China's path to a green economy

Decoding China's green economy concepts and policies

Xiaoxue Weng, Zhanfeng Dong, Qiong Wu and Ying Qin

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About the authors

Xiaoxue Weng, Researcher, Natural Resources Group, IIED. Email xiaoxue.weng@iied.org

Dr. Zhanfeng Dong, Associate Professor, Vice Director, Chinese Academy for Environmental Planning, Ministry of Environmental Protection, PRC

Qiong Wu, Research Assistant, Chinese Academy for Environmental Planning, Ministry of Environmental Protection, PRC

Ying Qin, Research Assistant, Chinese Academy for Environmental Planning, Ministry of Environmental Protection, PRC

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International Institute for Environment and Development
80-86 Gray's Inn Road, London WC1X 8NH, UK
Tel: +44 (0)20 3463 7399
Fax: +44 (0)20 3514 9055
email: info@iied.org
www.iied.org

@iied
www.facebook.com/theIIED

China's transition to a green economy has immense implications for sustainable development both domestically and worldwide. Yet China's green economy policies, concepts and actors still remain poorly understood in the emerging international discourse on the green economy. This report serves as an introductory guide to China's green economy thinking by i) tracing the evolution of China's green economy thinking of the last 40 years, ii) mapping key macro policies that shape China's green economy prospects today, iii) identifying relevant sectoral policies and players in finance, environmental industry, energy, forestry, urbanisation and industrial production, and iv) examining stakeholder groups, unique traits and areas for further exploration.

Contents

Key words of China's green economy policy discourse

Ecological Civilisation生态文明

A political vision emphasising the ecological quality and sustainability of China's economic development. First introduced in 2007 by former president Hu Jintao, it gained political traction at the 18th National Congress in 2013. See page 9 for details.

Ecological Red Line 生态红线

An environmental zoning line to ensure minimum space required for ecological health in environmentally vulnerable regions. Closely linked to China's national spatial planning. See page 13 for details.

Main functional areas 主体功能区

China's national spatial planning policy dividing and categorising areas into four different zone types (further high-quality development, further development, restricted development, and no development zones). See page 13 for details.

12th Five-Year Plan 十二五规划

Five-year plans formulate China's central macro development direction. The 12th Five-Year Plan covers the period from 2011 to 2015. For the first time a whole chapter is devoted to 'green development,' clearly proposing the idea of green and low carbon development. See page 11 for details.

Scientific Outlook on Development 科学发展观

A political vision proposing a balanced and sustainable model of development. Put forward in 2003 by former President Hu Jintao, it champions a technocratic approach to development. See page 8 for details.

Circular Economy 循环经济

A concept to decouple growth from resource constraints. Widely adopted by the Chinese government, as illustrated by the 2009 'Circular Economy Promotion Law'. It involves three levels in China: eco-cities (macro), eco-industrial parks (meso) and clean production and designs (micro). See page 20 for details.

Ecological Compensation 生态补偿

Similar to the internationally recognized concept of payment for ecosystem services, China's ecological compensation aims for resource users to pay for usage and compensate those affected by their usage. China has issued 29 national level policy documents related to ecological compensation. The payment mainly comes from governmental financial transfers. See page 32 for details.

National Development and Reform Commission (NDRC) 国家发展和改革委员会

One of the most influential players shaping China's green economy agenda. The NDRC is a 'super-ministry' overseeing China's macroeconomic planning and social development across all aspects of China's economy. With almost unrivalled power vis-à-vis other ministries or government agencies, it plays a critical role by setting prices, targets and regulations relevant to green economy implementation (Yuan *et al.* 2006; Gore 2011).

Summary

China's transition to a green economy has immense implications for realising sustainable development worldwide, combating climate change and exploring new development models for other developing countries. To shed light on China's green economy thinking – beyond much-discussed single issues such as renewable energy investment or carbon targets – and to incorporate the Chinese perspective into the emerging global green economy discourse, this report will:

i. Trace the evolution of China's green economy thinking over the last 40 years.

ii. Map important macro policies shaping China's green economy prospects today.

iii. Identify key sectoral policies and players.

iv. Discuss main stakeholders, unique characteristics of China's green economy thinking and areas for further exploration.

First, the authors find that China's green economy thinking is embedded in its economic development history since the 1978 reform and opening up policies. Whereas early development policies were concerned with 'end-of-pipe' basic environmental protection work, today's policies promote broader sustainability within China's overall development strategy epitomised by slogans such as 'green development' and 'ecological civilisation'.

Second, the report finds three macro policies to be significant in shaping China's overall green economy planning today, and sheds light on them: the 12th Five-Year Plan, the Main Functional Areas policy (China's national spatial planning) and the amended Environmental Protection Law.

Third, at the sector level, we focus on finance, environmental industry, energy, forestry, urbanisation, and industrial production where there is progress in the green economy transition and identify key policies and players contributing to it.

Fourth, we examine key stakeholders' interests and influence in driving China's green economy agenda. We also discuss two defining characteristics of the various policies presented: the piloting approach and the incomplete links between national and local planning which result in implementation gaps. Finally, we identify areas for further research, namely, finding the appropriate indicators and assessment methods, addressing the leakage issues associated with China's growing consumption through global trade, and improving the inclusivity of the decision making and implementation processes of innovative green economy policies.

As the world's second largest economy and a political heavyweight, China is increasingly judged not only by its domestic achievements, but rather by its efforts to reduce the country's global environmental impacts by shifting away from the brown economy. This report captures and explains China's current path away from the brown economy towards a greener future.

Introduction

China's green economy ambitions are of critical importance. They matter not only to the 1.4 billion people within its borders, but to the rest of the world as well. Success or failure of the transition to green economy will determine China's carbon emissions, investments, and consumption patterns as well as the model of economic development set for other fast-growing economies in the global south.

The Chinese government has launched a number of far-reaching policies targeting renewable energy, energy efficiency and industrial production in the last decade. These policies are but the visible end of China's endeavours to greening its economy. Indeed, the government's overall strategy aims at a wide range of sectors, encompassing macro-level planning and the mobilisation of various stakeholder groups. The efforts – and society's push for a more environmentally friendly development path – have given birth to some uniquely Chinese concepts and implementation mechanisms.

Outside China, despite the enormous scale and importance of the changes underway, discussions of the Middle Kingdom's green economy policies still mostly revolve around renewable energy investment and carbon emission reduction. The nascent global green economy discourse has paid insufficient attention to the Chinese approach. Only a few studies have presented a more comprehensive picture of the policies at the heart of China's green economy transition.

This is partially due to the distinctive Chinese terminology (for example ecological civilisation). Another challenge is that China's green economy policies sit within broader national development planning, such as the Five-Year Plans. This has made it difficult for international policymakers and researchers to identify the relevant Chinese policies and stakeholders.

Objectives

This report will:

i. Trace the evolution of China's green economy thinking over the last 40 years (Chapter 1).

ii. Map important macro policies shaping China's green economy policies today (Chapter 2).

iii. Identify key sectoral policies and players in finance, environmental industry, energy, forestry, urbanisation, and industrial production (Chapter 3).

iv. Discuss main stakeholders, unique characteristics of China's green economy discourse and areas for further research (Chapter 4).

The report is intended for the following audiences:

- For international researchers, practitioners and policymakers in the green economy to better understand and engage with the Chinese perspective.
- For developing country policymakers to be informed about the Chinese approach to the green economy, including a comprehensive view on its macro and sectoral policies and players.
- For Chinese policymakers and researchers to connect with the international audience, adding the Chinese voice to the global green economy discourse.

'Outside China, despite the enormous scale and importance of the changes underway, discussions of the Middle Kingdom's green economy policies still mostly revolve around renewable energy investment and carbon emission reduction.'

Methodology & Scope

The authors carried out extensive literature review (both primary and secondary) and conducted key informant interviews. As much as possible, we relied on original Chinese policy documents and referred to secondary literature for contextualisation only.

We have attempted to be more cross-sectoral, comprehensive and detailed than some of the existing literature. Given the large volume of relevant policies, however, the policies and stakeholders listed here are not exhaustive. As our focus lies on mapping policies and actors, it is also beyond the scope of this report to evaluate the progress of those policies and China's transition to a green economy. Finally, we do not provide in-depth knowledge about each sector. Readers are advised to consult the existing literature for this purpose.[1]

BOX 1: DEFINING GREEN ECONOMY

This report borrows UNEP's green economy definition: '*an economy that results in improved human well-being and reduced inequalities over the long term, while not exposing future generations to significant environmental risks and ecological scarcities (UNEP 2010).'*

This definition is suitable for analysing China, as it allows for capturing the vast array of policies relevant to greening China's economy and achieving sustainable development.

Importantly, China does not have a set of so-called green economy policies. The government has used various terms such as 'ecological civilisation' and 'green development', but official rhetoric does not feature the term 'green economy'.

This report has cast a wide net to identify those Chinese policies and actors fitting the UNEP definition.

[1] See Zadek & Zhang (2014) for green finance, UNEP (2013) for the five sectors (solar, wind, bioenergy, cement and the environmental industry), Pan ***et al.*** (2011) for green jobs created.

The evolution of China's green economy thinking

China's green economy path has deep historical roots. This chapter traces the evolution of this path through prominent policy concepts employed over the last four decades.

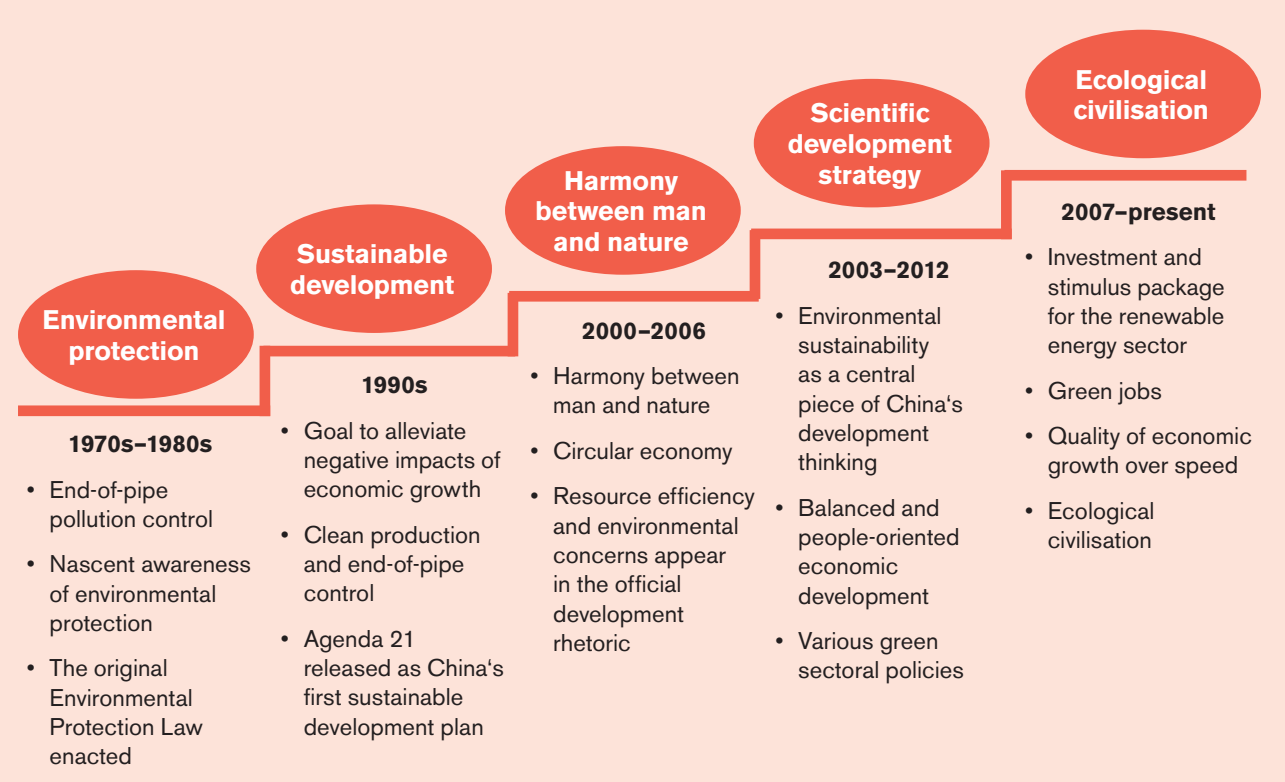
1

China's green economy thinking is closely linked to its history of economic growth and environmental degradation. Since the economic reforms of the 1970s, which made the economy boom but the environment suffer, Beijing has wrestled with balancing environmental protection and economic growth. The beginnings of China's environmental protection efforts consisted of little more than 'end-of-pipe' pollution control. This has changed. China's development strategy has made considerable progress in acknowledging the importance of environmental protection. We explain the evolution in five stages below.

1. 'End-of-pipe' pollution control: green economy's cradle (1970s–80s)

China kicked off its environmental protection efforts by attending the United Nations Conference on the Human Environment in Stockholm in 1972. One year later, Beijing hosted the first National Environment Conference and began considering environmental issues along with economic development. In this period, the original Environmental Protection Law was enacted, laying the legal foundations for environmental protection in China. At the second National Environment Conference in 1983, environmental protection was officially labeled a fundamental national policy to which the country must adhere in the long term. The guiding principle was to synchronise planning, implementation and development of economic development, urban and rural development, as well as environmental protection so as to achieve economic, social, and environmental benefits simultaneously (Li and Li 2011). The government for the first time paid attention to pollution problems and ecological damages resulting from excessive economic growth. However, most of the attention focused on the 'end-of-pipe' pollution control (i.e. where clean-up technology is added to a production or management system, rather than changing the fundamental process itself) rather than economic greening.

Figure 1: The Five-Stage Evolution of China's Green Economy Thinking[2]



[2] By the authors; note that the time frames in the figure are for illustrative purposes only, there may be overlap across time periods.

2. Sustainable development: green economy's initiation stage (1990s)

As a follow-up to the Agenda 21 of the United Nations Conference on Environment and Development in 1992, China was the first country to release a nationwide Agenda 21. The document detailed China's strategic sustainable development plan and laid out the blueprint for the country's economic and social development as well as environmental protection. Its aim was to balance the relationship between social and economic development, environmental protection and rising pressures on resource use.

In the 1990s, the 9th Five-Year Plan called for implementation of a sustainable development strategy and the transformation of the economic growth model. The guidelines at this stage mainly focused on alleviating the environmental and ecological impacts caused by economic development. The government also started to promote clean production as well as 'end-of-pipe' pollution control (Li and Li 2011). As the country sought for practical solutions to its numerous environmental problems, this period marks the beginnings of green economy thinking in China.

3. "Harmonious relationship between man and nature": green economy's exploration stage (2000–2006)

As China entered the 21st century, it faced acute environmental crises. The ancient Chinese ideal of harmony between man and nature resurfaced and, in 2002, was integrated into the slogan of building a 'well-off society'. Its main goals were to 'develop sustainably, improve the ecological environment, enhance resource efficiency, promote a harmonious relationship between man and nature, and push the entire society towards a productive, prosperous, and ecological development pathway.'

In 2005, Hu Jintao first advanced the idea of promoting a circular economy and building a resource-saving and environment-friendly society (also known as Two-Type Society). Later that year, the State Council issued the 'Proposals on Accelerating the Development of Circular Economy' to reduce resource consumption. The Two-Type Society idea was later incorporated into the 11th Five-Year Plan, listed as a necessary step for building a harmonious socialist society. The exploration stage witnessed the acceleration of China's green economy development and the incorporation of environmental needs into national-level plans and strategies.

4. Scientific Outlook on Development: green economy's rapid development stage (2003–2012)

At this stage environmental concerns became mainstream within China's development policy thinking. In 2003, Hu Jintao put forward the concept of 'Scientific Outlook on Development.' China's reform and development processes were to adhere to a people-oriented principle by constructing a comprehensive, balanced and sustainable development model. China was also to strike the balance between urban/rural development, cross-region development, economic/social development as well as the man/nature relationship. The 'Scientific Outlook on Development' became a long-term guiding principle of the Chinese Communist Party. During this period, the green economy agenda became implanted, if not fully integrated, into the country's development strategy and new green policies mushroomed across various sectors (see Chapter 2).

5. Ecological civilisation & the Stimulus Package: green economy's deepening stage (2007–present)

The current period can be considered as the 'great-leap-forward' of China's green economy agenda both conceptually and implementation-wise. In the conceptual domain, the term 'ecological civilisation' first appeared in the 17th National Congress of the Communist Party as part of the process to construct a well-off society. The concept received unprecedented political attention at the 18th National Congress in 2013 and was injected into the national development process, taking its place next to economic, political, cultural, and social construction. Most recently, in 2014, the National Congress discussed the practical institutional mechanisms for its implementation.

In the implementation domain, China has made important progress. The prime example is the stimulus package (4 trillion RMB, approximately US$586 billion) implemented in the aftermath of the 2008 financial crisis. A significant share was earmarked for green investment, facilitating the rapid growth of China's renewable energy sector and green jobs (China Environment 2014). The stimulus package contributed significantly to financing the beginnings of China's green economy transition. Most recently, the central government has revised down its economic growth targets and passed a progressive environmental law, reflecting Beijing's commitment to greening its economy.

In conclusion, China's green economy thinking originated in the basic 'end-of-pipe' environmental protection policies of the early 1970s. Since then, it has matured significantly as the government has mainstreamed environmental sustainability within its development strategy. Recent policy decisions suggest that the green economy will continue to be a driving force in China's development strategy and policies in the near future. In the next chapters, we turn to the specific policies affecting the implementation of China's green economy agenda.

Macro-level Policies

In this chapter, we turn to three macro-level policies impacting China's green economy transition today and in the near future: the 12th Five-Year Plan, the national spatial planning policy and the newly amended environmental law.

2

Although not explicitly labelled as 'green economy' policies, the 12th Five-Year Plan, the national spatial planning policy and the newly amended environmental law are projected to play a significant role in guiding China's green economy transition at the macro level. First, the 12th Five-Year Plan, drawn up in 2010, is the government's single most important policy document, as it outlines the overall national development strategy between 2011 and 2015. Second, the spatial planning policy divides the country into four types of development functional zones based on environmental considerations. Taking effect in 2020, it embodies China's future sustainable development framework. Lastly, the newly-amended environmental protection law will likely play a crucial role in providing a solid legal foundation for environmental protection efforts, monitoring polluting industries and safeguarding the public's interests. Full implementation of the amended law will be challenging, however.

Who is involved?

The National Development and Reform Commission (NDRC) and the Ministry of Environmental Protection (MEP) for guiding policy formulations; the central government's leadership (the Chairman, the Politburo standing committee and the State Council) for embedding the green agenda into macro-level planning.

12th Five-Year Plan: China's national development plan

The cornerstones of China's national development strategy, Five-Year Plans steer the nation's overall economic development, covering economic growth, social policies as well as environmental protection. The influence of the current Five-Year Plan (2011–2015) on China's transition to a green economy cannot be overstated. The 12th Five-Year Plan features an entire chapter on green development. Relevant issues addressed include renewable energy, climate change, resource efficiency, circular economy, pollution control, ecological conservation, and natural disaster prevention.

'The 12th Five-Year Plan, the national spatial planning policy and the newly amended environmental law are projected to play a significant role in guiding China's green economy transition at the macro level.'

Table 1: Major Policy Targets in the 12th Five-Year Plan[3]

AREAS	TARGETS	FEATURE OF TARGET
Economic Growth and Structure	Average annual GDP growth of 7%; service industry contributing 47% to GDP; urbanisation rate reaching 51.5%	Anticipatory
Energy, Climate and Environment	*Energy consumption per unit GDP* dropping to 0.869 t coal equivalent (at 2005 prices), a decrease of 16% compared to 2010 and 32% compared to 2005 levels Achieving *energy savings* of 670 million t of standard coal during 2010–2015 Reducing *carbon emissions per unit GDP* by 17% compared to 11th FYP target *Non-fossil energy* in primary energy consumption rising to 11.4% Lowering *water consumption* per unit of industrial added value by 30% National total *chemical oxygen demand and sulfur dioxide emissions* not exceeding 23.476 million t and 2086.4 million t, a decrease of 8% compared to 2010 levels National total *ammonia and nitrogen oxide emissions* not exceeding 2.38 million t and 2046.2 million t, a reduction of 10% compared to 2010 levels *Forest coverage* rate rising to 21.66 % of the land area; forest stock volume reaching 14.3 billion cubic meters *Cultivated land area* staying stable at 18.18 million hectares	Binding
Economic competitiveness	R & D expenditure increasing to 2.2 % of GDP Strategic emerging industry accounting for ~8% of GDP	Anticipatory
Social Development	Average annual increase in the number of new jobs in cities and towns topping 45 million Urban unemployment rate staying below 5%	Anticipatory

[3] Extracted from the 'PRC's national economic and social development 12th Five-Year Plan outline'. Note: Binding indicators are those which must be completed during the planning period; anticipatory indicators are those that are non-binding, instructive, but which the Chinese government will attempt to achieve through policy support, incentives etc.

China's national spatial planning policy: Main Functional Areas

National spatial planning is of critical importance for China's green economy transition given the huge regional disparities in resource availability and socio-economic development. In June 2010, the State Council (China's cabinet) approved the 'National Main Functional Area Planning,' which sections the country's vast territory into distinct function zones: further high-quality development, further development, restricted development, and no development zones. The policy, 'an ecological security strategy planning,' is an important measure for ensuring China's ecological and food security. The restricted development zone is indeed divided into two sub-areas: agricultural production areas and key ecological functional areas. Figure 2 shows the latter, which covered 40.2% of China's land area at the time of drafting the 12th Five Year Plan (the General Office of the State Council, 2011). Planners pledged that implementation rely on market-based mechanisms, utilising an ecological compensation mechanism (a Chinese variation of payments for ecosystem services).

Another important concept relevant to spatial planning is ecological red lines. In 2011, two policy documents, 'The State Council Suggestions on Strengthening Environmental Protection Work' and 'The National Environmental Protection 12th Five-Year Plan' proposed to conduct environmental function zoning by drawing 'ecological red lines' in ecologically sensitive areas (both terrestrial and marine), as well as to develop appropriate environmental standards and environmental policies for the various types of main functional areas. In January 2014, the Ministry of Environment issued the 'National Ecological Protection Red Lines – Technical Guide to Ecological Function Baseline Delineation (Trial),' urging the authorities to complete the 'national ecological protection red line' demarcation work. The aim is to ensure 'the minimum space required for ecological health,' developing those areas with special attention to ecological wellness. The proposed concept is an important text outlining China's sustainable green economy development. See Box 2 for an on-the-ground implementation example.

Figure 2: China's Key Ecological Functional Areas within the Restricted Development Zone

Image by authors

BOX 2: JIANGSU PROVINCE DRAWING ECOLOGICAL RED LINES FOR SAFEGUARDING GREEN SPACES

In Jiangsu province the ecological red line concept has been put into practice. One of China's economic powerhouses, the province nestling in the Yangtze River delta ranked second in GDP output among the 31 provinces in 2013. But the economic boom of the past decades has taken a heavy toll on the environment. To realise sustainable development, Jiangsu's provincial government issued the 'Eco-regional Conservation Planning Red Line in Jiangsu Province' in 2013. It assigns one of 15 eco-red categories to a total of 779 areas: nature reserves, scenic spots, forest parks, geological heritage protection areas, wetlands, drinking water source protection area, special marine protected area, flood regulation and storage area, important water conservation district, important fishing area and wetlands, water channel maintenance area, ecological forests, Taihu important protected area, as well as special species protected area. In total these eco-red regions cover ~24,000km^2, around a fourth of the province's total area. Development is strictly prohibited in these protected areas. The Jiangsu model is one example of how provinces and cities adopt and implement the concept of ecological red line in practice. (National Bureau of Statistics China 2013).

The amended Environmental Protection Law: the legal basis for China's green economy

The amended 'Environmental Protection Law', passed in April 2014, is a milestone in China's environmental policymaking. If implemented successfully, it will shape China's green economy transition in the years to come. As frequently noted, China's current economic structure and environmental safeguards still resemble those of developing rather than developed countries. China is scarred by dirty industrial production, weak local government oversight, lack of a systematic policy for environmental impact assessment, an undeveloped environmental litigation system, and little environmental awareness among the public. The amended Law could address these issues by providing a solid legal basis for more comprehensive environmental protection work. China's strictest environmental law to date, it could offer the much-needed basic incentives for China's green economy transition (ChinaIRN 2014).

Five points are particularly noteworthy. The Law:

1. *Provides the legal basis for obligatory environmental protection without renouncing economic development*. The amendment stipulates that the country should pursue economic and social development in accordance with environmental protection. By elevating the sustainable development principle to the legal sphere, the government shows its determination for turning environmental protection into a fundamental strategic national policy.
2. *Establishes a responsibility monitoring and evaluation system for government officials.* The new Law emphasises higher government offices' accountability for lower government offices' environmental performance, thereby incentivising local government cadres better to carry out environmental protection work. Officials will be monitored and evaluated according to environmental performance targets.
3. *Sets up a day-based punishment system for polluting parties*. The original 1989 Law only allowed for local governments to issue one-time fines to polluting companies. Companies often found that paying fines was cheaper than complying with the regulations. The new Law prescribes that penalties be increased day-by-day with no ceiling limit.
4. *Stipulates information disclosure and public participation.* The amendment affirms the public's right to know, participate and supervise government offices and polluting companies. All levels of environmental departments are to disclose environmental information and improve the public participation process. The amended Law also calls for key polluting companies to release their emission information – name of the pollutants, emitting methods, density and total amount of pollutants, excessive emissions, and existing pollution prevention facilities.
5. *Lays the foundation for China's environmental public interest litigation system*. The most heated discussions during the amendment process revolved around eligibility for initiating lawsuits. The final draft of the new environmental Law broadened eligibility to include non-governmental organisations registered with administration at the city level and active in environmental public services for more than 5 consecutive years. Although these specifications significantly cap the number of eligible NGOs, the amendments nonetheless are a major step forward and lay the foundations for the future environmental public litigation system (Liu 2014).

Specific Policies

In this chapter we turn to specific policies in the following areas: green finance, green production, green cities, reducing carbon emissions and promoting renewable energy, as well as sustainable forestry. We attempt to provide a comprehensive list of policies in each sector and map out key stakeholders.

3

There are various interpretations as to what constitutes a green economy and which sectors should be included in an evaluation (see e.g. UNEP 2012; Allen and Clouth 2012). This chapter includes those areas commonly thought to be important for green economy planning across the world as well as those that have received particular attention from the Chinese government, such as environmental services and industrial production.

Green Finance

A supportive financial system is critical to realising a green economy transition. From green credit policies to environmental pollution liability insurances, this sector has matured significantly over the past decade in China.

Who is involved?

The People's Bank of China (PBC) and the Ministry of Finance, the China Banking Regulatory Commission (CBRC), the China Securities Regulatory Commission, and the China Insurance Regulatory Commission, as well as implementing banks and investment funds. The Ministry of Environment (MEP) and the National Development and Reform Commission (NDRC) have also demonstrated their leadership in this sector.

Green Credit Policies

A set of green credit policies has its origin in an on-going collaboration between the Ministry of Environmental Protection and various financial institutions. Table 2 summarises the various policies issued since 2007 by the MEP, NDRC, China Banking Regulatory Commission (CBRC) as well as the People's Bank of China.

Implementation of the various policies has seen significant success. In 2009, for instance, the China Development Bank made loans of RMB 139 billion for energy saving and environmental protection projects. Also, the Agricultural Bank vetoed 83 loan projects citing environmental risks and supported 1,803 emission reduction projects (Liang 2011). According to the NDRC, cumulative investments in energy-saving projects reached more than RMB 600 billion between 2006 and 2010, of which about 50% stemmed from bank loans.

There are still some implementation obstacles however. For example, these include: a lack of consistent reporting on inter-bank green credits, insufficient evaluation of green credits provided to companies, and pressure on banks from local governments to give credits to polluting industries (Zadek and Zhang 2014). Some efforts are under way to improve implementation. The recent Trial to evaluate corporate environmental credit, for instance, represents a significant step forward for ensuring that green credit policies are implemented effectively.

Environmental Pollution Liability Insurance

In recent years the Chinese government has actively promoted environmental liability insurance – based on the liability and responsibility for damages caused by environmental pollution – through pilot projects. Environmental liability insurance is regarded as an effective policy instrument for companies to manage environmental risks and to safeguard the rights and interests of pollution victims.

The scheme was first piloted in 2007 after the former State Environmental Protection Administration and the China Insurance Regulatory Commission (CIRC) had jointly issued the 'Guiding Proposal on Environmental Liability Insurance.' Since then, local governments, in unison with local environmental and insurance departments, have drafted a series of guidelines and regulations encouraging the development of more insurance products and urging companies with high environmental risks to sign up for the insurance. The MEP and the CIRC released another document – 'Guiding Opinions on the Pilot Scheme for Compulsory Environmental Pollution Liability Insurance' – for piloting environmental liability insurance in 2013. It calls for industries with high environmental risk, such as heavy-metal industries, to take the lead in piloting environmental liability insurance. Key industries include:

- **Heavy non-ferrous metal ore (including associated ore) mining industry**: copper mining, mineral mining, nickel cobalt ore mining, ore mining, ore mining and mercury mining
- **Heavy non-ferrous metal smelting industry**: copper smelting, lead and zinc, nickel and cobalt smelting, tin and antimony smelting and refining mercury smelting
- **Lead battery manufacturing industry**
- **Leather and leather products industry**
- **Chemical raw materials and chemical products manufacturing**: basic chemical raw materials manufacturing and coatings, inks, paints and similar manufacturing products.

Table 2: China's Main Credit Policies

TIME	POLICY	DEPARTMENT	CONTENT
July 2007	'Guiding Proposal for Improving and Strengthening the Financial Services for Energy Saving and Environmental Protection Sectors'	The People's Bank of China (PBC)	• Promoting energy saving and environmental protection through financial services • Environmental performance to impact companies' access to loans
July 2007	'Proposal on Implementing Environmental Laws and Regulations and Reducing Loan Risks'	The State Environmental Protection Administration (the former MEP), PBC, and CBRC	• The first joint policy of different governmental agencies on energy saving, emission reduction and loan risks easing • Strengthening cross-departmental coordination of environmental monitoring and loan management • Making compliance with environmental laws and regulations a prerequisite for granting corporate loans • A national information disclosure system of corporate environmental credits • Banks to use the environmental compliance information as basis for granting loans
November 2007	'Guiding Proposal on Credit Granting for Energy Saving and Emission Reduction'	CBRC	• Polluting and high energy consuming companies should only receive new credits for energy saving and emission reduction measures. Other types of loans should be gradually reduced and withdrawn • Promising improved communication among financial institutions and departments in charge of energy saving and emission reductions to maintain updated list of high polluting companies
April 2012	'Guidelines for Green Credit'	CBRC	• Support green, low carbon and circular economy and prevent environmental and social risks in credits given to companies • Limit loans for production using inefficient technology
December 2013	'Evaluation Method for Corporate Environmental Credits (Trial)'	MEP, NDRC, CBRC	• Relevant authorities to guide local corporate environmental credit evaluation, supervise companies to fulfill their obligations and social responsibilities, regulate and punish non-compliance

To date pilot projects have been implemented in 28 regions. 18 regions, such as Shanxi and Dalian, have piloted compulsory environmental liability insurance (see Box 3 for a pilot case). Most of the major insurance companies are participating and 24,000 companies have purchased the insurance. Figure 3 and Figure 4 below show the rapid increase in the premium income received by insurance companies (an increase from RMB 13 million to RMB 332 million in three years) and the overall insured amount (an increase from RMB 2 billion to RMB 18.5 billion in 3 years), respectively.

BOX 3: SHANXI TIANJI LEAKAGE OF 2012

Environmental liability insurance played a key role in the aftermath of the aniline leakage accident of Shanxi Tianji Coal Chemical Group in Shanxi Province in 2012. In total, 38.7 tons of aniline – used in the manufacture of industrial chemicals and a toxic substance – leaked into the Zhuozhang River. As the river is a major source of drinking water for more than one million people in downstream cities, a water crisis ensued. Immediately after the accident, the company's insurer discharged RMB 1 million for financing pollution remediation efforts. By June 2013, a total compensation of RMB 4.05 million had been made. The environmental liability insurance significantly reduced the company's financial pressure, ensured a speedy clean-up of the spill and channelled compensation to those affected by the incident.

(Sources: Xinhua 2013 and China Insurance Regulatory Commission 2013).

Figure 3: Total Premium Income of the Pilot Environmental Liability Insurance

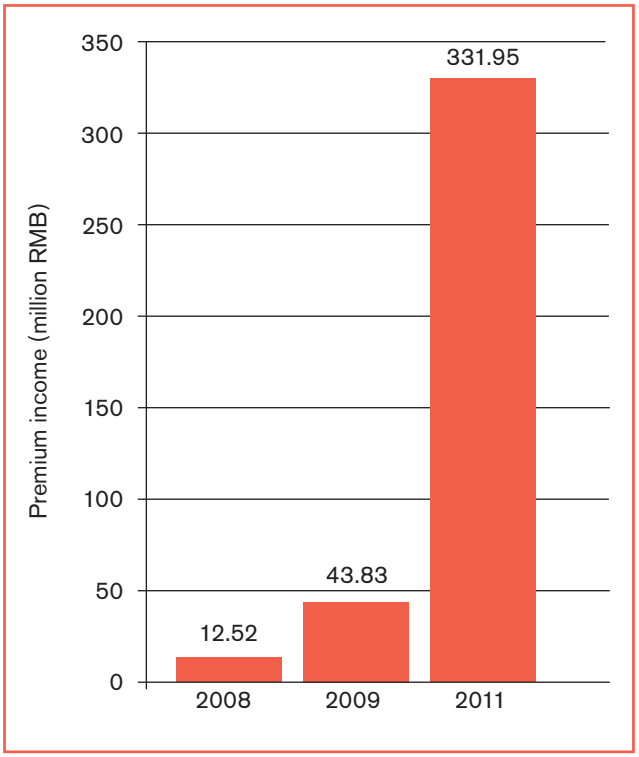
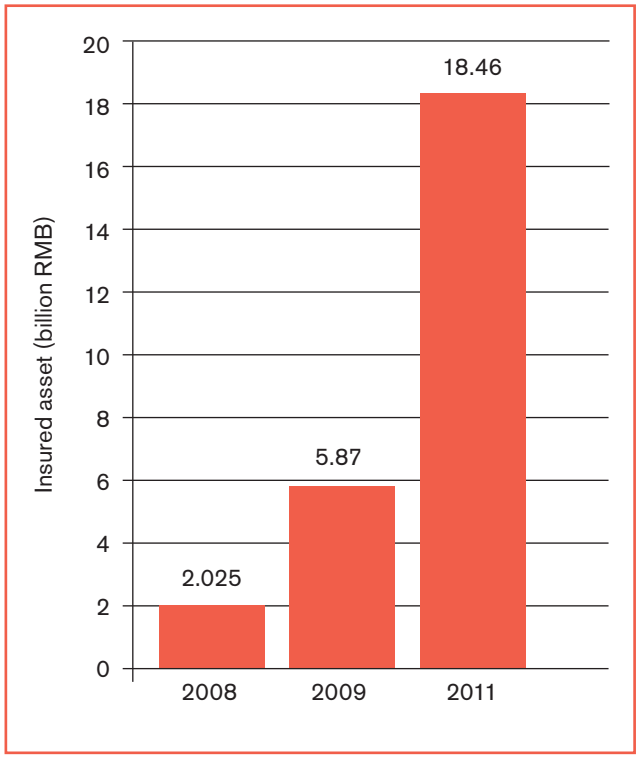


Figure 4: Insured Volume of the Pilot Environmental Liability Insurance



Green Production

As a 'factory of the world', China is still struggling to clean up its industrial production. In China, the term 'green industry' refers to cleaner industrial production processes through less input material consumption, less waste generation and recycling of materials.

China's green production policies consist of laws, regulations, technical guidance and capacity building. The lack of economic incentives and a shaky legal basis to enforce regulations have long prevented more environmentally-sound industrial production. In particular, mandatory audits and a public supervision system were absent.

The 'Cleaner Production Promotion Law' and the 'Clean Production Audit Interim Measures', issued in 2002 by the NDRC and SEPA (now MEP), were game-changers. Subsequently, the national government released two more directories aimed at clean production technology, involving nine key industries and 113 clean production standards. Finally the Congress enacted the new 'Cleaner Production Promotion Law' in 2012. The results of these clean production policies are impressive: during the 11th Five-Year Plan period, China's total resource output efficiency increased by ca. 8% – in particular, energy-to-output efficiency improved by 23.6%, water efficiency by 34.52% and industrial water usage efficiency by 58% (the State Council 2013).

Below, we examine three areas the government has focused on: the environmental industry, circular economy development and eco-industrial demonstration parks.

Who is involved?

NDRC, MEP, Ministry of Commerce, Ministry of Housing, Ministry of Science and municipal governments.

Environmental Industry

In the Chinese green economy thinking, 'environmental industry' refers to a myriad of industries that improve environmental conditions (UNEP 2013). In addition to water treatment, air pollution control equipment, energy monitoring and waste recycling, China's environmental industry now encompasses environmental protection products, clean products, environmental protection services, waste recycling products and ecological conservation services. The environmental industry has become a comprehensive sector.

The sector has burgeoned since the 1980s. To cope with pressing environmental problems and improved environmental regulations and standards, the government has implemented a series of measures including the 'Total Emission Control During the 9th Five-Year period', the 'Cross-Century Green Project Planning', the 'Water Pollution Prevention Plan', the 'Prevention Plan of SO_2 and Acid Rain', and the 'Beijing Pollution Prevention and Cleaning Bohai Project'. These measures breathed life into the environmental goods and services market.

'Thanks to the government's policy support, the environmental industry has grown exponentially over the last 15 years.'

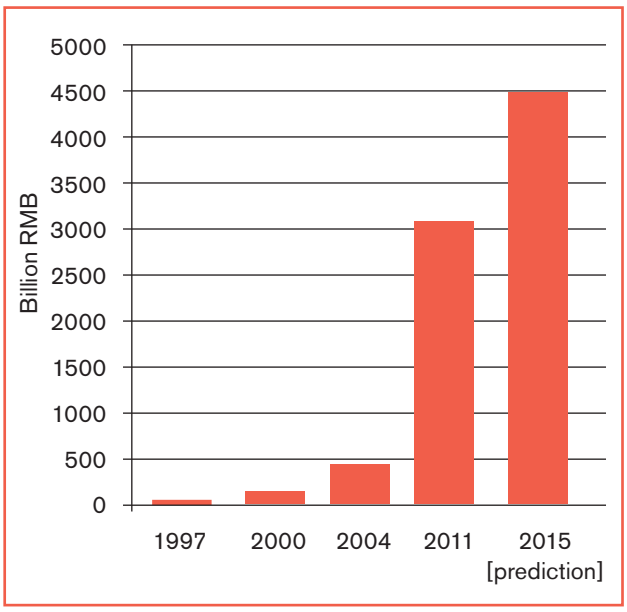
The environmental industry has gradually grown since the 10th Five-Year period. As the industrial structure has improved, economic profits have soared. It is one of China's seven 'national strategic emerging industries' for which the government has designed a number of supporting policies and plans, as shown in Table 3.

Table 3: Key Policies and Plans for Boosting the Environmental Industry

TIME	POLICY	DEPARTMENT
Oct. 2010	Decisions on Accelerating, Nurturing and Developing Strategic Emerging Industries	State Council
Jun. 2012	12th Five-Year Plan of Energy Saving and Environmental Protection Industry	State Council
Jul. 2012	12th Five-Year Plan of the National Strategic Emerging Industries	State Council
Jan. 2013	Guiding Proposals on Developing the Environmental Services Industry	MEP
Aug. 2013	Proposals on Accelerating the Development of the Energy Saving and Environmental Protection Industry	State Council
May 2014	Temporary Managing Principles of Piloting the Environmental Services Industry	MEP

Thanks to the government's support, the industry has grown exponentially over the last 15 years, as Figure 5 illustrates. It is predicted to be a RMB 4.5 trillion industry by 2015 (USD 730 billion). For more information consult the UNEP environmental industry report (UNEP 2013).

Figure 5: Annual Revenue of China's Environmental Industry[4]



Circular Economy

Circular economy development features prominently in Chinese green economy thinking. It was a favourite subject of former President Hu Jintao and has regularly found its way into CCP resolutions. Originally rooted in the industrial ecology theories and environmental policies of Germany and Sweden, the Chinese government has embraced the circular economy concept. In 2005, the State Council issued 'Several Opinions of the State Council on Accelerating Circular Economy Development.' In 2009, the concept was rendered into the 'People's Republic of China Circular Economy Promotion Law.'

China's circular economy consists of four levels: small, middle and large cycles as well as the recycling industry (also known as the fourth estate).

The **small** cycle refers to endeavours at the company level: promoting environmentally-friendly design of products, fostering clean production and reducing usage of products, services, materials, energy inputs, and pollutant emissions.

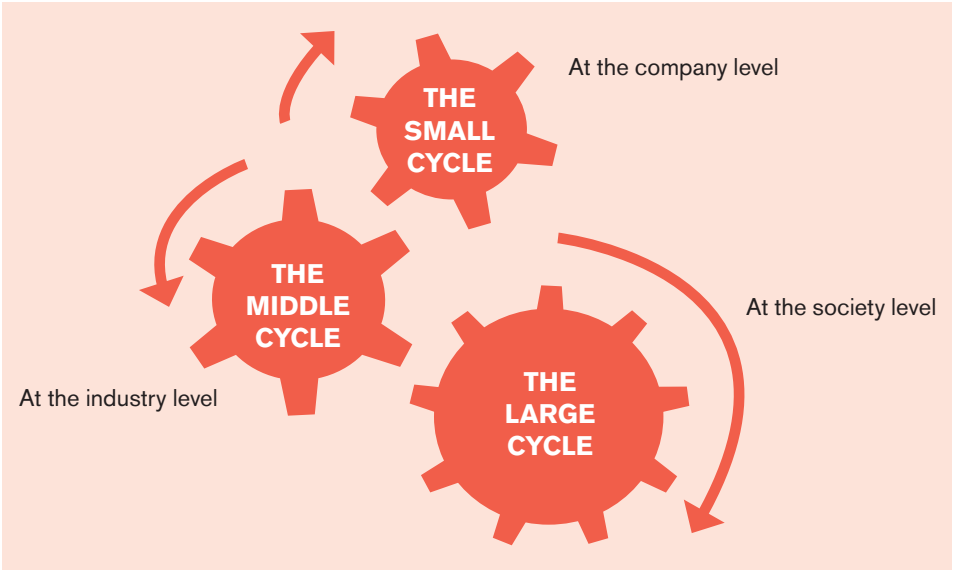
The **middle** cycle denotes efforts among companies: based on industrial ecology principles, industrial eco-parks promote a symbiotic and resource-saving relationship among companies through integration of materials, energy and information.

The **large** cycle is about initiatives at the society level. The current focus lies on establishing eco-cities, municipalities and provinces.

The **recycling industry** concerns the promotion of waste treatment and recycling at all levels, encouraging cyclical utilisation of resources throughout society.

The government has formulated a number of circular economy policies to facilitate implementation. In the 11th Five-Year period, the NDRC and six other ministries focused on key sectors such as composting, recycling and eco-industrial parks. The total number of circular economy pilot and demonstration projects exceeds 2300.

Figure 6: China's Circular Economy



'Circular economy development features prominently in Chinese green economy thinking. It has regularly found its way into CCP resolutions.'

[4] Ministry of Environmental Protection (1997, 2000, 2004, 2011)

Eco-Industrial Demonstration Parks

Eco-industrial demonstration parks are an integral component of China's green production policies and typify the circular economy's middle cycle developments. The first pilot scheme was the Guigang eco-industrial park in 2001 (Zhu and Cote 2004). In 2003, the government launched the first 'Eco-Industrial Demonstration Park Planning Guide (Trial)' and introduced the 'National Eco-Industrial Demonstration Park Declaration,' specifying management regulations. During the 11th Five-Year period, the total number of parks reached 39, twelve of which passed the assessment (CBRI 2013). Table 4 shows the relevant government documents to this date.

Green Cities

China has an ambitious urbanisation goal: 60% of the population is to live in cities by 2020. In the next 30 years more than 300 million Chinese will move from the countryside into urban areas (Fay *et al.* 2014). Greening the cities – through eco-city planning, clean vehicle policies and green building standards – will be critical for the green economy's success.

'China has an ambitious urbanisation goal: 60% of the population is to live in cities by 2020. Greening the cities will be critical for green economy's success.'

Table 4: Policies Related to Eco-Industrial Demonstration Parks

YEAR	DOCUMENT	CONTENT
2003	'Eco-Industrial Demonstration Park Planning Guide (Trial)'	Definition of eco-industrial parks and relevant planning requirements
2003	'National Eco-Industrial Demonstration Park Declaration (Trial)'	Regulations on planning, naming, feasibility studies and assessment
2005	'National Eco-Industrial Demonstration Park Declaration (Trial)'	Same as above
2006	'Class Eco-Industrial Parks Vein Industry Standard (Trial)'	Specifications of indicators and criteria for eco-industrial parks
2007	'Notice on National Eco-Industrial Park Construction Work'	Announcing construction of eco-industrial parks at the national level
2007	'Notice on the Issuance of National Ecological Demonstration Zone Management Approach Industry (Trial)'	Further regulations on reporting, naming, and other application materials
2009	'Notice on Strengthening the Development of a Low Carbon Economy in the National Eco-Industrial Park in the Circular Economy'	Emphasis on low-carbon criteria in reporting, construction and assessment phases for implementers of the projects
2011	'Guiding Opinions on Further Improving the 2011 National Eco-Industrial Park Construction Work (draft for consultation)'	Consultation draft on construction and planning of ecological parks
2012	'Opinions on Strengthening the National Eco-Industrial Park Construction'	Emphasis on fully understanding the construction of national ecological demonstration zones and outline of general requirements for industrial parks.

Who is involved?

NDRC, MEP, Ministry of Housing and Urban-Rural Development (MoHURD), Ministry of Transport, Ministry of Finance, Ministry of Construction, municipal governments; international architecture firms and foreign governments for technical cooperation.

Eco-Cities

China's 'eco-cities,' particularly their huge dimensions and investment scales, have received much international press coverage (see, for example, Wong and Pennington 2013; Kaiman 2014; The Economist 2014). Indeed, the Chinese government sees eco-cities as central for realising circular economy at the macro level.

China's eco-cities date back to the 1990s, when the MoUHRD issued standards for 'Garden Cities' aimed at creating green spaces in cities. The MEP started promoting 'Environmental Protection Model Cities' in 1997. In the 2000s, both ministries announced more stringent ecological requirements for cities to be classified as eco-cities.

China's eco-city projects are ambitious. Some of them, for instance, are built from scratch. Eco-cities house tens of thousands of residents in buildings with advanced energy efficiency technology and powered by renewable energy sources. Their transport infrastructure promotes the use of public transport and features bike lanes and pedestrian-friendly roads. New schools, hospitals, shopping centres and industrial production parks have to be built, requiring billions of dollars of investment.

Implementation has proved challenging. In practice many projects suffer from limited funding, supply-driven designs and a lack of consultation with various stakeholders. Indeed, although more than 200 eco-cities have been conceived to date (Yue and Nan, 2011), few projects have materialised besides Tianjin Eco-city (see Box 4 for details).

The huge costs are the biggest obstacle. The Sino-Singapore Tianjin Eco-city, for example, has attracted investments totalling RMB 52 billion. Most other eco-city projects have not been so prolific: the high-profile Dongtan project near Shanghai – once touted by Tony Blair as the hallmark of UK-China's sustainability cooperation – was abandoned due to a lack of funding (Larson 2009).

Another obstacle is that eco-city projects have largely been supply-driven in their design and construction. Mostly conceived by local governments and planned by international architecture firms, few projects have sufficiently considered the needs of the existing or new

BOX 4: SINO-SINGAPORE TIANJIN ECO-CITY

China's sustainability showpiece, Tianjin Eco-city is a USD 24 billion venture between the Singaporean and the Chinese governments. The eco-city is being built from scratch on a former wasteland area near the port city of Tianjin. It will feature world-class sustainable buildings, clean waterways and an eco-industrial park. Upon its completion in 2020, it aims to accommodate 350,000 people over an area of 30km2. So far 10,000 permanent residents have moved in.

The flagship project has had its setbacks. The distance to central Tianjin, for example, an hour commute by car, has proved unattractive for luring more residents. The local government now plans to build a subway to shorten the commute. While such a level of support and government funding could turn the Tianjin project into a success story, it yet highlights the difficulty to replicate similar projects elsewhere. Government-driven eco-city development in China still has a long way to go. (Kaiman 2014; The Economist 2014).

Figure 7: Tianjin Eco-city Design (photo credit: Archdaily)

residents in the communities. For example, Liaoning Province's Huangbaiyu project hoped to transform a rural village into a sustainable community. The project was abandoned before completion, however, as the new houses proved too expensive for local residents and came with features such as car parks or gardens that did not suit the local lifestyle (Larson 2009). Critics complain that China's eco-cities plans are bereft of the human element. They need to be based more around communities and less around hardware and technology (Wong and Pennington 2013).

Clean Vehicles

China is expected to add approximately 220 million new vehicles by 2020 (Pan *et al.* 2011). Clean emission standards will be critical for alleviating air pollution as well as promoting green transportation and city planning. The MEP has gradually tightened the nation-wide emission standards for vehicles in the last decade. Beijing, Shanghai and other large cities have implemented the 'China 5' standard in 2013, a rough equivalent of Europe's second most stringent emission standard. In October 2014, the NDRC announced that vehicles not meeting the standard will be taken off the roads in major cities by the end of 2015, and nationally by the end of 2017 (China Daily 2014). In addition, the Ministry of Transport and the Ministry of Finance jointly set up special funds for energy saving and emission reduction of transportation. In 2011, RMB 750 million stimulated RMB 20 billion investments of energy-saving and emission reduction in the transportation sector (Chinanews 2014).

The central government recently announced taking six million sub-standard cars off the road by the end of 2014. Such policies have also been well implemented at the local level. Shandong Province, for instance, began removing shoddy cars in 2013. The province also provides cash incentives for early retirement of heavy-duty trucks listed before 2006. Finally, the national government is serious about promoting cars fuelled by renewables. The NDRC recently announced a new public procurement policy: between 2014 and 2016, at least 30% of newly purchased vehicles by governments institutions should be 'new energy vehicles' (China Daily 2014). The city of Shenzhen, for example, employs various subsidies and incentives strategies to raise the number of cars running on renewable sources to 35,000 by 2015.

Green Buildings

China has made steady progress in setting better green building standards since the early 2000s. Various laws and regulations, such as the 'Construction Law,' 'Urban and Rural Planning Law' and 'Energy Conservation Law' have laid down green building standards (Table 5). The MoHURD set a concrete goal of buildings' energy saving in the 11th Five-Year Plan – a 50% improvement of public buildings' and residences' energy savings. In addition, at the policy level, the ministry issued the 'Green Building Action Plan' in 2013 that stipulated more stringent requirements for green residential buildings. At the same time, a set of policies was introduced, comprising the construction of energy saving buildings, reforming the heating system and applying energy more widely.

Table 5: Major Green Buildings Policies and Regulations

POLICY TYPES	NAME	YEAR
Law	'The People's Republic of China Construction Law'	1998
	'The People's Republic of China Urban and Rural Planning Law'	2008
	'The People's Republic of China Energy Saving Law'	2008
Administrative regulations	'Civil Building Energy Saving Regulations'	2008
	'Energy Saving Regulations for Public Institutions'	2008
Departmental regulations	'Regulations on Management of Promoting the Application of New Construction Techniques (Ministry of Construction Order No. 109)'	2001
	'Regulations on Management of City Construction Waste (Ministry of Construction order No. 139)'	2005
	'Regulations on Civil Construction Energy Saving Management Measures (Ministry of Construction order No. 143)'	2006

More than 95% of China's existing buildings fall short of green building standards. This low rate puts the country behind the advanced economies in green building construction (Tanpaifang 2011). China is catching up, however. The number of green building projects and areas constructed in 2012 surpassed the total sum of those in the previous four years combined. The number of green building projects and the area of green building increased by 61.4% and 62.2%, respectively, from 2011 to 2012. In its 12th Five-Year Plan, the government declared that 20% of all new buildings should comply with green building standards by 2015 (30% by 2020).

Reducing Carbon Emissions & Promoting Renewable Energy

In November 2014, the Chinese government pledged to peak carbon emissions by 2030. Although the specific numbers – not yet disclosed – are critical for the success of the global mitigation efforts, the historical move demonstrates Beijing's acknowledgement of the issue. Long before President Xi's pledge, China had already rolled out a series of low-carbon economy measures. Some are well known internationally: its massive renewable energy investment and the carbon market pilots, for example. Other policies have received less attention but are equally important, such as the planned national carbon market in 2016 and measuring cadre performance against carbon emission reduction. We highlight some of the key policies in energy intensity reduction, emission trading markets, renewable energy as well as coal consumption below.

Who is involved?

The National Development and Reform Commission (NDRC), Ministry of Finance (MoF), Ministry of Environment (MEP), Ministry of Science and Technology, Ministry of Housing and Urban-Rural Development (MoHURD), the National Energy Bureau (NEB), and the State Oceanic Administration (SOA).

Energy Intensity

Reducing energy intensity (i.e. energy consumption per unit GDP) has been a key government goal over the last decade. The first obligatory targets in the 11th Five-Year plan (2006–2010) aimed to slash energy intensity by 20% and the main pollutant emission volumes by 10%. The 12th Five-Year Plan then targeted energy intensity reductions by 16% compared to 2010 and 32% compared to 2005. Another goal was to bring down carbon emissions per unit GDP by 17% compared to 2010 levels. To achieve these objectives, Beijing recently released two key policies to encourage further adoption. See Box 5 for details (Xinhua 2014a).

BOX 5: LOW CARBON DEVELOPMENT ACTION PLAN & CADRES' PERFORMANCE ASSESSMENT BASED ON CARBON EMISSION

The 'Energy-saving Emission Reduction and Low-carbon Development Action Plan of 2014–2015' wants to see a 3.9% decrease in energy intensity and a 4% decrease in carbon intensity from 2014 to 2015. To ensure the necessary actions are taken, the NDRC subsequently issued 'Measures to Examine and Evaluate the Responsibility to Achieve Targets regarding Carbon Emission per Unit GDP Reduction' in August 2014. The document declares – for the first time – that local cadres are to be assessed against hard carbon emission reduction targets. Such a move had long been suggested to guarantee local implementation. It is hoped the new policy will spur real actions at the regional and city levels.

Emission trading markets

China unveiled trading markets for various pollutants in 2008. Since then the Beijing Environmental Exchange and the Shanghai Environment and Energy Exchange have covered pollutants such as SO2 (sulphur dioxide), COD (chemical oxygen demand) and Certified Emission Reductions (CERs) for carbon emission. In 2009, the Tianjin Climate Exchange established China's first carbon cap-and-trade scheme. The NDRC announced piloting carbon markets in five cities (Beijing, Tianjin, Shanghai, Chongqing and Shenzhen) and two industrial regions in Guangdong and Hubei provinces in 2011 (Han *et al.* 2012). A nationwide carbon market to be launched in 2016 is currently under approval by the State Council. If launched, its market volume will exceed that of the European Union emission trading system, currently the world's biggest.

Renewable energy

Renewable energy is a centrepiece of China's green economy policies and well known internationally. Ever since the 2005 'Renewable Energy Law', which outlined a variety of financial incentives, the government has banged the drum for renewable energy investment and deployment. Table 6 below illustrates the relevant policies to date. In response to the 2008 financial crisis, China earmarked about USD 140 billion of the USD 586 billion stimulus package for green investment (Benson *et al*. 2012). More recently, in 2013, China invested USD 56 billion in renewable energy – more than the EU's combined green investment (Frankfurt School-UNEP Centre, 2014). All this has catapulted China to take the lead in hydropower generation (220 million kW), nuclear energy generation (29 million kW) and wind power installation (cumulative 91.4 million kW) (REN21 2012; REN21 2014).

Coal Consumption

Despite massive renewable energy deployment, China is still dependent on coal. The Middle Kingdom, which consumes more than half the world's coal output, has been lambasted for its staggering contribution to global greenhouse gas emissions over the last decade. However, the coal consumption rate is gradually slowing down. Also, the proportion of coal in China's energy mix has decreased, whereas the proportion of clean energy (hydropower, nuclear power, wind power) has increased from 6% in 1996 to 9.4% in 2012. The

Table 6: Policies and Plans for Developing the Renewable Energy Industry

YEAR	POLICY	DEPARTMENT
2005	'Renewable Energy Law'	n/a
2007	'Development Plan for the Agricultural Biomass Industry (2007–2015)'	Ministry of Agriculture
2007	'Mid-to-long Term Development Plan for the Renewable Energy Industry'	NDRC
2008	'11th Five-Year Plan for Renewable Energy'	NDRC
2008	'Temporary Managing Principles of the Special Fund for the Industrialisation of Wind Power Equipment'	MoF
2009	'Temporary Managing Principles of the Subsidies for Solar Photovoltaic Buildings'	MoF
2009	'Implementing Proposals on Promoting the Application of Solar Photovoltaic Buildings'	MoF, MoHURD
2009	'Amendment to the Renewable Energy Law'	n/a
2010	'Temporary Managing Principles of Offshore Wind Power Development and Construction'	NEB, SOA
2010	'Decisions on Accelerating, Nurturing and Developing Strategic Emerging Industries'	State Council
2011	'Temporary Managing Principles of the Development Fund of Renewable Energy'	MoF, NDRC, NEB
2012	'Temporary Managing Principles of Subsidies for Renewable Energy Power Prices'	MoF, NDRC, NEB
2012	'Development Plan for Energy Saving and Renewable Automobiles (2012–2020)'	State Council
2012	'12th Five-Year Plan of the National Strategic Emerging Industries'	State Council
2012	'12th Five-Year Plan of Renewable Energy Development'	NEB

annual total energy consumption in 2012, for instance, was 3.62 billion tons of standard coal – a slight 4% increase from 2011 – while energy intensity decreased by 3.6%. To slash carbon emissions and alleviate air pollution problems, Beijing intends to cap the total coal consumption at 3.9 billion tons by 2015 (NDRC 2012). In places such as Beijing, Tianjin and Hebei – intensive coal users – total quantity control for coal consumption has been pushed forward. Moreover, Beijing's city government has recently announced plans to ban the use of coal for powering the city's heating by 2020 (Xinhua 2014b). Once seemingly impossible, China may achieve peak coal production in the next decade, if not before 2020 (Yuen *et al.* 2013).

'Once seemingly impossible, China may achieve peak coal in the next decade, if not before 2020.'

Sustainable Forests

Halting deforestation and soil degradation helps reduce carbon emission and facilitate transitioning to a green economy. After the devastating floods along the Yangtze and the Songhua rivers in 1998, the government banned logging and launched ambitious reforestation and afforestation programmes. Efforts have paid off. China currently boasts the world's largest planted forest area of 47 million hectares (Hammett *et al.* 2001) and the world's largest reforestation programmes (Yin *et al.* 2001). By one estimate, these efforts employed as many as 1.8 million full-time workers in 2010. Between 2011 and 2020, afforestation activities are predicted to create as many as 1.1 million direct and indirect jobs annually (Pan *et al.* 2011). Table 7 introduces the six major forestry policies.

Who is involved?

The State Forest Administration (SFA), the Ministry of Finance (MOF) and local governments.

Table 7: The Six Major Forestry Policies

NAME	OBJECTIVE	SCOPE
Natural Forests Protection Programme (NFPP)	Recovery and protection of natural forests	Involves 734 counties and 167 Forest Industry Councils in 17 provinces, covering the upper Yangtze, the middle and upper Yellow River, the Northeast and Inner Mongolia
Sloping Land Conversion Programme (SLCP)	Prevention of soil erosion in key areas	Covers all provinces in central and western parts of the country and the eastern provinces, involves 25 provinces and municipalities and 1,897 counties
Beijing and Tianjin Sandstorm Source Control Project	Sandstorm alleviation around the capital	Includes 75 counties in Beijing, Tianjin, Hebei, Shanxi, and Inner Mongolia
The 'Three North' Protection Forest Project	Desertification prevention, soil conservation etc.	Involves 13 provinces and municipalities and about 590 counties in China's 'Three North' region
Wildlife Protection and Nature Reserve Construction	Species protection and wetland conservation	Includes protection of natural ecosystems, natural habitats for rare and endangered wildlife, ecologically fragile areas and wetland areas
Key Area Fast-growing Timber Forests Construction	Increase timber supply	Encompasses 886 counties and 114 forestry sites in 18 provinces to the east of the 400 mm rain line

Discussions

Informed by the review of China's green economy policies, the relevant players and the historical development in chapters 1, 2 and 3, we now discuss the stakeholders driving the changes, the unique characteristics of China's green economy thinking and areas for further exploration.

4

Stakeholders

Earlier chapters' mapping of policies and government ministries has provided a glimpse into the diverse set of governmental players involved in green economy policies. This section examines the various stakeholder groups' interests and influence in shaping the green economy agenda. In particular, who is driving the changes in policy and practice for achieving a greener economy? Where do the strongest interests originate (the government, businesses, the public etc.)? Who enables and obstructs the desired changes? We map the various stakeholder groups (Figure 8 below) based on the literature review conducted for this paper and inputs provided by several key informants.

Note that the stakeholder map only indicates perceived relative levels of influence and interests based on our research. It is for orientation only. Moreover, note that the various government stakeholders' efforts in the end all contribute to the leadership's efforts to drive China's green economy transition – the leadership here is defined as the CCP chairman, the Politburo Standing Committee, the State Council and the National People's Congress.

First, our research suggests that the central government plays a fundamental role across all levels and sectors. In particular, as Figure 8 illustrates, the NDRC and MEP are driving forces in implementing innovative green policies and implanting the environmental agenda into overall economic planning (e.g. MEP's leadership in eco-cities, environmental industry and green credit; NDRC's lead on renewable energy policies and the cadre appraisal system based on environmental targets; see Chapter 2 for details). Various other ministries, as discussed in Chapter 2, are also prominent players in their respective fields. The Ministry of Finance, for example, has taken the lead in instituting green finance incentives. In the financial sector, however, other institutions are also influential, namely the People's Bank of China and the three regulatory commissions (China Banking Regulatory Commission, China Securities Regulatory Commission and China Insurance Regulatory Commission). They could achieve an even bigger impact by mainstreaming the green agenda in the financial sector and providing the right financial incentives for the society's green development.

'The central government plays a fundamental role across all levels and sectors… local governments are instrumental players… The urban population's discontent has influenced policymakers… In rural areas public pressure has yielded mixed results.'

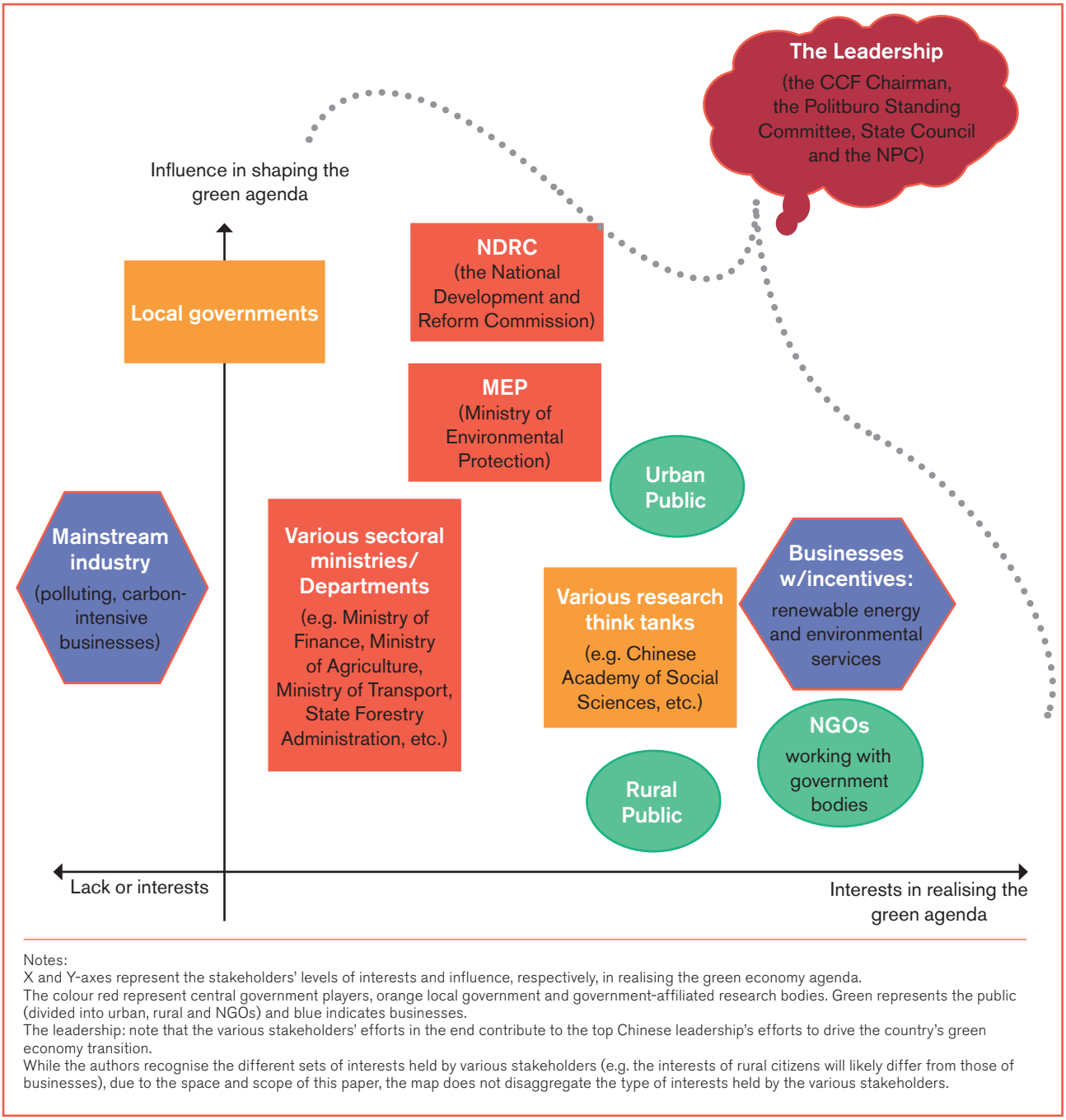
Figure 8 places local governments as instrumental players. Indeed, no matter how eager and ambitious the central government, implementation of the various policies largely rests on provincial, city and county officials. Their influence is greater than their interests in realising the green agenda, however. See page 34 for more discussion.

Second, the public – demanding environmental progress – matters. In particular, the urban population's discontent with air pollution and dirty industries has influenced policymakers. In large cities such as Xiamen and Dalian public pressure against polluting industrial plants and terrible air pollution has already led to change (Li *et al*. 2012; Huang and Yip 2012; Geall 2013). In rural areas, by contrast, public pressure has yielded mixed results. Local governments sometimes silence angry voices instead of engaging in dialogue (Li and O'Brien 2008; Deng and Yang 2013). Some changes in China's broader environmental governance framework could help resolve rural environmental disputes. These include, for instance: less emphasis on reckless economic growth in the national development strategy (see Chapter 1), spotlight on local officials' environmental performance (see Box 5) and the new environmental law paving the way for public environmental litigation (see Chapter 2).

China's environmental NGOs, a civil society stakeholder group, often assist government players and businesses in realising green economy objectives. Despite gaining influence, the most effective way for environmental NGOs to bring about the desired changes in policy and implementation is through partnering with government departments (Schwartz 2004).

Third, businesses are key operators of green economy policies. Rather than actively driving or demanding change, however, they for the most part passively receive government instructions and directions, at least in the initial stage. Once incentives are in place, businesses often drive innovation in technology and implementation – for instance in renewable energy, eco-city construction, green transportation and the environmental industry. The distinction between state-owned enterprises and smaller technology-focused companies is important. Technology-driven companies, particularly in renewable energy and other environmental industries, are beneficiaries of the government's policies and thus advocates of green economy policies. For many of China's state-owned enterprises, by contrast, although corporate social responsibility (CSR) reporting has become common practice, CSR efforts largely remain at the publicity level rather than affecting strategy (Loh 2012). Figure 8 shows traditional industries' interest in maintaining the status quo. The government is challenging these sectors through policies 'eliminating out-dated industrial capacity,' however. These policies

Figure 8: Green Economy Stakeholders' Influence and Interests Map



Notes:
X and Y-axes represent the stakeholders' levels of interests and influence, respectively, in realising the green economy agenda.
The colour red represent central government players, orange local government and government-affiliated research bodies. Green represents the public (divided into urban, rural and NGOs) and blue indicates businesses.
The leadership: note that the various stakeholders' efforts in the end contribute to the top Chinese leadership's efforts to drive the country's green economy transition.
While the authors recognise the different sets of interests held by various stakeholders (e.g. the interests of rural citizens will likely differ from those of businesses), due to the space and scope of this paper, the map does not disaggregate the type of interests held by the various stakeholders.

aim at nine sectors: power, coal, steel, cement, non-ferrous metals, coke, paper and pulp, tannery, printing and dyeing (Ministry of Industry and Information Technology web). The role of businesses, in general, requires further research.

Fourth, research institutes provide technical inputs and policy advice to government, businesses and civil society. Government-affiliated think tanks, in particular, inform their corresponding ministries. In the case of combating illegal logging and reducing imports of illegal timber products from tropical countries to China, for instance, the Chinese Academy of Forestry has collaborated with international experts and researchers to devise potential policy options, currently under review by the State Forestry Administration.

Unique Traits of China's Green Economy Pathways

The review of both macro and specific policies illustrates two characteristics worth highlighting.

Pilot Projects

China employs a 'pilot approach' to many of its green economy innovations. For example, as seen in Chapter 2, carbon trading pilots, environmental liability insurance pilots, and eco-industrial demonstration parks.

This method follows the general pattern of China's economic policymaking. Most famously, special economic zones were established along the coast in the 1980s to experiment with the economic opening of the country. This allowed the government to try out various economic models with little risk. Piloting different green economy policies, similarly, has allowed for innovative ideas to be tested. There are obstacles, however. Evaluating green pilot projects is significantly more difficult than evaluating other economic projects as straightforward indicators such as GDP growth rate are not available. Also, scaling up successful pilot projects, such as eco-industrial parks and eco-cities, is no small feat. As many of these projects are initiated, if not sustained, by large government investment and policy support, less wealthy provinces and cities often lack the financial resources to follow suit (see Chapter 2). Finally, each pilot area comes with a unique set of environmental characteristics that are essential to account for when scaling up a project.

BOX 6: ECOLOGICAL CIVILISATION PILOTS

China uses the pilot approach to put its ecological civilisation concept into practice. In 1995, the State Environmental Protection Agency (the former MEP) raised the idea of ecological demonstration provinces, cities and counties. In the 2000s, the SEPA and the MEP issued various policies clarifying specifications, targets and evaluation criteria. Today there are about 125 ecological civilisation construction pilots across China. The NDRC is in the process of drafting a guidance note on accelerating the construction of ecological civilisation.

National Strategy, Local Implementation

National government bodies design China's green economy policies; local governments devise the actual implementation plans. In the 12th Five-Year Plan, for instance, the central government set specific targets through policy documents, leaving it to local governments to think up strategies for achieving the targets. Although this national-local dynamic is not unique to China, leadership of the central government in driving the green agenda is made possible partly by China's political system.

The central-local model has traditionally allowed for localisation of national policies, accommodating the varying local environmental, social and economic conditions. This approach has proved essential in the past (Skinner 2003). In environmental governance, however, there have been wide implementation gaps of some policies – local governments often failed to carry out national directives. Various factors have contributed to this problem, including incentives for local governments to pursue short-term economic growth, weak political power of local environmental bureaus vis-à-vis other government offices and close relationships between tax-paying companies and local offices responsible for economic growth (He *et al.* 2012).

There have been signs of change in the past year, however. The amended environmental Law stipulates clear responsibilities for local governments to monitor and supervise environmental pollution (see Chapter 2). The amended law also strengthens the power of local environmental bureaus in enforcing penalties on cheating companies. As noted in Box 5, the NDRC has specified targets for local officials to achieve within the 12th Five-Year period. Similarly, the NDRC's latest move to assess local cadre's performance also based on carbon emission reduction will likely improve implementation of central government policies at the local level.

Areas for Further Exploration

Below we identify three topics that would benefit from further exploration by researchers, policymakers and practitioners: how progress towards green economy is assessed; and distributional issues within China and internationally.

Measuring progress

A system to measure and track progress is critical for implementing green economy policies. This is especially pertinent to China's policymaking, in which the central government sets quantitative goals for local governments to meet. Two areas in particular merit further research: collecting reliable data and incorporating social indicators and other sets of indicators used internationally.

First, past research has questioned the reliability of environmental and economic data collected in China (Sinton 2001; Lelyveld 2014). With the government often setting quantitative targets in green economy policies, more research is needed to understand the limitations of current data collection and reporting methodologies. Given the difficulties to quantify environmental and social factors, the statistical departments may need further coordination with different ministries to devise appropriate measurement methodologies.

Second, incorporating social indicators explicitly into environmental targets could help policymakers manage potential trade-offs between improving environmental services and raising standards of living. China's environmental and social development policies are often implemented separately. For example, the 12th Five-Year Plan's environmental policies do not feature social targets. Given that the green economy seeks to achieve both social and environmental outcomes, however, policymakers may consider adopting well-being and social equity indicators, such as those laid out by UNEP (for example, improved access to energy and water, Gini coefficient, and so on) (UNEP 2012). See below for more discussions on incorporating a social agenda into China's green economy implementation. Chinese policymakers and researchers may benefit from engaging in international discussions regarding measuring green economy progress, as various sets of indicators develop around the world.

International leakage

As China cleans up the domestic industry and reduces its carbon emissions, there is a growing need to examine the environmental impacts exported to other countries in the form of commodities imported and embedded carbon emissions through trade and investment. This leakage issue is particularly relevant to the rising middle class. Millions of Chinese are increasingly leading a consumption-driven lifestyle similar to that of more affluent economies.

'There is a growing need to examine the environmental impacts exported to other countries in the form of commodities imported and embedded carbon emissions through trade and investment.

Take forestry as an example. Since the logging ban of 1998, China's booming furniture industry (both for domestic consumption and exports) has looked elsewhere to obtain logs. The country is now the world's leading importer of tropical wood and the largest processing hub of timber products (ITTO 2011). Environmental NGOs have criticised the flow of illegal timber products to China, spotlighting the corresponding deforestation and other negative impacts in tropical countries (Laurance 2011; Environmental Investigation Agency 2012). China's trade and investment in other land-use sectors such as mining and agriculture have similarly been under scrutiny (Human Rights Watch 2011; Olsson 2012; Buckley 2012). Leakage problems are amplified if occurring in developing countries with weak governance – some particularly resource-rich countries lack the necessary environmental and social safeguards to ensure sustainability. Beijing has recognised these problems and responded by issuing various guidelines promoting legal and sustainable behaviours among Chinese companies operating overseas. Examples include a series of voluntary guidelines published by the State Forestry Administration on sustainable forestry operations by Chinese companies overseas (SFA 2007, 2010 and 2012) as well as the 'Guidance on Environmental Protection in Foreign Investment and Cooperation' issued by MEP and MofCom (MEP and MofCom 2013). Despite these efforts, however, corporate social responsibility awareness among Chinese companies operating overseas still lag behind their Western counterparts and adoption of sustainable practices will likely take time (Kaplinsky 2010).

Inclusive green economy

The topic of social equity and inclusivity in China's green economy implementation needs more attention. Some argue that inclusivity and social equity need a special place in the green economy debate given the hidden social and environmental costs of market-based mechanisms (Heynan *et al*. 2007) and the disproportionate burden on the poor in the transition phase (Dercon 2012). Some commentators thus argue that green economy policies should incorporate justice dimensions for delivering both environmental and social outcomes (Cook *et al*. 2012). Social equity in China generally is addressed through various poverty reduction policies in the context of overall economic development. Yet, as mentioned earlier, social targets are not embedded in green economy policies.[5]

'Social equity in China generally is addressed through various poverty reduction policies in the context of overall economic development. Yet, social targets are not embedded in green economy policies.'

There has been more awareness of the equity issue recently, however, especially regarding environmental services delivered across the nation. One policy instrument addressing equity is the ecological compensation mechanism proposed in the 12th Five-Year Plan. A variation of payment for ecosystem services (PES), it aims to make resource users pay for usage and compensate those affected by it. For instance: resource users of upstream water basins will provide compensation for those downstream; resource users in economic development zones will compensate for those in the protection zones; and beneficiaries of ecological conservation schemes will provide payments to those living in protected areas. In the last decade, China has issued 29 national level policy documents related to ecological compensation, though actual implementation remains a challenge (Wang *et al.* 2014). Besides specific policies, however, further exploration is needed to understand the degree of consideration given for social equity within China's overall green economy policies. In particular, China's large informal economy – and the millions of people working in it[6] – is not explicitly taken into account. The livelihoods of informal waste pickers in urban areas, for instance, are likely to be significantly affected by government-led efforts to create a formal recycling industry. As the informal economy tends to hold vulnerable populations (Carr and Chen 2001), future policy discussions should evaluate the consideration given to those vulnerable populations within China's green economy policies.

[5] The spatial planning policy gives limited consideration to justice issues; only the safeguard measures sections mentions issues like poverty reduction and sensible treatment of ethnic minorities.

[6] China does not collect systematic informal economy data, but scholars have estimated that at least 170 million urban workers work in the informal economy (Huang 2009); the number is much higher if rural population working in informal, local and unaccounted economies is included.

Conclusion

China's green economy ambitions are of global importance. Not only are they happening on a massive scale and affecting a huge number of people, but they are also setting an example for other emerging economies to achieving a more sustainable path of development than that paved by Western economies. China's current green economy path is important to examine – if not to replicate its success then to learn from its shortcomings in the future. This report has taken stock of the state of China's green economy by capturing its distinct terminology, its historical progression, its macro-level and specific policies, and its key players.

Our principal findings highlight the significant degree of embeddedness, and potential local ownership, of green economy approaches:

- China's green economy thinking has been embedded in its economic development history since the reform and opening up period. Over the last 40 years it has evolved from end-of-pipe basic environmental protection work to incorporating sustainable development within strategic overall development policies.
- China does not have a coherent set of green economy policies. Instead, policies are embedded in the larger development planning and environmental governance directives at the macro-level and spread across various sectors through environmental regulations and incentives (see Chapter 3 for details). Two characteristics were seen across the board: the piloting approach and the central-local planning model with often large implementation gaps.

'As the world's second largest economy and a rising political power, the world will not assess China's success merely by its relative progress made within its borders – instead, China will be judged for its global footprint reductions or shifts away from the brown economy.'

- Various stakeholder groups shape green economy policies. Central government players are the most influential. The National Development and Reform Commission (NRDC) and the Ministry of Environmental Protection (MEP), in particular, drive policy changes within the central government. The public, especially in urban areas, is powerful in influencing agenda-setting. Businesses appear to play a rather passive role as recipients of preferential policies; however more research is needed to test this. Finally, local governments are critical to successful implementation on the ground, but their commitment and lack of capacity need to be addressed.

To further illuminate China's green economy thinking, and to explore potential avenues for achieving a green economy that meets both environmental and social goals, the report has identified three areas for discussion and research: finding the appropriate indicators and assessment methods to measure progress, addressing leakage issues associated with China's growing consumption through trade and investment overseas, and improving social equity in green economy policies' decision making and implementation process.

These additional areas of enquiry are particularly important for an objective assessment of China's global environmental impacts. As the world's second largest economy and a rising political power, the world will not assess China's success merely by its relative progress made within its borders – instead, China will be judged by its global footprint reductions or shifts away from the brown economy. In the hope for China to succeed and to contribute to the knowledge base regarding its development path, this report has attempted to capture the Chinese road towards realising these long-term goals.

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China's transition to a green economy has immense implications for sustainable development both domestically and worldwide. Yet China's green economy policies, concepts and actors still remain poorly understood in the emerging international discourse on the green economy. This report serves as an introductory guide to China's green economy thinking by i) tracing the evolution of China's green economy thinking of the last 40 years, ii) mapping key macro policies that shape China's green economy prospects today, iii) identifying relevant sectoral policies and players in finance, environmental industry, energy, forestry, urbanisation and industrial production, and iv) examining stakeholder groups, unique traits and areas for further exploration.

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International Institute for Environment and Development
80-86 Gray's Inn Road, London WC1X 8NH, UK
Tel: +44 (0)20 3463 7399
Fax: +44 (0)20 3514 9055
email: info@iied.org
www.iied.org

Knowledge Products

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