reform debates (Mohan, Patra, & Kapur, 2013, p. 7). Today, 56 per cent of IMF members have a hard or soft peg of their currency to the U.S. dollar or another currency, 18 per cent follow a managed float regime, 16 per cent free-float their currency and 10 per cent have another managed arrangement (IMF, 2013, p. 7). More than 90 per cent of emerging markets have opted for fixed or managed exchange rates (IMF, 2014a, p. 44).

Since the financial crisis, fears of “currency wars” triggered by monetary easing have repeatedly been the subject of intense discussions (see, e.g., Ross, 2012). Concerns about instability and misalignments of exchange rates underline calls for greater international policy coordination and adjustments (see, e.g., Eichengreen, 2013; IMF, 2012a). Their potentially adverse impact on international trade has also led to proposals to evaluate a possible role for the World Trade Organization in the monitoring exchange rates, and in taking action when they deviate significantly from those perceived to be in line with fundamentals (see, e.g., Gagnon, 2013; Thorstensen, Ferraz, & Marçal, 2011).

In terms of capital flows, liberalization topped the agenda for many years. Starting in the 1970s, after the breakdown of Bretton Woods, and continuing in the 1980s and 1990s, many advanced as well as developing economies opened their capital accounts and allowed foreign investments to flow into and out of their countries without any or with significantly fewer restrictions (Kaminsky & Schmukler, 2003). Annual global inward foreign direct investments surged from USD 13 billion in 1970 to a peak of USD 2 trillion in 2007, and amounted to USD 1.5 trillion in 2013 (United Nations Conference on Trade and Development, 2014a, 2014b).

More recently, a greater recognition that capital flows bring both benefits and risks has reopened the debate on appropriate deviations from full liberalization of capital accounts. Now referred to as “capital flow management measures,” interventions to reduce the volatility of capital inflows—for example, taxes, restrictions or prohibitions—are becoming increasingly accepted. In particular, the IMF started reviewing its position on the management of global capital flows in 2010 and two years later published a new institutional view that seeks to balance the benefits and risks of capital flows. It now sees capital flow liberalization as “more beneficial and less risky if countries have reached certain levels or ‘thresholds’ of financial and institutional development. ... There is ... no presumption that full liberalization is an appropriate goal for all countries at all times” (IMF, 2012b).

Monetary policy, exchange rate regimes and capital flow management are interdependent. Being conscious of exchange rate regimes and capital flow management is essential in the analysis of monetary policy. According to the “impossible trinity,” also known as the “trilemma,” a country cannot have a pegged exchange rate, free capital movement and an independent monetary policy at the same time. When the exchange rate is fixed and the capital account is open, a country does not have any more discretion to run its own monetary policy. Understanding the impact of exchange rates and capital flows on investments on a country level is equally important—not the least with regard to financing climate adaptation and mitigation projects in developing economies.

## 2.3 RESERVE CURRENCIES

The use of reserve currencies is closely intertwined with exchange rate regimes and capital flow management for two reasons. First, central banks that want to intervene in currency markets need international reserves for doing so. Second, the scale and volatility of capital flows are key drivers of the demand for precautionary reserves (Mateos y Lago et al., 2009, p. 5).

The fact that demand for global reserves is met mainly by one country, the United States, and that being the key supplier of reserve assets provides the United States with a significant advantage, has been subject for intense debates for a long time. The “exorbitant privilege” that comes along with the U.S. dollar being the global reserve currency gives the United States more macroeconomic policy space, access to lower-cost financing and additional seigniorage (Mateos y Lago et al., 2009, p. 7). At the same time, it creates a conflict of interest—also referred to as the “Triffin Dilemma”—for the United States between pursuing its domestic monetary policy goals and providing global liquidity. The fact that the U.S. Congress has repeatedly come close to forcing the U.S. government to default on its debt, and thus on the world’s major reserve assets, adds further to international concerns (Ocampo, 2013).

Against this background, several proposals have been made for the introduction of a “super-sovereign” reserve currency that would be rules-based and not linked to the interests and economic conditions of any single nation. In fact, the introduction of an international currency unit was already suggested—unsuccessfully—by John Maynard Keynes in the negotiations of the Bretton Woods Agreements in 1944. Since then, both policy-makers and academics have repeatedly highlighted recommendations to replace the U.S. dollar with an alternative global reserve currency (see, e.g., Bergsten, 2009; Erten & Ocampo, 2012; Williamson, 2009; Zhou, 2009). Most of these proposals underline the fact that the IMF Special Drawing Rights (SDRs) already provide such an alternative and were launched in 1969 to fulfil this role: articles 8 and 22 commit IMF members to the objective of “making the special drawing right the principal reserve asset in the international monetary system” (IMF, 2008).

In that context, several suggestions have also been made to use SDRs to pursue specific sustainability objectives. Proposals by George Soros (2009) for developed countries to “lend \$100bn worth of [...] SDRs for 25 years to a special green fund serving the developing world,” by IMF staff to capitalize a green fund with reserve assets and to use SDRs for that (Bredenkamp & Patillo, 2010) and by the UN Department of Economic and Social Affairs (2012) to create “SDRs [...] to be allocated with a bias favoring developing countries or leveraged as development financing” are cases in point.

In addition to SDRs, the use of other currencies as reserve assets has repeatedly been and continues to be a topic on policy-makers’ agendas. According to the Currency Composition of the IMF’s Official Foreign Exchange Reserves (COFER) database, currency breakdowns are currently reported for just over a half of total foreign exchange reserves. Within that number, as per end-Q1 2014, the U.S. dollar accounted for 60.9 per cent of foreign reserves, followed by the euro (24.5 per cent), Japanese yen (4.0 per cent), pound sterling (3.9 per cent), Canadian dollar (1.9 per cent), Australian dollar (1.7 per cent), Swiss franc (0.3 per cent) and other currencies (2.8 per cent) (IMF, 2014b). World trade payments are also mainly done in U.S. dollar

(41.6 per cent), euro (32.4 per cent) and pound sterling (8.3 per cent). Use of the renminbi in international payments now stands at 1.5 per cent, up from 0.6 per cent in January 2013 (SWIFT, 2014). Concerns about this dependency on the U.S. dollar have led to repeated calls for a diversification of currencies used as reserves as well as in international trade. Suggestions for an increased use of regional currencies in Asia for bilateral trade settlements, as well as a bigger role of the euro for international trade, are cases in point for this (see, e.g., Rhee & Sumulong, 2013; Strauss & Hume, 2014). Measures to reduce the precautionary demand for national reserves, for example, by improving access to a global or regional reserves pool, have also been suggested (Mateos y Lago et al., 2009, p. 10).

## 2.4 BANKING SECTOR AND CAPITAL MARKETS

Banks play a central role in the transmission of monetary policy. The ability of central banks to influence market interest rates and lending depends significantly on the development and structure of the banking sector. This is particularly the case in economies with less developed capital markets, respectively for small companies who seek funding through bank loans rather than for larger corporations who can fund themselves through, if available, securities markets.

At the core of this stands the bank lending channel of monetary policy transmission. It is based on the view that banks are well positioned to overcome asymmetric information problems in credit markets and are thus important, in some cases essential, intermediaries that provide funding (Mishkin, 1996). It also assumes that expansionary monetary policy increases bank reserves and thus allows these institutions to expand their loan portfolios. To what extent they do that and whether they pass on reduced policy rates through the interest rates that they charge depends on the structure of the banking sector. The negative relationship between the degree of competition in the sector and borrowing costs is a case in point for that (see e.g., Bonfim et al., 2009; IMF, 2010, p. 5).

The relevance of the bank lending channel depends also on the availability of alternative funding sources through capital markets. Proposals for capital market development in emerging economies have been on policy-makers' agendas for a long time. They argue that "missing markets," that is to say, the lack of liquid local currency bond markets, lead these countries to push capital abroad and accumulate reserves as insurance. The result of capital flowing "uphill"—from emerging to advanced economies—results in investments not being made where they could be most productively used and thus to allocative inefficiencies. The development of local currency bond markets is suggested as a remedy (see e.g., Bush et al., 2011, p. 11; Committee on the Global Financial System, 2007; G20, 2013). It is also argued that deeper financial markets allow emerging markets to more readily absorb capital flows and would provide their central banks with a broader range of tools to conduct monetary policy (Singh, 2011; see also Huang, 2012; Mishkin, 1996; Zhang, 2012).

## 2.5 FINANCIAL REGULATION

Financial regulation is a further key factor that affects the transmission mechanism of monetary policy. Capital requirements for banks are a key aspect in this regard. As they attach lower risk weightings to collateralized rather than non-collateralized lending, they provide an incentive for financial institutions to focus their loan portfolio on asset-backed loans, for example mortgages, instead of project finance credit. The availability of long-term finance for sustainable infrastructure may suffer as a result (see e.g., Group of Thirty, 2013). An expansion of monetary policy may then lead to credit growth that funds price bubbles in existing assets rather than investments in the real economy. It may also result in sector biases and adverse sustainability effects. In Switzerland, as an example, more than CHF 900 billion, or 60 per cent of the CHF 1.5 trillion in total outstanding loans by the country's banks, are mortgages (Swiss National Bank, 2014) and thus used for real estate and construction—two sectors with a particularly high impact on the environment. A

thorough understanding of this connection—in particular in view of the country’s growing concerns about land use and urban sprawl—is essential (see e.g., White, 2012b, p. 19).

## 2.6 MONEY CREATION AND ALTERNATIVE CURRENCIES

In the current system, money is mainly created by commercial banks. Some contend that this should not be the case and that money creation should be the sole responsibility of central banks. Money today is predominantly credit-based money. Only a fraction of it comes from central banks themselves. The bulk of money in circulation is created by commercial banks making loans (see e.g., McLeay et al., 2014; New Economics Foundation, 2012). Critics argue that this role of commercial banks fuels boom/bust cycles and that only a small percentage of the loans they provide is invested into productive uses. In their view, money creation should be the exclusive responsibility of central banks, and commercial banks should be stripped of their current ability to increase money supply by granting loans (See e.g., Benes & Kumhof, 2012; Chamley, Kotlikoff, & Polemarchakis, 2012; Dyson, Greenham, Collins, & Werner, 2011; Jackson & Dyson, 2012; Wolf, 2014). In Switzerland, signatures are currently being collected to have the country vote on a proposal for a constitutional amendment that would implement this recommendation (Verein Monetäre Modernisierung, 2014).

Alternative currencies are getting more attention too. Several economists point to the advantages of alternative currencies that may coexist with conventional money on the local or national level. Such alternative currencies may eventually replace current money as we know it (see e.g., Litaer, Arnsberger, Goerner, & Brunnhuber, 2012). Suggestions for energy-related monetary instruments provide examples in this context with a particular link to environmental sustainability (see e.g., Ryan-Collins, Schuster, & Greenham, 2013).

# 3

## MONETARY POLICY MANDATES AND OBJECTIVES

Central bank mandates, as defined in their respective establishment laws, differ widely. This section describes different mandates that central banks pursue across the world, explores potential trade-offs between their objectives, and provides examples of the links between central bank goals and sustainability.

Several central banks in the G20 economies have a mandate covering two or more objectives such as price stability, financial stability, full employment and economic development. Others have a single focus on price stability. A similar picture of diversity emerges when looking at central banks in developing countries. Recent analysis of the mandates and objectives of central banks in 51 low- and middle-income countries shows all 51 making reference to price stability, 40 mentioning economic growth and 38 adding exchange rate stability (International Labour Organization [ILO], 2014a).

TABLE 1: CENTRAL BANK MANDATES IN THE G20<sup>1</sup>

Argentina	To promote—within the framework of its powers and the policies set by the national government—monetary and financial stability, employment and economic development with social equality.
Australia	To ensure that the monetary and banking policy of the Bank is directed to the greatest advantage of the people of Australia and that the powers of the Bank [...] are exercised in such a manner as [...] will best contribute to: (a) the stability of the currency of Australia; (b) the maintenance of full employment in Australia; and (c) the economic prosperity and welfare of the people of Australia.
Brazil	To ensure the stability of the currency's purchasing power and a solid and efficient financial system.
Canada	To regulate credit and currency in the best interests of the economic life of the nation, to control and protect the external value of the national monetary unit and to mitigate by its influence fluctuations in the general level of production, trade, prices and employment, so far as may be possible within the scope of monetary action, and generally to promote the economic and financial welfare of Canada.
China	The PBC shall, under the leadership of the State Council, formulate and implement monetary policies, guard against and eliminate financial risks, and maintain financial stability. The aim of monetary policies shall be to maintain the stability of the value of the currency and thereby promote economic growth.
Eurozone	The primary objective of the European System of Central Banks [...] shall be to maintain price stability. Without prejudice to the objective of price stability, the [European System of Central Banks] shall support the general economic policies in the Union with a view to contributing to the achievement of the objectives of the Union as laid down in Article 3 of the Treaty on European Union.
India	To regulate the issue of Bank Notes and keeping of reserves with a view to securing monetary stability in India and generally to operate the currency and credit system of the country to its advantage.
Indonesia	To achieve and maintain the stability of the rupiah value.
Japan	[To achieve] price stability, thereby contributing to the sound development of the national economy.
Korea	The purpose of this Act shall be to establish the Bank of Korea and to contribute to the sound development of the national economy by pursuing price stability through the formulation and implementation of efficient monetary and credit policies. The Bank of Korea shall pay attention to financial stability in carrying out its monetary and credit policies.
Mexico	To provide the country's economy with domestic currency. In pursuing this purpose, its primary objective shall be to seek the stability of the purchasing power of said currency. The Bank shall also have the purpose of promoting the sound development of the financial system and fostering the proper functioning of payment systems.
Russia	To protect the ruble and ensure its stability; to develop and strengthen the banking system of the Russian Federation; to ensure stability of and develop the national payment system; to develop the financial market of the Russian Federation; to ensure stability of the financial market of the Russian Federation.
Saudi Arabia	To deal with the banking affairs of the government; minting and printing the national currency (the Saudi Riyal), strengthening the Saudi currency and stabilizing its external and internal value, in addition to strengthening the currency's cover; managing the Kingdom's foreign exchange reserves; managing the monetary policy for maintaining the stability of prices and exchange rate; promoting the growth of the financial system and ensuring its soundness.

South Africa	To achieve and maintain price stability in the interest of balanced and sustainable economic growth in South Africa. The achievement of price stability is quantified by the setting of an inflation target by government that serves as a yardstick against which price stability is measured. The achievement of price stability is underpinned by the stability of the financial system and financial markets. For this reason, the bank is obliged to actively promote financial stability as one of the important determinants of financial system stability.
Turkey	The primary objective of the bank shall be to achieve and maintain price stability. The bank shall determine on its own discretion the monetary policy that it shall implement and the monetary policy instruments that it is going to use in order to achieve and maintain price stability. The bank shall, provided that it shall not be in conflict with the objective of achieving and maintaining price stability, support the growth and employment policies of the government.
United Kingdom	To promote the good of the people of the United Kingdom by maintaining monetary and financial stability.
United States	To promote effectively the goals of maximum employment, stable prices and moderate long-term interest rates.

*Note: Excluding the mandates of national central banks within the Eurosystem*

*Source: Central Bank websites and establishment laws*

The definition of a central bank's objectives and the question of whether central banks should pursue one or more objectives constitute areas for intense debates. Discussions about the mandate of the European Central Bank (ECB) are an example. Its primary objective is currently focused only on price stability. Many argue it should be expanded to include employment and thus to make ECB decision-makers as equally sensitive to unemployment as they are to inflation (see, e.g., Creel & Saraceno, 2011; Derviş, 2012; Epstein, 2007; Rosengren, 2013).

The addition of financial stability to the mandates of central banks that do not yet have this objective in their formal mission is another case in point. To what extent monetary policy can and should play a role in the prevention, management and resolution of financial crises has hit agendas across the world (Bank for International Settlements [BIS], 2011). Proponents of an explicit financial stability objective underline that price stability may be a necessity, but is not a sufficient condition for macroeconomic stability—and point to the recent financial crisis as a sobering illustration. They also argue that central banks should “lean against the wind” and curb credit or asset price growth in the interest of financial stability if needed (see e.g., BIS, 2011; Eichengreen, Rajan, & Prasad, 2011). Critics contend that a central bank “cannot reliably identify bubbles in asset prices, [and] even if it could identify bubbles, monetary policy is far too blunt a tool for effective use against them” (Bernanke, 2002). The impact such bubbles can have on, for example, the housing market and the distortions they create with regard to resource and land use underline the relevance of this debate for a broader agenda towards greening financial markets.

Whether one advocates for expanded or narrow mandates will depend significantly on whether one sees trade-offs between the different objectives. Potential conflicts between price stability and employment objectives are a case in point for this. In the United States, with inflation at 1.2 per cent and thus below the 2 per cent target, and employment lower than what is considered full employment, the objectives currently appear to be complementary (Lockhart, 2014). In Egypt, with inflation above 8 per cent while the country suffers from high unemployment, there appears to be at least a short-term trade-off (Central Bank of Egypt, 2014). In Europe, the ECB views its primary objective of price stability as fully aligned with its “secondary objectives” that are spelled out in the Treaty on European Union, namely: “a harmonious, balanced and sustainable development of economic activities, a high level of employment and of social protection, ... sustainable and non-inflationary growth, ... and economic and social cohesion” (European Community, 1957). Its view is based on an economic model in which central bank credibility is at the center of inflation expectations, and an increase in these expectations raises both inflation and output variability. According to this view, there is “no exploitable trade-off between these two objectives, at least not over the medium term” (Bini Smaghi, 2007; see also Cœuré (2014)). Others might agree that this is an accurate reflection of what happens in the medium-to-long run, but point to the fact that the short-term trade-offs are relevant



and must not be neglected. Some also point to evidence for trade-offs in the medium and long terms, for example, to trade-offs between inflation and unemployment on a regional level (Fitzgerald, Holtemeyer, & Nicolini, 2013). In addition, while there may be a stable relationship between inflation and output, the links between price stability and other societal goals—for example, employment and social cohesion—may be less clear. The phenomenon of jobless growth and rising inequality, together with economic expansion, is a case in point for that.

Possible trade-offs between price and financial stability provide further illustration. Some contend that a central bank that secures price stability will also protect the stability of the financial system: “incorporating financial stability considerations into monetary policy decisions need not imply the creation of an additional mandate for monetary policy. The potentially huge effect on price stability and employment associated with bouts of serious financial instability gives ample justification” (Tarullo, 2014). Similarly, some point to the risks that boom/bust cycles in asset prices pose for price stability and thus see a “tighter policy stance in the face of an inflating asset price bubble” as consistent with current price stability mandates (see e.g., Bordo & Wheelock, 1998; ECB, 2010; White, 2009). Others agree that price and financial stability are mutually supportive, but argue that the short-term interests of monetary policy and financial stability policy may occasionally diverge—an example being a leveraged asset bubble during a period of low inflation and a pace of expansion consistent with estimates of potential growth.

To clarify objectives *ex ante* and thus reduce the risk of *ex-post* policy challenges, explicit goals may be warranted. Such clarification may also be key to dealing with potential trade-offs between explicit and implicit objectives—also from a sustainability viewpoint (see, e.g., BIS, 2011). Moreover, translating objectives into measurable targets is, as we will see below, of critical importance, and often provides central banks with significant discretion. Such discretion would ideally be applied with a broad sustainability perspective as the starting point.

### 3.1 PRICE STABILITY

Most central bank mandates, if not all of them, include price stability as an objective. Some leave the quantitative definition of this objective undetermined and within the exclusive responsibility of the central bank itself. Others stipulate coordination between the central bank and the government in setting the numerical target (Dervis, 2012). For the ECB, the Governing Council has clarified that it “aims to maintain inflation rates [as measured by the Harmonised Index of Consumer Prices] below, but close to, 2% over the medium term” (ECB, 2014c). Similarly, in January 2012, the Federal Reserve (Fed) introduced a formal inflation target of 2 per cent as measured by the annual change in the price index for personal consumption expenditures as “most consistent over the longer run with the Federal Reserve’s statutory mandate” (Fed, 2014e). The Bank of Japan set an inflation target of 1 per cent in 2012 and doubled this number to 2 per cent in 2013 (BBC, 2013).

In setting inflation targets, possible interdependencies with the objectives of a green and inclusive economy should be taken into account. Whether such targets should be raised (see, e.g., Ball, 2013; Blanchard, Dell Ariccia, & Mauro, 2010), whether they should be defined in terms of headline or core inflation (see, e.g., Catão & Chang, 2010), whether central banks should target inflation rates or price levels (see, e.g., Altig & Bryan, 2013), and across what time horizon inflation rates should be returned to the target, if they deviate (see, e.g., Bank of England, 2013; Lockhart, 2014) are questions that call for a thorough evaluation of the implications for a broader sustainability agenda. Understanding the sustainability impact of deviations from the target—for example, inflation in the Eurozone that started falling well below the 2 per cent goal in 2013—as well as of the diversity in inflation rates faced by different sectors and regions (e.g., countries across the Eurozone or states across the United States), and different income groups, is equally important.

The links between inflation and inequality are a case in point. Studies on the correlation between the two point in different directions. Some researchers find inflation and inequality to be positively related (see, e.g., Albanesi, 2007) and thus support the standard case made by central banks that low and stable inflation is the best possible strategy to reduce inequality. Others find expansionary monetary policy to decrease inequality (see, e.g., Coibion, Gorodnichenko, Kueng, & Silvia, 2012). Further research indicates a U-shaped relationship, where rising inflation coincides with a reduction in income inequality until a certain inflation threshold and with an increase in inequality thereafter (see, e.g., Galli & van der Hoeven, 2001; Monnin, 2014). Putting the focus on wealth instead of income inequality, research focused on the United States indicates that the main losers from inflation are rich, old households (Doepke & Schneider, 2006). There may also be effects in the opposite direction, for example with inequality being a determining factor for inflation. Empirical studies that attribute a part of inflation to high inequality provide a case in point (see, e.g., Maurer & Yeşin, 2005). Robust correlations between high inequality and slower, less durable growth may also have potentially significant impacts on transmission mechanisms, as well as price and financial stability (see Ostry, Berg, & Tsangarides, 2014). Moreover, some research identifies “elite bias” in the political system resulting from inequality as an incentive for inflation (Crowe, 2006).

Similarly, the impact of resource scarcities on commodity prices and thus inflation is also relevant. The appropriate reaction to changes in commodity markets is a key task for central banks and critical for a country’s food and energy security. In that context, the question of whether to target headline or core inflation (i.e., the price of a basket that does or does not include food and energy) is of great importance (see, e.g., Catão & Chang, 2010). Moreover, the economic models of many central banks assume that commodity prices are exogenous variables. Research, however, reveals that the decisions by central banks have an impact on resource prices and thus on the inflation rates that they have targeted in the first place (see, e.g., Anzuini, Lombardi, & Pagano, 2010; Fratzscher, Schneider, & Van Robays, 2010). A better understanding of these feedback loops and spillover effects is critical for policy formulation.

### 3.2 EXCHANGE RATE STABILITY

The exchange rate regime followed by a country is another key parameter for the link between monetary policy and sustainability. Among the IMF members, 92 countries have an exchange rate anchor (IMF, 2013, p. 5). The establishment and pursuit of such a target has different effects on different sectors—with the general fault line running between exporting and non-exporting industries. The Swiss National Bank’s floor for the Swiss franc/euro exchange rate at 1.20 provides an illustration. It is particularly important for the country’s key exporting sectors such as pharmaceuticals, machinery and watches. Understanding the role these industries play with regard to sustainability and how the exchange rate target may shift the balance between them and other sectors in comparison to a non-intervention scenario is critical.

Exchange rates may also have significant impacts on the price of commodities. Fratzscher et al. (2013) find a causal link between exchange rates and oil prices and point to the fact that “a US dollar depreciation makes oil cheaper in domestic currency terms for those countries not pegged to the US dollar, thus raising global oil demand and the price of oil” (p. 5). Concretely, they estimate a weakening of the U.S. dollar by 1 per cent would cause oil prices to rise by 0.73 percent.

### 3.3 EMPLOYMENT

With unemployment figures at record highs, job creation ranks on top of policy agendas across the globe. Worldwide, the number of unemployed people stands at 200 million, and the unemployment rate amounts to 6 per cent. Advanced countries have seen this figure increase from 5.8 per cent pre-crisis to 8.5 per cent today. The figure across developing economies is roughly back to pre-crisis levels below 6 per cent (ILO, 2014b).

Against this background, it comes as no surprise that the role of central banks with regard to employment has been subject to intense debates. Similar to price stability, employment goals in central bank mandates are open to interpretation. Estimating full employment and selecting appropriate indicators is a challenging task. Unemployment rates may not provide an accurate picture of overall employment conditions as they depend on workforce participation rates. Those that can work, but have no job and are currently not looking for one, usually do not show up in official unemployment statistics. Yet this “shadow labor force” might be seeking employment, if economic conditions were different (Lockhart, 2014).

In 2012, the Fed, for the first time, tied its policy rate to a numerical employment target and announced that it would keep the target range for the Federal Funds Rate close to zero as long as the unemployment rate remained above 6.5 per cent (Fed, 2012). In 2013, it amended its position and clarified that the target range is likely to remain at current levels “well past the time that the unemployment rate declines below 6½ percent” (Fed, 2013)—a clarification that may also have been triggered by its consideration of the “shadow labour force” as referred to above.

Similarly, the Bank of England decided in August 2013 that it would not raise interest rates and stands ready to make further asset purchases, while the unemployment rate remained above 7 per cent. It subjected this forward guidance to the condition that (1) its 18-to-24-month inflation forecast remained below 2.5 per cent, (2) medium-term inflation expectations remained sufficiently anchored and (3) its monetary policy would not be considered a threat to financial stability that cannot be contained by mitigating policy actions. It also clarified that the 7 per cent threshold did not reflect its view on the lowest sustainable unemployment rate, but was rather considered an appropriate point to reassess its monetary policy position (Bank of England, 2013).

### 3.4 FINANCIAL STABILITY

As other objectives in central bank mandate, the translation of the goal of maintaining financial stability into concrete targets is not straightforward—probably even less so than the objective of price stability (BIS, 2011).

Similar to the links between price stability on the one hand and inequality and resource scarcities on the other, there may be important impacts between financial stability and green inclusive growth in both directions. Kumhof, Rancière and Winant (2013) point out that rising income inequality, combined with high household debt, can trigger financial and real crises. In June 2014, ECB Governing Council member Ewald Nowotny said that “monetary policy makers, including also the IMF, are paying more attention to questions of inequality, because we’ve seen that distribution can have effects that are relevant for monetary policy. ... For instance, it was a key reason for the U.S. financial crisis that policy makers tried to solve the housing problem for lower income brackets not by social housing but by very cheap credit” (Groehndahl, 2014).

Climate change, environmental degradation and related mitigation policies may have important consequences for financial stability as well. Particularly fossil fuel companies may face extensive write-downs of their assets when climate policy turns the reserves on their balance sheet into “unburnable reserves” and thus “stranded assets.” The fall in valuations may have significant repercussions for the stability of financial markets—a scenario that central banks should and are taking notice of (Morales, 2012).

# 4

## MONETARY POLICY INSTRUMENTS AND TRANSMISSION

In addition to the IMS and the mandates and objectives of central banks, the questions of which tools are available to them, what they are allowed to do to pursue their mandates and what they decide to do are critical—not just in economic terms but also from an environmental perspective. Against this background, this section describes the instruments that central banks use, their impact on the real economy and thus their possible relevance for green financial markets.

### 4.1 INTEREST RATES

Setting policy rates is at the core of central bank toolkits to pursue their objectives. By defining the rates at which they provide liquidity to the financial system, central banks influence market rates. The decision when to increase or decrease interest rates and the magnitude of changes belongs to the key leverage points they have.

In the United States, the Fed defines a target for the Federal Funds Rate—the rate at which banks and other depository institutions lend and borrow reserves from each other that they hold at the Fed—and intervenes to align the effective rate with its goal. It also sets a discount rate at which depository institutions can borrow money directly from the regional Federal Reserve Banks, as well as—since 2008—a rate for interest that the Fed pays on required and excess reserves. Since 2008, the Federal Funds Target Rate stands at a historic low of 0-0.25 per cent (Fed, 2008) and has thus hit “zero lower bound,” the Discount Rate for primary credit is 0.75 per cent (Fed, 2014e), and the interest rate that depository institutions receive on their reserves amounts to 0.25 per cent (Fed, 2014a).

Similarly, the ECB sets an interest rate for its main refinancing operations (MROs), currently at 0.15 per cent, as well as a rate on its marginal lending facility, currently at 0.40 per cent, which offers overnight credit to banks from the Eurosystem. It also sets a rate for overnight deposits that banks make at the ECB, which entered negative territory in June 2014: since then the deposit facility interest rate stands at -0.10 per cent (ECB, 2014b).

The transmission from policy rates to market interest rates differs from country to country and from time to time, and depends significantly on the respective economic and financial conditions. Traditionally, the rates set by central banks influence both short- and long-term market interest rates. More recently, the transmission from policy rates to market rates became less stable. The alleged loss of control of the ECB over interest rates in Spain and Italy was an illustration of this (The Economist, 2013). Against this background, several central banks have started to intervene to directly influence longer-term interest rates and other asset prices.

With interest rates playing a central role in models that discount future benefits and costs, their potential impact on sustainability is significant. Net present value calculations that help to determine whether a government policy should be pursued, as well as discounted cash flow calculations based on which investment opportunities are assessed, depend greatly on the chosen discount factor and thus on interest rate levels. The fact that the U.S. government uses the interest rates on U.S. Treasuries and Notes as its official discount factors (Office of Management and Budget, 2013), and that the Fed has directly intervened to influence the prices of these securities, provides an illustration of the important sustainability effects that central banks can have.

In this context, low interest rates may provide a welcome opportunity to increase long-term investments for a green economy (see, e.g., *The Economist*, 2012a). The lower the interest rate, the more attractive are projects that require investments today to reduce costs and seize benefits in the future. Renewable energy projects are a case in point. They demand high capital spending when they are started, but have low running costs from thereon. Power generation based on fossil fuel also requires high investments upfront, but also has high running costs over time. The higher the interest rate, the more these future costs are discounted and the better fossil fuels look compared to renewable energy. By influencing interest rates, monetary policy affects a key factor in this calculation and, thus, investment decisions.

Interest rates may also have potentially significant effects on commodity markets and, thus, resource security. Harold Hotelling argued as early as 1931 that the price of a non-renewable resource should increase at the rate of interest. Similarly, and more recently, research has pointed to the impact of low interest rates on increasing the demand for storable commodities and reducing their supply by lowering the incentive for extraction today rather than tomorrow (Frankel, 2008, 2014). Other researchers echo this view and show global monetary liquidity and low interest rates to be a driver for increases in both spot as well as futures prices of commodities. Lower returns on bonds and the incentive they bring to shift investments into higher-yielding asset classes—including commodities—are one of the channels at work in this context (see, e.g., Chakraborty & Bordoloi, 2013; Eickmeier & Lombardi, 2012). Lower interest rates also decrease inventory carrying costs for commodities and may thus increase incentives to smooth prices and lower volatility (Gruber & Vigfusson, 2012). Such links between monetary policy and commodity prices may have direct and critical consequences for resource security and livelihoods. The plea by Jeffrey Sachs in 2011 for the Fed to end its quantitative easing as “the first and easiest step to counter [the food crisis]” is an example for the calls that are made and the questions they raise (Sachs, 2011). The impact of prices, volatility and correlation on long-term supply and demand in commodity markets and the role of central banks in influencing these variables are cases in point.

At the same time, low interest rates pose significant challenges to savers and institutional investors to meet their return objectives. In January 2012, a working paper from the Bank for International Settlements, the “central banks’ central bank,” pointed to low coverage ratios of pension funds “resulting from an extended period of poor financial market returns followed by very low long-term interest rates” (Ramaswamy, 2012). A few months later, the U.K. pensions minister called the current low interest rate environment a “complete nightmare” for pension funds (Investment & Pensions Europe, 2012). His views were echoed by the Adam Smith Institute, Save Our Savers and the Cobden Centre in an October 2012 report arguing that “low interest rates and QE have poleaxed pension funds” and that “shortfalls in funds must be met by the companies concerned, reducing their investment resources and pushing fragile enterprises towards insolvency” (Adam Smith Institute et al., 2012; see also Ramaswamy, 2012). As a result, low interest rates may be pushing investors into more risky projects to increase returns. In that context, some researchers point to the dangers of “malinvestments” and misallocation of credit that come along with interest rates at current low levels (see, e.g., Garrison, 2012; Polleit, 2011).

Low interest may also be a key driver behind rising asset prices and thus an important factor behind growing wealth inequality. In 2012 the Bank of England published a paper estimating that 40 per cent of the gains resulting from the asset purchases it used to pursue its low interest rate target went to the richest five per cent of households (Bank of England, 2012; see also Elliot, 2012). Shortly thereafter, the *Financial Times* reported that “hedge funds are reaping some of their biggest profits from the securitized mortgage market since 2007” and pointed to the “large liquidity support from the US Federal Reserve” as one of the triggers of “a major rally in mortgage securities that hedge funds have been quick to take advantage of” (Jones, 2012). *The Economist* called the approach to boost asset prices, “make the rich wealthier and then pray that they will spend some of their newfound gains in ways that create jobs: trickle-down monetary policy,” and argued that, “if that is the plan,” we should “have an honest democratic debate about it and pass tax cuts”

(The Economist, 2012b). Other authors take the opposite view and argue that it is actually tight monetary policy that increases inequality (see, e.g., Coibion et al., 2012).

Possible industry and regional biases of interest rate effects are further points to note. While research on the impact of central bank decisions mostly focuses on aggregate economic indicators such as GDP, inflation and employment, a strand of the literature identifies asymmetric impacts of monetary policy on a disaggregate level—both with regard to sectors (see, e.g., Dhal, 2011; Hayo & Uhlenbrock, 1999; Peersman & Smets, 2002; Pellényi, 2012; Rodriguez-Fuentes & Padron-Marrero, 2008) as well as regions (see, e.g., Barigozzi, Conti, & Luciani, 2011). As mentioned above, the level of interest rates, for example, has different implications for renewable energy with relatively higher upfront costs and lower running costs, than on gas-fired power plants with a higher proportion of expenses resulting from operations. Interest rate changes by the ECB have different effects on a country like Greece with government debt at over 170 per cent of GDP compared to Estonia with a debt-to-GDP ratio of 10 per cent (Eurostat, 2014). Measures taken by the Fed to support housing markets have different social implications in Florida with a foreclosure rate of 1:409 than in Vermont with a rate of 1:11, 509 (RealtyTrac, 2014). They also have different impacts in the United States compared to other countries. The potentially destabilizing effects of financial flows into emerging markets as a result of quantitative easing by the Fed and their outflow as a consequence of the Fed's tapering are a case in point—and a development that the Reserve Bank of India Governor Raghuram Rajan pointed to in an interview earlier this year in which he warned that “international monetary cooperation has broken down” (Goyal 2014; see also Rojas-Suarez, 2010). Identifying the connections between such asymmetries and sustainability is critical to assessing and defining future policy.

## 4.2 STANDING FACILITIES AND OPEN MARKET OPERATIONS

Key instruments through which central banks implement their policy rates and other targets include standing facilities and open market operations (OMOs). Standing facilities provide liquidity to banks and other depositary institutions, respectively offering them the possibility of depositing money at their request. The Discount Window of the Fed, the Marginal Lending Facility and the Deposit Facility of the ECB, as well as the Operational Standing Facilities of the Bank of England are examples of that. In contrast, OMOs are market transactions that are initiated by central banks to buy or sell certain assets.

The Fed has historically used OMOs to move the interest rate that depositary institutions charge each other for trading their reserve balances, the Federal Funds Rate, to the target rate as defined by the Federal Open Market Committee. In that context, it conducts permanent OMOs through outright purchases or sales of securities, as well as temporary OMOs for short-term reserve adjustments through repurchase agreements and reverse repurchase agreements. Since the financial crisis, and in particular since 2008, the Fed has also used OMOs to influence longer-term interest rates through several large-scale asset purchase programs, which has significantly increased its holdings of longer-term securities. It has also extended the average maturity of its portfolio through a maturity extension program (also referred to as “Operation Twist”) (Fed, 2014d).

The ECB runs two types of regular OMOs—main refinancing operations providing one-week liquidity in euros, and longer-term refinancing operations providing three-month liquidity in euros. In recent years, the ECB complemented these measures with two operations providing three-year liquidity in euros (maturing in January and February 2015), as well as operations providing liquidity in U.S. dollars. In addition, in June 2014, it announced a series of targeted longer-term refinancing operations (TLTROs) that provide refinancing for loans to the euro area non-financial private sector, excluding loans to households for house purchases, over a window of two years (ECB, 2014c). Main refinancing operations, longer-term refinancing operations and TLTROs offer liquidity through repurchase agreements whereby a bank sells an asset to the ECB and commits to buy it back in the future at a slightly higher price that reflects the borrowing rate.

Next to the critical role played by the policy rates, the use and impact of these instruments are influenced by what assets are bought and sold respectively, and accepted as collateral in these transactions. The Fed currently holds more than 90 per cent of its balance sheet in USD 2.4 trillion in U.S. Treasuries and USD 1.7 trillion in mortgage backed securities (Fed, 2014c). The background memorandum for a recent U.S. Congress hearing argued that the latter “arguably puts the central bank in the position of favoring certain sectors of the economy over the others” (U.S. House of Representatives, 2014). One of the experts at the hearing conceded that this is true, but was appropriate because the sector had suffered disproportionately from the crisis, and quantitative easing is “more effective when undertaken in markets that are impaired” (Bivens, 2014). Chairman Bernanke referred to these purchases as being focused on “the principal types of securities that the Federal Reserve is permitted to buy under the Federal Reserve Act” (Bernanke, 2012). Others point out that, indeed, these are the principal securities, but not the only types that the Fed may take on its balance sheet, and suggest considering adding other assets to the portfolio, for example, securities to “fund public-private partnerships for investment in infrastructure instead of [...] state and local debt” (Diaz-Bonilla, 2012).

The Bank of England currently holds all the GBP 375 billion that it injected under its quantitative easing program in U.K. government securities (“gilts”). It has been urged to review the composition of this portfolio and to consider investing a part of this portfolio into “bonds issued by agencies with a specific remit for productive investment within the UK, such as in housing-building and retrofit, infrastructure and small and medium enterprises (SMEs).” (Ryan-Collins, Werner, Greenham, & Bernardo, 2013). As cash from maturing gilts continues to be reinvested to keep the stock at its current level, a decision on this issue remains a critical one.

The ECB, in 2013, adapted its requirements for collateral to accept asset-backed securities, arguing that this should support lending to small and medium businesses (Steen, 2013). At the same time, its legal framework prohibits “monetary financing,” and thus the purchase of government bonds in primary markets. Moreover, the ECB “may not differentiate between public and private institutions and, in particular, must not give public institutions (such as development banks) better conditions in its refinancing operations than private sector banks” (Cour-Thimann & Winkler, 2013, p. 5).

A central bank’s decision to buy and sell certain types of assets and not others may have significant repercussions for green finance. It may have an impact, as in the case of the purchase of mortgage-backed securities in the United States, on particular sectors. It may be seen, as suggested above for the Bank of England, as an opportunity to fund specific economic priorities, such as house retrofits for climate adaptation. And it may affect, as alluded to by the ECB, the access of finance for small and medium-sized firms. The fact that the massive central bank interventions in recent years were made without exploring the possibility of aligning them with green objectives constitutes a huge missed opportunity. At least part of the newly injected money could have been steered into environmental programs. At least part of it could have been used for what some refer to as “green quantitative easing” or “strategic quantitative easing” (Ryan-Collins, Werner et al., 2013b; Werner, 2012). In that context, it is important to note that central banks worldwide are expected to keep their balance sheets at current high levels for some time to come. To do that, they will need to reinvest their assets as the securities that they hold at the moment mature. As a result, opportunities for green quantitative easing will be presenting themselves again.

A further point to consider is the definition of potential borrowing limits. The ECB TLTROs provide refinancing to banks up to a percentage of loans to the non-financial private sector, excluding loans to households for house purchase. The exclusion of loans to the financial sector is aligned with its objective to ensure growth in credit to the real economy. With the exclusion of mortgages, the ECB reflects its concern about housing bubbles. Both exclusions influence credit allocation and echo the view that there may be a role for central banks to direct private credit creation away from certain sectors—guidance that can be further aligned with the objectives of a green and inclusive economy.

Some central banks—for example, the Bank of England with its Funding for Lending Scheme—have taken this approach a step further and made both the quantity and the price, of refinancing dependent on the amount of loans banks are providing to the real economy (Churm et al., 2012). Others have targeted refinancing schemes at an even narrower sector focus. An illustration is provided by the central bank of Bangladesh that has set up a dedicated BDT 2 billion (USD 26 million) refinancing facility at a concessional rate for projects focused on solar energy, biogas and effluent treatment plants (Bangladesh Bank, 2013). Bank loans for projects in these fields can be refinanced through Bangladesh Bank at a discounted rate of 5 per cent, provided that the interest charged to bank customers does not exceed 12 per cent.

Opinions about such targeted refinancing lines are mixed. Some see them as tools to overcome market failures and as important drivers to pursue key objectives such as poverty alleviation, job creation, food security and green investments. Others fear that they open doors for rent-seeking. They also point to the risk that funds from these refinancing lines are not used for their intended purpose. Moreover, in this context, some warn that the management of these lines takes up management capacity from the central bank and thus reduces its ability to pursue its other tasks, including banking regulation. Understanding these factors is critical for the design of an effective targeted refinancing line. Ensuring adequate monitoring and evaluation capacity in the central bank is essential for its successful implementation. Focusing this instrument on specialized banks—for example, a green bank for a refinancing line for green investments—could be a further success factor.

### 4.3 RESERVE REQUIREMENTS

Reserve Requirements are reserves that depository institutions need to hold as a percentage of customer deposits. Reserves that banks hold above the required levels are called excess reserves. Central banks—in the conventional view—use reserve requirements to influence the amount of money that banks can make loans with. The higher the requirement, the less funds for borrowing are available and the smaller the “money multiplier.” In contrast, proponents of theories of “endogenous money” contend that reserve requirements do not impose a constraint on banks to lend money, as the central banks will always supply them with the reserves they need. In their view, the money multiplier is a “myth” (Kydlund & Prescott, 1990; also see Benes & Kumhof, 2012; Carpenter & Demiralp, 2010).

This fundamental dispute notwithstanding, central banks across the world, including the Fed, the ECB and the PBC, are listing reserve requirements within their monetary policy toolbox. Others, such as the Bank of England and the Bank of Canada, do not set minimum requirements.

Some do not only use minimum reserves to influence the overall availability of credit, but set differentiated reserve requirements to steer credit towards certain parts of the economy. Targeted reductions in minimum reserves in China are a case in point for this. The country introduced a formal two-tier system with different Reserve Requirement Ratios (RRRs) for large and small banks in 2008. Since then, it has made further differentiations in the RRR (Ma, Xiangdong, & Xi, 2011). Most recently, in April 2014, the country’s central bank lowered the RRR by 50–200 basis points for county-level rural commercial banks and rural cooperatives. Two months later, it reduced the requirements for banks that had not yet profited from the April measures and that were holding sizable loans to the farming sector and SMEs. The measure also covered financial institutions that were providing auto and consumer loans (Qing & Shao, 2014; Wall Street Journal, 2014). Along similar lines, but with a different sector focus, Lebanon’s central bank engaged in an initiative to fund renewable energy projects in the country whereby it reduces reserve requirements for banks that are providing loans under the scheme (Campiglio, 2014).



For a thorough exploration of the links between monetary policy and green finance in China, let alone for making policy recommendations, additional research—in particular on a country level—is essential. Nonetheless, the following eight suggestions may provide initial guidance for future action:

- 1. Analyze historical and international experience with credit guidance in order to apply similar schemes for green finance.** As described in Sections 4.2 and 4.3, central banks around the world have used various instruments to steer credit into certain parts of the economy. The Bank of England’s Funding for Lending Scheme, targeted refinancing lines of Bangladesh Bank and differentiated reserve requirements set by the PBC are examples. Further analysis of the successes and pitfalls of such credit guidance would provide a solid foundation to determine if and how similar schemes could be designed to support green investments in China moving forward.
- 2. Identify and mitigate biases in current monetary policy that are misaligned with the objectives for a green economy.** As described in Sections 4.2 and 4.3, monetary policy often comes with biases. The choice of assets that central banks buy and accept as collateral, differentiated reserve requirements, as well as other criteria they set within the instruments they use, may not be neutral for the environment. Identifying such biases and, where possible, mitigating them may be one of the most concrete short-term measures to take.
- 3. Expand central bank reporting to reflect environmental considerations in a key publication.** Reporting by the PBC on the possible relationship between its policies and environmental objectives would be a key contribution towards raising awareness about important interdependencies in its work. It would also provide an impulse, both within and outside of the PBC, to further assess the impact that their policies have on the environment, and vice versa, to expand the knowledge base on the effects of environmental developments on their core mandate.
- 4. Assess the feasibility of steering asset purchases in the context of quantitative easing into green investments (e.g., through green bonds).** As described in Section 4.2, various central banks have significantly expanded their balance sheet in recent years. Many are expected to maintain their balance sheets at current high levels for the foreseeable future and thus continue reinvesting assets as the securities that they hold at the moment mature. An assessment to what extent this also applies to the PBC and, if so, whether their future investments could be steered towards “green quantitative easing” could make an important contribution to policy debates.
- 5. Develop a better understanding of the impact of interest rate levels on the long-term investments needed, for example, in the fields of energy, water and resource security.** As described in Section 4.1, interest rates are a central variable in investment decisions, and green investments may be more sensitive to interest rate changes than other investments. A close examination of this relationship in China would likely provide critical insights into a key factor for green investments.
- 6. Improve the knowledge base about the possible effects of environmental degradation and resource scarcities on price and financial stability.** As described in Sections 3.1 and 3.4, environmental degradation and resource scarcities may have significant effects on core monetary policy objectives—in particular, price and financial stability. Improving the knowledge base about these linkages, what risks they potentially pose to the core mandate of the PBC, and how the PBC could contribute to mitigating these risks would be a key step towards building up resilience.
- 7. Evaluate the possible use of SDRs to fund green investments.** As described in Section 2.3, several suggestions have been made to use SDRs to fund green investments. The governor of the PBC has been one of the proponents of an increased role of SDRs as a reserve currency. China could leverage this leadership role to promote an evaluation of the costs and benefits of a green fund that would be capitalized with SDRs.

8. **Study international suggestions for the introduction of “sovereign money” and alternative currencies.** As described in Section 2.6, suggestions to strip private banks of their ability to create money and to assign that responsibility exclusively to central banks have hit headlines across the world. At the same time, alternative currencies that are being used alongside official currencies are getting more attention. While these developments are at early stages, some economists believe they may be critical pillars for a green and inclusive economy. Further studies of these suggestions and their possible implications for China would be important to determine to what extent such system changes could be a path for greening China’s financial markets.

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# GREENING CHINA'S FINANCIAL SYSTEM

## CHAPTER 8:

# INTERNALIZING CLIMATE MITIGATION FOR FINANCIAL POLICY-MAKERS

SONY KAPOOR, RE-DEFINE



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## EXECUTIVE SUMMARY

Climate change is already upon us and, in the absence of urgent national and global action to sharply cut greenhouse gas emissions, it will have an ever-bigger negative impact on the economy, security and welfare globally. Related problems of the overexploitation of the environment in the form of falling water tables and imminent water stress (Gassert, Reig, Luo, & Maddocks, 2013) and concentrated urban air pollution in cities such as Beijing and New Delhi have also become far too urgent to ignore (Killalea, 2014).

While one expects a global deal on climate and more national- and local-level action on other environmental challenges, the reality is that we do not have the luxury of delaying action. The sheer gap, for example, between the demand and need for clean energy and the world's supply of it is such that only frontloaded large-scale investments in renewables will leave us with any hope of mitigating climate change. In the meantime, the world continues to increase its use of fossil fuels and the sector enjoys subsidies of more than USD 523 billion (Gurria, 2013; International Energy Agency [IEA], 2013) in the developing and emerging world alone. Fossil fuels attract new investments in exploration, the development of reserves and the construction of carbon-intensive power plants several times larger than the investments that go into renewables. In 2012, USD 674 billion was spent by listed companies alone on the discovery of new fossil fuel deposits (Carbon Tracker & London School of Economics' Grantham Research Institute, LSE, 2013), a multiple of what the world spent on clean energy.

While subsidy elimination and a higher effective price on carbon emissions are essential elements of any successful effort to limit climate change, a large-scale change in the allocation of capital both within firms and by the financial system away from “dirty” into “clean” investments is equally critical. Taxes, subsidies and actual price on carbon emissions are important for capital reallocation because they change incentives. But even without these, there are several policy measures that can be enacted to “green” the financial system.

One of the biggest challenges to this necessary and urgent task is that the world of financial and economic policy-making and the world of environmental policy appear to inhabit parallel universes. There are few overlaps between the environment ministries, development agencies, energy departments, non-governmental organizations (NGOs), academics and United Nations agencies that inhabit the world of climate change policy and the International Monetary Fund (IMF), the Bank for International Settlement (BIS), central banks, treasuries, financial regulators and supervisors that dominate financial policy-making. This is only starting to change with the heads of the IMF, the World Bank, the Organisation for Economic Co-operation and Development (OECD) and some national-level policy-makers beginning to address this chasm, but this process is far too slow and far too superficial. No matter how much regulators and central bankers may care about the environment and climate change personally, very few regard looking at these issues as part of their day-to-day job. This may not have been too big a problem, as policy-making is often done in siloes and is far too fragmented, were it not for the fact that the financial system as a whole is heavily biased against the greening of the economy and in favour of the dirty economy. Some of this is down to the fundamental nature of finance, but perverse regulations, short-termism, misaligned incentives and a collective under-appreciation of the financial and economic risks of continuing fossil fuel investments all play a significant part.

The financial system, as well as households and corporations, also systemically underinvest in energy-efficiency measures—despite the fact that the annual returns on such investments can reach double or even triple digits in a global environment where financial returns on other more mainstream investments have collapsed. Without urgent corrective actions by financial policy-makers, not only will other policies be insufficient to mitigate climate change, but the economy will continue to “lock in” future emissions through continuing investments in energy-intensive power generation and “waste” capital in the development and

exploration of fossil fuel sources that are essentially “unburnable” if we are to limit global warming within reasonable limits (Carbon Tracker & Grantham Research Institute, LSE, 2013). It will also continue to forego potentially high-return investments in energy efficiency, leaving everyone worse off.

Despite this, most financial policy-makers regard these matters as lying outside their traditional, relatively narrow interpretations of their mandates, and the objectives of economic and financial policy-making. This paper focuses on demonstrating why climate and environmental considerations fit naturally into the most widely accepted objectives of mainstream economic and financial policy-making. We show, for example, that the widely accepted policy objectives of increasing growth, employment and productivity, and providing stability and security are not just compatible with action to tackle climate change, but are likely to be undermined in the absence of such action.

As Jim Kim (2014), president of the World Bank said, “Financial regulators need to lead ... Sooner rather than later, they must address the systemic risk associated with carbon-intensive activities in their economies, made clear, of course, by price signals. Start now by enforcing disclosure of climate risk and requiring companies and financial institutions to assess their exposure to climate-related impacts.” A recent study from the Asian Development Bank (ADB), for example, shows how GDP in South Asia would seriously suffer because of a failure to tackle climate change (ADB, 2014). Investments in renewables can not only deliver a short-term economic stimulus, but can also enhance total factor productivity and generate much needed additional jobs. Particularly for countries such as India and China that are heavily dependent on fossil fuel imports, these can also help improve the balance of payments and contribute positively to both energy security and reducing macroeconomic vulnerability.

The paper also shows how the somewhat narrower objectives of financial policy-makers—such as investor protection, transparency, maintaining the safety and soundness of financial firms, financial stability, tackling systemic risk, reducing information asymmetries, tackling market failures and developmental objectives—offer multiple avenues to legitimize policy measures that can contribute to the greening of the financial system. In particular, objectives of investor protection, financial stability, tackling market failures and mitigating systemic risk may actually not be achievable even in a narrow and conservative interpretation of mandates without explicit action from policy-makers to take climate mitigation and other important environmental matters such as water scarcity into account.

The last part of the paper discusses what tangible policy measures financial policy-makers can undertake to green the financial system and shows how these fit neatly into the existing objectives and mandates of regulators and the central banks. Some of these are highlighted below.

Because risk measurements in the financial system are mostly backward looking, the system as a whole is underpricing the possibility of policy action to mitigate climate change (Campiglio, 2014). As such, actions have proliferated at local, regional and national levels. Even in the absence of a global deal to replace the Kyoto Protocol, it is foolhardy to ignore policy risks. Since renewable investments are less familiar than tried and tested technologies of fossil fuel power generation and have shorter “track records,” the financial system overestimates the risk of such investments.

Policy action that introduces strict disclosure of carbon and other environmental risks is urgently needed in China. This will need to be applied to both listed companies in the real economy and financial institutions of all kinds, including banks, asset managers and insurance firms. These disclosures would help comparability, but, given that the market is expecting a very low likelihood of strict policy action to curb climate change, they are likely to only change behaviour in the margins. The guidelines unveiled by the Securities and Exchange Commission (2010), the stock market regulator in the United States, can be instructive. This measure is compatible with the obligation to promote disclosure and transparency and reduce information asymmetries.

Chinese financial regulators need to go beyond simple disclosure and introduce a strict carbon stress regime, modelled on the EU-wide bank stress tests carried out by the European Banking Authority (2014). The EBA does not perform carbon stress tests, but instead it tests for unlikely but possible stresses in the housing markets and growth shocks that are conceptually similar. China ought to introduce mandatory carbon stress tests for all financial institutions, not just banks, but also insurance firms and asset managers. Like the EBA stress tests, the results of these carbon stress tests ought to be made public, as this will have a far bigger impact than if these are reported only to regulators. Financial institutions, which are heavily exposed to carbon or other serious environmental risks, must be forced to either build up capital buffers or reduce exposure, or both. This is consistent with the regulator's duty to safeguard financial institutions as well as protect investors and address market failures.

The world is still in the throes of a systemic financial crisis—the result of excessive leverage in the financial system, losses from the collapse of a housing bubble in some countries and a very high level of interconnectedness among financial institutions. For a risk to be considered “systemic,” the initial losses must be large enough, widespread enough and sudden enough to be amplified by the interconnectedness of the financial system so as to trigger large-scale losses that threaten the integrity of the financial system as a whole. In order to judge whether carbon risk poses a systemic threat or not, the Chinese financial authorities will have to first mandate the disclosure and stress tests discussed in the previous paragraphs. Only then will they possess sufficient information about the size and scope of exposure to risks arising from policy action to mitigate climate change, and then a judgment call can be made on whether to treat this as a source of systemic risk. The information from the stress tests will need to be assessed alongside the structure and the nature of interconnectedness in the Chinese financial sector, but *prima facie* carbon risk may pose a systemic threat. If such a threat is detected, then the authorities can increase risk weights for such exposures, introduce quantitative limits or mandate the holding of additional capital buffers, all of which will make the financial system greener.

Other policy measures, such as preferential risk weights for green investments, quotas, aligning incentives, allowing securitization of energy-efficiency investments etc., are also likely to be necessary alongside risk-based measures in order to effectively green the Chinese financial system, and they can be easily accommodated within the existing objectives and mandates of financial policy-makers.

# INTRODUCTION

The alarm bells are ringing, as evidence that climate change has already begun accumulates: glaciers are melting; flood risk is increasing; weather patterns more volatile; and global warming is upon us. What is even more alarming is that seeing the shape of a worrying future has done little to spur policy-maker action. An adequate global deal on climate mitigation is still elusive.

However, the world cannot afford to wait for this global-level action to begin, as even under the most optimistic scenario the deal would not be able to mitigate climate change on its own. A plethora of local, national and regional measures is needed to support the global framework. We are starting to see some of this with the emergence of carbon-trading schemes in the European Union, as well as at a state level in the United States and at a municipal level in China (Yu & Elsworth, 2012). Many other initiatives, including by the private sector, are also underway.

Despite this, we have a very long way to go. Investments in fossil fuels still far exceed those in renewables and energy-efficiency measures combined. Even now, USD 674 billion was spent in 2012 by listed companies alone on the discovery of new fossil fuel deposits (Carbon Tracker & Grantham Research Institute, LSE, 2013), a multiple of what the world spent on clean energy investments. We are still in the process of locking in ever more carbon emissions, so even the inflection point of changing over to renewable sources of power is a long way away. In fact, after rising for many years, investments in renewables have fallen for the past two years by 11 per cent in 2012 and 10 per cent 2013 (Bloomberg New Energy Finance, 2014).

Furthermore, the International Energy Agency (IEA, 2013) has reported that “fossil-fuel subsidies amounted to USD 523 billion in 2011, around six times the level of support to renewable energy. Currently, 15% of global CO<sub>2</sub> emissions receive an incentive of USD 110 per ton in the form of fossil-fuel subsidies while only 8% are subject to a carbon price.” Clearly, the financial, tax and subsidy landscapes are still tilted towards “dirty” investments and away from “green” investments.

In summary, the gap between what is necessary for us to mitigate global warming and how money is actually being invested keeps widening. Without reversing this, we have little hope of ever tackling climate change. This introduces a natural role for financial policy-makers such as market regulators, bank supervisors and regulators, as well as central banks and their international equivalents, to be intimately involved in the fight against climate change. Moreover, the general principle of most of the discussion on climate change and the financial system in this paper can be naturally extended to broader environmental issues such as water stress and local pollution.

Traditionally, environmental matters in general, and the discussion on climate change in particular, have been the preserve of environmental ministries, non-governmental organizations, academics and the United Nations in the domestic and international policy community. Financial policy-makers have had little to do with this discussion at any serious level, no matter how much they might personally care about climate change. The general feeling in this community is that “tackling climate change does not fall under our mandate.” In the business and financial community, too, climate change has, until recently, been of interest only to specialist groups and has not become a “mainstream” issue.

Fortunately, this is changing fast. An increasing number of national leaders, heads of international organizations such as the Organisation for Economic Development and Co-operation (OECD) (Gurria, 2013) and the International Monetary Fund (IMF) (Lagarde, 2012), businesses such as Unilever (2014) and investor groups such as Ceres (2013) have professed that climate change and environmental degradation are among the biggest challenges of our times and have urged for a strong and coordinated response. However, this has not gone far enough. Anybody who works in the field of financial or economic policy-making or within



the financial sector will immediately recognize the disconnect between what these thought leaders are saying and what central banks, financial regulators, banks, pension funds and sovereign wealth funds are actually doing. This disconnect between the worlds of finance and environment can no longer be tolerated if the world has any hope of tackling climate change and other serious environmental problems.

The financial sector not only is the “brain” of the economy, allocating resources among competing projects such as a wind farm or gas turbine, but it is also critical in sending price signals to firms in the real economy on which internal capital allocation decisions will be rewarded and which ones might be penalized. How much priority a firm gives to making investments in energy-efficiency measures, whether it decided to invest in oil exploration or not, or whether it puts money into research and development for developing “green products” are influenced by the expected reaction of the stock market and financial analysts.

The financial sector, comprising banks, investment funds, financial markets and ancillary firms such as ratings agencies, operates in a heavily regulated environment, where it gets its cues from policy-makers at central banks, bank regulators, market regulators and tax authorities. It is this regulatory landscape that, through defining the price of money, the tax regimes, and the regulatory restrictions such as capital weights, liquidity requirements, accounting rules, risk limits and disclosure requirements, has the biggest impact on where and how the financial sector directs funds and what price signals it sends.

What rules and regulations are set are in turn governed by a set of explicit and implicit objectives that are legitimate for policy-makers to pursue.

This paper seeks to bridge the gulf that exists between financial policy-makers on the one hand and those involved in tackling climate change and other critical environmental challenges on the other. It does so by:

- Discussing why recognizing and addressing climate change and other big environmental challenges are crucial to the core objectives of policy-makers.
- Highlighting how the financial system is biased against green investments.
- Exploring the sets of policies that financial policy-makers can pursue to counter this bias.

## HOW GREENING FITS INTO POLICY-MAKING OBJECTIVES

As discussed in the introduction, one of the biggest constraints to urgently needed policy action to green the financial system is a widely held belief among financial policy-makers that this lies outside of their policy-making objectives and mandates. This flows from an unnecessarily narrow interpretation of what the overarching mandates for economic policy-makers are. This section shows how “greening” fits naturally into the framework of a broadly accepted scope for what is legitimate for economic and financial policy-makers to focus on.

In order to identify what the commonly accepted objectives for policy-making are, the author spoke to a number of academics at schools of public policy, as well as to a number of policy-makers themselves. The following list of objectives comprises those that have a high degree of acceptance and are implicitly or explicitly pursued by policy-makers all over the world: 1) enhancing growth, 2) maintaining stability, 3) ensuring security, 4) increasing employment, 5) increasing productivity, 6) addressing market failures, 7) correcting externalities and 8) ensuring sustainability.

To further narrow down the scope of these broad objectives for the purpose of this paper, the author spoke to several central bankers and financial regulators in addition to looking at the published objectives for central bankers and financial regulators. The following lists are based on these two sources and encompass those objectives most commonly assumed to be part of the operational framework of financial regulators and central bankers. The appendix lists detail the official objectives of the central banks of China and India as examples.

For financial regulators, the most commonly pursued objectives are as follows: 1) consumer protection; 2) investor protection; 3) ensuring that markets are fair, efficient and transparent; 4) reducing systemic risk (Financial Stability Board, 2010); 5) promoting competition; 6) ensuring the integrity of the financial system (Financial Conduct Authority, 2014); 7) ensuring the safety and soundness of firms (Bank of England, 2014a); 8) ensuring a fair and efficient distribution of resources; 9) reducing information asymmetries (Di Giorgio, Di Noia, & Piatti, 2000); and 10) correcting market failures. For central banks (many of which are also regulators and/or supervisors) the most commonly pursued objectives are: 1) price stability; 2) financial stability; 3) pursuit of employment, growth, welfare and economic development; and 4) supporting policies of the government (BIS, 2009).

In the context of this paper, “green” policies refer to those directed at: 1) mitigating climate change through renewables, 2) adapting to climate change, 3) tackling other urgent and large environmental challenges such as water scarcity, 4) tackling particulate and other kinds of pollution commonly associated with the burning of fossil fuels.

Numerous scientific and economic analyses have shown that, unless climate change and other urgent environmental challenges are tackled, growth in economies will seriously suffer. A recent report by the Asian Development Bank (2014), for example, shows that growth in South Asia is likely to lower by 9 per cent because of climate change. Hence, a failure to tackle climate change is likely to lead to lower growth (Stern, 2006). This means that policies designed to address climate change and other key environmental challenges such as water scarcity and acute pollution will lead to higher growth, at least in the long term. As publications on a “green new deal” show (Re-Define, 2011), growth effects are also visible in the near term, so they are relevant to policy-makers with both long- and short-term decision horizons. Importantly, tackling climate change is the pro-growth strategy for the longer term, and it can be done in a way that does not cap the aspirations for growth of rich or poor countries (Stern, 2006). Hence, the pursuit of green

policies fits naturally within policy-makers' remit to maximize growth both in the context of minimizing negative impact on growth and harvesting the fruits of green investments to increase growth.

Maintaining stability is another core objective of policy-making both in economic and broader contexts. As studies have shown (ADB, 2014; Intergovernmental Panel on Climate Change, 2013; Peterson, Hoerling, Stott, & Herring, 2013; World Meteorological Organization, 2013), climate change is likely to increase the volatility of weather patterns, precipitation and extreme weather events such as monsoon rainfall patterns in countries such as India, thus increasing economic volatility. The possibility of the loss of lives and accompanying social unrest means that green policies that help reduce weather and climate volatility are also necessary for the broader stability objective, not just economic stability. Later, this paper will discuss another important aspect of "stability," namely the stability of the financial system and how a failure to tackle climate change can undermine it. Provided overall growth is the same, citizens have a strong preference for less volatile growth outcomes that can only be delivered with proactive green policies.

The provision of "security" is one of the basic functions of a state. This, of course, has multiple interpretations, but for the purpose of this paper, energy security is perhaps the most relevant. There is a long history of problems associated with countries that have a significant dependence on imported fossil fuels. This goes from the oil price spike of the 1970s to the more recent events in the European Union and Ukraine related to their dependence on gas imports from Russia. In a narrower economic sense, one of the biggest drivers of India's large current account deficit, a source of serious macroeconomic vulnerability, is its heavy dependence on fossil fuel imports. India imports 38 per cent of the fossil fuels it uses (Energy Information Administration, 2014), and China's dependence on imports of oil is even higher at 55 per cent (Rostoum, 2014).

The hundreds of billions spent on fossil fuel imports by regions such as the European Union, India, China and Japan often flows to countries where corruption is rife and/or to countries where some of these funds may end up in the hands of terrorist groups, such as the Islamic State, that impose a threat to global security. Thus, green policies are essential not just to provide basic energy security and to reduce economic vulnerability, but they may also help reduce threats from terrorism.

There is a unanimous agreement that the provision of jobs is one of the core tasks of policy-makers. Particularly in a global environment where unemployment levels in the European Union, Africa and emerging countries in Asia are unacceptably high, this policy objective has increased resonance. While employment depends on a number of variables, the level and variability of growth rates are very important. Given the earlier discussion, as well as conclusions from a number of studies on the green new deal, green policies are likely to result in a higher level of employment. There would be a transition cost, as certain fossil fuel-heavy sectors will see a rise in unemployment, but the overall effect is likely to be positive.

Particularly for countries facing high levels of unemployment, a large-scale greening of the economy cannot just provide an economic lift-up and possibly faster growth rates, but it also has the potential to create millions of new jobs (ADB, 2014; World Bank, 2014).

Increasing total factor productivity is an important goal of policy-making, as this is the only route to increasing the income of citizens. While traditionally the focus has been mostly on labour productivity, a serious discussion on increased resource productivity has emerged in parallel (United Nations Industrial Development Organization & Agence Française de Développement, 2013). While measures to improve education and training are crucial to boosting labour productivity in the economy, the emergence of green policies is central in increasing resource productivity. Those policies that focus on the development of new green technologies have the potential to simultaneously provide a big boost to both labour and resource productivity, and therefore should be especially encouraged by policy-makers.

Given that most economies in the world are now “market economies” to some extent or the other, correcting market failures is now one of the most important tasks for policy-makers. Sir Nicolas Stern has said that “climate change is a result of the greatest market failure the world has ever seen” (Benjamin, 2007). This market failure is the result of a failure to appropriately price the externalities imposed by greenhouse gas (GHG) emissions. Policy-makers regularly penalize other public “bads” such as smoking through punitive taxation, but this is mostly still not the case for GHG emissions. The need for green policies to meet the sustainability objective is self-explanatory.

To summarize, green policies that help mitigate climate change, as well as those that tackle other critical environmental challenges, are crucial to policy-makers meeting what are widely regarded to be their core obligations and objectives.

Now let us turn to the somewhat narrower context of legitimate objectives and mandates for financial policy-makers. Are “green” policies consistent with these and do these objectives provide legitimacy for financial policy-makers to proactively pursue such policies?

As discussed in the next section and in other reports (such as Re-Define, 2011), the financial system has a perverse bias against green investments and towards dirty fossil fuel-based activities. This is entirely inconsistent with not just the overarching need to mitigate climate change and other forms of environmental destruction, but also with the often loudly declared objectives of heads of state and international organizations, who have repeatedly voiced support for proactive policies to tackle climate change.

As Carbon Tracker (2013) has shown, the burning of the majority of identified fossil fuel reserves is not consistent with successful efforts to tackle climate change. Yet, as highlighted in the introduction to this paper, the financial system continues to pump more money into fossil fuels than into the renewables that are necessary to tackle climate change. Obviously, these new and existing fossil fuel investments are at tremendous risk from policy action that would mitigate climate change, but the financial system is blithely ignoring such risks.

Greening the financial system to better recognize the risks of carbon-intensive investments can be pursued under a number of objectives such as investor protection, financial soundness and systemic risk. How this fits under “pursuit of employment, welfare and economic development” has largely already been discussed above, and “in support of government policies” is self-explanatory. Because too little is known about carbon risk and the exposure of various businesses and financial institutions to it, requirements for better disclosure naturally flow from mandates for “reducing information asymmetries” and “promoting transparency.”

More proactive policies, such as those that deliver preferential credit, will more naturally fit under the broader mandates to “correct market failures,” “support growth and employment” and “support government policy.” Overall, it is clear that a reasonable interpretation of the broadly accepted mandates and objectives of financial policy-makers leaves them a lot of leeway for proactive policy actions that can help green the financial system. The next section shows why this is necessary.

# 3

## THE FINANCIAL SYSTEM IS BIASED AGAINST GREEN INVESTMENTS

The most important green investments for the purpose of mitigating climate change can be divided into two main categories. The first is energy-efficiency investments and the second is investments in renewable energy production. For a variety of reasons, the financial system is systematically biased against these investments.<sup>1</sup> A related problem is that the financial system continues to overinvest in “dirty” fossil fuel sources of energy. This overinvestment in dirty energy is the flipside of underinvestment in clean energy. Section 3 deals with the drivers behind these three undesirable characteristics of the financial system, and Section 4 will discuss what regulators and central bankers can do to correct them.

Some of the highest returns on investments can be generated through energy-saving measures such as changing light bulbs from the old fashioned incandescent variety to far more energy-efficient fluorescent lamps or LED bulbs, where the payback period can be less than a year and financial returns in excess of 100 per cent. Other energy-saving investments such as buying more efficient household appliances, more fuel-efficient cars, better insulations for homes and offices, etc., typically have longer payback periods, but the financial returns are often positive and in double digits.

The McKinsey cost abatement curve (McKinsey & Company, 2009) clearly shows the variety of energy-saving investments that generate positive returns, often in the double or triple digits. Yet the reality is that consumers, businesses and the financial system all underinvest significantly in efficiency-enhancing investments—the equivalent of leaving dollars lying around on the road. Why is that so? And what can financial policy-makers do to address this?

An even bigger problem is the overinvestment in fossil fuels and the underinvestment in renewable energy, even where the economic and financial case clearly favours the latter (Re-Define, 2011). What drives this behaviour in the financial sector and how can financial policy-makers address this perverse outcome? Most energy-efficiency investments are incremental, both in the context of households or businesses. For example, the installation of green bulbs is typically only a small proportion of a household’s or a business’s expenses. The installation of better insulation is usually only a small proportion of the cost of a building. Similarly, the purchase of more energy-efficient white goods or vehicles costs incrementally more than less green versions of the same. This means that the decision to make energy-efficiency investments is not one that typically occupies the “top of mind” for households or businesses. It is often a secondary consideration in decisions that are driven primarily by other criteria.

Because the costs of efficiency are often incremental to the main costs for households and businesses, it also means that the financial returns offered are relatively small compared to the main financial metrics that govern decision-making, even though the return on these incremental investments are generally quite high. The other critical matter is that energy efficiency is often not the main line of business or motivation for decision-makers. Both of these mean that many efficiency investments are often foregone.

This also creates challenges for the financial sector, as it makes energy-efficiency investments harder to “monetize” as a standalone category. Far too many of the investments needed are quite small, and their fragmented nature means that such investments are expensive if not altogether impossible for banks and investors to fund. It is also hard to disentangle the financial flows associated with such investments from the larger income flows and expenditures for households and firms.

<sup>1</sup> Re-Define (2011) has a very comprehensive treatment of this subject.

*Attention (or the lack thereof), access (which is hard) and the need for aggregation across a number of relatively small investments are three of the biggest challenges resulting in the real economy and the financial sector underinvesting in energy-efficiency measures.*

In theory, it is considerations of risk and return that ought to be the primary drivers of allocation of resources by the financial sector. In reality, these are tempered by the limited availability of information, the difference between perceived and actual risk, regulations, the time horizon of decisions and the incentives of those making the decisions.

The cost structure of investments in fossil fuel sources of energy generation and renewables, for example, is structurally different. For coal- and gas-fired plants, for example, the upfront capital investment is no doubt significant, but a large bulk of the costs arise in the future in the form of fuel costs. For renewables such as wind and solar power, the main cost is that of the upfront capital investment, as there are no fuel costs. Typically, then, renewable power sources are more capital intensive than an equivalent amount of fossil fuel power generators (Campiglio, 2014).

A short-term-oriented financial system of the kind we have will favour investments that have cost structures associated with gas turbines over those associated with solar and wind power installations. This bias is strongly observable in actual capital allocation. The longer the decision-making horizon, the more relatively attractive a wind turbine will look relative to a gas turbine, but the pursuit of short-term profitability biases the financial system and internal corporate investments against renewables.

A cost-plus billing model, wherein utilities are able to pass through potentially higher as well as more volatile future costs of fossil fuels to their customers, further distorts their incentive to make green investments even if these may be intrinsically more profitable.

If one looks at prevailing market norms, not only is the present explicit or implicit price of carbon too low (Howard, 2014; Organisation for Economic Co-operation and Development [OECD], 2013), but financial market players appear to give little weight to the likelihood that robust policy action in the form of a higher price on carbon emissions or quantitative limits to emissions may be forthcoming (Campiglio, 2014). The risk of fossil fuels is thus underpriced, particularly if one assumes that policy action will have to crystallize if the world has any chance of even partially mitigating the disastrous effects of climate change. Similarly, if one assumes that there is any substance to policy-makers' claims of their oft-repeated commitment to "robust action" to tackle climate change, then the market is clearly underpricing the "risk" of such policy action (Allianz Group & WWF, 2005).

Lord Nicholas Stern, author of the influential Stern Review (2006) on the economics of climate change, has argued that investors' current practice of zero pricing of carbon in their valuations is effectively betting on, indeed encouraging, the development of a carbon-intensive economy. Financial markets, on the whole, are failing to account for system-wide risks that endanger private investments and society as a whole. Investor surveys show that only about 2 per cent of assets are valued with any carbon price (Zadek & Chenghui, 2014). This leads financial actors and corporations making decisions on allocating capital to extracting fossil fuels (coal mining, oil and gas drilling), as well as the generation of power from fossil fuels (coal-fired plants or gas turbines) or making fossil fuel-intensive products (gas-guzzling SUVs), to over-allocate funds into activities that look far less attractive once the potential rise in the price of carbon emissions is accounted for.

For example, the oil industry has invested USD 341 billion into the development of new tar sands resources (Wells, 2012), which would be strongly hit by any policy action against climate change, and in any case have a high marginal cost of extraction. Another example is that ExxonMobil plans to invest USD 190 billion in the exploration and development of new oil and gas resources over the next five years (Warner, 2013), even as it becomes clear that large chunks of already identified reserves are unburnable.

Low prices on carbon in making capital allocation decisions, along with the relative profitability of “dirty” versus “green” investments and the failure of the market to account for policy action that is likely to come, diverts large amounts of capital away from greener investments into those that are fossil fuel intensive. For example, investments in renewables have actually declined in the past two years according to Bloomberg New Energy Finance (2014).

The failure of markets to account for the possibility of higher carbon prices in the future means that the value of fossil fuel reserves, for example, may be significantly overestimated. This failure has been clearly highlighted by the stranded asset debate (Carbon Tracker & London School of Economics’ Grantham Research Institute, LSE, 2013; Generation Foundation, 2013; Carbon Tracker Initiative, n.d.), which shows how the burning of already monetized “fossil fuel reserves” is inconsistent with our ability to mitigate climate change.

Given that green technologies are relatively new and unproven, they are typically considered to be more “risky,” so they attract a higher-risk premium than more traditional investments in fossil fuels and power generation from such sources. This typically means that the market applies a higher-risk premium to green investments such as solar and wind power. In short, the market underestimates the risk of dirty investments and overestimates their profitability. The situation is reversed with respect to clean investments. Additionally, financial markets are currently characterized by the widespread desire for liquid, short-term assets, which is at odds with the illiquid, long-term features of typical green investments (Spencer & Stevenson, 2013).

The lack of visibility on future regulations and the low carbon price to date, however, have prevented current efforts from having a significant effect on industrial strategies. The policy risks created are not material enough, and in the next 5–10 years are unlikely to drive capital allocation more into line with climate scenarios (Dupré & Chenet, 2012). Banks and other commercial entities routinely use an internal carbon price that is far too low—if they use one at all (Carbon Disclosure Project, 2013). They also still apply a risk premium to renewable investments that is not always justified, given the maturing of the technology and the regulatory environment. The combination of these factors means that banks put far too much money into the “dirty” economy and too little into the green economy. Investors in bond and stock markets increasingly track indices that reflect prevailing market capitalization rather than what is likely to happen in the future.

Because present market indices have a much larger proportion of fossil fuel firms and dirty utilities, far too much capital is blindly allocated to large oil and gas majors, as well as utilities that depend on “dirty” sources of energy, while too little capital makes its way into greener investments. Even when fund managers have discretion to deviate from the index, their short time horizons that are linked to annual bonus payments mean that the system is biased against high-upfront capital cost green investments. It also means that fund managers can and do ignore the longer-term financial risks to the development of fossil fuel reserves from policy action to tackle climate change. Even where managers may have a longer-term horizon, regulations that increasingly force them to mark the value of their assets to prevailing market prices (even when the market is obviously wrong) and the need to perform well against prevailing “market benchmarks” mean that the cards are stacked against greener behaviour. Michael Liebreich of Bloomberg New Energy Finance has described “a systemic failure of valuation, an overvaluation of the fossil-related and extractive industries and various other utilities and some other asset classes” (House of Commons, 2014, p. 7).

Large capital allocation decisions happen within corporate entities rather than capital being raised afresh for every project a firm invests in. But these decisions are often made on the same criteria as those in the financial markets, which send price signals to chief financial officers and are afflicted by the same short-termism and incentive misalignment problems that affect the broader financial sector (Re-Define, 2011).

In summary, efforts to green the financial system must 1) increase the perceived risk of dirty investments, while reducing their profitability; 2) reduce the perceived risk of green investments, while increasing their profitability; 3) limit short-termism in financial markets; 4) address regulations that might skew the landscape against green investments; 5) change market norms of behaviour and benchmarking; and 6) better align incentives of financial actors with the need for a greening of the economy. A good summary of the kinds of financial reforms that can help better align the financial system with the real economy that is greener can be found in reports such as Kapoor (2010) and Re-Define (2011).



# 4

## WHAT FINANCIAL POLICY-MAKERS CAN DO TO GREEN THE FINANCIAL SYSTEM

Financial regulators, central bankers and other financial policy-makers have thus far mostly failed to take on board how the financial system is failing to allocate sufficient capital to the greening of the economy. While many of them are personally concerned about impending climate change and broader environmental degradation, most do not consider tackling climate change to be part of their job description.

However, as we have discussed in a previous section, greening the financial system can be an integral part of even narrow interpretations of their self-declared and widely understood policy objectives. Not only do they have the legitimacy to work on this matter, but one might also say that not helping green the financial system may actually constitute a dereliction of duty on their part. Once one accepts this in principle, the challenge becomes more practical. What specific policy measures should financial policy-makers undertake within their remit that can help green the financial system? That is the question this section seeks to address. The measures discussed fit into several categories and can often be justified under multiple objectives.

### 4.1 DISCLOSE OF CARBON EXPOSURE

Lack of information and understanding about the carbon intensity of various businesses and financial portfolios is a basic constraint on the greening of the financial system (Dupré & Chenet, 2012). It is hard to draft policy measures on something if the basic information is missing. It is a chicken and egg situation, where the financial market largely appears to discount the possibility of policy action against climate change, so it does not consider information on carbon exposures as important. Regulatory intervention to correct this conundrum can be justified under a number of objectives.

As part of their mandate to make markets more efficient and transparent, as well as to reduce information asymmetries and to correct market failures, there is a strong case for authorities to intervene to increase disclosure of exposure to carbon. In order to do that, regulators have a number of tools at their disposal. The mandatory disclosure of the carbon exposure of all listed firms, both financial and non-financial corporate ones, is a good starting point. This disclosure would include not just utilities, manufacturing firms and others from the real economy, but would also cover most large banks and insurance firms. This action would be in line with measures taken recently by the Securities Exchange Commission (SEC) in the United States (SEC, 2010). The disclosure by non-financial firms would need to be in place for financial firms to be accurately able to report on how exposed their portfolios are.

Importantly, this same mechanism can be used to introduce requirements to report on other sources of environmental exposure such as dependence on scarce water or contribution to pollution against which policy action is likely. A related measure that would apply to fund and asset managers such as pension funds would be to report the carbon emissions that are implicit in their portfolio of investments and can be justified under similar objectives for disclosure, fairness and reduction of information asymmetries.

While measuring the degree of carbon emissions implicit in a company's business or a financial company's portfolio is a necessary first step, it may not necessarily result in greener behaviour, as long as financial markets continue to discount the likelihood of policy action.

## 4.2 INCREASE THE PERCEIVED RISKINESS OF CARBON EXPOSURE

This action is justified, if financial policy-makers believe that financial firms are failing to properly account for a real and material source of risk. If that is the case, then action can be justified under objectives such as investor protection, ensuring the integrity of the financial system and ensuring the safety and soundness of firms.

Perhaps the best way to do this would be, once carbon disclosure rules are in place, to force financial firms to perform stress tests on how their balance sheets would perform under different scenarios of the evolution of a carbon price. The same approach can be applied more widely to water stress as well as policy action against pollutants. These stress tests could be internal, so that regulators can check that financial firms such as banks will stay solvent under unlikely but plausible scenarios, say, of the carbon price rising to EUR 30 or EUR 50 per tonne. For long-term investors, scenarios that stretch further out in time and use even higher prices for carbon emissions can be applied.

Such an approach is now widely accepted for other sources of financial risk, such as macroeconomic slowdowns, as well as sharp falls in stock markets and real estate prices. Often the scenarios used are plausible, but unlikely. This means that a realistic interpretation of the state of the climate debate—that robust policy action is unlikely in the near term but still possible—already provides enough of a “burden of proof” to legitimately use the stress test methodology. Another strong case for regulatory intervention also arises because most risk management methodologies, such as “Value at Risk” and credit ratings used in the financial sector, are backward looking in that they are incapable of recognizing future risks unless they fit historical patterns (Kapoor, 2010).

In the European Union, for example, the European Banking Authority (EBA, 2014) performs regular stress tests to monitor the risks and vulnerabilities of the banking system:

One of the responsibilities of the European Banking Authority (EBA) is to ensure the orderly functioning and integrity of financial markets and the stability of the financial system in the EU. To this end, the EBA is mandated to monitor and assess market developments as well as to identify trends, potential risks and vulnerabilities stemming from the micro-prudential level. One of the primary supervisory tools to conduct such an analysis is the EU-wide stress test exercise.

In case stress tests are not disclosed, the regulator simply requires companies to demonstrate that they will be financially sound even if such a policy action occurs. If that turns out not to be the case for particular firms, the regulator can oblige them to either: 1) raise more capital, particularly in the case of banks; 2) reduce exposure to carbon and other environmental risks to more acceptable levels; or 3) undertake a combination of both.

In our opinion, the introduction of carbon stress tests for all financial firms, be it banks, funds or insurance firms, would be far more effective if they were forced to publicly disclose the results of these stress tests. The excellent work done on stranded assets in Europe (Carbon Tracker & London School of Economics’ Grantham Research Institute, LSE, 2013; Caldecott & McDaniels, 2014) that highlights the potential for financial losses related to policy action against climate change points the way; however, financial policy-makers have not yet gotten involved.

This would not only fit in neatly with the regulatory objectives of more transparency and reducing information asymmetries, but also additional ones of increasing competition and correcting market failures. It is expected that the public reporting of the results of carbon and environmental stress tests

would significantly improve how effectively such risks are factored into decision making within financial markets, and thus contribute to greening the financial system.

### 4.3 TACKLE SYSTEMIC RISK

Talk to most investment funds, insurers and banks about the possibility of large losses on their exposure to fossil fuel/carbon-intensive sectors, and they are confident that they will be able to reduce this exposure when a rise in the price of carbon or restrictions on the quantity of emissions becomes imminent. Individually, assuming no other financial actor was trying to do the same at the same time, this makes sense—but collectively, this is delusional.

This is too close for comfort to Citigroup CEO Chuck Prince’s now immortalized line on the eve of the financial crisis: “As long as the music is playing, you’ve got to get up and dance. We’re still dancing” (Nakamoto & Wighton 2007). When Citigroup had to be bailed out, Prince was talking about risks that he recognized, but felt compelled to take as long as the competition was taking them too. He also felt confident that when problems arose, Citigroup would be able to sell out of risky positions, which was also what every other bank was thinking.

We are at a similar point with carbon risks. That is why looking at the soundness of each financial institution as a standalone entity, as the stress tests discussed in the previous section do, is simply not good enough. As the likelihood of policy action to tackle climate change nears, it will have consequences for how financial institutions behave and what they do. Anticipating the rise in carbon price, institutions will all rush for the exit to reduce their exposure to carbon-intensive assets.

This is exactly what happened in the ongoing financial crisis, when, as soon as problems in the real estate sector became apparent, there was a rush for the exit as banks and investors alike sought to reduce their exposure to assets they knew were likely to fall in value. This exacerbated the fall in price, which further increased the incentive to sell quickly before the price fell even further. This “fire sale externality” is often an integral part of systemic financial risk—the risk of system-wide large-scale losses in the financial system (Brunnermeier et al., 2009).

A second important element of systemic risk is that interconnectedness in the financial system increases such risk. One mechanism for the propagation of such risk is that once a loss becomes likely at Financial Institution A, its counterparties, for example in the interbank market, seek to reduce their exposure to it by withdrawing lines of credit and stopping trade with the institution. This further weakens its market position and, given that it is often highly interconnected to other financial institutions too, this reduction in exposure imposes a negative externality on the other counterparties of Financial Institution A. This is another mechanism for the amplification of losses and overshooting in the financial system that makes the system as a whole vulnerable.

As discussed earlier in this paper, the role of financial regulators and central bankers is not just to ensure that each institution is making sensible choices in recognizing and dealing with risks, but even more so that that the financial system as a whole adequately recognizes and deals with risks.

Systemic risk is more an inherent characteristic of the financial system, rather than a risk flowing from a single source. Moreover, large, widespread and sudden losses can trigger the downward spiral of the sell-offs discussed above. So the question of whether carbon is a potential source of systemic risk hinges on whether the risk of losses 1) is large, 2) is widespread and 3) could crystallize suddenly. A reason that housing is unanimously considered to be a trigger for systemic risk is that, typically: it constitutes a very large proportion of bank lending portfolios (large); most financial institutions are exposed to mortgage

assets (widespread); and house prices can fall suddenly in response to external shocks like an unexpected recession.

In our understanding, carbon risk meets many of the same criteria, and the question of whether it poses a systemic threat to the stability of the financial system or not is a matter of judgment. A recent study (Weyzig, Kuepper, van Gelder, & van Tilburg, 2014) on the European financial system, for example, concludes that the risk from policy action on emissions is not yet systemic for the European financial system, but this is not a universally held view.

Given how large utility firms, as well as oil and gas majors, are, the exposure of the financial system to such firms is definitely large—though not as large as that to the housing markets. It is also more widespread, as the exposure is not just directly limited to banks as with real estate markets, but also to pension funds, insurance firms, retail shareholders and other asset managers. The possibility of a sudden manifestation of risk is also highly likely, as any international deal is likely to be only fully credible once announced—a point-in-time event that could lead to global market upheaval and sell-offs of carbon-intensive assets.

The judgment on whether this constitutes a potential source of systemic risk for China depends, first of all, on the measurement of the size and scope of carbon exposure in the Chinese financial system. That is why the carbon stress tests of the previous section are so important.

Measuring such exposure would achieve multiple objectives. First, it would increase the awareness of carbon risks among bank and fund management. This should automatically lead to some reduction in such exposures. Second, disclosing carbon exposures would allow bank shareholders and asset owners, who ultimately own investment funds, to compare them against others and put pressure on management to reduce excessive exposures to sunset industries in favour of safer assets. Third, it would reveal the extent of system-wide risk exposure to regulators, allowing them to take corrective measures on the macro-prudential front too.

These actions are not only justifiable under the “financial stability” and “tackling systemic risk” mandates of financial policy-makers, including central banks, but also not undertaking them may actually constitute a dereliction of duty. Macro-prudential measures such as imposing additional capital buffers for carbon exposures, introducing hard limits on how much exposure each firm can have or introducing higher risk weights for such exposures are all part of the toolkit regulators can use.

Such regulatory actions recognizing carbon as a source of systemic risk should also change the relative cost of dirty versus clean investments by making the financing of carbon-intensive activities and industries more expensive, and it ought to provide a significant boost to the funding of the green transition.

#### 4.4 OTHER MEASURES

The earlier discussion in this section was kept relatively narrow to address a small but important set of policy measures that financial policy-makers in China and elsewhere need to implement as a matter of urgency. Importantly, they are targeted at a more accurate reflection and mitigation of the risks arising from the carbon-intensive investment bias of the financial system. Many other sets of reforms are both possible and necessary in order to better green the financial system, as partially correcting for the lack of proper carbon risk assessment will simply not have an impact that is large enough to help us effectively mitigate climate change. Transitioning to a low-carbon society will require a very large amount of economic resources to be invested in “green” sectors (Ceres, 2014; IEA, 2012; World Economic Forum, 2013), so we will need to go further than these narrow measures.

These measures can largely be divided into two main categories. The first is the set of reforms that better align the functioning of the financial system with the needs of the real economy. These include measures that tackle short-termism, measures directed at making the system simpler and more transparent, and steps that provide for a better measurement of risk and make the financial system less vulnerable to pro-cyclical swings. They are not specific to the environment or to tackling climate change and are comprehensively treated in publications by Kapoor (2010, 2012).

The second category of measures includes those that positively discriminate in favour of green investments. These can encompass a range of policy options such as special discounted loans to the sector, lower risk weights, lower capital requirements, better treatment of collateral, lower reserves, mandatory lending quotas and so on. The question this raises is whether these “interventionist” policies can be justified within the existing objectives and mandates of financial policy-makers, or whether an expansion of their powers may be necessary. The mainstream thinking on this is that for emerging-market central banks and regulators, such as those in India and China, these measures are easier to enact than for policy-makers in OECD economies (Campiglio, 2014). The very broad nature of explicit mandates given to central banks in emerging economies is clear from the Appendix. There is an element of truth in this mainstream thinking, but this is often used to justify green inaction by financial policy-makers in OECD economies and to criticize the more interventionist stance of their counterparts in the emerging world. We believe that this view needs to be challenged.

The European Central Bank, often thought to have a relatively narrow mandate, has introduced a Targeted Long Term Refinancing Operation (TLTRO) and will seek to reward banks with discounted loans for additional lending into the real economy, particularly to small and medium-sized enterprises (SMEs) (European Central Bank, 2014a, 2014b). The European Union also applies a zero-risk weight for its member sovereigns, even though some, such as Greece, have actually defaulted. The Bank of England has now been pursuing a Funding for Lending program that also rewards banks for increasing lending to SMEs (Bank of England, 2012, 2014b). The U.S. Federal Reserve Bank has long followed the Community Reinvestment Act (Federal Reserve Bank, 2014) that judges banks on the basis of the strength of their operations in poor parts of the community and rewards those who have a bigger operations. The Bank of Japan has long had a reputation for pursuing “unconventional” policies. In short, all of the biggest OECD country central banks have been pursuing “interventionist” policies of some kind or the other. The Reserve Bank of India sets targets for lending to preferential sectors (RBI, 2014) as well as into rural areas, and many other governments in the emerging world use their central banks proactively to pursue broader economic development goals. The BNDES in Brazil, the Green Investment Bank in the United Kingdom and KfW, Germany’s publicly owned development bank, all do policy-based lending, as does the European Investment Bank that is owned by the European Union. Freddie Mac and Fannie Mae are among the world’s largest de-facto public sector financial institutions dedicated to the promotion of home ownership in the United States.

The idea that financial policy-makers in the OECD only pursue hands-off policies that do not take on broader public-policy goals is simply not borne out by evidence. If space can be found within existing mandates to have programs and regulations that favour economic actors such as SMEs or sectors of the economy such as housing, there is absolutely no reason to believe that the same positive discrimination cannot be extended to the greening of the financial sector. In fact, an increasing number of financial policy-makers around the world have already embarked on this path, and we expect a broadening and deepening of such positive discrimination for the green economy to take hold in financial supervision, regulation and central banking all over the world. The faster this happens, the higher the likelihood the world will be able to successfully mitigate climate change.

Among others, the Central Bank in Bangladesh and the Brazilian banking association (Febraban) in Brazil have already taken steps towards an attempt to implement a common sustainability agenda for the financial sector. In Bangladesh, the Environmental Risk Management Guidelines encourage banks

and financial institutions to integrate Environmental Risk Management policies into existing Credit Risk Management procedures (Bangladesh Bank, 2011). These guidelines thus make it mandatory for banks to address environmental and social issues in their lending processes, develop internal frameworks, introduce sector-specific policies, train staff and start reporting on environmental and social issues (United Nations Environment Programme Finance Initiative, 2011). In Brazil, similarly, commitments made under the Green Protocol include the promotion of green/social financing, internal environmental management and awareness raising (Febraban, 2011). Indonesia has set out an ambitious plan for a green transformation of the economy. The central bank is looking into how it could help make green finance work in Indonesia (Volz et al., forthcoming). China's green credit guidelines also show China's commitment to do more on greening its own financial system (Zadek & Chenghui, 2014).

# 5

## CONCLUSION

The world is fighting a losing battle against climate change, and the lack of a comprehensive global deal on tackling climate change is glaring. Nevertheless, an increasing number of local, national and regional initiatives are now underway to put a price on carbon, encourage energy efficiency or catalyze green investments. However, it is clear a green transformation cannot happen without large-scale investments in the green economy and without stopping the ongoing investments in the dirty economy that continue to lock in future GHG emissions.

We have run out of time to wait for a more coordinated global response, and, no matter how robust the deal in Paris next year is, it is unlikely to be enough to limit global warming to within reasonable limits on its own.

The financial system is directly and indirectly (through price signals and incentives for businesses) responsible for where investments are made. As discussed in detail in this paper, the system is heavily biased against the green economy and in favour of fossil fuel and energy-intensive investments. This bias is demonstrated by the much greater amount of money that still flows into the dirty economy when compared to what is invested into renewable energy and efficiency measures. This bias is widely known and acknowledged, but to date not much has been done to address it. Instead, it is further exacerbated by the huge subsidies provided for fossil fuels.

One of the reasons for inaction on the part of financial policy-makers is that the worlds of financial and economic policy-making and those involved in policy discussions on climate mitigation seldom intersect; however, this is starting to change very slowly. Central bankers, financial regulators and supervisors widely hold the view that tackling climate does not fall within their mandates. That is why we spend so much time in this paper showing that this view is, at best, unjustified and, at worst, outright irresponsible. We have also shown that, in a number of instances, a failure to enact policy measures to green the financial system may actually amount to a dereliction of duty on behalf of central bankers and regulators.

Towards this end, we have proposed a set of three complementary policies on carbon disclosure, stress tests and checking if carbon risk is potentially systemic, which is the minimum framework that financial policy-makers all over the world, including China, should adopt as a matter of urgency. However, this is likely to be far from sufficient, and more activist “interventionist” policies that positively discriminate in favour of the green economy would also be necessary. The paper gives some examples of what these might be.

In order to get policy-makers to treat these second sets of policies with the same level of seriousness as the first set, we have also challenged the view that it is only financial policy-makers in the emerging world that are “interventionist,” and that OECD country policy-makers are entirely “hands-off.” There are many examples of interventionist, policy-directed regulation, supervision and preferential treatment in both sets of countries with the Eurozone, the Bank of England and the U.S. Federal Reserve Bank all having recently enacted significant “sectoral” policies that discriminate in favour of a particular part of the economy. It is as legitimate for financial policy-makers to enact policies that favour the green economy, as it is for them to target the housing sector, SME lending or sovereign bonds.

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# APPENDIX A: OBJECTIVES OF THE PEOPLE'S BANK OF CHINA

1. Drafting and enforcing relevant laws, rules and regulations that are related to fulfilling its functions
2. Formulating and implementing monetary policy in accordance with law
3. Issuing the renminbi and administering its circulation
4. Regulating financial markets, including the interbank lending market, the interbank bond market, foreign exchange market and gold market
5. Preventing and mitigating systemic financial risks to safeguard financial stability
6. Maintaining the renminbi exchange rate at adaptive and equilibrium level; holding and managing the state foreign exchange and gold reserves
7. Managing the State treasury as fiscal agent
8. Making payment and settlement rules in collaboration with relevant departments and ensuring normal operation of the payment and settlement systems
9. Providing guidance to anti-money laundering work in the financial sector and monitoring money-laundering-related suspicious fund movement
10. Developing a statistics system for the financial industry and responsible for the consolidation of financial statistics as well as the conduct of economic analysis and forecast
11. Administering a credit-reporting industry in China and promoting the building up of a credit information system
12. Participating in international financial activities at the capacity of the central bank
13. Engaging in financial business operations in line with relevant rules
14. Performing other functions prescribed by the State Council

Source: People's Bank of China (2014)

# APPENDIX B: FUNCTIONS OF THE RESERVE BANK OF INDIA

## **Monetary authority:**

Formulates, implements and monitors the monetary policy.

Objective: maintain price stability and ensure adequate flow of credit to productive sectors.

## **Regulator and supervisor of the financial system:**

Prescribes broad parameters of banking operations within which the country's banking and financial system functions.

Objective: maintain public confidence in the system, protect depositors' interest and provide cost-effective banking services to the public.

## **Manager of foreign exchange**

Manages the Foreign Exchange Management Act, 1999.

Objective: facilitate external trade and payment and promote orderly development and maintenance of the foreign exchange market in India.

## **Issuer of currency:**

Issues and exchanges or destroys currency and coins not fit for circulation.

Objective: give the public adequate quantity of supplies of currency notes and coins and in good quality.

Developmental role:

## **Performs a wide range of promotional functions to support national objectives.**

### *Related Functions*

**Banker to the government:**

Performs merchant banking function for the central and the state governments; also acts as their banker.

**Banker to banks:**

Maintains banking accounts of all scheduled banks.

Source: Reserve Bank of India (2014)

## CHAPTER 9:

# A SYSTEMIC VIEW OF THE INSURANCE INDUSTRY AND SUSTAINABLE DEVELOPMENT: INTERNATIONAL DEVELOPMENTS AND IMPLICATIONS FOR CHINA

BUTCH BACANI, UNEP FINANCE INITIATIVE



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## EXECUTIVE SUMMARY

The contribution of the insurance industry to sustainable development relates to its three roles as a financial loss “shock absorber” in reducing real risks to assets, in safety and health, and as a significant investor in the real economy. Particular areas where the insurance industry is responding to sustainable development challenges are in relation to natural disasters, financial inclusion, aging populations, and the insurance and investment needs of the green economy.

Emerging regulations, legal frameworks and policies are addressing climate change and natural disasters, disaster resilience, access to insurance and aging populations. Key issues being debated in relation to environmental liability insurance include whether it should be compulsory or voluntary. There are also concerns that the impact of financial reforms such as the European Union’s Solvency II could prevent insurers from allocating capital to long-term infrastructure.

The United Nations’ Principles for Sustainable Insurance (PSI) provide a global insurance industry framework to address environmental social and governance issues and have been adopted by insurers representing 15 per cent of world premium volume. However, there is no common global framework for the routine and systemic integration of sustainable development issues into insurance regulation.

China is the world’s fastest-growing insurance market, and it faces key sustainability challenges related to environmental damage and an aging population. In relation to insurance, the key focus has been on environmental pollution liability insurance. But there is also broader potential to harness insurers as risk managers, risk carriers and investors in relation to the green economy, and to learn from and contribute to international regulatory practices. Policy proposals include:

- **Improving the insurability of environmental pollution liability risks** by strengthening regulations.
- **Reassessing the current environmental pollution liability insurance scheme** through a comprehensive consultation process.
- **Expanding the definition and scope of green insurance beyond** environmental pollution liability insurance to other areas where it could address environmental risks and liabilities, and promoting environmental sustainability.
- **Participating in international sustainable insurance initiatives and promoting sustainable development in global insurance regulatory frameworks.**



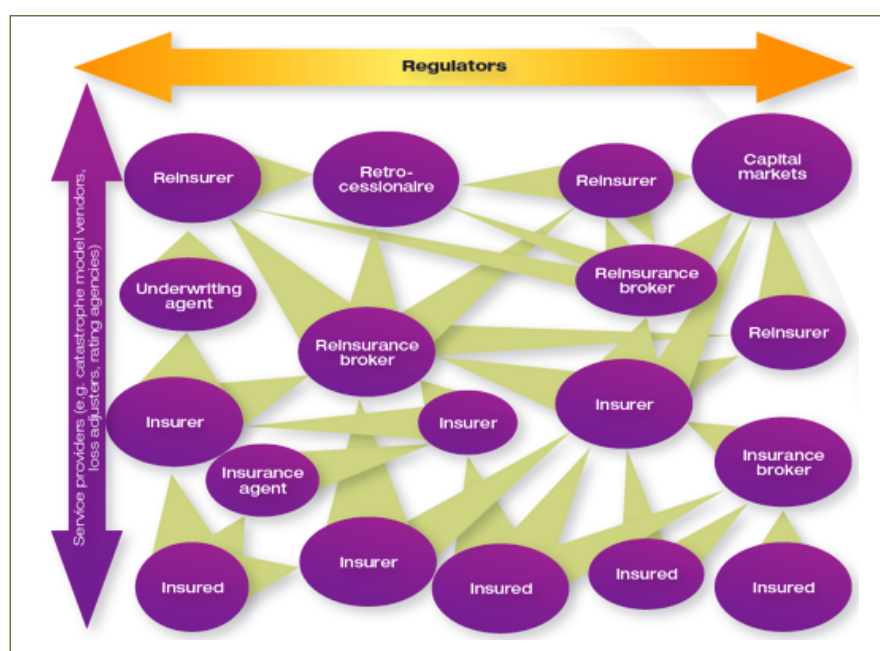
# THE INSURANCE INDUSTRY

The core business of the insurance industry is to understand, manage and carry risk. By pricing and creating a market for risk, it enables it to be pooled, diversified, managed and reduced, thereby protecting society, and supporting innovation and economic development (United Nations Environment Programme Finance Initiative [UNEP FI], 2012). Without this mechanism, risks would be borne solely by individuals, households, businesses, governments and other societal entities. However, it is important to understand that insurance is not only a financial risk transfer instrument—it also supports physical risk management because insurers carry out risk prevention and risk reduction measures in conducting their business (UNEP FI, 2009). When unexpected losses arise, insurance helps communities cope with the financial hardship associated with them (UNEP FI, 2014).

The nature of insurance activity—covering risks for the economic, financial and corporate undertakings and households—has both differences and similarities when compared to the other financial sectors. The International Association of Insurance Supervisors (IAIS, 2012) characterizes it as “reversing the production cycle” compared to other financial products, insofar as premiums are collected when the contract is entered into and claims arise only if a specified event occurs.

Since certain risks are too large to be borne by an individual insurer, these risks are spread in a global risk-sharing system comprising many players, including reinsurance (“insurance of an insurance”) and retrocession (“reinsurance of a reinsurance”).

FIGURE 1: HOW RISKS ARE SPREAD OUT IN THE INSURANCE INDUSTRY



Source: UNEP FI

Insurers, reinsurers and retrocessionaires are all risk carriers, as they put capital at risk and ultimately pay claims. Insurance agents and insurance brokers are intermediaries who provide services to those insured and their insurers, with agents representing insurers and brokers representing the insured. Similarly, reinsurance brokers and reinsurance underwriting agents provide services to insurers, reinsurers and retrocessionaires. There are also other service providers such as catastrophe model vendors, loss adjusters and rating agencies that are not directly involved in carrying risks.

In this paper, when referring to the **insurance industry**, the focus is on insurers and reinsurers. **Insurance regulation** refers to both insurance regulation and supervision.

Over the last few decades, insurance-linked securities have been developed (e.g., catastrophe bonds), where risk carriers transfer peak risks in their portfolios to the capital markets by securitizing, for example, their accumulated risk exposure in a specific territory due to natural hazards such as cyclone, flood or earthquake. Finally, insurance and financial regulators and supervisors oversee this risk-sharing system and the capital markets.

# 2

## THE ROLE OF THE INSURANCE INDUSTRY IN SUSTAINABLE DEVELOPMENT

The contribution of the insurance industry to sustainable development relates to its three roles—risk carrying, risk management and institutional investment.

- **Risk carrying** – Insurance is a financial loss “shock absorber” that builds the financial resilience of communities, businesses and households to unexpected losses such as those resulting from natural disasters, currency fluctuations, policy shifts, illness or accident. This in turn enables investment and supports economic resilience and growth.
- **Risk management** – The insurance industry’s contribution to managing risk extends well beyond the losses it pays out but includes developing an understanding and reduction of risks in homes, offices, factories, vehicles and vessels, including as related to emerging industries and issues. Insurers help reduce risk through research, as well as advocacy and support at the local level. Insurance pricing and other policy terms and conditions can provide clear risk signals and reward risk reduction efforts.
- **Institutional investment** – Insurers’ premiums are pooled and become part of a fund of financial assets, which insurers invest to generate additional funds to meet their obligations to policy holders. Globally, the insurance industry has over USD 29 trillion in assets under management (TheCityUK, 2014)

Critical sustainable development issues (or so-called environmental, social and governance (ESG) issues) with implications for the insurance industry across these three roles include climate change and extreme weather events, increasing vulnerability to natural disasters, natural resource degradation, water scarcity, environmental pollution, lack of access to insurance, widening social inequality, human rights, labour standards, aging populations, emerging health risks, trust and reputation issues, lack of accountability and transparency, and unfair treatment of customers.

FIGURE 2: THE INSURANCE INDUSTRY’S MULTIPLE ROLES TO MANAGE ESG RISKS AND OPPORTUNITIES



Source: UNEP FI

Particular areas where the insurance industry is finding new ways to respond to the diverse needs of individuals, government and commercial enterprise and support sustainable development are in relation to *natural disasters*, *financial inclusion*, *aging populations* and the insurance and investment needs of the *green economy*.

## 2.1 DISASTERS AND CATASTROPHES: MANAGING RISKS AND ENABLING RESILIENCE

The insurance industry's experience tells us that disasters are becoming more frequent and more severe. Together with higher exposure through population growth and urbanization, this is expected to result in a significant increase in losses over the coming decades. In 2013 global economic losses due to natural disasters amounted to USD 131 billion, which represents almost 2 per cent of GDP, with USD 37 billion of these losses being insured (SwissRe, 2014b).

Catastrophe insurance pools and index-based insurance solutions can facilitate the coverage of disaster risk in highly exposed and vulnerable communities. Insurance-linked securities, such as catastrophe bonds and extreme mortality bonds, can bring alternative capital to cover disaster risk. Governments and the insurance industry have set up public-private partnerships to establish social protection systems at national and regional levels that incorporate insurance mechanisms to increase disaster resilience. Examples include the African Risk Capacity, Caribbean Catastrophe Risk Insurance Facility, Central America Natural Disaster Insurance Facility, Pacific Catastrophe Risk Assessment and Financing Initiative, and Turkish Catastrophe Insurance Pool.

Environmental liability insurance, which is premised on good environmental risk management, covers risks arising from environmental damage, including pollution of lakes and rivers and damage to biodiversity and ecosystems (UNEP FI Insurance Working Group, 2007). Insurance products have traditionally covered forests for the loss of timber, but there are insurers that now include reforestation costs.

Insurance that facilitates investment in disaster risk reduction will lead to less economic, social and environmental losses; it is estimated that every dollar spent in disaster risk reduction returns between \$2 and \$10 in recovery savings.

## 2.2 FINANCIAL INCLUSION: DEVELOPMENT OF MICROINSURANCE

Microinsurance has emerged as a means to tackle social inequality and financial exclusion by providing access to affordable insurance. Globally, microinsurance covers about half a billion risks (International Labour Organization Impact Insurance Facility, n.d.) and up to 4 billion people (SwissRe, 2010). It provides financial protection to low-income communities by insuring their crops, livestock and assets and providing a means to cover accident, healthcare, dependents and funeral expenses. Another form of inclusive insurance is providing coverage for people with HIV/AIDS, people with disabilities and other underserved markets.

## 2.3 AGING POPULATIONS: MANAGING LONGEVITY RISK

For the life and health insurance industry, the question of how to provide for and address the needs of aging populations is becoming urgent in many countries. The global share of older people (aged 60 years or over) increased from 9.2 per cent in 1990 to 11.7 per cent in 2013 and will continue to grow as a proportion of the world population, reaching 21 per cent by 2050. Older persons are projected to exceed the number of children for the first time in 2047 (United Nations, 2013). As populations age, health expenses tend to grow rapidly since older persons usually require more healthcare and more specialized services to deal with their more complex pathologies.

The sustainability issues stemming from aging populations include longevity risk—the risk that individuals live longer than anticipated, with consequent shortfalls in incomes, pensioner poverty and pressure on public support systems, and on employers that sponsor defined benefit pension funds. Funded global longevity risk exposure has been estimated in excess of EUR 15 trillion, based on worldwide pension assets in Organisation for Economic Co-operation and Development (OECD) registered countries (Chief Risk Officers Forum, 2010).

Longevity risks are being addressed by a growing number of health insurance and retirement funding products from the insurance industry, including critical illness insurance, long-term care insurance (or nursing home insurance), impaired life annuities, longevity annuities (or longevity insurance), longevity swaps, longevity bonds and equity releases, which allow homeowners to release money from the property they live in.

## 2.4 RESOURCE-EFFICIENT OPPORTUNITIES: INSURANCE FOR THE GREEN ECONOMY

In the context of environmental sustainability, there is an increasing range of insurance products that promote the transition to a cleaner and more resource-efficient economy. These include insurance for renewable energy projects (including cover for transit, construction and operational risks), performance warranty insurance for solar panels and wind turbines, insurance for energy and water-efficient buildings, energy-efficiency or energy-savings insurance, geothermal exploration risks insurance, insurance for carbon capture and storage technology, insurance for hybrid and electric vehicles, and “pay-as-you-drive” or usage-based insurance.

More sophisticated solutions are being explored, such as policy risk insurance to facilitate renewable energy investments by providing a guarantee for investors against any changes in policy that will adversely affect their returns (UNEP, 2009). Other areas being explored include insurance solutions for low-emission shipping, such as managing risks associated with “save-as-you-sail” financial models to finance the energy-efficiency retrofit of vessels (Sustainable Shipping Initiative, n.d.). There are also insurance products that cover rebuilding costs for damaged buildings and homes to bring them to better environmental standards, promote better indoor air quality and use sustainable materials, as well as insurance products that replace damaged appliances with energy-efficient ones.

As long-term asset managers, insurers can support sustainable development through their investments across asset classes and geographies. This includes investments in renewable energy, sustainable agriculture and forestry, healthcare, waste management, inclusive finance, sustainable water management, and climate and disaster-resilient infrastructure.

# 3

## PRINCIPLES FOR THE INSURANCE INDUSTRY

Insurers are increasingly recognizing that sustainable development issues matter to their core business. This is reflected in the global, voluntary and aspirational Principles for Sustainable Insurance (PSI) and Principles for Responsible Investment (PRI) supported by the United Nations.

The PSI is a framework for the insurance industry, which includes the spheres of influence of an insurer including but not limited to investment management. The PRI is a framework for the institutional investment industry, which spans insurance and non-insurance institutions addressing only investment management.

The principles are complementary and also aligned with the UN Global Compact Principles on human rights, labour, environment and anti-corruption. They have become part of the criteria for assessing insurance companies for inclusion in key sustainability indices such as the Dow Jones Sustainability Indices, FTSE4Good and BM&FBOVESPA Corporate Sustainability Index. To demonstrate accountability and transparency to the public, a fundamental aspect is adopters having to publicly disclose their implementation progress every year.

The IAIS Insurance Core Principles, Standards, Guidance and Assessment Methodology (ICPs) that form the globally accepted framework for insurance regulation do not explicitly reference sustainability, but cover a number of relevant topics.

### 3.1 THE PRINCIPLES FOR SUSTAINABLE INSURANCE

The PSI were developed by UNEP FI and launched at the 2012 UN Conference on Sustainable Development with endorsement by the UN Secretary-General. They were developed through a global consultation process involving more than 500 senior representatives from the insurance industry and its stakeholders, and have been adopted by insurers representing approximately 15 per cent of global premium volume and USD 8 trillion in assets under management.

The PSI are applicable to all lines of insurance, all regions and all insurance industry participants and address environmental, social and governance risks and opportunities in relation to insurers' spheres of influence, including company strategy, risk management and underwriting, product and service development, claims management, sales and marketing, and investment management, as well as engagement with regulators and other stakeholders.

The vision of the PSI Initiative is of a risk-aware world, where the insurance industry is trusted and plays its full role in enabling a healthy, safe, resilient and sustainable society. Its purpose is to better understand, prevent and reduce environmental, social and governance risks, and better manage opportunities to provide quality and reliable risk protection.

## Box 1: The Principles for Sustainable Insurance

*“Sustainable Insurance is a strategic approach where all activities in the insurance value chain, including interactions with stakeholders, are done in a responsible and forward-looking way by identifying, assessing, managing and monitoring risks and opportunities associated with environmental, social and governance issues. Sustainable insurance aims to reduce risk, develop innovative solutions, improve business performance, and contribute to environmental, social and economic sustainability” (UNEP, 2012, p. 3).*

**Principle 1:** We will embed in our decision-making environmental, social and governance issues relevant to our insurance business.

**Principle 2:** We will work together with our clients and business partners to raise awareness of environmental, social and governance issues, manage risk and develop solutions.

**Principle 3:** We will work together with governments, regulators and other key stakeholders to promote widespread action across society on environmental, social and governance issues.

**Principle 4:** We will demonstrate accountability and transparency in regularly disclosing publicly our progress in implementing the Principles.

Source: UNEP (2012, pp. 4–5)

In terms of engagement with regulators, these possible actions are stated under Principles 3 and 4 (UNEP, 2012, p. 5):

- “Support prudential policy, regulatory and legal frameworks that enable risk reduction, innovation and better management of environmental, social and governance issues”
- “Dialogue with governments and regulators to develop integrated risk management approaches and risk transfer solutions”
- “Dialogue with clients, regulators, rating agencies and other stakeholders to gain mutual understanding on the value of disclosure through the Principles”

## 3.2 THE PRINCIPLES FOR RESPONSIBLE INVESTMENT

Launched in 2006 by the UN Secretary-General, the Principles for Responsible Investment (PRI) Initiative is an investor initiative in partnership with UNEP FI and the UN Global Compact. The initiative is driven by a growing recognition in the financial community that effective research, analysis and evaluation of environmental, social and governance issues are a fundamental part of assessing the value and performance of an investment over the medium and longer term, and that this analysis should inform asset allocation, stock selection, portfolio construction, shareholder engagement and voting. Responsible investment requires investors and companies to take a wider view, acknowledging the full spectrum of risks and opportunities facing them, in order to allocate capital in a manner that is aligned with the short and long-term interests of their clients and beneficiaries. The PRI Initiative believes that an economically efficient, sustainable global financial system is a necessity for long-term value creation, and that such a system will reward long-term, responsible investment and benefit the environment and society as a whole.

The PRI Initiative has become the leading global network for investors to publicly demonstrate their commitment to responsible investment, to collaborate and learn with their peers about the financial and investment implications of environmental, social and governance issues, and to incorporate these factors into their investment decision-making and ownership practices. Over 1,200 institutional investors, representing more than USD 45 trillion in assets under management, have adopted the principles.

The principles offer a menu of possible actions for incorporating environmental, social and governance issues into investment practices across asset classes. They are designed to be compatible with the investment styles of large, diversified, institutional investors that operate within a traditional fiduciary framework.

## Box 2: The Principles for Responsible Investment

*“Responsible investment is an approach to investment that explicitly acknowledges the relevance to the investor of environmental, social and governance factors, and the long-term health and stability of the market as a whole. It recognises that the generation of long-term sustainable returns is dependent on stable, well-functioning and well-governed social, environmental and economic systems”* (UN Principles for Responsible Investment, n.d.a).

**Principle 1:** We will incorporate environmental, social and governance issues into investment analysis and decision-making processes.

**Principle 2:** We will be active owners and incorporate environmental, social and governance issues into our ownership policies and practices.

**Principle 3:** We will seek appropriate disclosure on environmental, social and governance issues by the entities in which we invest.

**Principle 4:** We will promote acceptance and implementation of the Principles within the investment industry.

**Principle 5:** We will work together to enhance our effectiveness in implementing the Principles.

**Principle 6:** We will each report on our activities and progress towards implementing the Principles.

In terms of engagement with regulators, the following possible action is stated under Principle 4:

- “Support regulatory or policy developments that enable implementation of the Principles”

Source: UN Principles for Responsible Investment (n.d.b).

## 3.3 THE IAIS CORE PRINCIPLES

Established in 1994, the IAIS, based in Basel, Switzerland, represents insurance regulators and supervisors of more than 200 jurisdictions in nearly 140 countries, constituting 97 per cent of the world’s insurance premiums. It also has more than 130 observers.

The objectives of the IAIS are to promote effective and globally consistent supervision of the insurance industry in order to develop and maintain fair, safe and stable insurance markets for the benefit and protection of policyholders, and to contribute to global financial stability.

IAIS Insurance Core Principles (ICPs), Standards, Guidance and Assessment Methodology are the globally accepted framework used in the evaluation of supervisory regimes under the Financial Sector Assessment Program (FSAP) conducted jointly by the World Bank and International Monetary Fund. The most recent revision adopted in 2011 takes into account experience gained from the FSAP assessments, as well as recommendations from the G20 Finance Ministers and Central Bank Governors and the Financial Stability Board and include a new principle on macroprudential surveillance (IAIS, 2012).



### Box 3: The ICPs and Sustainability

As with the core objectives of the IAIS, the ICPs do not explicitly aim for an insurance industry aligned to sustainable development. It seeks to maintain a “fair, safe and stable” insurance sector for the benefit and protection of the interests of policyholders, beneficiaries and claimants, as well as contribute to the stability of the financial system. The insurance industry and its regulators must respond to a “wide range of social, technological and global economic forces,” but the environment is not mentioned.

The ICP provides high-level principles, each supported by a hierarchy of standards and guidance. A range of principles can be relevant to the aims of the PSI and PRI, such as ICP 7 (corporate governance), ICP 8 (risk management and internal controls), ICP 13 (reinsurance and other forms of risk transfer), ICP 14 (valuation), ICP 15 (investment), ICP 16 (enterprise risk management for solvency purposes), ICP 17 (capital adequacy), ICP 18 (intermediaries), ICP 19 (conduct of business), ICP 20 (public disclosure), ICP 21 (countering fraud in insurance), ICP 22 (anti-money laundering and combating the financing of terrorism), and ICP 24 (macroprudential surveillance and insurance supervision).

No ICP explicitly recognizes the interlocking ESG and economic dimensions of sustainable development, and the materiality of ESG risks and opportunities to the insurance business.

Source: IAIS (2013)

# 4

## INTERNATIONAL REGULATORY ISSUES LINKED TO SUSTAINABLE DEVELOPMENT

The ICPs which provide the accepted regulatory framework for the insurance industry are not clear and explicit about the ESG dimensions of sustainable development, and do not sufficiently enable the routine and systemic integration of sustainable development issues into insurance regulation. Nevertheless, a range of regulatory issues is emerging in relation to insurance and sustainable development.

### 4.1 NATURAL DISASTERS ARE INTERTWINED WITH CLIMATE CHANGE AND OTHER ENVIRONMENTAL RISKS.

Insurance regulation has long been focused on risk management with regard to natural hazards such as earthquakes, cyclones and floods, ensuring that the market provides affordable insurance for households and enterprises, and that insurers are able to fulfil their obligations to policyholders. The UN has warned that economic losses linked to disasters are “out of control,” with direct losses tending in the range of USD 2.5 trillion between 2000 and mid 2013 (UNISDR, 2013). The implications of the relationship between climate change and natural disasters are not well understood, and the two are often mistakenly viewed as synonymous or even as sweeping terms for environmental risks. There is also a material difference between natural disasters and man-made disasters (such as industrial accidents that result in environmental pollution). For example, assessing the predictability of natural disaster risk entails scientific information such as hydro-meteorological and geological data, while assessing environmental pollution risk is more dependent on industrial company risk management and safety cultures. Generally, property damage due to natural hazards can also be quantified much faster compared to environmental damage claims, which can take years or even decades to fully develop (Insurance Europe, 2013)

### 4.2 CLIMATE CHANGE IS A MATERIAL RISK, BUT THE RESPONSE HAS LARGELY BEEN ON ADAPTATION ONLY.

Climate change has been a driver of market innovation, policy engagement and analysis within the insurance industry—and is now stimulating new approaches to insurance regulation. In the United States, the National Association of Insurance Commissioners (NAIC) adopted a white paper on the potential impacts of climate change on insurance regulation in 2008 and, in 2009, approved a mandatory requirement that insurance companies disclose to regulators the financial risks they face from climate change, as well as actions companies are taking to respond to those risks. A number of states have been actively promoting mandatory public disclosure, notably California. In 2012, NAIC adopted revisions to the 2013 Financial Condition Examiners Handbook to ensure that insurers are addressing climate-related risks. These revisions incorporated risk-focused examination questions that provide examiners with needed guidance on what questions to ask insurers regarding any potential impact of climate change on solvency. They were specifically designed to help examiners identify unmitigated risks and to provide a framework for them when examining such risks and their impact on how an insurer invests its assets and prices its products.

In Europe, the United Kingdom’s Prudential Regulation Authority (PRA), part of the Bank of England, has accepted an invitation from the government to complete a Climate Change Adaptation Report by July 2015. The report will inform the next U.K. Climate Change Risk Assessment, to be laid before the U.K. parliament in 2017. With a focus on insurance, the report will examine the impact of climate change on the PRA’s objectives and the roles of insurance regulation in supporting adaptation to climate change. In producing the report, the PRA will be carrying out a phased approach, including a survey of insurance companies on climate-related risks (UNEP, 2014b)

Insurance regulation does not appear to focus on the mitigation side of climate change—the need to reduce the level of greenhouse gas emissions produced by human activities. In particular, there is a lack of regulatory innovation to support the development of insurance products that facilitate the transition to a low-emission and resource-efficient economy. For the insurance industry, delays in a strategic regulatory response to climate change could result in increasing litigation—both against insurers and by insurers. Many in the industry have warned that climate claims could match the industry’s decades-long financial pain from paying asbestos settlements (Leurig, 2011).

Over the years, the insurance industry has grappled with legacy issues, defined as potential loss exposures, arising from policies issued in the past where new theories of litigation might trigger a claims payment never contemplated at the time the policy was underwritten. A classic example is asbestosis, which has resulted in massive payouts from the insurance industry that span decades and continue to this day. Potential legacy issues could be nanotechnology risks or liability risks associated with the failure to act on climate change. Not all conversations on environmental, social and governance issues are “safe” or “comfortable,” as they can touch not just the coverage to be offered in the future, but also the potential reinterpretation of policies issued in the past (UNEP FI Insurance Working Group, 2009).

#### **4.3 ACCESS TO INSURANCE IS A KEY PRIORITY IN DEVELOPING COUNTRIES, AND MICROINSURANCE REGULATORY FRAMEWORKS ARE EMERGING.**

Poverty, social inequality, natural disasters and climate change all reinforce the policy and regulatory imperative of ensuring access to insurance to reduce vulnerability and help escape the poverty trap, particularly in developing countries. But there can be market tension between access to affordable insurance and risk-based pricing, which could move insurance cover out of reach of low-income communities (UNEP, 2014a). Regulators have a particularly difficult balance to maintain. At times, insurance availability and affordability and the claims-paying ability (capital adequacy and solvency) of the insurers they regulate and supervise present conflicting objectives. For example, high premiums preclude financial inclusion, while inadequate premium rates (price is not commensurate to risk) can ultimately lead to insurer insolvency, the potential for unpaid claims, and insurers withdrawing a certain coverage or from a market altogether.

Internationally, the Access to Insurance Initiative, founded in 2009 by the IAIS, multilateral organizations, governments and other organizations, is working to enhance broad-based, demand-oriented and sustainable access to insurance for low-income customers (Access to Insurance Initiative, n.d.). The initiative seeks to:

- Generate the knowledge that policy-makers and supervisors need about financial inclusion (e.g., good regulatory practices to inform IAIS-globally accepted insurance standards such as the ICPs).
- Enable the effective use of knowledge (e.g., helping regulators implement the ICPs in national regulatory frameworks).

Complementary regional programs have started, such as the Regulatory Framework Promotion of Pro-poor Insurance Markets in Asia. The program, which will be implemented from 2013 to 2015, supports Asian insurance regulators in enhancing the enabling conditions for pro-poor insurance. The program uses Access to Insurance Initiative methodology and IAIS global tools to build the capacity of insurance regulators and currently has mutual exchange forums on inclusive insurance in Indonesia, Mongolia, Nepal, the Philippines, Thailand and Vietnam (Inclusive Insurance Asia, 2014).

Moreover, in 2012, the IAIS adopted the *Application Paper on Regulation and Supervision Supporting Inclusive Insurance Markets* (IAIS, 2012). The *Application Paper* provides regulators, particularly in developing countries, guidance in implementing the ICPs, balancing the objectives of protecting policyholders and contributing to global financial stability, with policies that aim to develop inclusive insurance markets. In recent years, a growing number of microinsurance-specific regulatory frameworks have been developed in Asia and

Latin America, including Brazil, China (Taiwan, Province of China), India, Mexico, Peru and the Philippines. Territories where microinsurance regulation is under consideration include Nigeria, Pakistan, South Africa and member countries of the Inter-African Conference on Insurance Markets (CIMA or Conférence Interafricaine des Marchés d'Assurances), spanning French-speaking countries in Central Africa and West Africa (Beiner, Eling, & Schmidt, 2013).

#### **4.4 HARNESSING THE FULL POTENTIAL OF INSURERS IN DISASTER RISK MANAGEMENT IS AN EMERGING STRATEGIC RESPONSE.**

With increasing disaster risk, insurers are increasingly looking at ways to better understand and reduce disaster risk and build resilience, beyond the financial resilience provided by insurance coverage. This is the focus of the PSI Initiative's Global Resilience Project, which aims to deepen understanding of disaster risk reduction globally, assess the economic, social and environmental cost of disasters, and use this information to help governments and communities manage risk. The project, which focuses on the three natural hazards that have created the most devastation globally—cyclone, earthquake and flood—will include engaging insurance regulators and governments in disaster risk reduction, and its links to the availability and affordability of insurance.

This initiative goes beyond the traditional, narrower focus on the risk-pooling role of the insurance industry. It could also be argued that insurance—the financial risk transfer instrument—may not be the appropriate societal response if it creates a perverse incentive for behaviours that should not be rewarded and that stifle innovation. Along this view, the PSI Initiative has produced an insurance industry commitment in support of the intergovernmental process to develop the Post-2015 UN Framework for Disaster Risk Reduction. The commitment seeks to harness the full potential of the insurance industry in disaster risk management—from understanding, assessing, preventing and reducing disaster risk—to disaster response and relief, disaster recovery, disaster risk financing and disaster risk-sensitive investments (UNEP FI, 2014).

Furthermore, efforts are underway to explore how the application of risk-based assessments and stress tests common in the insurance industry can be applied to manage disaster risk in other parts of the financial system. Insurers are routinely assessed to ensure that they can remain solvent and pay all valid claims in the event of a 1-and-200-year worst-case event over each 12-month period (UNEP, 2014a).

#### **4.5 POST-FINANCIAL CRISIS REGULATORY REFORMS ARE AFFECTING THE ROLE OF INSURERS AS INVESTORS.**

The insurance industry is a large investor, with over USD 29 trillion in assets under management globally (TheCityUK, 2014). There has been concern about the impact of financial reforms, such as the EU's Solvency II regulations on the appetite of insurance companies to allocate capital to long-term infrastructure, including renewable energy. According to Swiss Re and the Institute for International Finance, "high capital charges for longer-term assets such as infrastructure and a high degree of uncertainty surrounding the implementation of reforms is not conducive to these investments" (UNEP, 2014a). The risk-based solvency rules at the core of Solvency II have been proposed for application to European pension funds as well. This matter could also be relevant for other risk-based solvency regimes under development such as the Solvency Assessment and Management (SAM) regime in South Africa and the China Risk-Oriented Solvency System (C-ROSS).

## 4.6 AGING POPULATIONS ARE A MAJOR GLOBAL CHALLENGE.

In 2013 the Joint Forum<sup>1</sup> released its final paper on longevity risk transfer markets, which underscores the serious social policy and regulatory challenges in many countries associated with aging populations. Beyond the fact that people are living longer, the report highlights the problem with longevity risk. It says that longevity risk—the risk of paying out on pensions and annuities for longer than anticipated—increasingly calls into question whether existing “saving for retirement” products are sustainable (Joint Forum, Bank for International Settlements, 2013).

The report outlines that total longevity risk is significant when measured from a financial perspective, with each additional year of life expectancy adding about 3–4 per cent to the present value of the liabilities of a typical defined benefit pension fund. It notes that estimates of the total global amount of annuity and pension-related longevity risk exposure range from USD 15 trillion to USD 25 trillion. Hence, risk holders will have to pay over an additional USD 450 billion to USD 1 trillion in aggregate for each year that they underestimate longevity (Joint Forum, Bank for International Settlements, 2013). For this reason, the report says that pension funds in some countries are increasingly looking to transfer their longevity risk. Furthermore, it acknowledges that “longevity risk transfer markets are a more or less uncharted territory for analysts and academics as well as for supervisors.” The report concludes with eight recommendations to supervisors and policy-makers, including: communicating and cooperating, understanding longevity risk exposures, assessing relevant policies, reviewing longevity risk rules and regulations, ensuring adequate risk-bearing capacity, monitoring market developments, paying attention to tail risk, and collecting adequate data. It highlights that “while longevity risk transfer markets are not large enough to present systemic concerns yet, their massive potential size and the growing interest from investment banks in mobilising this risk make it important to ensure that these markets are safe, both on a prudential and a systemic level.”

The very substantial global longevity risk exposure and the growing demand for longevity risk mitigation solutions were already highlighted by the Chief Risk Officers Forum (2010). Furthermore, while longevity risk is largely about increasing life expectancies, the Chief Risk Officers Forum has outlined countervailing trends to consider, including emerging health risks and environmental risks: “Over short durations, the effects of increased obesity, alcohol consumption and recreational drug-taking may prove damaging to life expectancies. Over longer durations, there will be challenges ahead from climate change, pressure on water resources and new pathogens, as well as the increasing prevalence of conditions specific to an aging population, such as Alzheimer’s disease. During the last 30 years more than 30 new pathogens have been identified, including HIV, new variant CJD (Creutzfeldt-Jakob Disease) and SARS (Severe Acute Respiratory Syndrome). A significant proportion of these is derived from human-animal transmission and represents a material change in the risk landscape.”

The nature of certain longevity risk products for individuals, such as equity release, has led to governance-related practices from providers that ensure integrity and transparency when products and services are offered to customers. For example, the Equity Release Council in the United Kingdom has a Code of Conduct that sets strict criteria for its members, and puts in place safeguards for consumers to ensure that they can have confidence in Equity Release Council members and their products and services. The council also has a Statement of Principles for its members to bring about outcomes that are in the best interests of customers and rules and guidance incorporating a number of documents that set out the council’s requirements and expectations of its members (Equity Release Council, 2015a, 2015b).

<sup>1</sup> The Joint Forum is a group of senior financial sector supervisors working under the auspices of its parent committees: the Basel Committee on Banking Supervision, the International Organization of Securities Commissions and the IAIS. The objective of the Joint Forum is to support banking, insurance and securities supervisors in meeting their regulatory and supervisory objectives and, more broadly, to contribute to the international regulatory agenda in particular where risks exist across or in gaps between the three supervised sectors. See Chapter 4 in Section 2 of this book, Lessons from the Development of Green Finance China by Tian Huy and Chapter 4 in Section 2 of this book, Problems and Difficulties in the Development of China’s Green Finance by Wang Gang.

## 4.7 TRUST, REPUTATION, ACCOUNTABILITY AND TRANSPARENCY ARE MORE IMPORTANT THAN EVER.

Insurers have articulated that “we depend on the trust people place in our industry to fulfil its obligations” (UNEP FI, 2012). An annual international trust and credibility survey of business and governments has produced consistent results over the past five years (Edelman Berland, 2014). Across industry sectors, the financial services industry, which includes banks and insurers, is the least trusted. In contrast, the technology industry is the most trusted. By a three-to-one margin, informed publics say that there is not enough government regulation of the financial services, energy, and food and beverage industries. The main reason is to protect consumers, and because the demand for oversight is even higher for industries where the potential impact on environmental, health and economic well-being is more prominent.

Despite the high demand for regulation of business, the survey shows a significant level of permission for business to play a role in the debate and design of regulation, as most respondents do not see government as capable of delivering the necessary regulations on its own, especially at the scale and level of complexity that is often required. Another key finding is that the vast majority (84 per cent) of respondents believe that business can pursue its self-interest while doing good work for society.

The survey report concludes that today’s world requires a shift from the historic, transactional nature of capitalism to a model of value creation that encompasses both social benefit and shareholder value. It ends with examples of companies that have created value for clients and society, highlighting that, “in a world of constrained resources and growing stresses, compromise and choice are required for forward progress, based on values and with a commitment of greater societal value” (Edelman Berland, 2014).

Insurance and financial regulators have continued to step up efforts on governance and conduct of business. For example, in 2014, the Joint Forum released its final paper on point-of-sale disclosure. The report identifies and assesses differences and gaps in regulatory approaches to point-of-sale disclosure for investment and savings products across the insurance, banking and securities sectors, and considers whether the approaches need to be further aligned across sectors. It sets out eight recommendations, for use mainly by policy-makers and supervisors to assist them in considering, developing or modifying their point-of-sale disclosure regulations (Joint Forum, Bank for International Settlements, 2014).

Beyond point-of-sale disclosures and as part of the overall thrust on financial consumer protection, insurance regulators are working on outcome-based regulatory reforms. Examples include the Treating Customers Fairly (TCF) initiative of the Financial Conduct Authority in the United Kingdom, and TCF approach of the Financial Services Board in South Africa. There are similar initiatives in Asia, such as the Guidelines on Fair Dealing of the Monetary Authority of Singapore (2013), applicable to investment products, and the Treating Customers Fairly Charter of the Hong Kong Monetary Authority (2013), applicable to banks. According to the UK Financial Conduct Authority (FCA, 2013): “All firms must be able to demonstrate that they are consistently delivering fair outcomes to consumers and that senior management are taking responsibility for ensuring the firm and staff at all levels deliver the consumer outcomes relevant to their business through establishing an appropriate culture. We expect customers’ interests to be at the heart of how firms do business. Customers can expect to get financial services and products that meet their needs from firms that they can trust. Meeting customers’ fair and reasonable expectations should be the responsibility of firms, not that of the regulator.”

#### Box 4: Treating Customers Fairly

The United Kingdom FCA's Treating Customers Fairly initiative set out six consumer outcomes expected of firms. The FCA said it would use them as an important factor in guiding regulatory decisions and actions.

**Outcome 1:** Consumers can be confident that they are dealing with firms where the fair treatment of customers is central to the corporate culture.

**Outcome 2:** Products and services marketed and sold in the retail market are designed to meet the needs of identified consumer groups and are targeted accordingly.

**Outcome 3:** Consumers are provided with clear information and are kept appropriately informed before, during and after the point of sale.

**Outcome 4:** Where consumers receive advice, the advice is suitable and takes account of their circumstances.

**Outcome 5:** Consumers are provided with products that perform as firms have led them to expect, and the associated service is of an acceptable standard and as they have been led to expect.

**Outcome 6:** Consumers do not face unreasonable post-sale barriers imposed by firms to change product, switch provider, submit a claim or make a complaint.

Source: FCA (2013)

The TCF outcomes of South Africa's Financial Services Board (FSB) mirror those of the United Kingdom's FCA. According to the FSB's TCF Roadmap, released in 2011, it is implementing a program for regulating the market conduct of financial services firms. It indicates that the TCF approach seeks to ensure that fair treatment of customers is embedded within the culture of financial firms. TCF will use a combination of market conduct principles and explicit rules to drive the delivery of clear and measurable fairness outcomes, and will enforce the delivery of these outcomes through imposing a range of visible and credible deterrents to unfair treatment. The FSB adds that TCF will require regulated firms to consider their treatment of customers at all stages of their relationship with the customer, from product design and marketing, through to the advice, point-of-sale and after-sale stages. Firms will ultimately be required to demonstrate—through management behaviours and monitoring—that they are consistently treating customers fairly throughout the stages of the product life cycle to which they contribute.

TCF initiatives in different jurisdictions are in line with the aims of Insurance Core Principle 19 (Conduct of Business) of the International Association of Insurance Supervisors, and those of the High-Level Principles on Financial Consumer Protection endorsed in 2011 by the G20 Finance Ministers and Central Bank Governors.

### Box 5: The G20 High-Level Principles on Financial Consumer Protection

These G20 principles are voluntary principles. They are designed to complement, not be a substitute for, existing international financial principles or guidelines. In particular, they do not address sector-specific issues dealt with by the relevant international organizations and the financial standard setters (e.g., Basel Committee on Banking Supervision, International Association of Insurance Supervisors, International Organization of Securities Commissions). They cover ten key areas:

1. Legal, regulatory and supervisory framework
2. The role of oversight bodies
3. The equitable and fair treatment of consumers
4. Disclosure and transparency
5. Financial education and awareness
6. Responsible business conduct of financial services providers and authorized agents
7. The protection of consumer assets against fraud and misuse
8. The protection of consumer data and privacy
9. Complaints handling and redress
10. Competition

Source: G20/OECD (2011)

## 4.8 ENVIRONMENT LIABILITY INSURANCE IS COMPLEX AND STILL EVOLVING.

In 2013 commercial liability premiums accounted for 10 per cent of total global non-life premiums. Liability insurance is far more prevalent in advanced markets such as the EU and North America than in emerging markets. In 2013 advanced markets accounted for 93 per cent of global liability premiums (Swiss Re, 2013).

Established legal liability frameworks for environmental damages include the U.S. Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (which established the “Superfund”), the Environmental Liability Directive in the EU, Prevention and Integral Management of Wastes in Mexico and the Environmental Protection Law in China. The insurance industry has been responding to the rise of these liabilities through the development of new products such as environmental impairment liability (EIL) insurance. These products were introduced following the introduction of the Superfund Regulations, when U.S. insurers began excluding pollution cover under general liability policies. This specialist EIL insurance class continued to develop in the early 1990s covering damages from sudden as well as gradual pollution and has since become available in Europe and globally. More recently, EIL insurers have started to explore emerging issues such as damages to natural resources and loss of biodiversity (UNEP FI, 2007)



## Box 6: The EU Environmental Liability Directive

The EU Environmental Liability Directive (ELD), which entered into force in 2004, established a legal framework to prevent and remedy environmental damage to protected species and habitats, water and soil. “The polluter pays” is the underlying principle. As the ELD deals with the ecological damage, it is based on the powers and duties of public authorities (“administrative approach”). Therefore, liability claims are brought by public administrators for remediation to the damaged environment, not by injured third parties, as would be the case in “traditional damage” such as damage to property, economic loss or personal injury.

Operators carrying out dangerous activities (such as waste management and manufacture of hazardous substances) fall under strict liability (no need to prove fault). Those carrying out other occupational activities are liable for fault-based damage. Affected natural or legal persons and environmental non-governmental organizations (NGOs) have the right to request the competent authority to take remedial action if they deem it necessary. The strict and fault-based liability regimes under the ELD are distinct from the purely strict liability regime of the Superfund in the United States. Furthermore, unlike the Superfund, the ELD is not retroactive, so it does not cover damage caused before its implementation.

The European Commission reported to the European Parliament in 2010 that the available information did not allow for concrete conclusions to be drawn about the effectiveness of the ELD. The European Commission is due to submit its report on the effectiveness and application of the ELD to the European Parliament and EU Council and undertake a review by mid 2015. A key element the report will cover is whether there is a need for EU-wide compulsory ELD insurance and an extension of activities falling under strict liability (Insurance Europe, 2014b).

Environmental liability products are offered across EU member states through different mechanisms, such as environmental liability pools, endorsements to existing general liability policies and stand-alone environmental liability products. However, insurance covering the liability for the prevention and remediation of environmental damage is still developing in many EU member states. While the availability of this insurance has increased since adoption of the ELD in 2004, financial capacity in the market remains small compared to other, more advanced liability insurance markets (such as motor or general third-party liability insurance) (Insurance Europe, 2013). Insurance Europe believes that a voluntary free market is working, with different products and approaches available, and that a “one-size-fits-all approach” at the EU level would not be feasible.

Other issues that continue to be debated include the potential extension of strict liability; the extension of the scope of environmental damage to air as well as invasive alien species; the significance thresholds for land damage and water damage; the harmonization of the currently optional ELD defences; and the consideration of industrial activities currently covered by international convention (Insurance Europe, 2014b)

*Source: European Commission (2015)*

The debates on the ELD illustrate the broader question of in what circumstances insurance should be compulsory or voluntary. Insurance usually works most effectively when developed in response to actual customer demand. Compulsory insurance can interfere with insurer’s ability to tailor cover to customer needs, such as by giving price incentives for improved risk management, thereby leading to more risk-reducing behaviour by the policyholder.

Governments usually step in, including through public-private partnerships, when there is a market failure. However, a consumer’s incentive to exercise due diligence and minimize risk may be diminished in cases where they are compelled by law to have a specific type and scope of insurance. This could include, for instance, the take-up of adaptation measures such as adhering to building codes and preparing flood defences). The result may be a potential decrease in overall risk awareness and safety and an increase in more severe losses as the result of a natural catastrophe. But moral hazard (i.e. the lack of risk-reducing behaviour) may not be an issue in all compulsory insurance markets. A compulsory insurance system implemented in line with a public-private partnership can at times even lead to diminished moral hazard. In

France, for example, which mandates an extension of natural catastrophe coverage to property insurance, the economic losses caused by a disaster are only partly covered by insurance (50 per cent to 60 per cent). Public authorities must thus deal with the remaining uninsured damage to infrastructure. As a result, the private and public sectors work together to try and minimize risk (Insurance Europe, 2013).

# OUTLOOK ON INSURANCE REGULATION AND SUSTAINABLE DEVELOPMENT

## 5.1 ESG RISKS RUNNING AHEAD OF REGULATORY FRAMEWORKS

In 2009 the UNEP FI Insurance Working Group conducted a global survey of the insurance industry and sustainable development issues. The survey results are relevant to regulatory and legal frameworks and continue to resonate today. A critical component of the survey was to ask respondents to judge the maturity of ESG factors in relation to the industry on a scale from “not a factor” to having a “developed regulatory or legal framework.”

FIGURE 3: EVOLUTIONARY PROGRESS SCALE



Source: UNEP FI Insurance Working Group (2009)

The 12 primary ESG factors considered were:

- **Environmental:** climate change, biodiversity loss and ecosystem degradation, water management, pollution
- **Social:** financial inclusion, human rights, emerging manmade health risks, aging populations
- **Governance:** regulations, disclosure, ethics and principles, alignment of interests

Respondents were also asked to evaluate the same factors—framed as risks—with respect to their potential frequency, severity and uncontrollability. One of the more profound insights from the survey was the extent to which the insurance underwriter, responsible for pricing risks, judged ESG risks to have significant loss potential in terms of risk frequency, severity and uncontrollability. However, the societal response to these ESG risks on the evolutionary progress scale was indicative of societal response “lagging” the underwriters’ assessment of the risk involved, with prudential regulatory or legal frameworks underdeveloped. Therefore, the interesting question that arises is whether a regulatory or legal framework is a precondition of insurability, or whether it is simply one of many important issues that influence the underwriting process. This is a question of no small importance with respect to ESG risks, many of which are dynamic and systemic and involve public goods. The insurance industry perspective reflected in the survey results suggests that ESG risks may be “outrunning” the development of prudential regulatory or legal frameworks that address sustainable development issues. This is significant because the insurance industry is highly regulated, and the survey statistics revealed that “regulations” is the number one factor influencing underwriting, and the number one factor in terms of risk severity.

The responsibility of insurers entails economic considerations as well as being part of society, and the survey data suggested that the dynamic characteristics of ESG risks need an equally dynamic framework to guide an industry response to ESG risks where prudential regulatory or legal frameworks are underdeveloped. The global survey was the final part of the research foundation that stimulated the development of the Principles for Sustainable Insurance, with the aim of bridging the societal, regulatory and legal gap on ESG risks in a proactive way.

## 5.2 NO GLOBAL FRAMEWORK FOR INTEGRATING SUSTAINABLE DEVELOPMENT INTO INSURANCE REGULATION

As yet, there is no common global framework for the routine and systemic integration of sustainable development issues into insurance regulation. Insurance regulatory frameworks at the global and national levels are addressing certain sustainable development issue, such as social inequality and lack of access to insurance, although there is still much work needed.

Overall, it appears that the insurance regulatory frameworks and practices, including the IAIS Insurance Core Principles, are more focused on the basic responsibility, safety and stability of the insurance industry in relation to its policyholders, than on its wider role in supporting a sustainable economy. Moreover, the roles of insurers as risk managers and institutional investors (i.e., beyond their role as risk carriers) appear to be underused in the context of tackling sustainable development challenges.

Meanwhile, the advent of global principles on sustainable development for the insurance industry offers key insights. For example, the PSI and PRI are consistent with the “total balance sheet approach” (i.e., assets and liabilities) of the IAIS Insurance Core Principles and new risk-based solvency regulatory frameworks such as the EU’s Solvency II. The PSI and PRI are frameworks and initiatives that can facilitate better understanding and management of ESG risks and opportunities and strengthen the capacity of insurers to fulfil their obligations to policyholders. Moreover, these principles serve as global frameworks that offer a shared view of the future, which, along with concrete actions today, can catalyze transformational and systemic change that supports sustainable development.

Indeed, global insurers are increasingly assessing ESG issues in relation to country risk, where previously they concentrated on political and financial risk criteria (Chief Risk Officers Forum, 2013). The insurance industry is also increasingly recognizing emerging ESG issues such as human rights in the context of reputational, legal and transactional risks (Chief Risk Officers Forum, 2014). The understanding and integration of ESG issues in investment management has traditionally been a weaker point for insurers, compared to the underwriting side of the insurance business. However, the role of insurers as institutional investors will likely gain more prominence in driving sustainable development (UNEP FI Insurance Working Group, 2009). The insurer, Aviva has produced a white paper outlining a roadmap for sustainable capital markets, and how the UN Sustainable Development Goals can harness the global capital markets (Aviva, 2014).

The convergence of sustainable development issues is posing a shared risk to the insurance industry, business, government and society. This provides a strong incentive for collaboration, and presents a new generation of opportunities for innovative solutions. With sustainable development issues increasingly on the agenda of insurers and society at large, it is becoming evident that formal insurance regulatory frameworks would need to respond in a proactive, holistic and systemic way. However, this presents a real challenge as the burden of regulation has consistently been singled out in recent years as the greatest risk facing the global insurance industry (Center for the Study of Financial Innovation, 2013).

## CHINA'S INSURANCE INDUSTRY AND SUSTAINABLE DEVELOPMENT

China is one of the world's largest and fastest-growing insurance markets. Agricultural insurance premiums in China were USD 5 billion in 2013, up 27 per cent from the previous year, making China the world's second largest agricultural insurance market after the United States. However, the majority of China's population lacks access to insurance. Insurance density and insurance penetration in China remain low at USD 201 in premiums per capita and 3 per cent (premiums as a percentage of GDP), respectively, in 2013 (excluding figures for Hong Kong, Special Administrative Region, China; and Taiwan, Province of China) (Swiss Re, 2014c) and there is a lack of trust in insurers (McKinsey & Company, 2012).

Insurers such as China Life view China's massive populations of rural residents and urban migrant workers as a huge market for microinsurance. From the launch of its life microinsurance pilot scheme in 2008 to September 2013, China Life has expanded its coverage to more than 122 million low-income people, providing accident, term life and medical insurance. During the same period, the proportion of the country's rural population that benefited from microinsurance coverage rose from 0.35 per cent to 4.1 per cent (China Life Insurance Co. Ltd., 2013).

Three key factors characterize the sustainable development challenge for insurance in China:

- **Major environmental challenges:** China is the world's largest emitter of greenhouse gases, relying heavily on coal and oil, which account for nearly 90 per cent of energy production. In 2011 China accounted for 60 per cent of the world's cement use, 49 per cent of iron and steel and 20 per cent of energy. It is estimated that 90 per cent of China's urban water bodies are polluted, and outdoor air pollution is estimated to contribute to 1.2 million premature deaths per year. It is also estimated that 10 million hectares of farmland are contaminated and the amount of waste sent to landfills is rising. High levels of public concern on the environment have led to a 29 per cent increase in local environmental protests. Without action, large levels of carbon dioxide emissions will result in dangerous climate change, to which China is vulnerable (UNEP, 2013). China has suffered five of the top ten deadliest natural disasters in history, three of the top five deadliest earthquakes, the top five deadliest floods and more typhoons than any other country (an average of approximately 11 per year). In recent history, catastrophes have affected over 70 per cent of China's land area and over half the population (Aon Benfield, 2013). In 2013 Typhoon Fitow became the strongest typhoon to reach China since 1949. It resulted in major flooding, which led to most of the estimated total losses of USD 10 billion. The insured losses of USD 1.1 billion made it the second-largest claims event ever in China (Swiss Re, 2014b).
- **Major environmental opportunities:** At the same time, China has become the world leader in renewable energy investment. China has the world's largest installed capacity of wind farms. It is the world's largest leading manufacturer of solar photovoltaic modules, and produces more hydroelectricity than any other country. In 2012, renewable energy investment in China stood at USD 67.7 billion, the highest in the world, and double the level of investments in 2009. During the 11th Five-Year Plan (2006–10), significant investments were made in industrial energy efficiency, resulting in a 19.1 per cent fall in energy use per unit of GDP. The cement sector, in particular, was successful at increasing its efficiency during that five-year period—the amount of energy required to produce a tonne of cement fell by 41 per cent. China aims to reduce the carbon intensity per unit of GDP by 40 to 45 per cent by 2020 compared to 2005 levels, and plans to produce 15 per cent of its energy from non-fossil fuel sources by 2020. Regulations are also playing a role in China's transition to a more sustainable economy, including regulations that led to the phasing-out of inefficient plants, and increasingly stricter regulations on water pollution, air quality and waste management are driving investment (UNEP, 2013).

- **A rapidly aging population.** China has had a declining number of births since the 1990s and has a rapidly aging population. In 2013 there were 23 million persons aged 80 years living in China, by 2050 this will have reached over 90 million (UNEP, 2013). Western European countries spend about USD 4,833 per capita on health, while Japan, the most aged country in the world, spends about USD 3,120 per capita on health. In the case of China, which still has a relatively young population structure, it spent only USD 374 per person in healthcare services in 2010. Rapid aging will increase both per capita and total spending in health.

## 6.1 KEY INSURANCE DEVELOPMENTS

Green insurance in China is currently defined as, and by, one insurance product—environmental pollution liability insurance. In 2013 the Ministry of Environmental Protection (MEP) and the China Insurance Regulatory Commission issued Guidelines on Pilot Projects of Compulsory Environmental Pollution Liability Insurance, and the Environment Protection Law, revised in 2014, “encourages” the purchase of environmental pollution liability insurance by companies.<sup>2</sup>

### Box 7: Guidelines on Pilot Projects of Compulsory Environmental Pollution Liability Insurance

The Guidelines on Pilot Projects of Compulsory Environmental Pollution Liability Insurance help local governments develop and test schemes for compulsory environmental pollution liability insurance in high-environmental-risk industries such as metals and petrochemicals. This is a significant development towards better environmental risk management practices. MEP (2013) sees insurance as “a social and market-oriented approach to reduce environmental pollution damage, and can help to push enterprises to enforce environmental risk management and lower the number of pollution accidents; it is also helpful to respond to pollution incidents promptly, as well as timely compensate and effectively protect the pollution victims.”

There appear to be differing views on the effectiveness of the insurance scheme, spanning a range of issues, such as the clarity, certainty and enforcement of environmental laws; the level of fines and penalties; the quality of environmental risk management practices; the limits and scope of insurance coverage; underwriting, loss evaluation and claims management standards; the high risk of adverse selection; and the lack of diversification given the focus on the most polluting industries only (The Geneva Association, 2011).

Other recent and ongoing regulatory reforms and developments in China include:

- The China Risk-Oriented Solvency System
- The construction of a national natural disaster risk-transfer program and improvement of loss models and underlying data
- The Scheme for the Overall Promotion of Life Microinsurance
- Microinsurance regulation in Taiwan, Province of China
- The TCF Charter of the Hong Kong Monetary Authority
- The establishment of the Independent Insurance Authority by the Government of Hong Kong, Special Administrative Region, China.

Given the major ESG risks and opportunities for China, ongoing development of insurance regulations and policies offer opportunities to enable the routine and systemic integration of ESG risks and opportunities to advance sustainable development. Developing such a regime could include having a clear recognition of the role of insurance for both economic resilience and sustainability through its risk carrying, risk management and institutional investment roles. China also has the opportunity to learn from international insurance regulatory practices linked to sustainable development; adopting global sustainability principles; and creating an enabling environment for insurers, regulators, policy-makers and other insurance industry stakeholders to communicate, innovate and collaborate for sustainable development.

<sup>2</sup> See Chapter 4 in Section 2 of this book, Lessons from the Development of Green Finance China by Tian Huy.

## 7.1 IMPROVING THE INSURABILITY OF ENVIRONMENTAL POLLUTION LIABILITY RISKS

Improving the insurability of environmental pollution liability risks in China is a key priority. First, there must be legal clarity and certainty with respect to the Environmental Protection Law and its provisions relevant to environmental liability, including responsibilities and accountabilities of different entities. The greatest problem for liability insurers is the foreseeability of the loss. Insurers can only set appropriate premiums and the technical reserves required by insurance regulators for uncertain occurrences if they are foreseeable. Unforeseeable claims (relating to legal changes with retroactive effects or technological developments) provide a major challenge to insurers. Thus, legal clarity and certainty is a prerequisite for insurability—broadly defined as the willingness of insurers to provide cover. Second, there must be strict implementation and enforcement of the Environmental Protection Law, including effective penalties and fines. Third, good environmental risk management practices must be widely promoted and implemented in both the public and private sectors. Environmental risk management checks by insurers should be taken as procedures that supplement good environmental risk management practices by insured companies themselves, in compliance with applicable environmental laws.

Improving the legal system with respect to environmental liability; promulgating regulations on compulsory environmental pollution liability insurance and upgrading such cover from pilot projects to a nationwide, long-term system are all steps that can improve insurability. Aside from strengthening the coordination between environmental protection authorities and the insurance industry (such as on data collection and sharing, environmental risk management), insurers themselves must develop the technical competence to underwrite environmental liability insurance, a highly complex and specialized line of insurance. It is important to understand that the complexity of environmental liability risks is evolving along with new technological risks in industries such as oil and gas.

Equally, insurers must develop the technical competence to manage environmental liability claims. Liability claims are highly exposed to economic, social and legal dynamics. This is mainly because liability claims can take years to finalize—even decades. During this period, the variables determining final claims payments (such as inflation and the size of legal awards) may change, and because liability risks can accumulate, a single loss event may result in many claims being filed under different policies, and across policy types, by many injured parties. This is particularly the case for environmental liability claims (Swiss Re, 2014c). Proper claims management is also essential to restore the environmental damage in an effective way. To further mitigate policy-related risks, it would be prudent for China to learn from the difficult experience in more mature yet still evolving environmental liability insurance markets, particularly in the United States and the EU. It would also be insightful for China to better understand the circumstances that led to the insurance industry's decades-long financial pain from paying asbestos liability claims, which continues to plague insurers to this day.

## 7.2 REASSESSING THE CURRENT ENVIRONMENTAL POLLUTION LIABILITY INSURANCE SCHEME

Environmental pollution liability insurance is an important type of green insurance. However, the scale and effectiveness of the environmental pollution liability insurance scheme in China could be improved. There appear to be differing views on the effectiveness of the insurance scheme, and questions remain about whether a mandatory or voluntary approach will prevail.

In light of this, it is suggested that the environmental pollution liability insurance scheme in China be reassessed. A comprehensive consultation process could be carried out involving leading Chinese insurers

and reinsurers, leading international insurers and reinsurers operating in China, the China Insurance Regulatory Commission, the Insurance Association of China, relevant government entities (such as the Ministry of Finance, Ministry of Environment and Development Research Centre of the State Council) and other key insurance industry stakeholders (such as relevant UN agencies, business and industry associations, and civil society organizations).

### 7.3 EXPANDING THE DEFINITION AND SCOPE OF GREEN INSURANCE

Green insurance in China is currently defined as, and by, one insurance product—environmental pollution liability insurance. Limiting the definition and scope of green insurance to this product alone is a narrow, unintegrated approach to environmental risk management. This limits the huge potential for policy-makers and insurers to better understand, reduce and build resilience to a wide range of environmental risks, and to seize insurance-industry-related opportunities that accelerate the transition to a green economy.

The Development Research Center of the State Council itself has recognized this narrow definition:

The narrow understanding of green finance might limit the development of the policy support system and the market practice. This is remarkably demonstrated in the insurance field. In foreign countries, green insurance usually refer to the various insurance plans related to environmental risk management and in essence, the insurance is used as an instrument of sustainable development to deal with some issues related to environment, including the climate change, pollution and environmental destruction. By comparison, China's definition of green insurance at the current period is much narrower and it usually refers to one specific type of insurance, i.e. environmental pollution liability insurance, and has not included climate change, the long-term environmental risk, into the scope of environmental pollution liability insurance.<sup>3</sup>

This narrow definition of green insurance is further highlighted when compared to the application of green credit guidelines in China, which include areas such as agriculture, forestry, energy and water conservation, environmental protection and ecological restoration, disaster prevention and control, recycling, water treatment, pollution prevention and control, renewable energy, rural and urban water, green buildings, and green traffic and transportation. In essence, if green credit guidelines extend to these sectors, should green insurance guidelines also have similar scope?

Insurers' roles as risk managers and investors can be applied more widely and strategically with an expanded definition and scope of green insurance. For example, reducing environmental risks through risk research, models, analytics, tools and metrics across insurance lines (including property, marine and aviation), and advocating for greater investment in disaster risk reduction measures and disaster risk-sensitive investments.

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<sup>3</sup> See Chapter 4 in Section 2 of this book, Problems and Difficulties in the Development of China's Green Finance by Wang Gang.



## Box 8: A Green Insurance Framework

The following is a proposed definition of green insurance: *Premised on good environmental risk management, green insurance is financial protection that spans environmental risks and liabilities, and promotes environmental sustainability.*

Insurance (i.e., financial risk protection) is not a substitute for good risk management (i.e., risk identification, assessment, prevention and reduction). Accordingly, good environmental risk management is the bedrock of green insurance. Without good environmental risk management, it will be difficult to make green insurance viable, affordable, effective, scalable and sustainable.

Recognizing the full spectrum of environmental risks and opportunities, three categories of green insurance are proposed, each with a distinct purpose:

- **Environmental liability protection:** Green insurance that provides financial protection from liabilities due to environmental damage. The specific insurance for this category is environmental impairment liability insurance. The cause of environmental damage could be pollution or non-pollution events.
- **Environmental risk resilience:** Green insurance that provides financial protection and builds resilience to environmental risks, including climate change risks and natural hazards. Examples include insurance for homes, vehicles and businesses against losses due to cyclones, floods, droughts, earthquakes and volcanic eruptions.
- **Environmental sustainability:** Green insurance that provides financial protection and promotes environmental sustainability through low emissions (i.e., emissions pertaining to greenhouse gases and air pollutants) and natural resource-efficient solutions. Examples include insurance for renewable energy technologies, energy and water-efficient buildings, energy savings, geothermal exploration risks, carbon capture and storage technology, electric vehicles, and pay-as-you-drive insurance and green rebuilding insurance.

## 7.4 PARTICIPATING IN SUSTAINABLE INSURANCE INITIATIVES

It is important to note that China's insurance industry is facing other sustainable development issues, such as a rapidly aging population and the lack of access to insurance, particularly with respect to low-income people. While these issues may not necessarily fall under the "green insurance" definition, they are part of the "sustainable insurance" definition internationally. In this context, it would be prudent for China to be aware of and learn from international good practices in managing ESG issues:

- **Environmental issues:** For example, climate change mitigation and adaptation, increasing vulnerability to natural disasters, natural resource degradation, water scarcity, environmental pollution.
- **Social issues:** For example, lack of access to insurance, widening social inequality, human rights, labour standards, aging populations, emerging health risks.
- **Governance issues:** For example, trust and reputation issues, lack of accountability and transparency, unfair treatment of customers.

ESG issues are the focus and scope of the UN's PSI, which serve as the global framework for insurance and sustainable development. PSI (UNEP FI, 2012) defines sustainable insurance as "a strategic approach where all activities in the insurance value chain, including interactions with stakeholders, are done in a responsible and forward-looking way by identifying, assessing, managing and monitoring risks and opportunities associated with environmental, social and governance issues. Sustainable insurance aims to reduce risk, develop innovative solutions, improve business performance, and contribute to environmental, social and economic sustainability."

By promoting the adoption of PSI in the Chinese insurance industry, China will be embracing a forward-looking policy that could set the foundation for China's next progression—from green insurance focusing on environmental issues to sustainable insurance focusing on ESG issues.

It would be strategic for Chinese insurance organizations (e.g., Chinese insurers and reinsurers, the China Insurance Regulatory Commission, the Insurance Association of China) to adopt the principles now. This will enable them to better understand and learn from good practices in managing ESG issues. Furthermore, as the largest collaborative initiative between the UN and the insurance industry, PSI provides a global network for the Chinese insurance organizations to communicate and work together with their peers in the insurance industry on sustainable development issues.

## **7.5 PROMOTING SUSTAINABLE DEVELOPMENT IN GLOBAL INSURANCE REGULATORY FRAMEWORKS**

With one of the largest and fastest-growing insurance markets, China is a key member of the global insurance industry. This presents an opportunity for China to take a leadership role in championing green insurance in both national and international public policy.

At the global level, the Insurance Core Principles (ICPs) of IAIS provide the accepted regulatory framework for the insurance industry. However, the ICPs are not clear and explicit about the ESG dimensions of sustainable development.

With its strong green insurance policy agenda and the proposal for Chinese insurance organizations to adopt the PSI, China would be well positioned to play a leading and catalyzing role in integrating the ESG dimensions of sustainable development into global insurance regulatory frameworks such as the ICPs. This could also extend to ongoing discussions on global capital standards, systemic risks, macroprudential policy and surveillance, and financial stability.

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# GREENING CHINA'S FINANCIAL SYSTEM

## CHAPTER 10:

# GREENING CHINA'S BOND MARKET

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# EXECUTIVE SUMMARY

This chapter provides an overview of the green bonds theme, innovative structures in the international market and potential application in China. A key message is that green finance, in addition to providing a green benefit, can assist in implementing and enforcing financial reforms that address imbalances in China's financial system. Another message is that providing support to kick-start a green bond market can allow China to assume a global leadership role in capital markets that are financing green growth.

## Why Green Bonds?

The size of the investments required for the low-carbon economy requires action from the bond market and institutional investors. The USD 100 trillion—and growing—global debt capital markets are the dominant global source of capital and the core-refinancing component of the capital pipeline.

The proceeds of green bonds are earmarked for green projects. They can be issued by corporate entities, national or local governments and development banks, and bought by institutional investors or retail investors. They are a means of easily identifying and marketing green investments.

The Climate Bonds Initiative (2014) identifies some USD 503 billion in bonds outstanding relating to climate change solutions in 2014. Some USD 50 billion have been marketed as green or climate bonds, with half those issued to date from development banks (Climate Bonds Initiative, 2014).

## Why Green Bonds for China?

**China's low-carbon/green economy transition needs huge amounts of funding.** China's financial markets can and should play a key role in this transition. As financial markets mature, bonds will become an increasingly important financing instrument in China.

**Financial changes are also needed to meet non-environmental policy objectives.** In addition to increasing environmental investments, large investments are needed to: maintain satisfactory economic growth; improve the efficiency of public investments by crowding in more private investment; introduce greater transparency into financial markets; provide more financing options for non-state entities and improve economic stability; and tap into the country's huge pools of domestic savings. There are several issues and trends that China should consider that will affect what financial regulatory changes are suitable to meet these policy objectives, such as urbanization, reducing the financial sector's reliance on bank lending and the need to reduce high levels of potential unstable short-term debt, as well as to shift to more long-term finance.

**As a part for its financial reforms, China is committed to greening its financial system.** For example, the Green Credit Guidelines require banks to integrate environmental assessments in their lending processes and a Green Credit Statistics System integrates environmental ratings into national credit ratings for companies. However, it has proven challenging to implement these green credit initiatives in practice, due to a lack of common, operable definitions of green, disclosure and enforcement mechanisms.

**China is also committed to reforming its bond market and introducing green bonds.** China's leaders have explicitly recognized that green bonds can help address some of the financial system issues by boosting bank lending, providing longer-term capital and becoming more efficient with public capital. Importantly, green bond development can dovetail with the deep reforms and increased transparency required for rapid bond market growth, rather than rely on existing structures. China's experiences with developing and implementing the Green Credit Guidelines can provide useful lessons for growing a green bonds market in China.



## Emerging International Practice on Green Bonds

### Policy Frameworks

Governments can leverage the bond markets to meet their public low-carbon and green development targets by pulling two specific levers:

1. Putting in place policy and *regulatory frameworks* that reduce underlying project risks. This includes a broad range of policies from green credit directives to long-term price signals (e.g., feed-in-tariffs).
2. Employing *public finance instruments and tools* to provide the scale, liquidity and risk/return profile necessary for investors. These instruments and tools include government and development bank demonstration issuance, policy support for green revenue bonds, dual recourse bonds, as well as support in establishing green definitions. It also includes the use of tax incentives and de-risking instruments like guarantees and first-loss provisions. Lastly, there is potential for government to set green mandates for public funds (e.g., sovereign wealth funds).

Policy support examples highlighted include:

- *Public demonstration issuance.* Particularly in the form of green municipal bonds, but also national development bank bonds, this can kick-start the market by increasing supply and providing a model for replication by other issuers.
- *Dual recourse structure for green municipal bond issuance with investors having recourse to underlying assets, as well as government balance sheets.* Such structures will improve transparency for investors without increasing their risk. A dual recourse structure therefore provides a useful bridge from fully entity-backed green bond issuance and green asset-backed securities.
- *Green warehousing and credit enhancement.* The small scale of many green projects requires aggregation to reach the scale required by bond markets. Warehouse entities that aggregate green loans from a range of banks are a useful tool to enable scale, particularly in the initial stages of a Chinese green bond market. Moreover, as China increasingly moves away from implicit government guarantees for all bonds, explicit credit enhancement might be needed for the bonds issued by such a warehousing entity initially to get a deal flow of green bonds that fit investor preferences in terms of risk-return.
- *Tax credits for interest earned on green bonds from state-owned enterprises (SOEs) and corporations.* Allowing tax-free interest, as per municipal bonds in the United States and government bonds in China, would drive taxable investors to support green bond issuance from SOEs and corporates.
- *Providing a price differential for green loans* compared to “brown” loans. This can be done by supporting differential (e.g., 25 basis points) interest rates for green bonds through investor mandates and through development bank issuance, or by having different bank capital ratio requirements for green debt products. Green lending developments are important for green bonds as they facilitate a larger pool of loans suitable to be refinanced with green bond issuance through green securitization.

### Current Trends in the Green Bonds Market Globally

**Market expansion is expected to continue:** The labelled green bonds market is growing rapidly, from USD 11 billion in issuance in 2013 to almost USD 40 billion in 2014. A total USD 100 billion of issuance is expected in 2015.

**New green bond issuers:** There has been a shift in the market from development banks dominating issuance, to *corporate earmarked green bond issuance* accounting for the majority of issuance. *City and municipal bonds* have also entered the green bond market in the last year. This is an important area for future growth,

as cities and subsovereign entities raise financing to meet green infrastructure requirements. Development banks are also increasingly issuing green bonds to kick-start domestic markets—the International Financial Corporation of the World Bank (IFC) has recently explicitly done so in Peru, and KfW, the German development bank, has provided demonstration issuance at a national level. China’s development bank could do the same to kick-start a domestic green bond market.

**New types of green bonds:** The majority of green bonds issued to date have been asset-linked, not asset-backed, meaning the bonds give investors recourse to the issuing entity, but proceeds are *linked* to green assets. However, asset-backed green bonds backed directly by the performance of green assets are emerging as the market matures. Asset-backed securitization in particular will be important to aggregate fragmented renewable-energy and energy-efficiency markets to the scale bond markets require.

**Standards around reporting rules and definitions of green investments are developing:** The Climate Bond Standards Scheme is developing standardized, science-referenced definitions of what constitutes green investments. This will be important to the next stage of growth as the market expands beyond large and trusted banks and organizations to smaller institutions and regional issuance. The Green Bond Principles, a set of voluntary guidelines around the design and reporting characteristics of green bonds, were launched in January 2014. There is a broad array of policy areas under China’s 12th Five-Year Plan (FYP) where the labelling of green bonds could act as a performance metric of allocated capital and environmental benefit.

## **An Action Plan for China**

### **Providing the Foundation for a Green Bonds Market: Green Standards, Verification and Enforcement**

Most fundamentally, developing a robust green bond market requires clear definitions for investments linked to bonds that will qualify as green, along with a government-*endorsed* system of providing assurance for both investors and regulators about the green claims of corporate, bank and local government bond issuers. China already has relevant experience to develop such clear definitions.

Green standards for the bond market can build on the definitions developed under the Green Credit Guidelines. A Green Bonds Market Development Committee, which would include regulatory representatives, would review and adjust the existing definitions for Green Credit to be suitable to the bond market. The bond-market-relevant definitions should be consistent with the FYP.

A self-funding and self-policing verification and enforcement system is needed to ensure that green bond issuers’ comply with the common standards and criteria set at a central level by the Market Development Committee.<sup>1</sup> This could take the form of an independent non-governmental, non-profit entity established specifically to verify the green performance of bond issuances at the asset level against these standards.

### **Actions for China’s Policy-Makers to Grow a Green Bonds Market**

In addition to supporting the development of definitions, standards, certification, verification and enforcement systems, kick-starting any new bond market requires government support on both the supply and demand sides. It is worth stressing that several of the proposed policies rely on standards, certification and verification systems being developed first, to ensure that the policy support is going to investments that are aligned with robust environmental progress. Actions for the following policies are proposed:

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<sup>1</sup> An international model exists in the Climate Bonds Certification Scheme.

- **Public demonstration issuance:** *Allowing selected SOEs and local governments to issue green bonds to initially develop the market.* “Demonstration programs” of green bond issuance can illustrate the concept and create trading volume and liquidity at a superior investment grade. Government can set targets and quotas for green bond issuance by development banks, selected SOEs and local governments.
- **A program of government support for other entities’ green bond issuance:** Priorities include providing preferential loan terms for green and tax incentives for green bonds. Making green assets eligible for dual recourse bonds issuance is another opportunity, particularly for green municipal bonds.
- **Warehousing and credit enhancement:** A key recommendation is aggregating green assets—for example, regional bank loans—in a separate entity and bundling them together in asset-backed securities to get to the scale necessary for the capital market. Credit enhancement of the asset-backed securities might be necessary to achieve the risk-return required by investors.
- **Helping build a domestic investor base** by instituting a system of green bond certification against clear and transparent criteria for green investments.
- **Opening a Foreign Direct Investment (FDI) window specifically for green bonds** as part of China’s gradual enlargement of the Qualified Foreign Institutional Investor program.

**Other green finance measures can also support a green bond market.** First, the growing *carbon markets* in China are an example of a strong price signal, although they still need a stronger track record and greater stability. The monitoring, reporting and verification mechanisms developed for the carbon markets can also provide valuable input for the verification and enforcement of green commitments for green bonds. Secondly, *green banks* facilitate supply by supporting standardization, credit enhancement and issuance. Green banks can also provide a warehousing role.

# INTRODUCTION

This paper provides an overview of the green bonds theme, innovative structures in the international market and potential applications for green bonds in China. The introduction will set out why green bonds are suitable for China. Section 2 will set out emerging international practices China can learn from. Section 3 sets out the current trends in the green bond market globally and how they apply to China. Finally, section 4 provides an action plan for China.

## 1.1 WHY GREEN BONDS?

The size of the investments required for the low-carbon economy requires action from the bond market and institutional investors. The USD 100 trillion—and growing—debt capital markets are the dominant global source of capital, and the core refinancing component of the capital pipeline. Institutional investors provide a large amount of capital for the bond market, with bonds accounting for a dominant and growing share of institutional investors' portfolios (50–60 per cent of their assets).

As well as having the capital, institutional investors have long-term liabilities that provide a good fit with green infrastructure investments. Demand from institutional investors for fixed income instruments is set to rise, to the detriment of capital appreciation securities such as equities or high volatility securities, for example, private equity and venture capital. There are two main reasons:

- First, the aging membership of rich country pension regimes requires a shift to more predictable investments for shorter-term payouts.
- Second, simply because bonds have inbuilt maturities, they will need to be replaced continuously, which is not needed with an equity portfolio held long term. In other words, there is a steady stream of reinvestment to be tapped with green or climate assets structured as debt instruments if the project base and demand for financing are forthcoming.

The increased maturity of low-carbon technologies, business models and companies means the risk is falling and becoming more appropriate to the risk-return profiles of institutional investors. Lastly, institutional investors are increasingly incorporating sustainability into their investment decisions.

In response, over the past 10 years, a range of programs have been developed around the world to use bonds to channel capital into investments that are important for addressing environmental challenges such as climate change. The Climate Bonds Initiative (2014) identifies some USD 503 billion of outstanding bonds relating to climate change solutions in 2014. Some USD 50 billion has been marketed as green or climate bonds, with around half of issuance from development banks (Climate Bonds Initiative, 2014). Put simply, the proceeds of these green bonds are earmarked for green projects. To date, green projects financed by green bonds include renewable energy development, energy-efficient buildings, environmental investments that improve water supply and low-carbon transport. A key point is that the green credentials of the bond are based on the *projects* or *assets* linked to the bond issuance, not the green credentials of the entity issuing the green bond. This allows a wide range of issuers to be eligible for green bond issuance. Issuers can be national or local governments, multi-national development banks, commercial banks or corporations.

In practice, green bonds are structured no differently from normal bonds in the wider market—the issuing entity guarantees to repay the bond over a certain period of time, plus either a fixed or variable rate of return. The difference is that proceeds are transparently channelled for green purposes. How this is done is elaborated in Table 1, as it would correspond to standard asset classes in the fixed income market.

TABLE 1: TYPES OF GREEN BONDS

Asset Class	Issuer	Description
Sovereign bonds	National government	A country could issue a green bond with the proceeds earmarked for a specific green program, or even for their contribution to an international initiative like the UN Green Climate Fund.
Subsovereign bonds	Local government / municipality	Muni bonds can follow several forms, such as general obligation (similar to sovereign) or revenue bonds where cash flows are ring-fenced from a program or project to repay the bond. Both types of bonds may be linked specifically with green infrastructure or services provision.  Examples: French city sustainability bonds; Massachusetts State; Johannesburg
	Agency bonds	Government-related agencies are often focused on environmental or social purposes. In the United States, it is possible to purchase affordable housing bonds through agencies. National development finance institutions and Green Banks are also public sector issuers that could ring-fence bonds for green purposes. Finally, state-backed agencies in infrastructure such as railways and waters could also fit this category.  Examples: NRW Bank, Nordic Investment Bank, Eurofima
	Supranationals	These are essentially the same as sovereign bonds: general obligation bonds where proceeds are allocated to qualifying investments.  Examples: World Bank and International Finance Corporation green bonds; European Investment Bank Climate Bond
Financial Institution (FI) bonds	Commercial banks	A bank can issue a bond linked to a pool of qualifying loans: wind and solar energy, rail, green buildings.  Examples: Bank of America
Non-FI corporate bonds	Corporations	These are issued by companies with substantial green assets on their balance sheets  Examples: EDF, GDF Suez, Abengoa
	Special Project Vehicles (SPVs)	These are issued by a project development company or SPV on a green project  Examples: Hannon Armstrong
Covered bonds	Commercial bank	Covered bonds are typically issued by banks under specific legislation or by using contractual documentation. Investors in covered bonds have dual recourse to the financial institution behind the covered bond program (the covered bond issuer) and to the assets in the cover pool. The asset cover pool typically includes residential or commercial mortgage loans, or public-sector assets.  Examples: Munchner Hypo
Structured finance and securitization	Corporations	Utilities could issue structured covered bonds secured against renewable energy assets as a way to reduce their cost of capital.
	Warehouse facilities/ finance companies	Companies seeking to refinance a mature (low-return, low-risk) portfolio of loans or assets so they can recycle funds into new lending or developments that have higher returns.  Examples: Toyota low emission loans; SolarCity solar rooftop securitization.

## 1.2 WHY GREEN BONDS FOR CHINA?

### 1.2.1 CHINA'S LOW-CARBON/GREEN ECONOMY TRANSITION NEEDS HUGE AMOUNTS OF FUNDING.

Under its 12th Five-Year Plan (FYP) (2011–2015), China has ambitious plans to improve energy intensity, grow environmental industries and reduce environmental stress. This will require the mobilization of huge amounts of capital.

The Development for Emerging New Industries, for example, requires CNY 5 trillion (USD 817 billion) in investment up until 2020 (People's Daily Online, 2010). China has also announced that CNY 1.7 trillion (USD 275

billion)—twice the amount of the total defence budget for the same period—will be invested in improving air quality in the next five years (The Economist, 2013). China’s financial markets can and should play a key role in this transition.

### 1.2.2 FINANCIAL CHANGES ARE NEEDED TO MEET NON-ENVIRONMENTAL POLICY OBJECTIVES.

A policy report from July 2014 suggested that China is facing an “investment trilemma” (Amin, Ng, & Holmes, 2014). In addition to increasing environmental investments, large investments are needed to maintain satisfactory economic growth. The third main objective is improving the efficiency of public investments by crowding in more private investment. The government also aims to:

- a. *Introduce greater transparency into financial markets and improve economic stability.*
- b. *Provide more financing options for non-state entities.* The new major contributors to economic growth, particularly small and medium-sized enterprises (SMEs) and private companies, are increasingly unable to access financing, as lending is prioritized for state-owned enterprises (SOEs) and local government investment companies.
- c. *Tap into the country’s huge pools of domestic savings.* They are the world’s largest (20 per cent of GDP), that at present have limited opportunities for investment, which leads to a leakage of savings into unregulated investments (EDHEC Risk Institute, 2013).<sup>2</sup>

China should consider several issues and trends that will affect which financial regulatory changes are suitable for meeting the above policy objectives, including:

- Urbanization is a macro trend leading to major requirements for investments in green public infrastructure. By 2030, over a billion people in China will live in cities, the development of which will require an infrastructure spend of CNY 41.6 trillion (USD 6.8 trillion).
- China’s finance sector is heavily dependent on banks, and financial instruments are relatively limited in availability. Bank loans represent 132 per cent of GDP, higher than the advanced economy average of 123 per cent; however, the bond market is relatively underdeveloped compared to those of advanced economies at RMB 22 trillion (USD 3.6 trillion), 47 per cent of GDP in 2012 compared to global average of 138 per cent of GDP (Dobbs, Leung, & Lund, 2013).
- Longer-term finance is in short supply. Moreover, Chinese listed firms have the largest short-term debt ratio in the world with 78 per cent of debt in tenors of one year or under, compared to 28 per cent for U.S. firms (Sorge, Zhang, & Koufopoulos, 2013). The reliance on short-term debt is a risk factor for stable economic development.
- Foreign investor demand for Chinese debt investment is high, but their ability to invest is restricted by China’s quota system. However, the government is responding to this. In the last two years, the China Securities and Regulatory Commission has increased the quota five-fold from USD 30 billion to USD 150 billion in order “to attract more long-term foreign investment institutions to China’s market and promote the development of the capital market” (Ye & Lim, 2013).

### 1.2.3 CHINA IS COMMITTED TO GREENING ITS FINANCIAL SYSTEM.

In 2012 the China Banking and Regulatory Commission (CBRC) introduced its Green Credit Guidelines, requiring banks to ensure environmental assessments are in place for projects using bank loans and requiring banks to develop green credit products that support the country’s environmental protection goals. This development was a response to the lack of compliance with a Green Credit Policy launched in 2007. This seems to have had a positive effect, with public disclosure on the guidelines by financial institutions and a sanction system under the CBRC (Matisoff & Chan, 2008; Xu, 2013). State-owned banks, for example, are

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<sup>2</sup> For more detail see Kidney and Oliver (2014).

actively responding by creating lists of firms identified as environmentally unfriendly and penalizing them in case of loan applications.

Additionally, in March 2014, CRBC launched the Green Credit Statistics System. This system integrates environmental ratings into national credit ratings for companies in 12 industries with heavy pollution or overcapacity based on their efforts to protect the environment (Bloomberg News, 2014; Amin, Ng, & Holmes, 2014). This will have a direct impact on their bond issuance. There are plans to issue qualitative and quantitative performance indicators to facilitate banks to assess their green credit performance.

However, although the guidelines and statistics system have been somewhat successful, the lack of common, operable definitions for what is “green,” combined with lack of common disclosure guidelines for the banks and a limited legal framework for green finance, have limited the enforceability of the initiatives. These are useful lessons for developing a green bond market in China.

#### **1.2.4 CHINA IS ALSO COMMITTED TO REFORMING ITS BOND MARKET AND INTRODUCING GREEN BONDS.**

In the 12th FYP, the Chinese government signalled its intention to reform and broaden the domestic bond market as part of a series of measures to improve the financial system (China Securities Regulatory Commission, 2012). This objective has been reinforced in more recent government announcements. In May 2014, the State Council issued guidelines on financial market reforms that would help deliver a “multilevel capital markets system” by 2020. These overarching guidelines complement more recent detailed notices on pilot issuance of municipal bonds and corporate SOE bonds by the NDRC (State Council, 2014).

The bond market has started to change already, with Chinese bond markets beginning to attract significant amounts of capital. The corporate bond market has grown 45 per cent year-on-year since 2007, albeit from a low base, and bonds from financial institutions have grown 23 per cent (Dobbs, Leung, & Lund, 2013). The offshore RMB bond market located in Hong Kong, where domestic and international issuers may issue RMB-denominated bonds for the international market, has grown from RMB 69 billion in 2010 to RMB 405 billion by the end of January 2013 (HSBC, 2013).

In August 2013 the State Council reiterated the call for reform with a focus on the corporate bond market, in particular as part of meeting the objectives of the 12th FYP (State Council, 2013b). A key departure is that this call not only occurred in an announcement targeted at the financial sector (State Council, 2013a), but also in a strategy on accelerating the development of green industries to twice that of GDP growth targets (State Council, 2013b).

China’s leaders are also explicitly recognizing the opportunity of green bonds. In July 2014 the Chief Economist of the People’s Bank of China reiterated the importance of green bonds for China and added, “to distinguish green bonds from other bonds [...] they should have lower financing costs and greater support from the government, such as tax exemptions” (Ma, 2014). The options for governments to provide such policy support for green bonds are set out in Section 2.

Importantly, there is an opportunity for green bonds to dovetail with the deep reforms and increased transparency required for rapid bond market growth rather than rely on existing structures. For example, the State Council has announced guidelines to improve disclosure for bond issuers to reduce reliance on external credit ratings and improve the ability of investors to identify risks. This policy development provides an opportunity to disclose information on the green credentials of bonds and issuers. Disclosure guidelines for green bonds should specify the green or low-carbon assets and the activities for which the funds raised will be allocated.

### 1.2.5 GREEN BONDS CAN ADDRESS SOME OF THE FINANCIAL SYSTEM ISSUES: BOOSTING BANK LENDING, PROVIDING LONGER-TERM CAPITAL AND BECOMING MORE EFFICIENT WITH PUBLIC CAPITAL.<sup>3</sup>

A prominent issue for China's financial system is the high reliance on bank lending and the high level of short-term, rather than long-term, debt. Shifting from bank debt to bonds provides the opportunity for greater transparency and liquidity and frees space on banks' balance sheets, allowing them to recycle their capital to new projects. International green bond buyers have characteristically been longer-term holders of debt with an appetite for longer dated bonds; shifting to green bonds provides an opportunity to shift from shorter-term to longer-term funding.

Applied to state banks, bonds generally, and green bonds specifically, would contribute to China's aim of becoming more efficient with public capital, as publicly supported loans would have an exit strategy, as the publicly originated loans can be sold to private investors as bonds.

The potential for longer tenor offered by green bonds can also help local government financing platforms deal with the problem of short-term debt: average bank loan duration is around three years, yet it may require more than 10 years to service debt. This sort of mismatch suggests significant volatility risk in China's financial markets. As bonds provide an instrument for banks to refinance the loans into longer-dated green bonds, this will help mitigate the volatility risk arising from short-term debt. In July 2014 the Chief Economist of the People's Bank of China stated his agreement with this beneficial function of green bonds for China's financial system.

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<sup>3</sup> For more detail see Kidney and Oliver (2014)



# 2

## EMERGING INTERNATIONAL PRACTICE ON GREEN BONDS

### 2.1 POLICY FRAMEWORKS

Governments have, for a long time, used a variety of policy tools to enable economic transformation to provide growth and stability. Many of these tools can also allow governments to leverage the bond markets to meet their public low-carbon and green-development targets. The policy tools pull two specific levers:

1. The first lever involves putting in place *policy and regulatory frameworks* that reduce underlying project risks in the real economy. Green bonds go hand-in-hand with other regulations and green credit instruments in channelling finance rather than replacing such initiatives.
2. The second lever involves employing *public finance instruments and tools* that support private issuance in the scale, liquidity and risk/return profile necessary to allow the market to grow, and mandates demand from public funds.

This section presents an overview of the policy tools and highlights best practice examples for China.

TABLE 2: POLICY FRAMEWORKS AND PUBLIC FINANCE INSTRUMENTS TO SUPPORT GREEN BOND MARKETS<sup>4</sup>

Policy category	Policy	Description	Example
Policy to reduce underlying risks	Green policy frameworks	Long-term price signals for projects reduce risk for investors, e.g., feed-in tariffs, carbon pricing.	Power purchase agreements underpin several green bond issuances in the U.S., e.g., Topaz solar farm bond issuance, California
Public policies targeting bond issuance	Government bonds issuance	Raising funds directly through general obligation bonds, at the sovereign or municipal level, earmarking portion of funds for green. Bonds backed by taxes.	Municipal green bond issuance, to date, includes Gothenburg and Stockholm (Sweden); Ile de France, Provence and Pays Nord (France); California (US), Massachusetts (US), New York (US), Washington DC (US); Johannesburg (South Africa), Ontario (Canada)
	Revenue bonds support	Raising funds for specific projects. Bonds backed by cash flows from those projects.	In Hawaii, the government has passed legislation to enable the issuance of USD 100 million green infrastructure revenue bonds to finance local clean-energy upgrades. The revenue bonds will be repaid by a surcharge on electricity bills for households and businesses and excluded from the state's debt limitations and general obligation guarantee.
	Support for dual recourse bonds	Raise funds for priority areas. Dual-recourse bonds that are backed by both general creditworthiness of the issuer and the cash flow from the specific projects for which funds are raised. They typically attract higher ratings than the issuers themselves.	In September 2014, Overseas Private Investment Corporation (OPIC), a U.S. government development finance institution issued a bond for a solar project in Chile where returns are coming from project revenue streams, giving investors exposure to asset performance, but also backed by OPIC to keep risk low.
	Green definitions support	Public sector support for commoditizable definitions and policing/verification mechanisms makes it easier for issuers to know what qualifies, for buyers to compare green claims from issuers and for investors to know that proceeds will be used as promised.	China has developed performance standards and regulations for resource-efficient and green infrastructure goods and services for several sectors. China has also developed green assurance and verification systems through, for example, the adoption of the CDM and in the development of local emission trading systems.
	Green banks bond issuance	Raising money through public sector banks and infrastructure funds established to provide finance to green projects.	The Connecticut Energy Finance and Investment Authority (CEFIA) has issued USD 50 million in bonds backed by a ring-fenced account in the state's Special Capital Reserve Fund
Financial instruments supporting issuance	Tax-based incentives	Tax credits or equivalent direct subsidies for bondholders can both attract capital and reduce financing costs for issuers.	In the United States, Clean Renewable Energy Bonds (CREBs) and Qualified Energy Conservation Bonds (QERBs) give tax credits to bond holders or direct subsidies for interest payments to issuers to reduce interest payment burden for issuers.
	Guarantees	Partial loan guarantees, performance guarantees, insurance products and bond wraps that are introduced for a period to develop a stronger credit history.	In August 2014, the U.K. government's Infrastructure Fund (part of the Treasury department) provided loan guarantees for a GBP 48.5 million bond issuance to finance the green biomass power project Speyside.
	First loss provisions	Public agencies take subordinated debt positions.	In 2013 EU's Project Bond Initiative, where the European Investment Bank takes first-loss positions in bond issuances, was used to finance the Greater Gabbard transmission project to connect offshore wind to the grid in the United Kingdom.
Directives supporting demand	Green mandates for public sector investment institutions	Directing pension, social security and other state funds to allocate a percentage of their fixed income budgets to green bonds.	N/A. In spring 2014, Norway's Sovereign Wealth Fund stated it might mandate a certain allocation to green investment.

<sup>4</sup> For more details, see Kidney and Oliver (2014).

To use public capital efficiently, credit support measures like guarantees should be selective, so that the government only absorbs certain risks that the market is not placed to deal with, such as policy risk. Blanket guarantees that cover all risks of green investments and skew the market significantly or pick winners should be avoided. The aim is to kick-start a green bonds market by providing the green investment opportunities that fit the risk-return profile of investors.

It is worth noting that explicit credit enhancement mechanisms and guarantees have not been actively used in the Chinese onshore bond market. Instead, there has been a general consensus of implicit government credit backing, as the government has been actively involved in backing bond issuance from government entities and big financial institutions. Defaults in China were non-existent until 2014, when a solar technology company became the first onshore issuer to fail coupon payments. As China seeks to move to a more market-based financial system, there have been calls for a move away from implicit guarantees. For example, the State Council announced in October 2014 that the central government would not provide guarantees for local debt in the future (Tu, 2014a). A reduction in implicit guarantees means explicit credit enhancement can be necessary, especially at the initial state of the market, for green bond issuance to have acceptable risk levels.

Traditionally, such explicit credit enhancements and guarantees in China have only been applied to the offshore (Dim Sum) bond market. The most frequently used enhancement tools in the offshore market have been letters of support issued by third party financial institutions and keep-well agreements signed between offshore subsidiaries and onshore parent companies (Prakash & Collins, 2013). However, general investor concerns about these mechanisms emerged, and, in response, a new regulatory framework for guarantees and credit enhancements was issued to make it easier for companies to guarantee offshore debt offerings and boost bond issuance (Allen & Overy, 2014). The set of measures became effective in June 2013 and allowed onshore debt issuers to offer bundled packages of bonds with cross-border guarantees. The new guidelines are expected to encourage new debt issuance, especially for public and private companies seeking to fund overseas projects and perform mergers and acquisitions. Still, the main drawback is that guarantees will only be offered for debt issuance for overseas projects, leaving behind developers who usually raise funds for mainland projects. Understanding the landscape of credit enhancement and guarantees in the general bond markets in China is important to develop mechanisms that specifically can support green bonds, as policy support is important to boost a nascent market (for example see Nguy et al, 2014; Moody's, 2013).

## 2.2 PUBLIC DEMONSTRATION ISSUANCE: MUNICIPAL BONDS AND DEVELOPMENT BANKS

Public demonstration issuance is key to growing a green bond market; it provides liquidity and scale to the market, as well as providing a model to other issuers by establishing issuance processes and frameworks. In the bond markets, the main entities to play this role are local governments and development banks. There is room for green bond issuance through both these channels in the Chinese market. There are several examples of public demonstration issuance from other countries. For example, KfW, the German development bank, has issued two green bonds to grow the domestic market. On the city level, Gothenburg in Sweden and Johannesburg in South Africa are examples of cities that have embarked on green bonds programs.

In China, development banks play a large role in domestic bond issuance, providing a great opportunity for green bond issuance.

For green city bonds, the rapid rate of urbanization in China increases the role of cities, both in the low-carbon transition and in terms of financial power. These trends and the Spring 2014 regulatory changes allowing 10 municipalities to issue bonds directly mean there is significant potential for green bonds at the city level in China. It has been estimated that China's municipal bond market can grow to RMB 1 trillion (USD 164 billion) in 2015 (Tu, 2014a). Green City Bonds can be used to finance a wide range of green projects, key categories for cities in China being rail transport, renewable energy, green buildings and clean water. Green

City Bonds in China can be issued on the domestic markets, or denominated in RMB in the offshore bond market, to attract a wider range of investors and display to the global investment community that China is taking a leading role in growing a green bonds market.

## 2.3 POLICY SUPPORT EXAMPLE: DUAL RECOURSE BOND STRUCTURES FOR GREEN BONDS

Government entities can issue green dual recourse bonds to bridge the gap between earmarked bonds backed by issuing entities, as set out above, and green asset-backed securities (see Section 2.3 below), where performance is based on the underlying green assets. Dual recourse bonds would primarily give investors recourse to the issuing entity, as with green general obligation bonds. However, investors would also have recourse to an underlying pool of green assets, in the event of the default of the issuing entity. Dual recourse bonds improve transparency, as they give investors insight to the performance of the underlying green assets without taking the risk of basing their returns directly on these assets' performance.

Green dual recourse bonds would be a means of improving the transparency of provincial debt in China by rolling over debt into new dual recourse vehicles. The primary function of such green dual recourse bonds is to give investors experience in analyzing the performance of green assets without exposing them to higher risks. The reduced risk and improved transparency offered by dual recourse bonds fit well with recent policy developments for municipal bonds in China. Transparency in provincial debt was improved to a certain extent by the NDRC's move in 2014 to require municipal bond issuances in China to disclose the use of proceeds (Tu, 2014b); green dual recourse bonds further improve transparency by also providing insight for investors into the financial and green performance of the underlying assets. The reduced risk of dual recourse bonds can be more attractive to investors in China's municipal bond market following the announcement from the State Council in October 2014 that China's central government will no longer provide full guarantees for local debt (Tu, 2014a).

Making green assets eligible for dual recourse bonds will provide an option for a *transition* from publicly backed loans to public-private partnerships. Metro system loans, for example, could be re-financed with dual recourse bonds, where the investor receives a provincial guarantee, as well as recourse to an asset pool.<sup>5</sup> As investors become familiar with the green assets' performance, the recourse to the entity will no longer be needed, and the market can move to green asset-backed securities. Enabling issuance of asset-backed securities would be beneficial to debt-laden municipalities, as issuance of asset-backed securities allows the municipalities to take the debt off their balance sheet.

Munchner Hypo's recent "social" Pfandbrief (covered bond) in Germany provides a clear template for issuing green dual recourse bonds.

## 2.4 POLICY SUPPORT EXAMPLE: GREEN WAREHOUSING AND CREDIT ENHANCEMENTS

Tapping bond markets for green projects requires a certain deal size in order to be taken up by the mainstream market. Smaller loans and assets, including from SMEs, need to be aggregated and packaged appropriately. This is particularly relevant for green investments, as many renewable energy and energy-efficiency investments are smaller scale. Banks could, in theory, fulfil this aggregator role. However, in practice there is typically a lack of sufficient loan volume for a given type of green investment, which prevents any individual bank in China from aggregating to the necessary level for repeat issuance of green bonds at the size the bond market demands. This means that cooperative warehousing arrangements aggregating assets across several banks may be needed. Having a cooperative, independent warehousing entity for green loans also provides the additional benefit of driving standardization of green loan agreements across banks by setting certain requirements for loans to qualify for aggregation. China's experience with the Green Credit Guidelines shows the importance of having common standards to ensure robust implementation of green finance innovations.

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<sup>5</sup> For more details see Kidney and Oliver (2014).

A warehouse entity for green assets in China can come in several forms, as illustrated by examples of successful warehousing entities from other countries, both for green and for other assets. First, existing development banks could host a green warehousing entity—the European Investment Bank (EIB) has been developing such a model, called Renewable Energy Private Investment Platform (REPIN), which could be used as a template for some of China’s main development banks. Second, provincial governments could support setting up a new entity for green warehousing. A good example is the Warehouse for Energy Efficiency Loans (WHEEL) in the United States, which aggregates residential energy-efficiency loans from selected state and local energy loan programs in a warehouse. Once the total pool of loans is large enough to meet the investment demand from institutional investors, WHEEL issues a bond to recapitalize the facility, allowing them to buy a new round of loans. WHEEL is set up as a public-private partnership, where state governments provided initial capital and developed the program in collaboration with a non-profit organization, but the arranging bank and the conduit entity are both private. Third, green banks can provide a warehouse for green loans from other commercial banks.

In addition to aggregating and standardizing green loans, such a publicly supported warehousing facility could provide selective credit enhancements to fit the risk profile of the market for the green bonds that do not have high enough credit rating to be attractive to institutional investors. As an example, junior or mezzanine debt from a development institution can enable green bond issuance from investors at a suitable investment grade to attract private capital. The proposed REPIN-vehicle of the EIB is an example of a facility that would combine aggregation, standardization and credit enhancement for green projects. Another example illustrating how credit enhancement can be used for green projects is the EIB’s Project Bonds Initiative, where the EIB takes a first-loss position in the financing structure.

## 2.5 POLICY SUPPORT EXAMPLE: TAX INCENTIVES FOR GREEN INVESTMENTS

There is scope to support investment in green bonds by allowing tax incentives for green bond investments. Tax incentive schemes have been an important part of the development of bond markets in the United States. They have been put in place there for renewable energy and energy-efficiency bonds, and examples in the U.S. market show that tax incentives for bonds can be put in place in different ways:

- 1. Tax credit bonds:** Bond investors receive tax credits instead of interest payments, so issuers do not have to pay interest on their green bond issuances. An example in the area of clean energy is the U.S. Clean Renewable Energy Bonds (CREBs) and Qualified Energy Conservation Bonds (QECBs) program (Energy Programs Consortium, 2012). The program allows for the issuance of taxable bonds by municipalities for the purposes of clean energy and energy conservation, where 70 per cent of the coupon from the municipal bond is provided by a tax credit or subsidy to the bondholder from the federal government. This structure would be suitable for green bonds in China.
- 2. Direct subsidy bonds:** Bond issuers receive cash rebates from the government to subsidize their net interest payments. This structure is also used under the CREB and QECB programs in the United States. This structure is suitable for all potential green bond issuers in China.
- 3. Tax-exempt bonds:** Bond investors do not have to pay income tax on interest from the green bonds they hold (so the issuer can get a lower interest rate). This type of tax incentive is relevant for non-government bond issuance in China, where domestic investors’ interest income is typically subject to a 25 per cent tax (Liu, 2014). This type of tax incentive is typically applied to municipal bonds in the U.S. market. In the green bond space specifically, an example to highlight is tax-exempt bond issuance for financing of wind projects in Brazil.

## 2.6 POLICY SUPPORT EXAMPLE: PRICE DIFFERENTIAL IN LOANS BASED ON ENVIRONMENTAL PERFORMANCE

Green lending developments are important for green bonds, as a significant flow of green loans is needed to create the necessary deal flow for a mainstream green bond market. The high reliance on bank loans in China's financial landscape provides a significant opportunity, as the potential for refinancing loans into bonds is very large. However, green securitization or bond issuance from the banks means that a substantial green loan flow is needed. It follows that a policy to boost green bonds would be to increase the amount of green loans originating in banks. While the Green Credit Guidelines are an initial step to do so in China, providing a price differential for green loans compared to “brown” loans is a policy option to boost green lending further.

This can be done by supporting differential (e.g., 25 basis points) interest rates for green bonds through investor mandates and through development bank issuance, to having different bank capital ratio requirements for green debt products. To ensure preferential treatment is only given when it is warranted on environmental grounds, a verification and standardization system<sup>6</sup> should be put in place. Verification and certification of green criteria could be a requirement for issuers to receive preferential lending rates. The scheme should be set up so that the lower interest rate fully covers the cost to issuers (c3–5 basis points) of this certification process, as well as leaving sufficient cost savings with issuers (c20–22 basis point), making it attractive to lend to green. The importance of a strong verification process and common standards is illustrated by the fact that ensuring compliance with the Green Credit Guidelines has been problematic—for example, compliance for this policy has lacked clearly defined standards for banks to implement the guidelines.

A preferential loan process for green could be achieved by different policies. A green preferential lending policy would fit with environmental risk disclosure developments already occurring in China. In March 2014, an environmental credit rating was implemented and companies will be ranked based on a four-colour scale, and companies marked as red (the worst rating) will face credit constraints from banks (Bloomberg News, 2014). A similar development has been seen in Brazil, where they have been integrating green criteria in the credit-awarding process since the 1990s (BNDES, 2011). However, both in Brazil and China, the green policies are not yet designed to provide systematic price differentials in lending. Disclosure around green performance should align with the general guidelines for disclosure in China's financial markets. It is, however, worth noting that regulatory changes to interest rate subsidies might be required to provide subsidies for green loans at the necessary scale. Currently, there are limits to the subsidy rate that can be provided, with the maximum set to the central bank benchmark rate, the real interest rate of the current year or 3 per cent. Further, interest subsidies can only be provided for up to 3 years. This restriction on tenor is particularly problematic considering the long-term investment horizons of many green investments.

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<sup>6</sup> For more details, see Kidney and Oliver (2014).

## CURRENT TRENDS IN THE GREEN BONDS MARKET

The key developments at the end of 2013 and in 2014 are: general market expansion, new types of issuers entering the market, new types of green bonds, and developments around reporting and definitions of what classifies as green.

### 3.1 CONTINUED MARKET EXPANSION

The green bonds market is growing rapidly, as is illustrated by issuance in 2013 (USD 11 billion) and 2014 (USD 36 billion), accounting for over 85 per cent of the total USD 50 billion outstanding in the labelled green bond market (Climate Bonds Initiative, 2014). The big growth area in green bonds issuance in the past year has come from non-pure play companies issuing bonds with proceeds earmarked for green or climate-related investments. The growth is expected to continue, with USD 100 billion in issuance expected in 2015.

### 3.2 NEW GREEN BOND ISSUERS

**There has been a shift in the market to corporate earmarked green bonds**, with these now accounting for the majority of labelled issuance. Additionally, the size of individual green bonds issued has increased: the largest corporate bond to date was issued in 2014 by GDF Suez at EUR 2.5 billion (USD 3.44 billion). Corporate green bonds have expanded also to Asia: the first Asian labelled corporate green bond was issued in July 2014. While no labelled green corporate bonds have been issued in China yet, the potential exists: USD 164 billion in bonds aligned with the low-carbon economy were identified in China as of June 2014 (Climate Bonds Initiative, 2014). This is the potential from pure-play companies only, meaning the full potential is much larger, as the majority of growth in green bonds is from non-pure play issuers who issue bonds earmarked for green or climate projects.

**City and municipal bonds have also entered the green bond market.** In 2013 and 2014, green city and muni bonds were issued, with bonds from, among others, Ile de France (Paris), Massachusetts, Gothenburg, Stockholm and Johannesburg. This is an important area for future growth, as cities and subsovereign entities (especially in emerging markets) raise financing to meet climate infrastructure requirements. Green City Bonds can be issued by various entities with various structures. To date, most green city and municipal bonds have been general obligation bonds issued by the city or municipality. However, bonds can also be issued by city entities, such as transportation bodies, or by approved corporations' public-private partnerships with the city, either as general obligation bonds or revenue bonds. Moreover, where cities do not have bond-issuing powers, as is the case for the majority of cities and municipalities in China currently, central government and development banks can issue general obligation green city bonds that funds earmarked for green projects in a given city.

As discussed in Section 1, there is a large scope for municipal green bonds in China; current urbanization trends mean cities and municipalities play an increasing economic role, and recent regulatory changes are opening up opportunities to realize this potential for the bond space, as certain municipalities will be allowed to issue bonds (The Economist, 2014). Green city bonds can also be issued by municipal utilities, public-private partnerships and private corporations that are building green assets for city governments.

**Domestic development banks are also increasingly issuing green bonds to kick-start domestic markets.** Most recently, in July 2014, the German development bank KfW issued its first green bond, a EUR 1.5 billion bond earmarked for financing renewable energy. This issuance was followed by a second green bond issuance in October 2014 for USD 1.5 billion. Scandinavian development banks have also issued green bonds for their domestic markets; and the IFC has stated that issuing green bonds for their domestic markets is a new objective for its green bond issuance, and has issued a USD 15 million Peruvian currency green bond. China's development banks could follow these developments to kick-start a domestic green bond market.

### 3.3 NEW TYPES OF GREEN BONDS

Green bonds backed directly by the performance of green assets are emerging in the United States and the United Kingdom; as the market matures, moving to more risky structures is becoming possible. Issuance of asset-backed securities is particularly useful for green assets, as it helps aggregate fragmented renewable energy and energy-efficiency markets to the scale bond markets require. There is market potential for green bonds from asset-backed securities in China in the energy-efficiency installation for business, rooftop solar and other sectors. In particular, banks with portfolios of loans to small business and householders could use securitization to recycle limited lending allocations (see Box 1).

#### **Box 1: Green securitization: SolarCity's bonds backed by solar leases and power purchase agreements**

SolarCity, the largest solar rooftop installer and financing company in the United States, provides an example of successful green securitization issuance. They issued their first asset-backed securities (ABS) in 2013, with USD 54.4 million in bonds backed by a pool of 5,000 rooftop solar leases and power purchase agreements. In 2014, they have followed with two more ABS issuances, the most recent an issuance of USD 201.5 million, backed by 16,000 rooftop solar leases and agreements.

*Source: Greentech Solar (2014).*

### 3.4 DEVELOPING STANDARD REPORTING RULES AND DEFINITIONS OF GREEN INVESTMENTS

To date, green bonds have relied on differing definitions of use of proceeds, depending on the issuer of the bonds. There is not yet a standardized approach for the issuance of a green bond. A principle of using expert and independent review of inclusion criteria to ensure credibility has therefore emerged.

The Green Bond Principles, a set of voluntary guidelines developed by four major banks (Citibank, Bank of America Merrill Lynch, JP Morgan and Credit Agricole) around the design and reporting characteristics of green bonds, were launched in January 2014. The principles promote the idea of green bonds being about the use of proceeds for green assets—rather than for green entities—and the use of independent reviewers of both environmental credentials and financial ring fencing. Some 50 organizations, the majority banks, are now signatories to the principles. However, they do not try to promote any one set of criteria to define “green projects,” instead relying on those already available in the market.

The Climate Bond Standards Scheme is developing standardized, science-referenced definitions of green investments in the global bond market. This will be particularly important to the next stage of growth as the market expands beyond large and trusted banks and organizations to smaller and regional issuance. The Climate Bonds Standard involves a wide coalition of academic and industry experts preparing open-access guidelines for which climate-related investments can be associated with green bonds.

This work feeds into the Climate Bonds Initiative's certification and verification scheme that certifies bonds and includes reporting requirements for bond issuers to verify the use of proceeds based on eligible green project areas.<sup>7</sup> The scheme is tailored to the needs of corporate and bank green bond issuance, where investors consider assurance about the use of funds as important as the assets to which they get allocated. Under the scheme, bonds are certified after a straightforward third-party verification. Costs are born by issuers. A spot audit scheme sits above the program, policing correct verifier behaviour.

<sup>7</sup> More details around what is eligible as green bonds are available from Kidney and Oliver (2014).



Certifying and labelling green bonds in China could be useful as a performance metric of allocated capital and environmental benefit (e.g., in kilowatt hours or tons of carbon dioxide equivalent) related to China's 12th FYP targets assigned to local governments and SOEs. Under the appropriate common definitions, monitoring and reporting standards, there is potential for many different bonds, such as government, financial and corporate bonds, to be recognized within the green bond thematic asset class. It is possible for policy frameworks and regulations to spur on these investments through some innovative structuring and incentives that will be discussed in the next section.



#### 4.1 PROVIDING THE FOUNDATION FOR A GREEN BONDS MARKET: GREEN STANDARDS, VERIFICATION AND ENFORCEMENT

Developing a robust green bond market requires clear definitions of which investments linked to bonds will qualify as green, along with a government-endorsed system of providing assurance for investors and regulators about the green claims of corporate, bank and local government bond issuers. China's policy-makers recognize the importance of developing standards and definitions at a level that is practical for financial market participants, especially following their experience with banks' limited adherence to the Green Credit Guidelines due to the lack of clear, operable definitions of "green." China already has relevant experience to develop clear definitions, grounded in their performance standards and regulations for resource-efficient and green infrastructure, goods and services. In some areas, China's green definitions and standards surpass the equivalents in developed markets. China has also had experience in developing green assurance and verification systems through, for example, the adoption of the CDM and in the development of local emission trading systems. These experiences can be leveraged in establishing verification and enforcement mechanisms for green bonds.

For green bonds, definitions, standards and certifications around green credentials should be developed. This can be done using the China Banking Regulatory Commission's (CBRC, 2013) definitions for green credit as a starting point. These definitions provide a solid foundation for standards suitable for a robust green bond market in China, and their use would avoid duplication, simplifying the process of green standardization for regulators, issuers, investors and other market actors. Further, ensuring consistency with the definitions and key policy areas set out under the Five-Year Plan is crucial.

A Green Bond Market Development Committee is leading the expansion of the CBRC's Green Credit definitions. The committee will consist of regulators and other market actors and will review the existing definitions included in CBRC's Notice for Green Credit Statistical Report. This review would particularly consider how the current standards would need to change to be tailored to China's bond markets, and how to ensure consistency across different types of bonds and bond markets. While its focus in developing definitions for green bonds would be the green credit definitions, it is recommended that the committee collaborate with the international and global process already in place to develop green bond definitions, organized by the Climate Bonds Initiative through their Standards and Certification Scheme.

The committee would collaborate closely with CBRC to ensure that commentary from the review would feed back to CBRC. Moreover, the bond regulators (People's Bank of China, Ministry of Finance, National Development and Reform Commission and China Securities Regulatory Commission) should partake in this collaborative review process. The Green Bond Market Development Committee would provide an informal complementary working group to the high-level formal working groups on green finance and green bonds already established in the DRC and PBOC.

Once green bond standards are developed, support is required for CBRC to communicate the standards to financial market actors to ensure broad uptake. This would also be within the remit of the Green Bond Market Development Committee.

Robust implementation of these definitions and standards in the market will require a verification and enforcement system. Lack of verification and enforcement processes, and a legal framework around these, are limitations to the implementation of existing green finance initiatives, such as the Green Credit Guidelines. The verification process for green bonds could be designed as follows, combining the structure

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<sup>8</sup> For more details see Kidney and Oliver (2014).

used for the National Energy Savings scheme and the structure proposed for verification under China's Social Credit System:

- A range of government-approved third-party verifiers undertakes verification and certification against the proposed green bonds standards. These could be specialist green bond verification entities or existing entities. For example, credit rating agencies, whose role is improving with the proposed reforms, could take on green verifier roles to check compliance with green bond standards. Technical auditors could also take on this role, as what is needed is verifying and auditing against set standards of what is green; not making ad hoc decisions about what is green.
- An independent, non-governmental, non-profit entity set up explicitly for this purpose to supervise the verifiers.
- The bond market regulators can play a role in the development of this verification system; however, their main role in the process is to mandate the use of the verification platform to ensure its wide use in the market.

The costs of verification should be low enough that the cost to issuers should be recoverable by the additional marketing benefits achieved by marketing a bond as green. The labelling of bonds as green would be consumer-focused, providing a fair-trade-like label for the bonds signalling their green credentials. This is beneficial in China's move to a market-led economy, as current standards are typically complex and not signalled with easily understood labels. The costs to issuers could also be further compensated by preferential policy support for green bonds—for example, preferential tax exemptions, as proposed above, which would be made conditional on verification. However, relying on preferential policies for green verified bonds for issuers to recover costs would limit the initial growth of the market; keeping the costs lower should therefore be a priority.

While the verification process will be different in China than in other countries, it is recommended that regulators look to the global green bond markets for the key components to include in their verification process:

- Review the green assets linked to the green bond proceeds, rather than reviewing the green credentials of the bond issuer at the entity level. This is an important feature in that it enables a much larger market than if the green credentials are established at the entity level, which would exclude the potential issuers that are not pure play.
- Review whether commitments have been made to regular (annual) confirmation of the use of green bond proceeds and the performance of green bond proceeds and assets. Due to the lifespan of a bond, ensuring that the green credentials are guaranteed over time is important.

## 4.2 ACTIONS FOR CHINA'S POLICY-MAKERS TO GROW A GREEN BOND MARKET

In addition to supporting the development of definitions, standards, certification, verification and enforcement systems, kick-starting any new bond market requires public sector support on both the supply and demand sides. On the supply side, governments can provide initial liquidity and trading volume from government-backed bond issuance, as well as forms of credit support, until investors become familiar with opportunities. Developing a green bond market in China will need the same. Following the policy support examples set out in Section 2, five actions for China's policy-makers are proposed. It is worth stressing that several of these rely first on the development of standards, certification, verification and enforcement systems, to ensure that policy support is going toward investments that are aligned with robust environmental progress.

## 1. Public demonstration issuance

Bond market regulators (PBoC, MoF, NRDC, CSRC) should:

- Allow state-owned corporations and state entities to develop “demonstration programs” of green bond issuance that serve to illustrate the concept and, most importantly, to create trading volume and liquidity at a superior investment grade.
- Set targets and quotas for green bond issuance by development banks, SOEs and local governments to issue green bonds to initially develop the market. The potential of green city bonds is particularly exciting, considering the increasing importance of urban centres in China’s economy. Green quotas for municipal bond issuance would promote transparency and the development of local economies if allowances were made for green municipal bonds. This can be done by MoF allowing:
  - a. A top-up on the municipal bond quota for green municipal bonds, clearly linked to sustainable development plans or infrastructure.
  - b. Mandating a proportion of current quotas for green bonds.

## 2. Dual recourse green municipal bonds

- Develop a program for green dual recourse bonds at the local government level by providing government guarantees for bonds that also have exposure to the underlying green assets. This will bridge a market made up of bonds that are explicitly or implicitly government-backed to one that first introduces recourse to underlying assets, and then moves away from government guarantees to full revenue-backed bonds.
- Develop legislation to ensure the high quality of the assets eligible in the recourse of the bond pool.

## 3. Warehousing and credit enhancement

- Set up a green warehousing facility within existing development banks, or as a separate entity modelled on the U.K. Green Deal Finance Warehouse or on the U.S. WHEEL program, or as part of a green bank.
- Allow development banks to provide credit enhancement for green bond issuances in priority areas.

## 4. Tax incentives

- Change fiscal policy to make green commercial bonds tax exempt, provide tax credits to investors or direct subsidy for interest payments to green bond issuers, after first undertaking a study of which would be most effective in China.

## 5. Price differentials for green

- Change lending policies of development banks to give lower interest rates to green projects, conditional on a certification process of the borrowers.

**Beyond these actions inspired by global policy examples of green finance, there are opportunities for China’s policy-makers to grow green bonds that are unique to the Chinese context:**

- a. *Helping build a domestic investor base by instituting a system of green bond certification against clear and transparent criteria for green investments.* This will support integrity within a green bonds market by setting targets for green bond purchasing targets for public funds such as the National Social Security Fund (NSSF) and by encouraging green bond trading markets. Definitional work is already being done in Europe and could be adapted for China's special situation.
- b. *Opening a Foreign Direct Investment (FDI) window specifically for green bonds as part of China's gradual enlargement of the Qualified Foreign Institutional Investor (QFII) and Renmimbi QFII (RQFII) programs.* These programs are important channels to expose international investors to China's green bonds, as the total quota of these programs is significantly larger than the offshore RMB bond market (Liu, 2014). This regulatory change can be made by the CSRC, who regulates the foreign investor quota programs. The window should be tailored to meet the needs of long-term institutional investors such as pension funds, sovereign wealth funds and insurance funds. These actors will help improve risk management practices and governance in the investment system and increase liquidity by introducing more buyers to secondary markets. To ensure a smooth process of uptake, this window would initially focus on offering green bonds from SOEs, gradually allowing more offerings from corporate issuers. Similar to quotas on municipal bonds, special consideration could be afforded to investments in green bonds to top up or channel investor quotas.

Underpinning the specific policy actions is an understanding that coordinating regulatory measures to promote a green bond market is important to ensure smooth growth.

#### 4.3 OTHER GREEN FINANCE MEASURES TO SUPPORT A GREEN BOND MARKET

In July 2014, the Chief Economist of the PBC, in addition to reiterating the support for green bonds, outlined additional measures to push green finance in China, several of which play important roles in facilitating a green bond market. These measures come in addition to green financial products that are already in place, such as the Green Credit Guidelines in the banking sector.

Measures relevant to growing a green bond market in China:

1. *Carbon markets – an example of providing a strong price signal:* Carbon markets can provide a strong price signal for investors, as seen in other sectors. For essential public services, the regulation of assets and revenues through prices is integral to the ability of those operators, either private or public, to access bond markets. In services for clean water and wastewater provision, transportation, education, electricity, waste management, etc., there are minimum guaranteed payments to operators for the provision of an essential public service.

Carbon pricing has the potential to provide this certainty. However, recent carbon market experiences have failed to reassure investors because of price volatility and the market's reliance on policy-driven demand signals in the form of artificial caps, as opposed to the provision of essential services. Until such demand signals can be copper-fastened, carbon pricing will not provide the necessary track record and stability required of bond investors.

Carbon pricing could, however, provide certain revenues for investors similar to feed-in tariffs, which have successfully facilitated green bond issuance. Expanding feed-in-tariffs as well as the carbon market, would help grow a green bond market in China's power sector, as the key instrument, power purchase agreements, provide a "bankable" asset to allow bond issuance.

## Box 2: Feed-in Tariffs

Topaz solar farm in California, a 550-megawatt project, raised over USD 1.2 billion from the bond market in debt capital at a BBB investment grade rating and a 5.75 per cent coupon. As stated by credit-rating agencies, the key determinants of the success of this bond issue were the 20-year power purchase agreement from an A-rated utility and the contracting of First Solar, a proven technology manufacturer and systems installer, to implement the project (Oliver, 2013)

Additionally, the methodologies, monitoring, reporting and verification systems established under pilot emissions trading systems may be co-opted by green bond market players. Recent guidelines outline priorities on futures trading in carbon commodities and asset-backed securitizations. As corporate green bond issuers may also act as key participants in emissions trading platforms, the verification agents and reporting platforms may be cost-effectively co-opted to perform the same duties for the green bonds market.

2. *Greening development banks – facilitating supply by standardization, credit enhancement and issuance:* Incorporating green criteria into existing institutions is important to ensure the mainstreaming of green projects throughout the market. Public sector finance institutions can play a variety of roles in supporting a green bonds market. They can be:
  - Issuers of green bonds. These can provide initial market product pipelines and liquidity, engaging investors and educating them about the asset class.
  - Sponsors of or investors in warehouses/conduit entities, as set out in Section 2.
  - Credit enhancers. A wide range of guarantee and credit enhancement tools is available. For example, the EIB's Project Bonds Initiative provides credit enhancements for bond issuance addressing the policy objectives of the EU's Connect Europe program.

## Box 3: Raising capital through bonds and warehousing green assets

The Connecticut Energy Finance and Investment Authority (CEFIA) was established in September 2011 as a clean energy bank. It has begun implementing multiple finance programs aimed at attracting private capital such as a commercial PACE program and a solar leasing program for households and businesses. Supplemental legislation passed in June 2012 allows CEFIA to issue USD 50 million in bonds backed by a ring-fenced account in the state's Special Capital Reserve Fund.

Source: Berlin, Hundt, Muro, & Saha (2012)

# 5

## CONCLUSION

There is a significant opportunity to grow a green bond market in China. In addition to the growth of the green bond market internationally, the opportunity for green bonds has grown as China's general bond markets have grown impressively over the last decade. In addition to providing a way to finance the massive environmental investments required in China, a green bond market is aligned with China's other policy priorities, in terms of developing the country's financial markets and ensuring continued economic growth. A green finance shift in China, including growing a green bonds market, can assist in implementing and enforcing financial reforms that address imbalances in the financial system as much as they provide green benefits.

There is a wide range of tools available to China's policy-makers to support the growth of a robust green bond market in China. This paper has highlighted the fundamental need for the government to support the adjustment of the existing definitions and standards for green projects, as developed by the CBRC for the Green Credit Guidelines. Moreover, regulators should support the establishment of an independent non-governmental, non-profit verification entity, and mandate that issuers of green bonds use it. Additionally, regulators must establish enforcement systems to ensure compliance by issuers over the bond term with their green commitments. The paper has also highlighted that policy support can be provided by: public demonstration issuance of green bonds, particularly at the municipal level; dual recourse green municipal bonds; green warehousing and credit enhancement; tax incentives for green bonds; and providing a price differential for green loans. In addition to these policies with a direct positive impact on the green bonds market, establishing a carbon price and greening development banks, issues already on Chinese policy-makers' agendas, will also have a positive impact on a green bond market in China.

Providing the support to kick-start a green bond market outlined in this paper at this early stage in the global green bonds market can allow China to assume a global leadership role in developing capital market financing for green growth.

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## CHAPTER 11:

# ALIGNMENT OF INVESTMENT STRATEGIES WITH CLIMATE SCENARIOS: PERSPECTIVES FOR FINANCIAL INSTITUTIONS

STANISLAS DUPRÉ AND JAKOB THOMÄ, 2° INVESTING INITIATIVE



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# EXECUTIVE SUMMARY

## 2° Investing Concept

**2° Investing can be defined as investing strategies and policy frameworks leading to a financial portfolio that is in line with investment roadmaps based on +2° C climate goals.** At the heart of the 2° Investing concept is the capital reallocation and mobilization challenge. This involves closing the long-term financing gap, increasing the exposure to climate-friendly assets and reducing the exposure to high-carbon assets. This concept and the associated investment strategies apply for all types of financial institutions, including institutional investors and banks.

**Financial institutions today are unable to measure their exposure to climate change. There are equally no approaches to inform on the alignment of their investment strategies with national or international environmental goals.** By extension, there is no way to translate the 2° Investing concept into practice. Financial institutions seeking to contribute to environmental goals lack the tools. Mainstream financial institutions worried about their exposure to the long-term risks associated with the transition to a “green economy” are unable to measure and manage these risks. Policy-makers in turn seeking to develop policy incentives for the finance sector lack the right metrics to develop targeted incentives that will actually be guaranteed to be in line with their environmental policy goals.

## Relevance for the Financial System

**From a financial institution perspective, the 2° Investing concept has key implications for climate performance. Green finance objectives will have a significant impact at all stages of the investment chain—for investees as well as for banks and asset owners.** In terms of deal flow, for example, a European study identified cumulated financing needs related to climate change of EUR 350 billion in technology development and EUR 1.65 trillion in technology procurement (Barclays & Accenture, 2011). While there are no similarly rigorous estimates for portfolios, the “green share” in inventors’ financial portfolios will likely need to increase to 5–10 per cent.

**Economic changes associated with green finance will also need new risk management strategies.** Changes in economic models are likely to affect the valuation of physical assets and, by extension, the valuation of financial assets—whether equity, bonds or alternatives such as real estate, commodities and project finance. A model of the changes in the risk-return profile of various assets in a 2° C scenario shows long-term portfolio risk of over 10 per cent for financial portfolios (Mercer, 2010).

## Measuring and Managing the Climate Performance and Risk of Financial Portfolios: International Practices

**Currently, there are three types of approaches to measure the climate performance of financial institutions. None of the three approaches is currently able to comprehensively inform on the alignment of investment strategies with climate goals. While there are some individual examples, there is no comprehensive application of these frameworks in regulatory and policy frameworks.**

*Socially responsible investment frameworks* use environmental, social and governance (ESG) metrics to influence capital allocation decisions. These metrics, however, are not directly focused on climate change considerations and do not operate as impact measurements. As a result, they cannot inform in a meaningful way on the alignment of investment strategies with 2° C climate goals. The French government is currently exploring developing a Socially Responsible Investment (SRI) label dedicated to the energy transition.

*Financed emissions methodologies* are metrics that attempt to measure the carbon footprint of the financing and investing activities of a financial institution. Shortcomings include their limited overall coverage and the fact that they only inform on high-carbon investments. Financed emissions are accounted by about 40 fund managers and institutional investors. To date, however, it seems that this reporting does not inform investment decisions.

*Green/brown ratios* focus on defining what are “green” assets and “brown” assets in order to target a share of each of them in investment. At this stage, there is still no standard for defining “green” and “brown.” In terms of application, non-governmental organization initiatives and some funds have divested from brown sectors. Another application is in the area of financial market equity and fixed income indices that start to exclude brown assets or focus on green. In terms of policy, the Central Bank of Fiji mandated in 2012 that all commercial banks in Fiji allocate at least 2 per cent of their deposits and similar liabilities to the renewable energy sector.

***While risk assessment frameworks are becoming increasingly sophisticated at the asset level, risk metrics for banks and investors are still limited, preventing a more comprehensive integration of these metrics in investment practices and regulation.*** For risk assessment at the asset level, the first investor tools have been developed, notably the Bloomberg Carbon Risk Valuation Tool, although it is unclear whether this has affected investment decisions to date. In terms of risk at the portfolio and bank levels, there is no standard methodology, although there have been some ad hoc initiatives. The initiatives that have tried to measure carbon risks generally have found little materiality.

**Climate performance and risk metrics can be integrated into the analysis of a number of “sister” studies as part of the project on Greening the Chinese Financial Sector.** This includes the regulation of the insurance sector, macroprudential regulation, monetary policy and developing green debt markets.

## Trends and Next Steps

The next couple of years are likely to see a significant evolution of climate performance and risk frameworks. Whereas current risk metrics are limited, initiatives by a range of actors are likely to lead to significant improvements in risk frameworks in the next years. Climate performance metrics are also continuously being developed, both in terms of improving existing frameworks and pursuing alternative “science-based” approaches to measuring climate performance.

There is an increasing call for investors and banks to align their activity with climate goals and target-setting in this area. French Foreign Minister Laurent Fabius called for asset owners to allocate 10 per cent of their portfolios to climate-friendly investments. Building on CPI reports findings and the International Energy Agency roadmaps, U.S.-based organization CERES recommended institutional investors to set a goal of 5 per cent of their portfolios allocated to clean energy, compared to an estimated exposure of 1–2 per cent today depending on definitions.

Better climate performance and risk metrics are likely to support an increasing mobilization of financial regulatory and policy tools to drive capital towards financing the transition to a low-carbon economy. In this context, there will be an increased focus on transparency around disclosure and reporting, but with a sufficient level of sophistication in terms of metrics to provide for targeted incentives. These can relate to monetary policy instruments, financial regulation, public incentives, and accounting and disclosure.

## Implications for China

Climate performance and risk metrics can play a significant role in the Chinese financial sector reform process in the coming years, particularly for the Green Credit Guidelines, regulation of asset management and macroprudential risk frameworks. It can also help inform Conference of the Parties (COP) negotiations in 2015.

- *Implications for Green Credit Guidelines:* Climate performance accounting frameworks can be the next step to creating quantitative targets as part of the Green Credit Guidelines and improving the current reporting.
- *Implications for COP negotiations:* The Chinese negotiators can use target-setting frameworks to articulate a position about involving the finance sector (both public and private) as a key stakeholder in the climate change negotiations process.
- *Implications for growth of asset management:* The expected growth of asset management in China will likely be associated with significant regulatory reform. Climate performance metrics and risk frameworks can be integrated into this reform process.
- *Implications for risk to Chinese financial system:* Risk metrics can help to inform Chinese regulators on financial sector risks related to the transition to a low-carbon economy.

## 1.1 THE 2° INVESTING CONCEPT

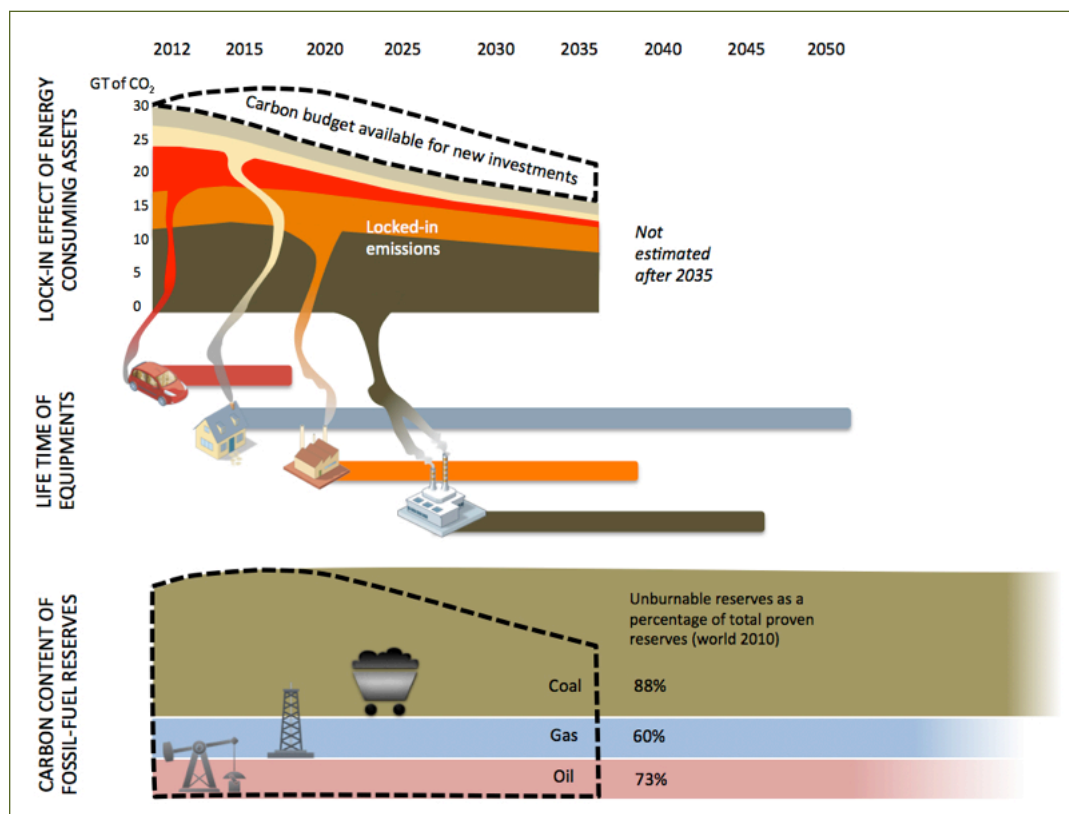
The long-term and climate-friendly investment needs associated with the transition to a low-carbon economy have given rise to the idea of 2° Investing. 2° Investing can be defined as investing strategies and policy frameworks leading to a financial portfolio that is in line with investment roadmaps based on goals to stay below 2° C of climate change.

**The capital reallocation and mobilization challenge.** At the heart of the 2° Investing concept is the capital reallocation and mobilization challenge related to building a 2° C world:

- *Long-term capital mobilization:* The Organisation for Economic Co-operation and Development (OECD) (2011), the World Economic Forum (2011, 2012) and the Group of Thirty (2013) stress the increasing gap between future long-term investment needs in the real economy and the share of long-term assets on asset-owners' balance sheets. According to Dobbs et al. (2010), the global economy may face a potential gap of USD 12.3 trillion equity financing in 2020. Closing the long-term financing gap will be key for mobilizing climate-friendly capital.
- *Reallocation capital to climate-friendly investments:* In terms of climate change, it is estimated that clean energy investments will require an additional annual investment of about \$1 trillion by 2050 (International Energy Agency [IEA], 2014). Financing these investments will require an increased role by both banks (Credit Suisse & WFM, 2011; Barclays & Accenture, 2011) and institutional investors (Nelson & Pierpont, 2013). Political credence to this role has been lent by French Foreign Minister Laurent Fabius (host of COP 21), who has called for asset owners to allocate 10 per cent of their portfolio to climate-friendly investment (le Figaro, 2014).
- *Reducing high-carbon capital expenditures:* Achieving climate goals will require a gradual and relative decrease for capital expenditures in certain in high-carbon sectors (e.g., oil exploration and production) and a reallocation within low-carbon sectors to low-carbon technologies (i.e., low-carbon vehicles in the automotive sector, renewables in the power sector) (IEA, 2014). A part of foreseeable capital expenditures in high-carbon sectors should therefore be avoided, or will lead to the creation of stranded assets (Carbon Tracker Initiative & Grantham Research Institute, 2014). In order not to exceed the "carbon budget" associated with +2°C climate goals, a significant part of fossil fuel reserves should not be exploited (Meinshausen et al., 2009). All the same, the IEA estimates that, without further action, by 2017 the greenhouse gas (GHG) emissions locked-in energy-related infrastructure will exceed the allowed 2° carbon budget (Figure 1) (IEA, 2012a).

For banks and asset-owners, this reallocation challenge implies a shift from brown to green in both the flows of financing delivered and the allocation of their assets.

FIGURE 1: EMISSIONS LOCKED-IN ENERGY INFRASTRUCTURE AND FOSSIL FUEL RESERVES



Source: 2° Investing Initiative data: IEA (2009, 2010, 2011); Carbon Tracker (2011, 2013).

**Organization of this paper.** This report is organized as follows. Section 1 introduces the concept of 2° investing and details the framework that quantifies the capital reallocation and mobilization challenge. Section 2 highlights the implications for capital expenditure decisions by investees (companies, governments, and households) and investment decisions by investors (institutional investors, banks). Section 3 reviews the international practices in terms of measuring and managing the climate performance and risk related to these scenarios by financial institutions. This discussion will focus on the issue of target setting for financial institutions vis-à-vis climate goals and associated risk management. It will also briefly discuss the implications for the other papers being produced in the context of this report. Section 4 will discuss the expected future trends and debates on the 2° Investing concept. Section 5 will conclude by briefly sketching out the implications for China.

## 1.2 2°C ROADMAPS AND INVESTMENT SCENARIOS

**From climate scenarios to energy-technology roadmaps.** The current framework to define investment needs for the 2° C economy is based on a translation of climate scenarios into *energy-technology roadmaps*.<sup>1</sup> The most prominent global scenarios are those of the IEA,<sup>2</sup> although alternative global scenarios have also been developed by environmental non-governmental organizations (NGOs) and research organizations such as Greenpeace (2012), WWF & Ecofys (2011) and World Energy Council (2013). These usually distinguish themselves by challenging the prominent role that carbon capture and storage (CCS) and nuclear power

<sup>1</sup> Climate scenarios are usually modelled on carbon budgets and develop different trajectories in terms of the future energy infrastructure (and in some scenarios, other high-carbon sectors) to meet the climate objectives. Most of the scenarios described in this paper rely on the Potsdam Institute RC3PD emission trajectories that give a 50 per cent chance to limit global warming to +2°C.

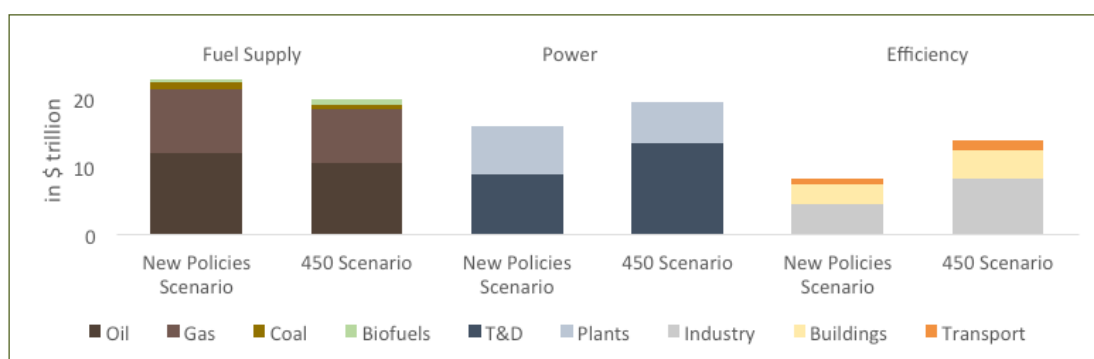
<sup>2</sup> The IEA has developed two scenarios in line with 2° C climate goals, the 450 scenario for the World Energy Outlook, covering 2014–2035 and the 2DS for the Energy Technology Perspectives, covering 2014–2050.



play in the IEA scenarios, and putting emphasis the relative contribution of shifts in transportation patterns. Specific scenarios are also developed at the country level.<sup>3</sup>

**From energy roadmaps to investment needs.** Energy roadmaps are increasingly being turned into investment roadmaps. The three most prominent organizations currently developing investment roadmaps at the global level are the IEA (2014) and the World Energy Council (2013) for energy investment needs, the OECD (2012) for infrastructure investment more broadly, and the Frankfurt School with Bloomberg New Energy Finance (2014) (limited to low-carbon energy investment). Figure 2 shows the investment roadmap for the IEA. The Bloomberg New Energy Finance scenario, which focuses on clean energy investment needs, estimates annual investment needs of USD 1 trillion by 2030, under a 2°C scenario. Given current levels of around USD 356 billion to USD 363 billion of climate finance, these investment scenarios demonstrate a significant gap (CPI, 2013b).

FIGURE 2: WORLD CUMULATIVE INVESTMENT IN ENERGY SUPPLY AND EFFICIENCY BY SCENARIO 2014–2035



Source: IEA (2014)

**Gaps in the analysis.** There are currently a number of challenges with regard to turning energy scenarios and associated investment roadmaps into meaningful benchmarks for financial institutions. The following briefly summarizes some of the major challenges.

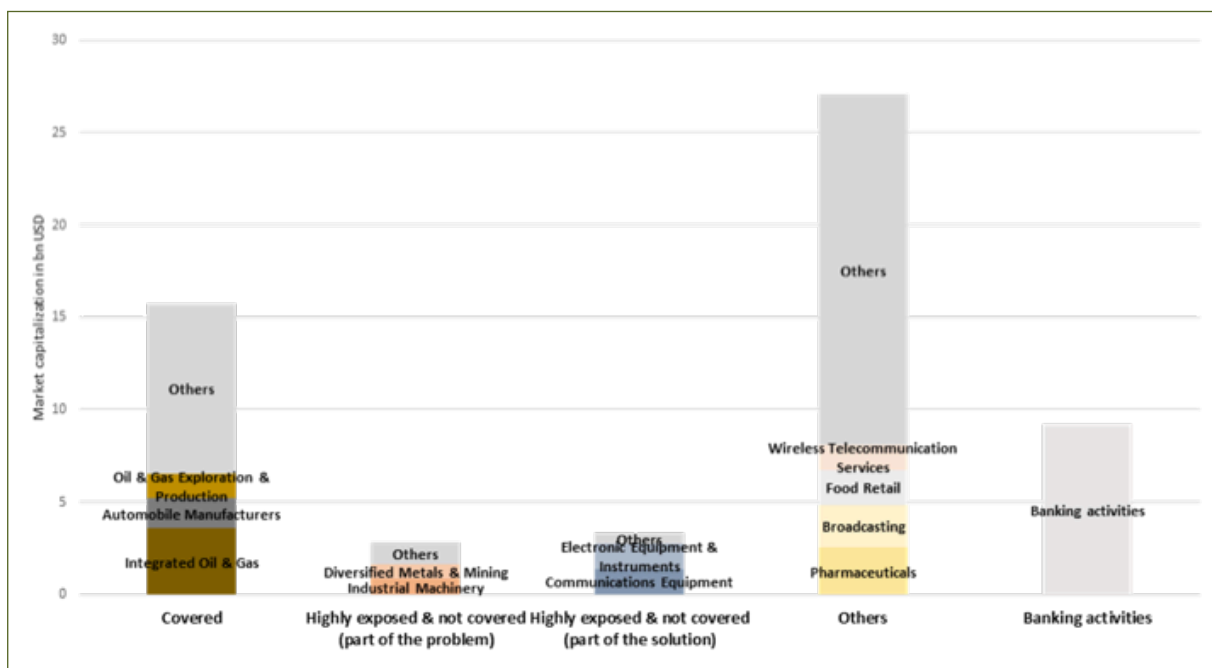
- **R&D expenditure:** Investments in R&D to date are largely underdeveloped in energy investment roadmaps.<sup>4</sup> Taking the cement sector as an example, the IEA projects 63 per cent of emissions associated with production will be captured through carbon storage by 2050. This still leaves roughly one third of emissions that need to be reduced through other means, even in an optimistic CCS scenario. Research and development (R&D) will be a key bridge in this regard, in particular expenditures on R&D for low-carbon alternatives to cement (i.e., reproducing at industrial scale the chemical process of coral reefs or egg shells) (Lafarge Group, 2004).

<sup>3</sup> For example, the Energy Research Center of the Netherlands (ECN) established several scenarios to discuss the different routes towards a “clean” Dutch economy (reducing carbon emission in 2050 compared to 1990 with 80 per cent). The “Gone Green” scenario produced by the UK National Grid simulates the transition pathway of UK’s energy system with the same emission target by 2050. The National Energy Board of Canada started the project Canada’s Energy Technology Future in 1998 and has constantly revised it in every two years. The aim is to provoke strategic thoughts about the range of possible futures in energy technologies and systems, and improve the government’s long-term planning capabilities. There are also several scenarios built around China. The prominent examples are the Bloomberg New Energy Finance’s 2014 paper, *The Future of China’s Power Sector*, which estimates China’s energy mix under different scenarios in 2030; CITI’s *Peak Coal in China*, which focuses on China’s coal consumption by 2030; and scenarios produced jointly by the Lawrence Berkeley National Laboratory and the China Energy Group, which analyze the role of energy-efficiency policies in transitioning China to a lower emission trajectory and meeting its intensity reduction goals. For references, see World Energy Council (2013), ECN & PBL (2011), National Grid (2014), Natural Resources Canada (2000), Bloomberg New Energy Finance (2013), Citi Research (2013), Ernest Orlando Lawrence Berkeley National Laboratory & China Energy Group (2011).

<sup>4</sup> The IEA Energy Technology Perspectives scenario does cover R&D expenditures for each technology, but beyond carbon capture and storage, the scenario only relies on best available technologies. The needs and perspectives regarding the introduction of breakthrough technologies in high-carbon sectors are not discussed.

- *Missing sectors and time frames:* Energy investment roadmaps usually miss significant sectors relevant from a climate change perspective, such as agriculture and land use.<sup>5</sup> In addition, most sectors only provide guidance until 2050. The IEA scenarios only provide limited coverage of the market capitalization of a sample of major stock indices (Figures 3 and 4).
- *Types of capital:* Most investment roadmaps do not distinguish between different types of capital. For instance, translating the energy roadmap for transport into implications for debt financing requires distinguishing development capital in aircraft manufacturing and low-carbon jet fuel, procurement capital for airlines and investment in airports infrastructure.
- *Uncertainties:* A challenge of investment roadmaps is the high degree of uncertainty associated with issues such as the changes in capital costs. For example, lower investment levels in 2012 were largely a function of lower prices in solar photovoltaic (PV) systems (Bloomberg New Energy Finance, 2014).
- *Target for whom:* Energy investment roadmaps are generally built for the energy sector and thus need to be “translated” for financial institutions (Section 2.2).

FIGURE 3: MARKET CAPITALIZATION BY MAJOR SECTORS



Source: Authors, Datastream Data (2013)

<sup>5</sup> In the IEA scenarios, 22.76 per cent of emission reductions rely on changes in land use, while the related actions and implications are not described in the roadmaps.

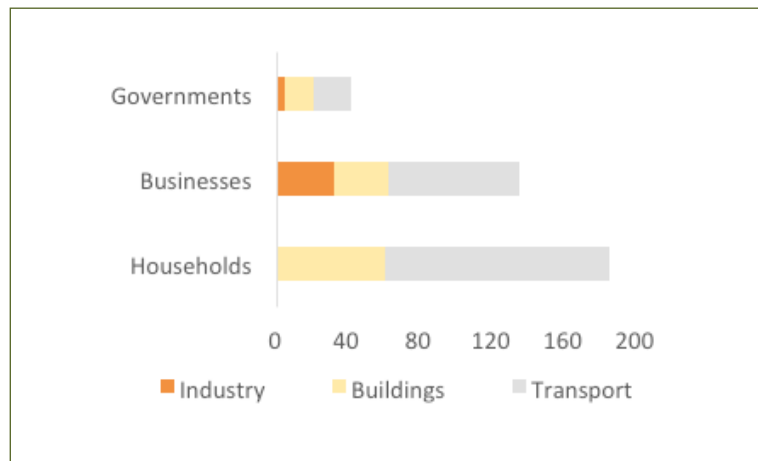
# 2

## RELEVANCE FOR THE FINANCIAL SYSTEM

### 2.1. IMPLICATIONS FOR INVESTEES

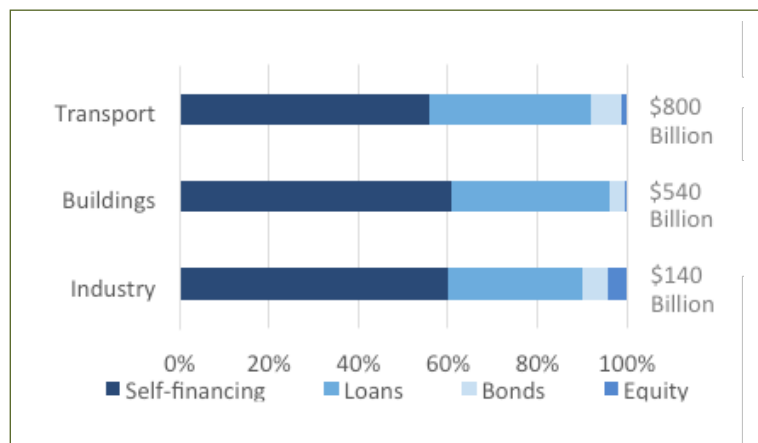
**Financing capital expenditure.** Energy investment roadmaps operate in the first instance as guidance on capital expenditure decisions by companies, households and states. Indeed, in this context the implications of the scenarios (insofar as they cover the relevant sector) are much more straightforward than for financial institutions, as will be discussed in the subsequent section. To understand the implications for companies, households and states, the key piece of information for determining the investment needs is an analysis of the ownership (Figure 5) and financing structure (Figure 6). The most common source is, by far, self-financing from savings or revenues or, in the case of governments, from tax revenue. This type of analysis clearly maps the implications of energy investment roadmaps for the key actors.

FIGURE 5: AVERAGE ANNUAL INVESTMENT IN ENERGY EFFICIENCY IN THE NEW POLICIES SCENARIO BY OWNERSHIP CATEGORY AND SECTOR, 2014–2035



Source: IEA (2012)

FIGURE 6: ESTIMATED INVESTMENT IN ENERGY EFFICIENCY BY SECTOR AND FINANCING SOURCE IN THE NEW POLICIES SCENARIO, 2014–2020



Source: IEA (2012)

**Impairment risks.** Given the conclusions on locked-in emissions and capital reallocation, energy investment scenarios also imply significant potential for the impairment of fixed assets. Carbon-related impairments occur when the future free cash flows derived from an asset are corrected downwards due to the occurrence of unexpected changes in the regulatory and market environment. The risks range from below-expectation returns to premature closure. On paper, the concept applies to any long-term high-carbon asset that can face competition from low-carbon technologies, including infrastructure (power plants, fossil fuel reserves, cement and steel plants, airports and highways), product development programs (automotive, aircrafts, power technologies), and real estate and fertilizer-dependent croplands. However, to date, the attempts to precisely define and quantify the related risks have been limited to a few sectors, including power,<sup>6</sup> oil,<sup>7</sup> residential housing<sup>8</sup> and croplands.<sup>9</sup>

**Missed opportunities.** The flipside of issues related to impairment risks are missed opportunities in climate-friendly investments. The IEA (2014) provides a current example for this: German utilities for example have largely failed to respond to the significant increase in renewable energy capacity and generation with their own fuel mix adjustments. While there is a range of reasons as to why German utilities have suffered in the past years (Smith School of Enterprise and the Environment, 2014), part of the equation is having missed the opportunity to capitalize on the growth of renewables as part of the German *Energiewende*.

## 2.2 IMPLICATIONS FOR BANKS AND ASSET OWNERS

### 2.2.1 ROADMAPS FOR THE FINANCE SECTOR

Attempts to “translate” energy-climate investment roadmaps into targets or constraints for financial institutions have been very limited to date. A significant reason for this analytical gap is the technical challenge associated with this “translation” exercise. The following maps some of the core issues in this regard, in particular analyzing the implications of energy investment roadmaps on deal flows, asset allocation and broader investment strategies.

### 2.2.2 IMPACT ON DEAL FLOWS

Understanding the implications of investment roadmaps for financing activities involves making assumptions regarding the evolution of ownership, the structure of financing and the relative role of bond markets and bank lending, for different technologies. In 2011, Barclays and Accenture developed a scenario for Europe dealing with the financing of a sample of technologies in power production, road transport and building efficiency until 2020. The scenario is based on the analysis and extrapolation of past transactions on these technologies. The authors have identified cumulated financing needs for EUR 350 billion in technology development and EUR 1.65 trillion in technology procurement (Figures 7 & 8). Equity issuance plays a key role in financing development, while retained earnings, loans and bonds are the primary sources of financing for procurement. To deliver, the finance sector is expected to develop green seed capital, venture capital and private equity funds to finance innovation, mobilize equity and bonds underwriting businesses to provide expansion and procurement capital, and develop the capacity to originate loans for small-scale projects. Building on Barclays and Accenture findings, Credit Suisse and WWF (2011) estimated a few months later that the related business opportunities for banks amount to between USD 25 billion and USD 30 billion in 2020. To date, such a roadmap as not been designed for other regions.

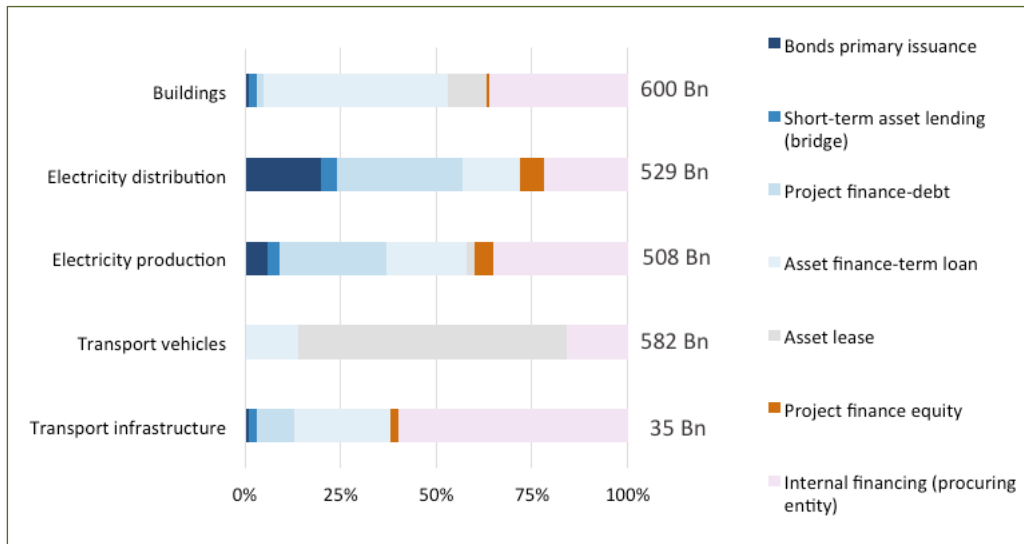
<sup>6</sup> The European power sector actually experimented with EUR 30 billion of impairments on fossil fuel-fired plants from 2011 to 2013, due to a combination of competition from renewables, constraints on carbon emissions and flat demand partly due to energy efficiency (Perrin, 2013). The consequence for equity investors has been significant: at their peak in 2008, the top 20 European energy utilities were worth roughly EUR 1 trillion. In October 2013, they were worth less than half that (The Economist, 2013).

<sup>7</sup> Analysis by the U.K.-based Carbon Tracker Initiative (2012) suggests that an estimated USD 1.1 trillion of capital expenditure earmarked needs a break-even market price of USD 95 out to 2025, a price significantly above projections in a low-carbon scenario.

<sup>8</sup> In France, the SHIFT Project has explored the relationship between the risk of default on mortgages and the energy-profile of residential real estate (energy efficiency and dependency on individual transportation). They concluded that a doubling in the price of energy would significantly increase the default rate of low-income, energy-intensive homeowners, and called for the integration of energy risks in social homeownership programs.

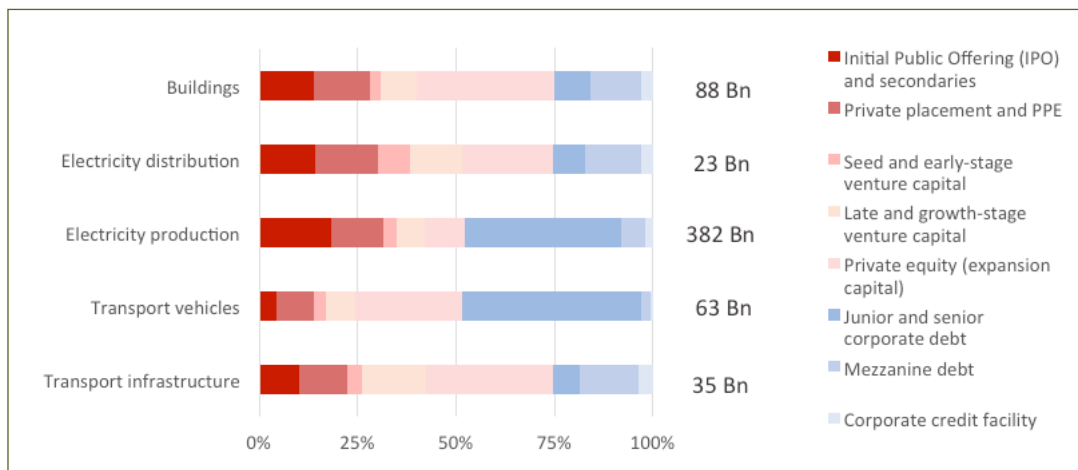
<sup>9</sup> The Oxford University Smith School of Enterprise and the Environment (2013) Stranded Assets Research program has mapped impairment risks for the agricultural sector and ranked the exposure of various types of assets to these risks.

FIGURE 7: CUMULATIVE PROCUREMENT CAPITAL (2011–2020) NEEDS IN EU-25 BY SOURCES OF FINANCING



Source: Barclays and Accenture (2011)

FIGURE 8: CUMULATIVE DEVELOPMENT CAPITAL (2011–2020) NEEDS IN EU-25 BY SOURCES OF FINANCING



Source: Barclays and Accenture (2011)

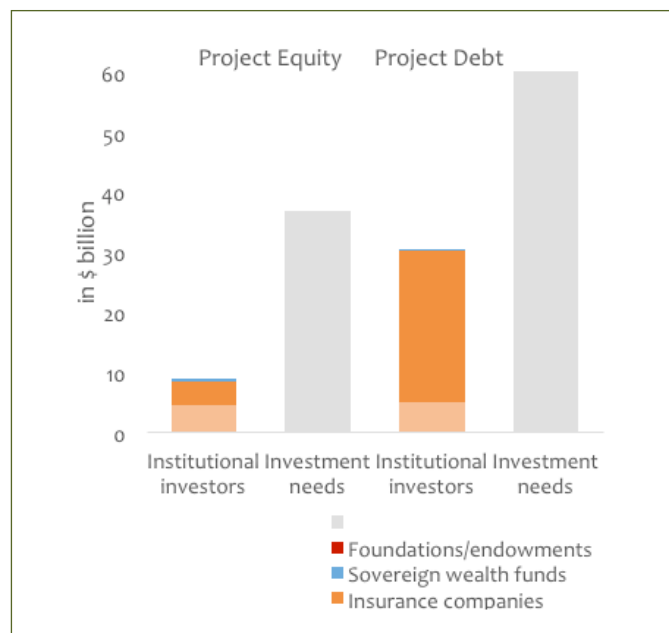
### 2.2.3 IMPACT ON ASSET ALLOCATION

The evolution of the allocation of the stock of assets owned is a second step in the translation of investment roadmaps into implications for financial institutions. New financial assets will ultimately be accounted on the balance sheet of banks (loan books), institutional investors (portfolios) and households (savings and rights on pension funds). For these asset owners, the transition to a low-carbon economy will therefore have an impact on the allocation of their portfolio by technology and sector.<sup>10</sup> Beyond the creation of new assets, the allocation of financial assets will be influenced by several other factors, including the evolution of asset prices and the average maturity of credit for each technology and sector on the asset side of their balance sheet, as well as changes in the structure of their liability and regulatory constraints. This leads to a very complex equation. Very few organizations have attempted to model these changes:

<sup>10</sup> One major obstacle in the “translation process” relates to the inability of existing sector and business segment classifications (including GICS, ICB, Bloomberg for listed equities, Barclays and Merrill Lynch for bonds, and SIC and NACE for credit) to properly reflect the exposure to different energy technologies. Indeed, most sector categories aggregate brown and green technologies. The 1,000 categories in the U.S. statistics sector classification provides a good example of this obstacle: a specific category exists for tortilla manufacturing, but renewable, coal-fired, gas-fired and nuclear power plants are all accounted in the same category.

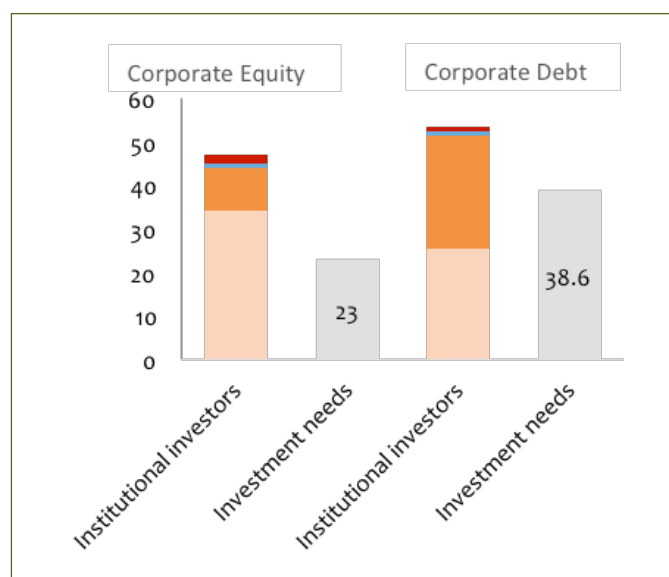
- In 2013, CPI estimated the ability of institutional investors to increase their exposure to renewable energy assets in order to “absorb” the expected flow of new assets. They concluded that these investors have a limited ability to adjust their direct exposure to renewable energy infrastructure investments, but can cover the needs thanks to their indirect exposure via equity and corporate bonds portfolios (Figures 9 & 10).
- A few years before, in 2010, Mercer tried another approach: they modelled changes in the risk-return profile of various assets in 2°C scenarios, and then calculated the implications for asset allocation (Figure 11 & Section 3.2). They concluded that to bet on one scenario or another has tremendous implications for portfolio allocation.

FIGURE 9: POTENTIAL ANNUAL INVESTMENT VERSUS OECD PROJECT INVESTMENT NEEDS



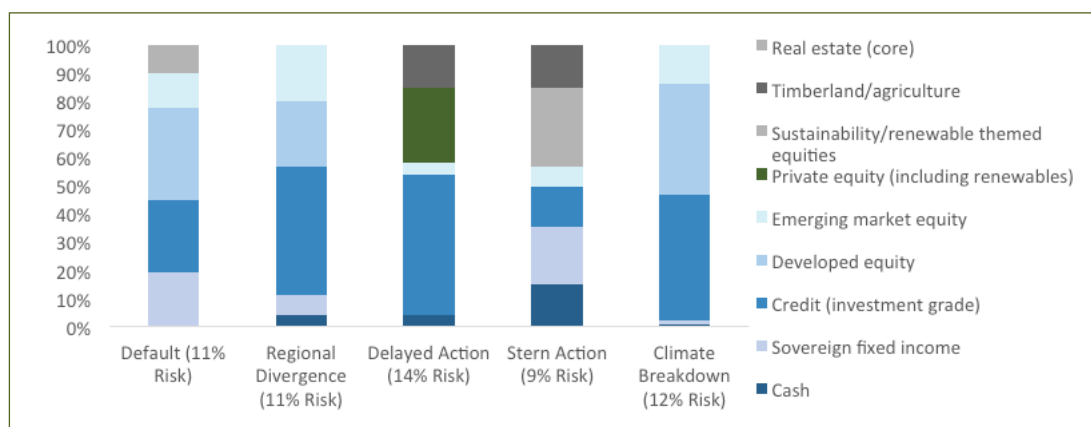
Source: Buchner, Hervé-Minucci et al. (2013)

FIGURE 10: CORPORATE INVESTMENT NEEDS



Source: Buchner, Hervé-Minucci et al. (2013)

FIGURE 11: EXAMPLE OF PORTFOLIO MIX ACROSS THE SCENARIOS: 7 PER CENT RETURN TARGET



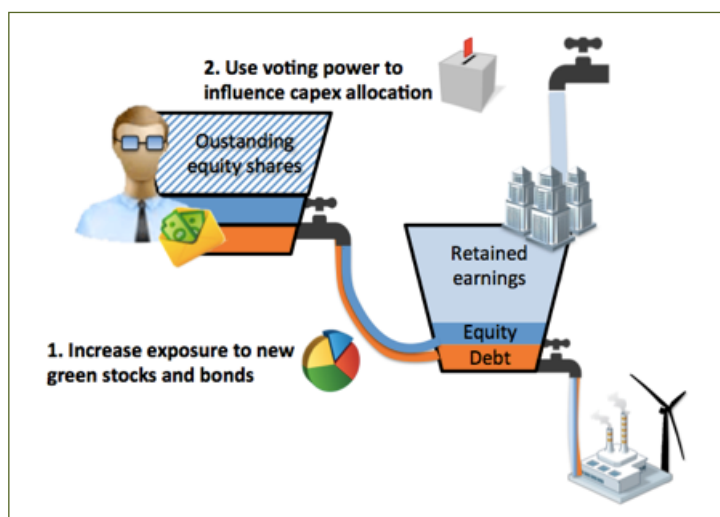
Source: Mercer (2010)

## 2.2.4 IMPLICATIONS FOR ASSET OWNERS' INVESTMENT STRATEGIES

For financial institutions, the pathways and methodologies used for aligning their portfolios are obviously very different, depending on how they understand their role and mandate. However, whatever the approach, asset owners can act at three stages.

**Shareholder engagement.** Financial institutions frequently act as prominent shareholders or key debtors. In this way, they affect capital expenditure decisions through two avenues: (i) by increasing exposure to newly-issued “green” stocks and bonds, financing green projects, and (ii) by using their voting power or influence as shareholders to influence capital expenditure decisions (Figure 12).

FIGURE 12: PATHWAYS FOR SHAREHOLDERS



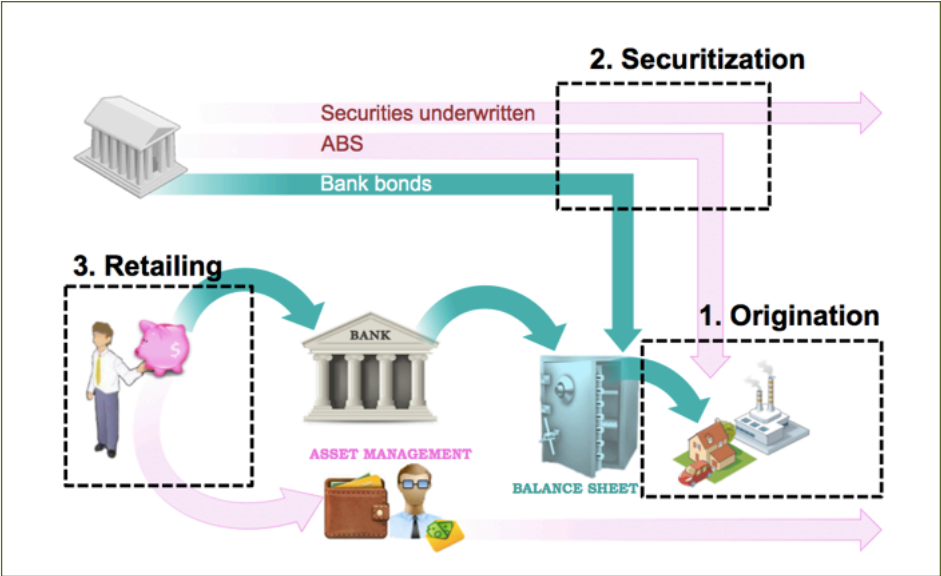
Source: Authors

This lever allows them to not only affect the allocation of the investment they finance, but also the investments financed by retained earnings. This pathway is key where a technology shift is required within the industry and retained earnings play a key role, like the power and the energy sectors.<sup>11</sup> So far, the involvement of shareholders in decisions on capital expenditure (capex) plans has been very limited. On the one hand, shareholder engagement still needs to be boosted (Section 3.4). On the other hand, there is a broader challenge in terms of transparency, as companies often do not report the breakdown of capital expenditure by energy technology in relevant sectors.

<sup>11</sup> In the OECD power sector, for example, 74 per cent of capital expenditure in 2012 was financed through “internal sources” (i.e., retained earnings). Source: 2<sup>o</sup> Investing Initiative.

**Channelling power.** Banks can use their ability to channel capital flows in order to increase investment in certain assets and limit investments in other assets (Figure 13). For banks with a climate mitigation mandate, the objective is to increase (or reduce) the demand for green and brown assets, thus influencing the cost and availability of capital for investees, and hopefully influence their ability to invest. The overall allocation is primarily determined by the risk-return profile of investment opportunities in the real economy (i.e., the “demand” for capital), but the financial sector also has an ability to influence choices. This is especially the case for the design and distribution of investment products, particularly given that in many countries, products are sold to rather than purchased by retail clients (Autorité des Marchés Financiers, 2013). In this context, fiscal incentives can play an important role (Section 3.4).

FIGURE 13: BANKS’ POINTS OF ACTIONS FOR CHANNELLING CAPITAL



Source: 2° Investing Initiative (2014b)

**Reallocation of outstanding assets.** Institutional investors, asset managers and banks can directly influence the cost and availability of capital for green and brown investees with climate mitigation targets in mind or simply manage their risk exposure to future climate policies. This lever is very much related to the channelling power, but applies to the management of stocks rather than flows. For policy-makers and the public, it is easier to focus on this dimension since most financial institutions publicly report on the outstanding assets owned or under management, rather than flows channelled by different activities. Financial institutions can adopt different positioning vis-à-vis climate scenarios:

- *Passive strategies* take the view that changes in public policies will lead to changes in demand for capital in the real economy, the role of financial institutions being to respond to this demand while maintaining business-as-usual investment frameworks. This is the dominant positioning within the finance sector to date.
- An *active strategy* implies updating the way a financial institution prices financial risk and opportunities related to the energy transition. This approach seems dominant among U.S. and U.K. organizations.
- A *proactive approach* assumes that proactive changes in asset allocation and investment strategies in the finance sector might support the reallocation of investment in the real economy. This approach is relevant where governments seek to embed economic goals in public financial institutions’ mandates, as well as financial regulation and incentives.



## 2.3. KEY DRIVERS AND BARRIERS

This section will briefly highlight the main finance sector drivers and barriers to aligning investment strategies with the roadmaps outlined in the previous sections.

### 2.3.1 DRIVERS

**Reputation:** Reputational costs are usually a function of public pressure. Examples include the campaign of the Rainforest Action Network (2014) against Bank of America Merrill Lynch and the U.K. campaign by Platform and the World Development Movement (2014) against the Royal Bank of Scotland (RBS). In both cases, the respective banks responded, largely by attempting to reduce their financed emissions (see Section 3). In China, Green Watershed and several partner NGOs have begun to publish coal finance rankings. The examples show that, while public pressure can have an impact, this pressure is usually limited to targeting specific financial institutions and high-carbon financing, without addressing broader climate goal alignment.

**Fiduciary duty.** Another driver relates to the concept of fiduciary duty, which includes the “prudent investor rules.” It has been argued that investors exposed to high-carbon “toxic” assets face significant carbon risks and that their over-exposure can constitute a violation of their fiduciary duty.<sup>12</sup> Going forward, this concept may gain new traction with a broader interpretation of fiduciary duty and a more forward-looking standard of what constitutes optimal diversification in the setting of the energy transition (2° Investing Initiative, 2013b). To date, however, the impact of this narrative is limited.

**Public finance.** In many countries, public finance is the largest source of climate-friendly capital and a significant lever for mobilizing private capital (Buchner, Falconer et al., 2013), with a leverage factor ranging from two to 25 times, according to the Inter-American Development Bank (Smallridge et al., 2013). Although their role has been important, they do not comprehensively address the key barriers in the finance system to 2° C Investing, as outlined below.

### 2.3.2 KEY BARRIERS

**Climate and carbon risk management frameworks.** Climate and carbon risk frameworks are ill-equipped to integrate long-term risks as a result of short-term risk horizons, backward-looking risk analysis and doubts regarding 2°C climate goals. To highlight one example, short-term risk horizons create a disconnect between climate policy and climate risks and the risks considered by financial analysts or equity fund managers with relatively short average holding periods (Figure 14). In addition to these challenges, accounting may be the biggest barrier at the current stage: the risks are complex and multi-dimensional. They are likely to require an asset-per-asset analysis and the related data collection and research infrastructure is not yet sufficiently developed (see Section 3.2).

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<sup>12</sup> This narrative has, for instance, been developed by the Carbon Tracker Initiative and AI Gore.

FIGURE 14: TIME HORIZON DISCREPANCIES IN THE INVESTMENT CHAIN FOR EQUITY FUNDS



Source: Authors

**Target-setting and reallocation:** A main barrier for target-setting by policy-makers and strategic capital mobilization/reallocation strategies by financial institutions is the underlying accounting frameworks. Current metrics are largely unable to inform on the exposure of a financial institution to economic transition scenario. They are not integrated at a strategic level nor are they used to help develop mainstream financial products (i.e., benchmark indices, portfolio optimization tools) for investors.

**Public policy incentives:** Current financial policy and regulatory frameworks largely ignore climate goals, with a few notable exceptions. The Green Credit Guidelines in China are a first step in this regard (see Section 5) (2° Investing Initiative, 2013c). In some cases, such as Basel III, regulation may even increase incentives for short-term investing at the expense of long-term, climate-friendly finance. As a result, policy does not address finance sector barriers, with mainstream climate policies ill equipped to respond.

Section 3 will explore the international practices in response to the key barriers.

# MEASURING AND MANAGING CLIMATE PERFORMANCE AND RISK OF FINANCIAL PORTFOLIOS: INTERNATIONAL PRACTICES

In the context of the capital reallocation and mobilization challenge, a number of initiatives have developed to help financial institutions measure and manage the climate performance and risk of their financial portfolios. In light of the growing momentum around the global climate negotiations in 2015 in Paris, these initiatives have likewise seen tremendous growth in recent months. They have focused on strengthening the methodologies underlying the measurement of climate performance and risk, and their application in regulatory frameworks and investment tools. This section will review the leading international practices to measure climate performance and risk and briefly discuss their application. Section 3.3 will then briefly discuss how the methodologies reviewed here fit into the broader context of the studies produced as sister studies to this report.

## 3.1. CURRENT STATE OF TARGET-SETTING FRAMEWORKS

One of the two approaches to integrate climate considerations into an investment decision is to set targets related to the contribution of a financial portfolio to financing the energy-technology transition. At the base of these targets are methodologies, necessary to measure the alignment with the targets or objectives that have been articulated. Table 1 summarizes the relevant methodologies.

TABLE 1: METHODOLOGIES FOR TARGET SETTING

Methodology	Approach	Shortcomings
1. ESG/Socially Responsible Investment scoring and screening	Evaluation of assets and portfolio based on environmental criteria	Based on investment process, rather than actual impact on capital expenditures, not focused on climate change issues per se
2. Carbon footprint of investment portfolios	Measuring financed emissions of financial activity	Lack of forward-looking analysis on emissions, does not inform on green assets
3. Green/brown ratios	Measures the exposure to green and brown assets	Lack of wide agreement on a robust definition of “green” (and “brown”)

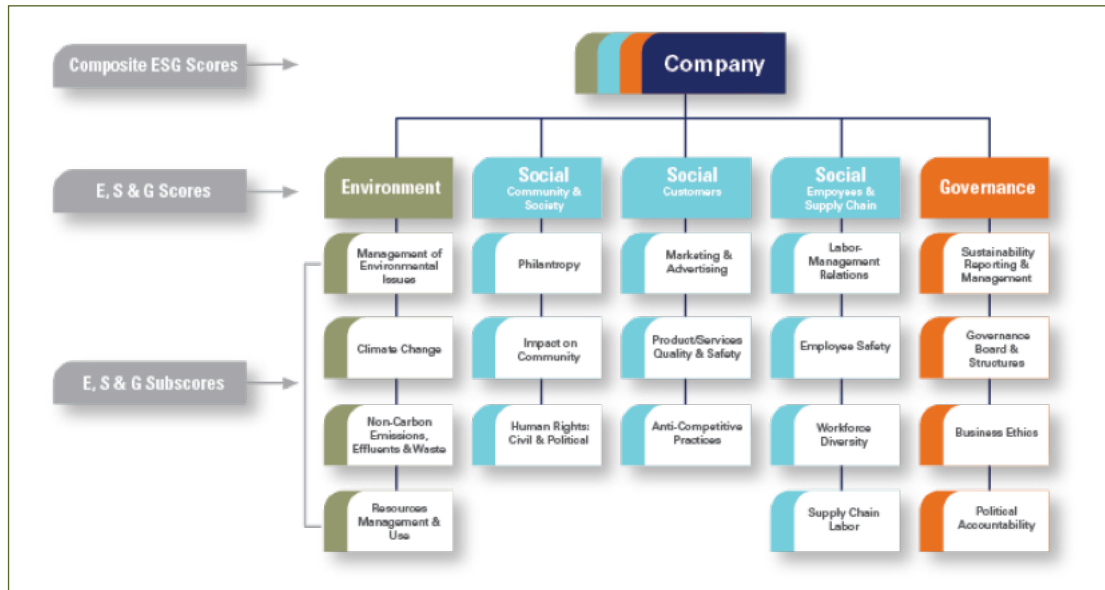
### 3.1.1 SOCIALLY RESPONSIBLE INVESTMENT (SRI) FRAMEWORK

**Approach.** SRI funds use ESG metrics to influence capital allocation decisions. These are usually based on management processes and “scoring” systems, with a limited role for quantitative metrics and a “best-in-class” approach that focuses on the highest ESG performers, even in industries, such as fossil fuels, where there may be over-arching concerns.<sup>13</sup> There is a range of ESG metrics providers. Given the more process-based approach of these metrics, they are generally easier to implement methodologically.

One example of ESG metrics is the ESG Research Methodology from MSCI ESG Research, one of the leading ESG data and research providers worldwide. MSCI ESG Research uses data from company filings, media, governments third-party data providers and NGOs. Each company is assigned to one of more than 80 industry groups, each of which has a unique set of ESG rating data and weightings. The research model generates numerous sub-scores for the company across each data category applicable to the industry group (Figure 15). The model aggregates the sub-scores to generate separate ESG scores for the company, which are ultimately expressed as a single composite ESG score. A company’s ESG score is mapped to a 9-point letter scale, with ratings from AAA (highest) to C (lowest) (MSCI, 2014).

<sup>13</sup> This has received some criticism, notably by Novethic Research (2013).

FIGURE 15: OVERVIEW OF MSCI ESG FRAMEWORK



Source: (MSCI, 2014)

**Shortcomings.** As a result, from a climate change perspective (MSCI, 2014), there are a number of shortcomings to SRI frameworks. First, they are not directly focused on climate change considerations, but take a broader approach. Second, they do not operate as impact measurements. As a result, they cannot inform in a meaningful way on the alignment of investment strategies with 2°C climate goals.

**Application.** Nevertheless, there have been some initiatives to use SRI frameworks to label funds. The French government is currently exploring the development of an SRI label dedicated to the energy transition. The idea is to reach a critical mass of labelled funds in order to stimulate the reallocation of capital (a target). At the European level, the Packaged Retail Investment Products (PRIIPS) Directive addresses the need for a label (article 8, paragraph 5) to signal socially and environmentally friendly investments in key information documents. The regulatory text, however, fails to produce satisfactory ESG information for retail investors on the basis that (article 34) “at this point there are no certain criteria or a formal procedure to objectively verify the target of these investments as being socially or environmentally friendly” (European Commission, 2014). The question will therefore be tackled during the review of the directive in 2018 if satisfactory quantitative metrics exist by then.

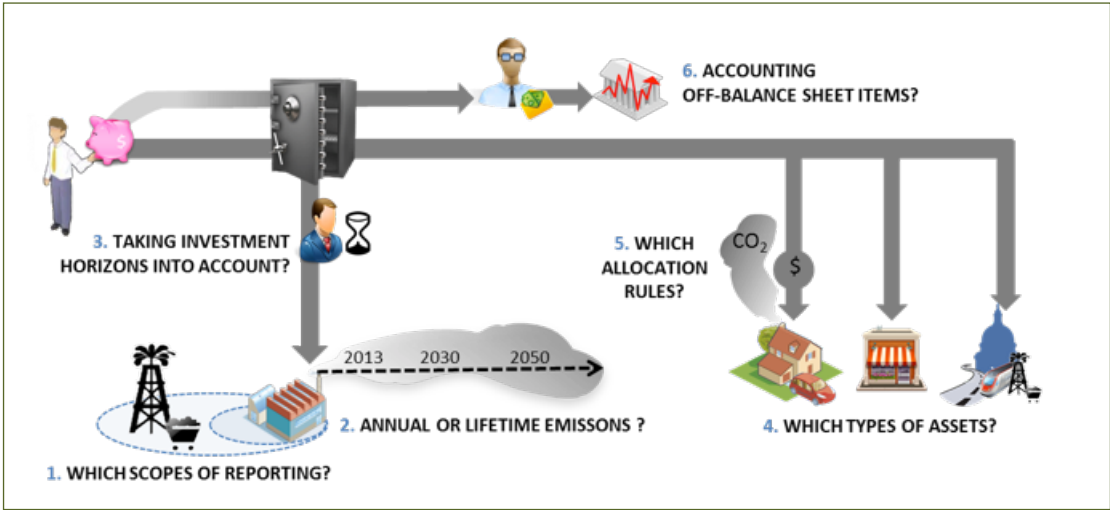
### 3.1.2 FINANCED EMISSIONS METHODOLOGY

**Approach.** Financed emission (FE) methodologies are metrics that attempt to measure the “carbon footprint” of the financing and investing activities of a financial institution. There are about a dozen different FE methodologies that have been developed to date (2° Investing Initiative, 2013a). Targets related to FE methodologies can either be relative (i.e., to last year’s footprint, peers or an index) or absolute (i.e., to a carbon budget). The methodologies differ on a number of issues related to key accounting questions (Figure 16) and responses to data gaps. There are currently several standardization initiatives under way in this field, including the United Nations Environment Programme’s Finance Initiative (UNEP-FI) GHG Protocol guidance on financed emissions, and the Association Bilan Carbone, sponsored by the French Environmental and Energy Agency.

One example for these methodologies is that of South Pole Carbon. The methodology uses data for annual Scope 1 and Scope 2 emissions of the investees (see endnote 15) and parts of Scope 3 emissions based on Carbon Disclosure Project (CDP) data. In addition, it provides qualitative data related to climate-related key

performance indicators. The methodology can at least in part adjust for double counting. For equities, the model covers 50,000 equities based on reported and modelled data. The model thus uses a mix of reported data and estimated data based on regression models and extrapolation. The results can be accessed on yoursri.com and Bloomberg Screener.

FIGURE 15: OVERVIEW OF KEY METHODOLOGICAL QUESTIONS FOR FE METHODOLOGIES



Source: 2° Investing Initiative (2012a)

**Shortcomings.** FE methodologies currently exhibit a number of shortcomings. First, many of the methodologies do not account for supply-chain and product-use emissions.<sup>14</sup> They also generally do not cover all asset classes. More importantly from a climate perspective, however, FE methodologies only inform on high-carbon investments. A portfolio with low financed emissions does not inform on that portfolios’ contribution to financing a 2°C scenario.<sup>15</sup> They also seem ill suited to inform on risk exposure, given that all types of emissions are treated equally.

**Applications.** As part of the Montreal Pledge, over 40 investors have agreed to do their carbon footprint using financed emissions (as of May 2015). To date, however, it seems that this reporting is largely driven by green marketing and does not inform investment decisions in a meaningful way.<sup>16</sup> While the French government is currently exploring making this reporting mandatory, supported by some asset managers and owners,<sup>17</sup> financial institutions and standardization organizations such as the UNEP-FI GHG-Protocol initiative are increasingly exploring alternatives due to a mix of technical challenges and reservations by banks.

3.1.3 DEFINING GREEN/BROWN RATIOS

**Approach.** An alternative approach to financed emissions and ESG scoring focuses on defining what are green assets and what are brown assets in order to target a share of each of them in investment portfolios. Interestingly, the French public financial institution Caisse des Dépôts et Consignations (CDC), which was a pioneer on ESG assessment in the 2000s and road-tested FE assessments in 2011, is now developing an approach based on green and brown exposure. The main challenge in this regard is defining “green” and “brown” categories (Solactive, 2014). In terms of green assets, the OECD (2013) has identified a number of different approaches. The conclusions highlight the sizeable common intersection of the various definitions

<sup>14</sup> Greenhouse gas emissions are categorized into three groups or “scopes” by the most widely used international accounting tool, the Greenhouse Gas (GHG) Protocol. While scopes 1 and 2 cover direct emissions sources (e.g., fuel used in company vehicles and purchased electricity), scope 3 emissions cover all indirect emissions due to the activities of an organization. These include emissions from both suppliers and consumers.  
<sup>15</sup> Low levels of financed emissions could, for example, simply mean that the portfolio has significant investments in low-carbon sectors that are not related to climate change and energy infrastructure (e.g., finance sector, pharmaceuticals, etc.).  
<sup>16</sup> For example, in 2014 the Nordic fund Nordea assessed the carbon footprint of its fund, but the analysis showed that its lower carbon intensity was due to higher weighting to information technology and healthcare sectors and a lower weighting to energy and materials, rather than a concrete better exposure to “climate solutions” in those fields (Marriage, 2014).  
<sup>17</sup> For example, the French public pension fund ERAFP communicated its GHG footprint in 2014 and is advocating for public financial institutions to do so (RAFP, 2014).

in terms of some sectors (e.g., renewable energy), commodities (e.g., carbon energy credits), services (e.g., waste management) and technologies (e.g., to enhance energy efficiency). Equally, a number of divergences remain (e.g., questions around including nuclear power, changing consensus around biofuels and ambiguity for sectors such as agriculture). The most prominent organization in the context of defining green investments for financial institutions is the Climate Bonds Initiative (CBI). CBI is currently working to create a “Climate Bond Taxonomy” based on an inductive approach of scanning sectors and technologies one by one based on their contribution to a 2° C world (Climate Bonds, 2014).

**Shortcomings.** At this stage, there is still no standard for defining “green” and “brown.” For example, practitioners define the “greenness” of bonds in very different ways (e.g., for corporate climate bonds, they are mostly self-labelled). No robust method or even conceptual framework exists today to define and measure this dimension in a meaningful way. An example of a remaining challenge is the real estate sector, where energy-efficiency investments in buildings may be “greener” than the status quo, but still not in line with 2°C energy-efficiency targets.

**Application.** In the United States, a growing divestment movement has been urging educational and religious institutions, city and state governments, and other institutions that serve the public good to divest from fossil fuels. To date, the “Go Fossil Free” movement has received commitments from 11 colleges and universities, almost 30 cities, and dozens of foundations and religious institutions (Go Fossil Free, 2014). In March 2014, Norwegian Funds started considering a divestment strategy and the Norwegian Pension Fund Storebrand has already divested from 10 fossil fuels firms (Clark, 2014). These initiatives have largely relied on a rough definition of “brown” as fossil fuel assets (e.g., coal, gas and oil).

Another application of this approach is in the area of financial market equity and fixed income indices. Here, thematic indices are developed based on the exclusion of brown assets or focused on green assets. In terms of fixed income indices, Solactive currently offers the only Green Bond Index (Solactive, 2014), although Barclays and MSCI have publicly announced the launch of such an index in July 2014. In terms of equity indices, there are a number of green indices (i.e., RENIXX World, ALTEXGlobal, S&P Global Clean Energy Index, etc.). In terms of policy, there is one notable, albeit peripheral from a global finance perspective, example that stands out. The Central Bank of Fiji mandated in 2012 that all commercial banks in Fiji allocate at least 2 per cent of their deposits and similar liabilities to the renewable energy sector (Reserve Bank of Fiji, 2012).

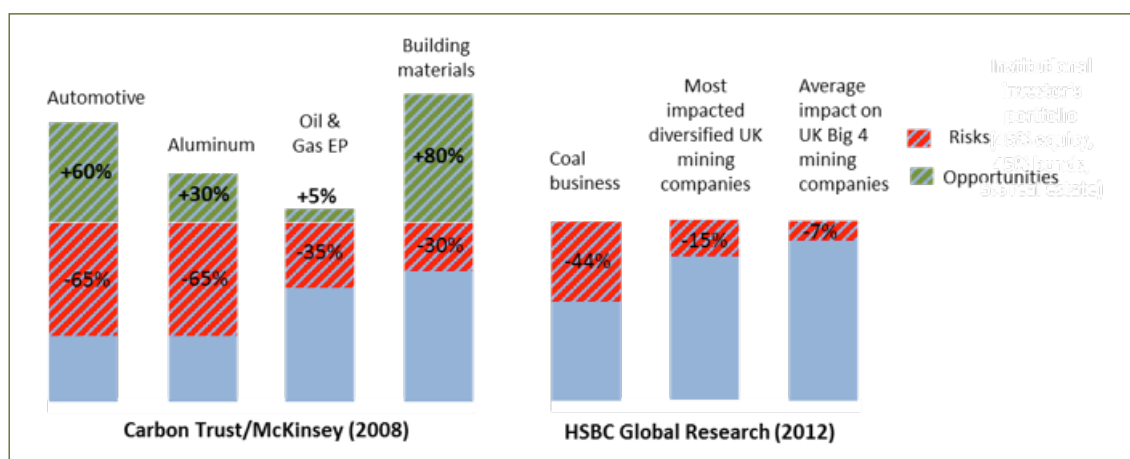
## 3.2. THE CURRENT STATE OF CLIMATE AND CARBON RISK MANAGEMENT

Asset impairment is set to become a growing challenge for households, governments and companies, and by extension, financial institutions (Section 2). While to date issues around carbon risk do not seem material to the majority of financial institutions, risks may become more prominent moving forward. This section will review carbon risk management at asset, investor portfolio and bank portfolio levels.

### 3.2.1 RISK ASSESSMENT AT ASSET LEVEL

**Approach.** Risk assessment at the asset level usually relies on scenario analysis to understand the exposure of high-carbon industries to carbon risks, specifically adjusting discounted cash flow (DCF) calculations to account for higher prices on direct or induced carbon dioxide emissions. These approaches have been piloted by brokerage houses and researchers on climate-sensitive industries. According to several studies, the impact of a 2°C scenario on companies’ valuations can reach up to 35 per cent for oil companies, 44 per cent for pure players in coal mining and 65 per cent for car manufacturers and aluminum producers (Figure 17) (Carbon Trust & McKinsey, 2008; HSBC, 2012).

FIGURE 17: MARKET VALUE AT RISK IN A 2° C WORLD FOR SELECTED STOCKS



Source: 2° Investing Initiative (2012a)

**Shortcomings.** While an analysis at the company level in terms of data availability is somewhat more straightforward, the exercise is complicated when assessing carbon risk at the industry level. Within industries, the ultimate materiality of carbon risks may not be evenly distributed, as many high-carbon assets are at very distinct positions on the cost curve.<sup>18</sup> Moreover, from a financial institution, given short-term time horizons, many of the risks at asset level may not be material from a financial institution perspective.

**Application.** The approach is now starting to be translated into investor tools. In 2013, Bloomberg launched a beta version of a Carbon Risk Valuation Tool based on the approach described above, allowing equity managers to test the impact of low-oil-price and high-carbon-price scenarios on fossil fuel and power equities. It is unclear whether the tool has affected investment decisions to date. In terms of regulation, the U.S. Securities and Exchange Commission (2014) issued an interpretive guidance on climate disclosure in February 2010, including climate and carbon risks. To date, however, the guidance has had little impact on carbon and climate risk exposure by listed companies (Coburn & Cook, 2014).

### 3.2.2 RISK ASSESSMENT AT THE PORTFOLIO LEVEL

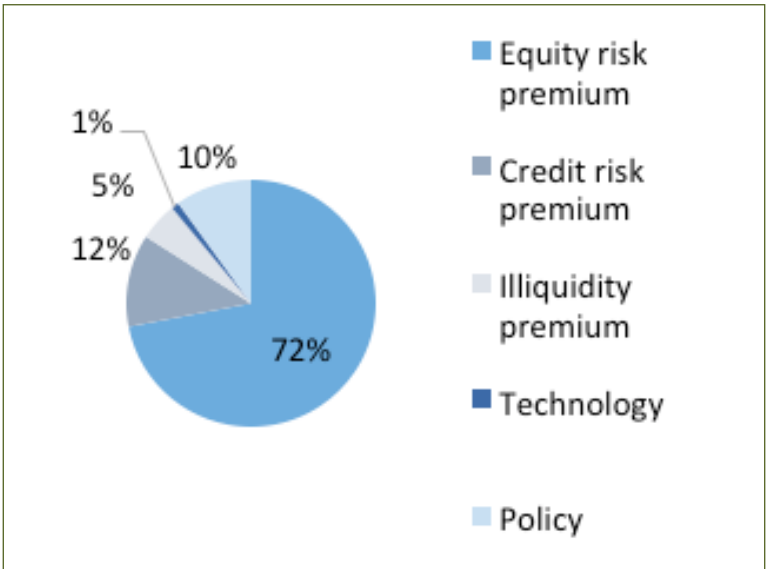
**Approach.** The work of Mercer (2010), the French national pension reserve fund (FRR, 2009) and Green European Foundation (Weyzig, Kuepper, van Gelder, & van Tilburg, 2014) provide the sole examples of a risk assessment framework at the portfolio level published to date. Mercer assessed the potential impact of climate policies and change on various parameters including GDP, investment flows, cost of mitigation and adaptation, etc. They then modelled the impact on the risk-return profile of each asset class (equities, sovereign fixed income, equity, corporate bonds, cash) and some specific sub-categories (renewable equities, agriculture, etc.) to come up with an optimal allocation strategy for each scenario. Mercer concluded that climate policy risks account for about 10 per cent of total risk exposure of an average portfolio (Figure 18). In 2008 the FRR project launched a similar project targeting the definition of investment strategy, with a wider perspective (environment: climate, fossil resources, biodiversity and water). The report for that project (self-labeled as preliminary) proposed to investigate several ways to integrate environmental issues in strategic allocation, on the basis of four (climate) scenarios (FRR, 2009). For each, risk/return ratios are built for different asset classes and discussed in terms of geographic and sectorial impacts.

**Shortcomings.** Beyond methodological limitations, one shortcoming of this approach lies in the fact that most institutional investors have investment horizons shorter than the expected time frame for the materialization of the policy and physical climate risks (See Section 2.3). Consequently, the climate risks are material on paper, but do not necessarily lead to major changes in asset allocation given the current short-term focus of investment frameworks.

<sup>18</sup> The Carbon Tracker Initiative is pursuing a research project to address this question in more detail.

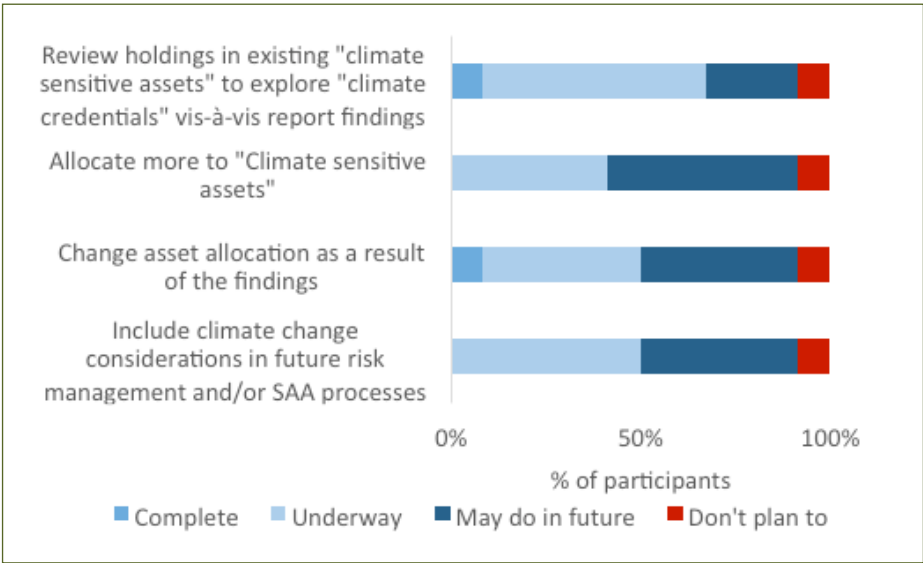
**Application.** One year after release, Mercer (2012) surveyed the 14 institutions that commissioned the research. Among the conclusions, half of the participants decided to include climate change considerations in future risk management and/or strategic asset allocation processes, while 40 per cent were still undecided, and one entity had no plans to make any changes (Figure 19). Participants in the project made the most significant change related to their engagement strategy, showing that asset allocation and investment decision is not always the most powerful tool for investors to address climate change. To our knowledge, the time-horizon issue stated earlier was also the reason for which the FRR did not follow up on its first exercise of integrating environment and climate change in its allocation strategy. It is likely that climate-change-related risks are perceived as immaterial given the time horizon of investment decisions and mandates, and thus not integrated by decision-makers. In the case of FRR, this may explain the decision to end the work on these methodologies.

FIGURE 18: CONTRIBUTION TO RISK FOR REPRESENTATIVE PORTFOLIO MIX IN “DEFAULT CASE”



Source: Mercer (2010)

FIGURE 19: CHANGES FOLLOWING MERCER RISK ANALYSIS AMONG ROAD-TESTERS



Source: Mercer (2012)



### 3.2.3 RISK ASSESSMENT FOR BANKS

**Approach.** Similar to risk assessments for portfolios, carbon and climate risk assessments for banks have been limited. The Green European Foundation (GEF) published the only major study on this topic in 2014. The results showed a limited impact, specifically a 0.4 per cent loss of total assets in the European banking sector and 2.5 per cent for the European pension fund sector. Interestingly, there was a significant European variation among institutional investors, with losses of slightly more than 7 per cent for the Universities Superannuation in the United Kingdom. Beyond this report, UBS has launched an internal review to stress test climate and carbon risks for the bank (the review is ongoing). The stress test will largely focus on climate risks to the institution, but also address carbon risks. There is no public material on the methodological approach of this review.

**Shortcomings.** In terms of the GEF study, the analysis was limited to carbon risks related to fossil fuels and did not take other sectors (e.g., power, transportation, etc.) into account. Moreover, as the study identified, given, again, short-term time horizons, these risks were not material at a significant level for financial institutions. For investors, the report concludes that the calculated losses are comparable to regular developments in overall equity markets over a one-month period.

**Application.** Beyond UBS, there is no known application by a financial institution or policy-maker. However, in the wave of the GHG Protocol and UNEP-FI's work stream on carbon asset risks, one can reasonably expect new road tests in the next few years.

## 3.3. IMPLICATIONS FOR PARALLEL RESEARCH STREAMS

This paper, written for the IISD by the 2° Investing Initiative, is part of a broader focus on greening China's financial system. There are a number of connections between this report and its sister studies, including:

*Regulation of the insurance sector:* Carbon (and climate) risk considerations are likely to be a key part of future insurance regulations. This paper focuses particularly on issues surrounding environmentally related risks and opportunities. The ability for insurers to measure these risks at the asset and portfolio levels are likely to be a key prerequisite for effective regulation and effective implementation by insurance companies (Section 3.2).

*Macprudential regulation:* This research stream addresses the potential financial system risk associated with the impairment of carbon-intensive assets. Here, too, key connections to this report appear with regard to measuring asset impairment risk.

*Monetary policy:* This research stream focuses on the international experience of central banks and regulators that have built environmental and social policy goals into their mandate. Incentives for "climate-friendly" portfolios and target-setting will rely on relevant methodologies.

*Developing debt markets:* This research focuses on policies to support the development of debt markets that encourage lending for environmentally sustainable activities, with particular reference to green bonds. Climate bonds are covered in this paper as one of the ways to support the reallocation of capital from brown to green assets, with a specific focus on defining "green" assets.

In the coming years, a number of key developments can be expected in terms of the methodologies used to measure climate performance and risk, their application and the broader framework.

#### 4.1 EVOLUTION OF CLIMATE PERFORMANCE AND RISKS FRAMEWORKS

The next couple of years are likely to see a significant evolution of climate performance and risk frameworks. In terms of risk assessment:

- The buzz created by the Carbon Tracker Initiative has sparked a form of competition in research on “stranded assets,” involving other NGOs like CERES, universities like Oxford Smith School Stranded Assets program, and sell-side research like Kepler-Cheuvreux and HSBC. U.S. and European foundations are currently planning multi-million multi-year grants on these topics in order to develop the conceptual framework, quantify risks in new sectors and engage with the finance sector.
- The GHG Protocol, UNEP-FI and JP MorganChase will release a draft guidance document on “carbon asset risk” assessment in September 2014. This initiative is expected to lead to further developments and road testing in 2015 and 2016. A dozen of major financial institutions are actively involved in the working groups.<sup>19</sup>
- Mercer is planning to update their risk-based methodological framework in 2014 and 2015 in collaboration with a group of investors and extend the analysis to sector considerations.

There are also developments in terms of climate performance:

- World Resources Institute, Carbon Disclosure Project, and WWF are developing a guidance document to be published by the end of 2014 to help companies set science-based, credible GHG emission reduction targets.
- As outlined above, a number of initiatives are under way to help standardize FE accounting, including internationally by the UNEP-FI GHG-Protocol and in France by the Agence de l’Environnement et de la Maîtrise de l’Energie (ADEME).
- From 2015 to 2017, a consortium of 12 organizations (universities, equity research firms, index providers, etc.) led by the 2° Investing Initiative, in collaboration with a group of investors, banks and governmental organizations, will fine tune and extend the translation of investment needs into financing and allocation targets.<sup>20</sup> The project plan is to develop a methodology to measure the alignment of financial assets and financial portfolios with climate and associated investment scenarios, to address associated data needs, and build financial products (i.e., indices, portfolio optimization tools) based on the methodology.

#### 4.2 VOLUNTARY COMMITMENTS AND TARGET-SETTING

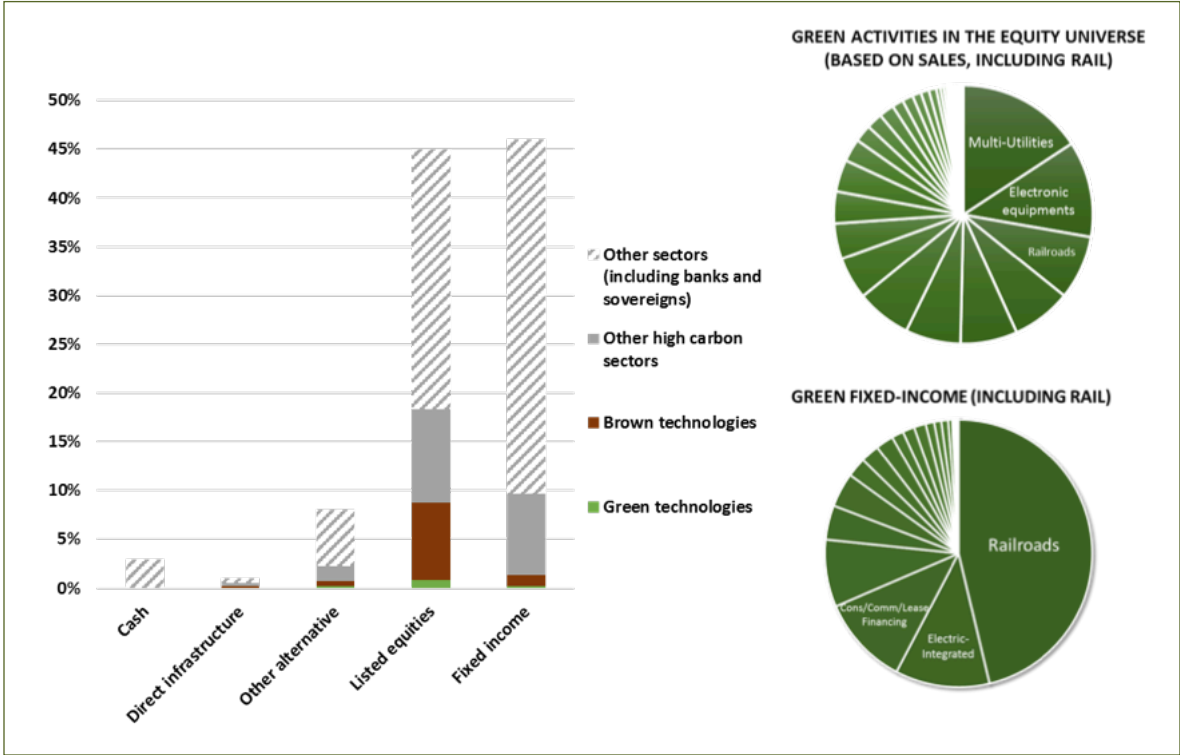
There are increasing calls for investors and banks to align their activities with climate goals. Building on CPI reports findings and the IEA roadmaps, the U.S.-based organization CERES presented a 2014 report at the United Nations headquarters that recommended institutional investors set a goal of 5 per cent of their portfolios allocated to clean energy (Fulton & Capalino, 2014), compared to an estimated exposure of

<sup>19</sup> Participants include, for instance, Bank of America, JP MorganChase, UBS, Citi, Wells Fargo, Deutsche Bank, Unicredit, BNP Paribas, Societe Generale, State Street, Calvert, Prudential, Allianz.

<sup>20</sup> The consortium includes the 2° Investing Initiative, WWF, CDP, Climate Bonds Initiatives, Kepler Markets, University of Zurich, SMASH, and the Frankfurt School of Finance. It has been endorsed by a number of public and private financial institutions, the French and German government ministries, as well as several non-governmental organizations and academic institutions. The project is still at the fundraising stage with the European Commission and other international funders.

1 per cent to 2 per cent today, depending on definitions (Figure 20).<sup>21</sup> It should be noted that these figures are primarily back-of-the-envelope estimates made for public communication rather than the result of academic research meeting science standards. However, these recommendations seem to get traction from climate policy-makers and even lead to an “inflation” in the ambition of targets: in July 2014, Laurent Fabius, French Minister of Foreign Affairs in charge of organizing COP 21, suggested to “set the objective of 10% of standard investment portfolios allocated to green assets in 2020 instead of 1% today” (Le Figaro, 2014). In this context, there is likely to be a significant debate around COP 21 for mobilizing financial institutions as partners for financing the transition to a 2° C world.

FIGURE 20: CURRENT EXPOSURE OF A REPRESENTATIVE INSTITUTIONAL INVESTOR’S PORTFOLIO TO GREEN AND BROWN ASSETS



Source: Estimates 2° Investing Initiative, based on MSCI ESG Research data (2014)<sup>22</sup>

### 4.3 POTENTIAL IMPLICATIONS FOR FINANCIAL PUBLIC POLICIES

The trend is increasingly pointing in the direction of mobilizing financial policies and regulatory framework as tools to drive capital towards financing the transition to a low-carbon economy. In this context, there will be an increased focus both on transparency around disclosure and reporting, and on having a sufficient level of sophistication in terms of metrics to provide for targeted incentives. Table 2 provides an overview of existing financial policy tools that can potentially embed climate mitigation targets or carbon risk assessment. A specific example is the current EU proposal for revising the Directive on Institutions for Occupational Retirement Provision (IORP). Article 29 of this proposal requires climate stress testing for these institutions. However, without the associated stress-testing frameworks, this article will likely face significant barriers to implementation.

<sup>21</sup> There are significant limitations to this assumption, including questions around how to measure the “green” exposure associated with investments in sovereign bonds and investments in financials where the footprint is unclear.

<sup>22</sup> Assumptions and categories: The list of green innovators from MSCI ESG Research is used to apply the thematic revenue (per cent of green exposure of a company) to estimate the part of green activities in major indexes. In this case, CAC 40, Stoxx 600, S&P 500, Dax 30, FTSE 100, MSCI World and MSCI ACWI are represented without any duplicate. From the five categories used for environmental innovators, only green building, alternative energy and clean technology are kept, while sustainable water and pollution prevention are ignored. The sector classification used is GICS level 4 (Sub-Industry), being matched with ISIC and NAICS. The railroad sector is considered as 100 per cent green, whatever the thematic revenue from MSCI is. Brown technologies are mainly oil and gas and coal companies, while other high-carbon sectors are highly exposed to energy-efficiency challenges.

TABLE 2: POTENTIAL POLICY INSTRUMENTS FOR INTEGRATING GREEN FINANCE CONSIDERATIONS

TYPE	INSTRUMENT	EXAMPLE
Monetary Policy Instruments	A carbon-linked monetary instrument	“Create carbon assets that can serve as legal reserves with central banks”
	Collateral frameworks	“Improve the liquidity of ‘green’ assets through preferential treatment in collateral frameworks”
Financial Regulation	Stress testing	“Integrate carbon risks into stress-testing frameworks”
	Capital reserve requirements	“Expand the scope of portfolio matching by insurers in the context of capital reserve directives”
	Lending guidelines	“Establish guidelines for integrating environmental considerations and risks into investment processes”
	Lending mandates	“Establish lending restrictions for ‘high-damage’ sectors”
	Mortgage markets	“Provide incentives for climate-friendly home ownership in the framework of mortgage origination”
	Carbon markets	“Design carbon markets under a regulatory auspice that guarantees transparency”
	Benchmarks	“Mandate ‘diversification assessments’ of mainstream indices and strengthen associated reporting”
	Credit rating regulation	“Strengthen the rules regarding carbon risk reporting”
Public Incentives	Tax incentives	“Provide tax incentives for savings’ interest and pension fund benefits that invest in low-carbon assets”
	Public banks	“Leverage public banks to increase private investment in ‘green’ assets”
Accounting & Disclosure	Developing new metrics	“Invest in developing and adopting more sophisticated carbon metrics reflecting both climate-friendliness and carbon risk concerns”
	Rules governing Key Information Documents (KIDs)	“Integrate climate-friendliness and carbon risk indicators in KIDs”

Source: 2° Investing Initiative (2013c)

## IMPLICATIONS IN THE CHINESE CONTEXT

The paper has focused on one type of environmental reporting—that related to climate change. The focus in this regard allows for a detailed description of the conceptual framework, the current state of the art in terms of methodologies and their application, and the remaining challenges and expected developments. Despite the chosen focus, it is important to highlight that the analysis can be extended to all types of environmental accounting and methodologies. This chapter will review the potential implications of the analysis for the Chinese policy context.

### 5.1 IMPLICATIONS FOR THE IMPLEMENTATION OF THE GREEN CREDIT GUIDELINES

The current assessment framework with regard to the Green Credit Guidelines and the Enterprise Environmental Credit Evaluation is aligned with international practices. At the same time, the assessment framework faces a number of challenges. First, the framework provides room for improvement with regard to providing quantitative indicators. Second, the framework does not inform quantitatively on the alignment of the banking sector with the environmental policy goals of the Chinese government. Third, a number of avenues remain to be explored in terms of integrating these indicators into policy frameworks.

To allow Chinese policy-makers to measure the alignment of the Chinese banking sector activities with environmental policy goals and create associated policy incentives, we recommend the development of new metrics that allow the Chinese government to measure the alignment of banks' loan books and investors' portfolios with the 5-year plans.<sup>23</sup> The objective of the indicator is to measure the alignment of a bank's financial activities with the Chinese environmental policy goals. In particular, the focus could be on the investments in the “two highs and one over” and strategic sectors and whether they diverge from the policy path. The research project can be linked to existing international research projects, notably in Europe,<sup>24</sup> or operate independently. The objective of the research project should be a turnkey indicator for policy-makers, regulators, bank officials and investors.

Associated with the indicator are improvements in reporting and disclosure. Corporate reporting guidelines should be updated to facilitate adoption of the new indicator. Similarly, the Chinese government can use the indicator to report on the progress of the Chinese finance sector in aligning with policy goals.

Beyond changes in reporting frameworks, the indicator can also be associated with direct incentives related to adoption, which can be road tested at the provincial level. These incentives can be related to the adjustment of interest rate regulations for green savings accounts (defined on the basis of these metrics), fiscal incentives for “best performers” on the part of financial institutions and the adjustment of the Enterprise Environmental Credit Evaluation ratings system based on the loan book indicator to facilitate credit intermediation to better performers. Beyond policy incentives for commercial finance sector institutions, a direct policy application of this proposal could relate to the mandatory adoption by the Chinese policy banks. First, this would ensure the alignment of its activities with policy goals and, second, it could act as a “road test” for the adoption by the Chinese commercial state-owned banks.

<sup>23</sup> Given that the current Five-Year Plan is set to expire in 2015, this policy proposal is based on the expectation that a 13th Five-Year Plan will be developed for the time frame 2016–2020. Hypothetically, the assessment framework does not rely on five-year policy plans, but can also operate with market-developed “transition roadmaps.” In the case of climate change, the role model in this regard is the *IEA World Energy Investment Outlook*, which maps the energy-technology and investment roadmap for 2035 and 2050.

<sup>24</sup> In Europe, a consortium led by the 2° Investing Initiative is planning a research project set to begin in November 2014 that will develop a European assessment framework to allow companies and financial institutions to measure the alignment of their portfolios with climate goals.

## 5.2 FINANCIAL RISKS RELATED TO GREEN FINANCE

China's path towards a sustainable growth model will be associated with a transformation of the economic model. As outlined in the sister papers to the 2<sup>o</sup> Investing Initiative report (see, for example, *The Risks and Opportunities of Stranded Assets*), a significant challenge will relate to ensuring a smooth and low-cost transition. This relates in particular to the potential cost of so-called stranded assets. Stranded assets are defined as “assets that have suffered from unanticipated or premature write-downs, devaluations, or conversion to liabilities” (Smith School of Enterprise and the Environment, 2015). In the Chinese context, these are particularly likely to appear in the “two highs and one over” industries (industries with high energy consumption and high pollution or overcapacity). Better risk metrics proposed above can help to manage these risks and provide policy guidance on reducing these risks for the relevant agencies represented in the National Energy Commission, notably the Ministry of Land and Resources, the Ministry of Housing and Urban-Rural Development, and the Ministry of Environment Protection.

## 5.3 DEVELOPMENT OF THE ASSET MANAGEMENT INDUSTRY

In the context of the Chinese push to grow the asset management industry, a key step will be avoiding the “legacy” costs incurred by the European and American asset management industry that relies on high-carbon financial products. A key component of these legacy costs are benchmark equity and bond indices, notably cap-weighted equity indices, that act as sector allocation guidelines, despite their misalignment with market diversification and low-carbon transition roadmaps.<sup>25</sup> The developing industry also constitutes a window of opportunity to develop environmentally friendly alternatives that are, unlike their European and American counterparts, both connected to policy goals and enjoy public sector incentives.

In the context of the development of the asset management industry, there is an opportunity to mandate one of the major Chinese stock exchanges (e.g., Shanghai Stock Exchange) to develop an investable equity index series, which overall, and based on its constituents, is aligned with the Chinese environmental policy goals. In the context of the momentum around COP 21, Europe has seen a number of such climate-related indices developed in recent months. Particularly with a view towards COP 21, China can contribute to putting the Chinese asset management industry on a similar decarbonization trajectory through providing policy-related indices as investment tools. Here too, indices can be associated with relevant disclosure requirements by the exchanges, both for climate-related and non-climate-related indices, and potential policy incentives for the adoption of these indices.

<sup>25</sup> In 2012 the share of the oil and gas sector in the total capital expenditure of major cap-weighted indices (S&P500, FTSE100, MSCI World, Stoxx600) was between 30 and 45 per cent of total capital expenditure, relative to an estimated 10 per cent share of all global listed equities (2<sup>o</sup> Investing Initiative, 2014a).

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## FULL LIST OF WORKING PAPERS FOR THIS PROJECT

### PHASE ONE WORKING PAPERS

- *China's Green Finance: Status Quo, Issues and Future*, Development Research Center of the State Council
- *Using Innovative Policy and Regulatory Approaches to Incentivize the Alignment of Investment Strategies with Sustainability Considerations*, Jessica Robinson, Association for Sustainable & Responsible Investment in Asia
- *Integrating Environmental Risks into Asset Valuations: The Potential for Stranded Assets and the Implications for Long-Term Investors*, Nick Robins, HSBC Climate Change Centre of Excellence (now co-Director UNEP Inquiry)
- *Introduction to Institutional Investor Fiduciary Duties*, Keith L. Johnson, Institutional Investor Services Group, Reinhart Boerner Van Deuren s.c.
- *Governance, Accountability and Transparency: Advancing Green Finance*, Mariana Silva, International Institute for Sustainable Development
- *Growing a Green Bonds Market in China*, Sean Kidney and Pdraig Oliver, Climate Bonds Initiative

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- *Internalizing Climate Mitigation for Financial Policy-Makers*, Sony Kapoor, Re-Define
- *Greening China's Bond Market*, Sean Kidney, Pdraig Oliver and Beate Sonerud, Climate Bonds Initiative
- *Monetary Policy and Green Finance: Exploring the Links*, Pierre Monnin and Alexander Barkawi, Council on Economic Policies

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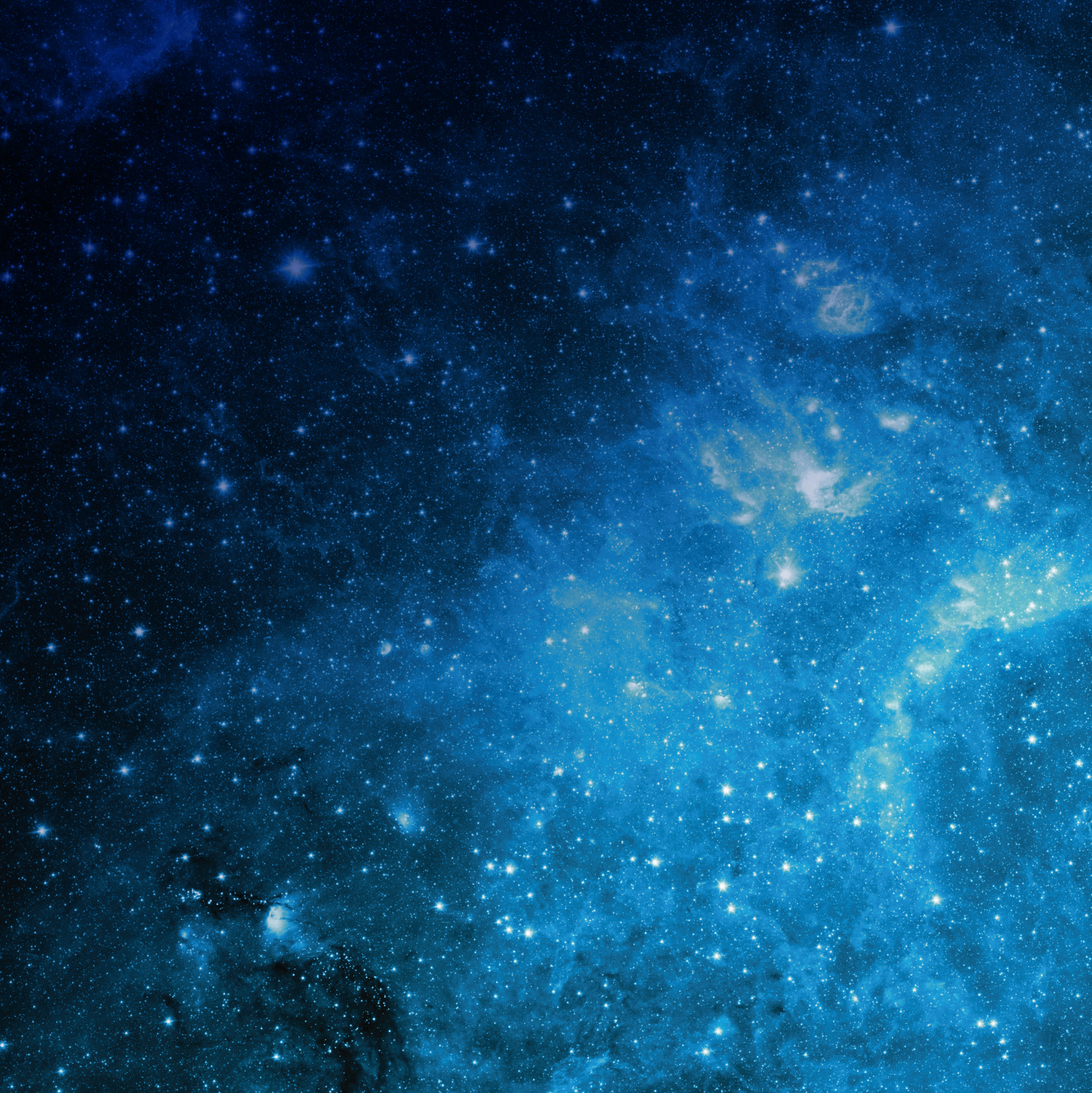
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