

Chapter 7

Establishing Green Finance System to Support the Circular Economy

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Chapter 7

Establishing Green Finance System to Support the Circular Economy

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1. Introduction

For years, pioneers in sustainability have been talking about concepts such as ‘closed-loop’ and ‘cradle-to-cradle’, which are focused on bringing individual products and processes into a more circular life cycle. This life cycle concept has been evolving, from individual companies to an entire circular economy. It is an inevitable choice in realising economic growth and effective utilisation of resources to develop a circular economy. The transformation towards a circular economy will entail a lot of costs, such as research and development and capital investments, wasted capital and stranded assets, subsidies for new products to the market, as well as public spending on green infrastructures. The British government has estimated that the creation of a completely effective recycling and recovery system will cost about GBP 13 billion. Scaling up to Europe, the cost will be GBP 110 billion. Providing effective financial support mechanisms and systems can meet the financial needs of circular economy industrialisation. The relationship between finance and circular economy development is very close. Industrial transformation of the circular economy needs green financial support oriented to the market. The upfront costs of investment and the anticipated payback period are more sensitive to additional finance resulting from green innovation and green business activities. Studies have shown that lack of green finance resources is one of the major barriers to establishing and managing a recycling scheme. Meanwhile, the development of the circular economy industry is also favourable for promoting reform and innovation in the financial sector. Financing policy is an effective booster and important guarantee for promoting the circular economy development and transformation of an economy to a development mode. It is also a key link for nurturing and developing the circular economy. Taking the

banking financial institution as an example, financial support on the circular economy can be increased and cost pressure of enterprises can be relieved by lowering the interest rate, extending the credit period, increasing the loan amount, and relaxing repayment conditions. Meanwhile, investment behaviour that does not comply with the principle of the circular economy can be restricted by not providing loans, raising interest rates, and mandatory repayment. It supports the circular economy from another level.

We now have the global Sustainable Development Goals, which target an annual investment pipeline measured in trillions of dollars to end poverty and marry increased prosperity with social inclusion and environmental regeneration. We also have the Paris Agreement on Climate Change, which signals the shift to a low and ultimately net zero carbon economy and stresses the urgency of improving resilience to mobilised financial institutions and regulators in novel ways. However, the current financial system in Association of Southeast Asian Nations (ASEAN) countries lacks the environmental function. Thus, building a healthy market-oriented environment and a green financing system to support the circular economy has a profound social background and practical significance for accelerating the establishment of resource-saving society, improving quality and efficiency in economic growth, and promoting sustainable development of the national economy.

2. Theoretical Framework

One of the basic assumptions of classical microeconomic theory is that companies will seek to maximise profits. However, the market prices for some of these input materials and output products do not fully reflect the externalities of their production and consumption. Internalising the externalities so that production of polluting products falls and production of cleaner products rises calls for the following sets of policy measures:

- increase the investment return of green projects by increasing the revenues for cleaner products, lowering their taxes, or reducing real risks and costs of production, thus kindling firms' enthusiasm to invest in green-related industries;
- lower shareholders' expectations on the return on their investments in polluting projects by reducing perverse subsidies and raising taxes on pollution, and raising the costs through lender liability and mandatory disclosures; and

- increase environmental awareness and responsiveness amongst investors, companies, and consumers through risk assessment and information disclosure for companies and financial institutions on the environmental impact of their investment projects, etc. Consumers play a vital role in the market equilibrium mechanisms that determine market price. Therefore, to influence market price and reduce externalities, efforts should be made to change their consumer preferences.

The purpose of these policy measures is to internalise the environmental costs and curb investment activities with excessive environmental risks through financial means to protect the ecological environment and optimise economic growth. Thus, it calls for a green financial system. A 'green finance system' refers to a series of policies, institutional arrangements, and related infrastructure building. The main source of capital towards the circular economy can be divided into three categories: public capital, private capital, and hybrid funds. All kinds of capital flow to green fields mainly through development banks, United Nations agencies, and capital market channels. The green financial system was rapidly extended in the world with the push for green economic development. The following may be included in the financial support for promoting the circular economy:

- financial institutions may encourage corporations to engage in environment-friendly management and socially responsible investments;
- banks may reflect on the emission of environmental pollutants and greenhouse gases as well as the efficiency of energy usage during investment and loan review stage;
- capital market may form green funds and offer incentives, or develop green industry stock indices and green management performance indices;
- revitalisation of private investment on the construction of foundation facilities;
- strengthening of public notice systems on the green management information of companies and expansion of financial support for green companies; and
- formation of green finance infrastructures to improve the general public's awareness of green finance or to cultivate professionals related to the industry.

The relevant financing policy tools and acting mechanisms are summarised in Table 1.

Table 1. Financing Policy Tools and Acting Mechanisms

Financing Policy Tools		Main Benefits and Acting Mechanisms
Greening Bank System	Discounted Green Loans	Reduce the cost of funding for green projects.
	Lender Liability	Strengthen the social responsibilities of investors; impede the availability of funds for polluting projects by increasing their financing costs.
	Green Banks	Increase the return on green investment and reduce the investment risk and cost of private capital for green projects by leveraging the economies of scale and specialised services and operations.
Greening Capital Market	Green IPO	Facilitate efforts by green companies to raise funds; indirectly reduce financing costs.
	Green Bonds	Reduce the cost of funding for green projects.
	Green Funds	Build up the economies of scale and specialised green services and operations; reduce the cost of green investment.
	Green Equity Indices	Indirectly reduce the investment costs of green projects by channelling more funds into green industries.
	Green Insurance	Expose environmental risks through insurance policies, which indirectly increases the costs of polluting projects and discourages investment in such projects.
Green Capacity Building	Carbon Markets	Drive down the cost of emission reductions through market mechanisms.
	Green Ratings	Reveal environmental risks; reduce the investments in polluting projects by increasing their costs; reduce the financing costs of green projects and foster more of these projects by showing their positive externalities.
	Environmental Cost Database	Increase the accessibility of environmental information and reduce the cost of environmental impact studies.
	Green Investor Network	Increase investor companies' preference for green projects through pressure from institutional investors; increase investors' preference for green projects through online educational programmes.
	Compulsory Disclosure	Encourage (discourage) companies to invest in green (polluting) projects by emphasising greater corporate social responsibilities.

IPO = initial public offering.

Source: Author.

3. Financing Practices and Experiences from Developed Countries' Perspective

Estimates indicate that around US\$1 trillion of additional investment is needed annually up to 2030 to establish new green infrastructures in energy, transport, buildings, and industry. Such an amount, which is reasonably modest at roughly 1.5% of global gross domestic product, is in addition to the need to mobilise US\$5 trillion a year for the underlying investment. Even if this investment target can be met, there are still trillions of dollars of polluting investments that need to be addressed. Developed countries have already accumulated rich experiences in developing green finance-related institutional arrangements and financial products.

3.1 Overview of the Financing Policy that Promotes Green Finance Internationally

In 1974, the first social and ecological bank, Gemeinschaftsbank für Leihen und Schenken Bank (GLS Bank), was founded in Germany to provide preferential loans for cultural, social, and ecological projects. It currently finances around 23,000 projects and businesses. In 1980, the United States enacted the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 and established a superfund to finance the cleanup of sites contaminated with hazardous substances and pollutants.

In 1992, The United Nations Environment Programme Finance Initiative was established. It comprised two core initiatives, the Financial Institutions Initiative and the Insurance Industry Initiative, each based on a statement of commitment to sound environmental and sustainability management principles, endorsed by supporting companies. The United Nations Environment Programme Finance Initiative collaborates with commercial and investment banks, insurance and reinsurance companies, fund managers, multilateral development banks, and venture capital funds.

In June 2003, the International Finance Corporation launched the Equator Principles, which were initially implemented by 10 leading international banks in seven countries, including Citibank, Citigroup, ABN AMRO, Barclays, and WestLB. The Equator Principles are a set of environmental and social benchmarks for managing environmental and social issues in development project finance globally (Equator Principles Association, 2013).

Since then, green finance began to flourish and gradually formed a huge system with diversified markets and increasing green products and services. Commercial banks, investment banks, trusts, insurance companies, and private investors actively participate in the green financial market. Consumers are witnessing a flood of new financial products and services geared towards rewarding and/or stimulating environmentally sustainable behaviour and practices. The following is a brief overview of the financing policies that promote green finance internationally.

The Equator Principles. The Equator Principles require financial institutions to assess the environmental and social implications of projects proposed for financing, and only finance those that demonstrate compliance with social and environmental standards. In July 2006, the Equator Principles were revised, increasing their scope and strengthening their processes.

Green securitisation. Properly functioning capital markets ensure the efficient operation of businesses and the economy in a globally competitive marketplace by providing appropriate reputational and financial incentives, and efficiency in controlling pollution emissions given its appropriate monitoring and enforcement as a market mechanism. The earliest attempt at introducing securities based on natural disasters was the end of 1992, when the Chicago Board of Trade developed catastrophe futures and call spread options. Currently, a variety of innovative environmental securitisation techniques have begun to emerge, including green initial public offerings, green bonds, eco-securitisation pilot programmes, and green mortgage-backed securities.

Green credit and green banks. The shift in banks' strategies and actions towards sustainability is underway, not only amongst smaller alternative and cooperative banks but also amongst diversified financial service providers, asset management firms, and insurance companies. Many western financial institutions have answered to market demand and developed green credit products with preferential loan limits, lending rates, and loan application processes catered to enterprises, individuals, and families. Several banks have created service divisions or teams dedicated to large-scale renewable energy project finances, such as Rabobank International's Project Financing Department, Barclay's Natural Resources Team, and West LB's Global Energy Team. Beyond financing, green banks also undertake a variety of non-finance market development activities to facilitate turnkey, easy-to-use clean energy finance and adoption solutions. For example, the United Kingdom's (UK) Green Investment Bank was initially a policy bank funded by the government, and now is an independent financial entity, renamed the Green Investment Group (GIG), offering both technical and financial expertise on green infrastructure investments. The Japan Bank for International Cooperation, a

government-owned bank, is implementing part of Japan's climate change policies by providing finance together with private banks.

Green funds and indices. The Netherland's Green Fund Scheme is an example of government's support for banks financing green growth. The programme consists of three parts: green projects, green institutions, and tax incentives. The government provides funds to green projects at low cost by taking full advantage of banks' financial intermediary functions. There are also some environmental indices-related funds. An environmental stock market index aims to provide a quantitative measure of the environmental damage caused by the companies in an index. Broad-based indices of stocks generally use extensive environmental, social, and governance criteria, and scoring systems to select companies that are 'leaders' in social and environmental responsibility. Examples include the FTSE4Good series, the BM&FBovespa Corporate Sustainability Index, the FTSE/JSE Responsible Investment Index Series, the NASDAQ OMX GES Sustainability Nordic Index, the Wienerhill Sustainability Index, and some sector-specific indices focusing specifically on companies that provide solutions to sustainability challenges, i.e. the Financial Times Stock Exchange's Environmental Technology Index series, Deutsche's DAXglobal Alternative Energy Index, the NASDAQ OMX Clean Edge Global Wind Energy Index, and the New York Stock Exchange Arca Cleantech Index. These are frequently linked to exchange-traded funds. By October 2008, these funds had over US\$42 billion in assets under management, with a dominated volume of US\$7.3 billion venture capital/private equity investment.

Green venture capital and private equity. Venture capital and private equity investments are an important source of financing for innovative entrepreneurial firms and can significantly accelerate the market diffusion of new technologies (Bürer and Wüstenhagen, 2009). There has recently been increasing attention to 'cleantech', an investment category which consists of renewable energy technologies such as solar energy, wave energy, and biofuels, as well as a collection of other sustainability related subsectors (Usher, 2008 cited in Bürer and Wüstenhagen, 2009). The past few years have seen an explosion of interest in clean energy by venture investors, attracted by the size of the markets that will be created.

Green bonds. Green bonds are instruments which tie the proceeds of a bond issue to environmentally friendly investments. In 2007, the European Investment Bank issued the first climate-related bonds (EIB, 2013). In 2010, the International Finance Corporation launched a green bond programme to help catalyse the market and unlock investment for private sector projects that support renewable energy and energy efficiency. Since then, green financial markets started to flourish. In March 2015, the International Capital Market Association published Green Bond Principles, enabling

capital-raising and investments for new and existing projects with environmental benefits. Recent activities indicate that the market for green bonds is developing rapidly. The global green bonds market amounted to over US\$40 billion in 2015, with issuers including the World Bank, commercial banks, corporations, and municipalities from all over the world.

Green insurance. The purpose of this type of insurance is to form insurance funds for the prevention and restoration of ecological accidents and other types of accidents. It typically encompasses two product areas: insurance products, which differentiate insurance premiums based on environmentally related characteristics; and those specifically tailored for clean technology and emission-reducing activities. In 1990, the German government passed the Environmental Liability Act, which requires the compulsory insurance of 96 sectors (including, amongst others, thermal power, mining, and petroleum) across 10 major industries. Examples of green insurance products include green auto insurance and green home insurance, and the like.

Carbon finance. Key elements of carbon finance include carbon trading, carbon finance, carbon funds, and carbon-related financial derivatives. To date, carbon market products and services have largely been found in Europe, driven by the January 2005 implementation of the European Union's Emissions Trading Scheme. Other trading markets include the Chicago Climate Exchange, the Keidanren Voluntary Action Plan in Japan, the New South Wales Greenhouse Gas Reduction Scheme in Australia, the New Zealand Emissions Trading Scheme, and many others. Collaboration between multilateral development banks and private financial institutions has led to the emergence of a variety of carbon funds to help finance greenhouse gas emission reduction projects to curb climate change. Financial institutions have introduced many derivative products based on carbon emission rights as they become more intertwined with the carbon trading market.

Supply chain financing. Supply chain financing is one area where versatility and scalability are possible, making it a great starting point in building a more circular economy. The industry chain connects supply enterprises, manufacturing enterprises, distribution enterprises, retail enterprises, and even all users, and provides financing services for numerous enterprises in the industry chain. Continuous appreciation of the whole industry chain is realised through functional division and cooperation of relevant enterprises. The International Chamber of Commerce and its Banking Commission are currently focusing on the establishment of new financial solutions that will enable corporations to maintain a resilient supply chain.

3.2 Experiences and Implications

3.2.1 Governments should play a positive and vital role in promoting environmental sustainability and green finance in the earlier stages.

In terms of the financial channels and tools introduced above, the government has played a positive role in promoting green finance in three aspects: policy incentives, subsidies, and preferential loans. In the UK, for example, to meet the huge investment gap in climate change, a green bank was created in 2012 by the government to attract private funds to finance the private sector's investments related to environmental preservation and improvement. It is the world's first investment bank dedicated to greening the economy, with a government funding of US\$5 billion. The Green Investment Bank invests in innovative, environmentally friendly areas where there is lack of support from private markets. Four-fifths of the value of its investments is divided between four main priority sectors: offshore wind, waste recycling and energy from waste, non-domestic energy efficiency, and support for the government's Green Deal, which was launched in January 2012 with the aim of improving the energy efficiency of more than 14 million homes by 2020. As its parliament stated, the mission of the bank is a key component to accelerate the UK's transition to a greener economy, and to create an enduring institution operating independently of government. As well as providing finance, government initiatives also aim to remove the information and green technology barriers by managing risks, simplifying processes, and building the skills and experience in these projects. As of January 2014, the Green Investment Bank had committed US\$ 0.9 billion to mobilise US\$ 4.2 billion when fully deployed, a ratio of private-to-public investment of 3:1. The Green Bond Principles is another example. The green bond market is relatively young but rapidly expanding, growing from US\$0.4 billion of new issuances in 2008 to nearly US\$42 billion in 2015, with a total of US\$118 trillion green bonds currently outstanding. There is no separate legal framework under which green bonds are issued. A new Green Finance Initiative was launched by the City of London in 2016, supported by both the Treasury and the Department of Energy and Climate Change, with the aim of promoting London 'as a leading global centre for green financial services'.

Another example is the United States (US). In 2008, the US committed to develop a green economy through addressing climate change, developing new energy, and improving energy saving and efficiency. In 2009, the US proposed an independent, tax-exempt green bank, with an initial capitalisation of US\$10 billion through the issuance of green bonds by the US Department of Treasury. The principal charge of the green bank is to assist in the financing of qualified clean energy projects and qualified energy efficiency projects.

3.2.2. Financial institutions, especially banks, play a vital role in prompting green finance.

Given their intermediary role in the economy and far-reaching customer base, international banks are well-positioned to benefit from the design and marketing of new green products and services. Globally, international banks are starting to see the top line money-making reality of delivering sustainability to corporate and retail clients. They define clear roles and responsibility at the board of director or supervisory board levels and establish teams or committees to build and promote green credit activities. Moreover, they set up and improve policies, systems, and processes for environmental and social risk management, and establish working mechanisms conducive to green credit innovation to boost innovation of green credit processes, products, and services. For example, Citi, Standard Chartered, and HSBC make public financial commitments of their green financial products and services; JPMorgan and Mizuho embed basic ecological and sustainable (E&S) principles directly into its credit management policy. At present, more than 80 financial institutions in 35 countries have officially adopted the Equator Principles, representing more than 90% of global project finances. Over 200 financial institutions worldwide report their E&S performance using or referencing the Global Reporting Initiative framework. By 2005, the majority of the leading European banks had debt portfolios that contained committed lines to finance renewable energy assets.

Banks have also started to employ innovative financing arrangements for large-scale clean fuel and renewable energy projects. Banks also established a capital base for environmental projects through specialised private equity units focused on clean energy growth markets and investment opportunities. Some banks have taken steps towards participating in the growing carbon market, including US banks Goldman Sachs, Merrill Lynch, JP Morgan, Morgan Stanley, and several European banks, HSBC, Barclays Capital, Fortis, and ABN AMRO. They employ a range of financing approaches to improve portfolio diversification, secure opportunities, and hedge risks.

In 2014, the Green Bond Principles were developed with guidance from issuers, investors, and environmental groups. These principles serve as voluntary guidelines that recommend transparency and disclosure, and promote integrity in the development of the green bond market by clarifying the approach for issuance of a green bond. It will provide greater certainty to the market, which could increase financing opportunities for renewable energy, energy efficiency, clean transportation, sustainable water management, and climate change adaptation projects. In 2014, the Green Bond Principles had been signed by 25 major investment banks that facilitate green bond issues.

3.2.3. Environmental awakening and regulation will build momentum for the green products and service innovation, and expose new business opportunities.

The relatively high level of environmental awareness and government support for environmental sustainability in Europe and the US has driven the ever-growing consumer demand for eco-friendly products and services. Higher levels of media coverage about various environmental challenges, along with multinational environmental campaigns and outreach initiatives, have helped improve the general public's understanding (UNEP FI, 2007).

In Europe, proactive governmental regulatory actions, such as the European CO₂ Emissions Trading Scheme, German feed-in-tariffs for renewable energy, and Dutch Green Funds, provide price certainty in environmental markets and significantly stimulate demand for green products and services amongst bank clients. Organisations that have the foresight and capacity to tap into this desire of consumers to achieve positive environmental change may experience benefits ranging from improved corporate image to increased growth and competitiveness in the marketplace. The Comprehensive Environmental Response, Compensation, and Liability Act of 1980, which was passed in 1980 in the US, requires the lender to assume liabilities if the business operation, production, and waste disposal of its borrower would cause pollution. The United Nations' Principles for Responsible Investment require investors to report on the status of implementation of the network's principles on an annual basis and make their reports and evaluation documents accessible for external review.

3.2.4. Building networks for green institutional investors help facilitate the inclusion of environmental considerations in the investment decision-making process.

The Investor Network on Climate Risk, established in 2003, includes 100 large-scale investors managing US\$11 trillion of assets. The Institutional Investors Group on Climate Change, which was founded in 2001 and currently has 80 members, publishes the carbon emissions data of 2,500 institutions (companies) from 30 countries and their potential commercial risks.

4. Financing Practices and Experiences of Developing Countries: China's Case

4.1 Circular Economy Promotion in China

Facing significant natural resource consumption, environmental degradation, and public frustration, the Chinese government has considered ecological modernisation, green growth, and low carbon development with a national circular economy strategy. The leadership developed a 50-year plan to address sustainable growth objectives and challenges. Important steps include the passage and implementation of the Cleaner Production Promotion Law in 2003, the commitment of US\$1.2 billion in science and technology investment for sustainable development by the Ministry of Science and Technology, and the adoption of the Circular Economy Promotion Law in 2009, which outlined national plans for safe urban municipal solid waste treatment, energy savings, and emissions reduction.

To promote the circular economy at a larger scale, and build a resource-saving and environment-friendly society, the Notice on Policies, Measures and Opinions of Investment and Financing to Support the Development of the Circular Economy was issued on 19 April 2010. It is the first macroeconomic policy guidance document promoting the development of the circular economy since the implementation of the Circular Economy Promotion Law of the People's Republic of China in 2008, which puts forward specific measures to support the development of the circular economy. The data showed that the Ministry of Science and Technology continuously increased research support to key and common technology, developing the circular economy during 2006–2008; science and technology investment in the field was increased every year; and support range also continuously expanded.

In China's 12th five-year plan, energy conservation and pollution control take high priority on the agenda. The 10 key environmental protection projects in the 11th five-year plan was adjusted to eight in the 12th five-year plan by reducing main pollutant emissions and improving people's livelihood. The key preferred environmental protection areas include:

- **major pollutants reduction** such as sewage treatment, sludge treatment, desulphurisation, and denitrification;
- **living environment improvement** such as water/air/soil quality improvement;
- **environmental protection in rural areas** such as non-point source pollution control from agriculture;
- **ecological preservation** such as nature reserve development and biodiversity conservation;

- **environment risk prevention** such as prevention and control of heavy metal/hazardous chemicals pollution and persistent organic pollutants;
- **nuclear safety** such as nuclear safety systems/technology development and radiation monitoring;
- **environmental infrastructure** such as waste treatment facilities development and projects on water supply security; and
- **environmental monitoring** capability development and talent training.

In August 2012, the State Council cleared 10 out of 12 key energy-saving and emission-reduction projects under the five-year plan of energy-saving and emissions reduction, including the demonstration of energy-saving technology industry and the circular economy demonstration.

These environmental protection projects can be divided into three categories. The first are the resources recycling projects with obvious economic benefit, as well as the government pricing or government subsidies, and rewards that can be directly given to the enterprise, such as urban sewage treatment facilities construction, garbage disposal facilities construction, and power plant desulphurisation facilities construction projects. The second category of projects with no short-term economic benefits mainly include the vast number of industrial pollution prevention, ecological protection, and so on. The third category of projects with indirect economic benefits include industrial resource efficiency improvement, land reclamation, etc.

4.2 Current Investment Pathway and Potential Finance Gap

To meet the financing demand, the 12th five-year plan states that China is seeking around CNY3.4 trillion of investments to protect its environment, with around CNY1.5 trillion to be injected first into eight types of 'green' projects, double than in the 11th five-year plan. The government also launched a series of environmentally friendly policies in a bid to encourage the development of 'green' industries. Some of these policies include:

- offering incentives to enterprises engaged in sewage treatment, sludge treatment, desulphurisation, gentrification, and waste disposal;
- improving the pollution charging system to increase the cost of high-pollution production;
- encouraging bank loan issuance to 'green' projects; and
- increasing the portion of 'green' products on the government's procurement list.

In accordance with relevant plans in specific areas, urban sewage treatment and recycling facilities in country construction planning had an investment of about CNY30 billion, and urban life garbage disposal facilities construction investment was nearly CNY2,636 billion. This represented a 37.0% and 14.1% growth, respectively, from the actual investment in the 11th five-year plan. Pipeline construction for sewage treatment received CNY2,173 billion investment, while garbage disposal facilities construction received CNY44.3 billion, representing 56.8% and 65.6% growth, respectively. The government also introduced market mechanisms such as establishing low-carbon product standards, an energy labelling system for consumer products, and carbon trading pilot programmes.

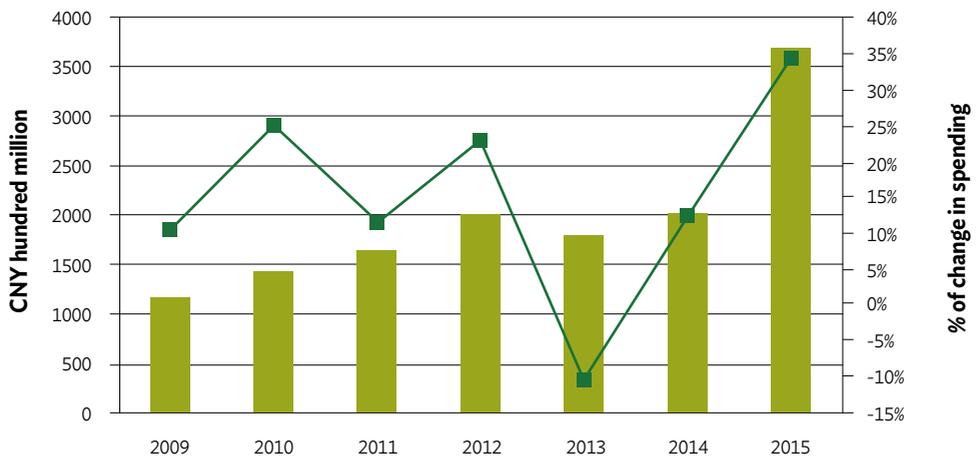
In 2014, the national environmental pollution treatment investment was CNY957.6 billion, up by 6% from the previous year (see Figure 1). In December 2015, spending on energy conservation and environmental protection in China was more than CNY370 billion (see Figure 2). According to the Ministry of Environmental Protection, during the 12th five-year plan, environmental protection-related investment reached CNY3.4 trillion, of which CNY1.5 trillion will be allocated to eight key projects. Total final investment is expected to exceed CNY5 trillion.

Figure 1. National Environmental Pollution Control Investment and Growth
(2006–2014, CNY hundred million)



Source: Based on dataset from the Ministry of Finance, China.

Figure 2. Spending on Energy Conservation and Environmental Protection in China
(2009–2015, CNY hundred million)



Source: Based on dataset from the Ministry of Finance, China.

To demonstrate the efficiency and applicability of these plans, the state has made substantial investments in circular economy-oriented pilot projects, including the application of clean production techniques in specific sectors, and municipal and regional eco-industrial developments. Most circular pilot project cities have met or exceeded the targets set. Beijing has achieved a 62% reduction in energy consumption per GDP in 2010, a 45% increase in the rate of treated wastewater recycling, and a 45% reduction in consumption per capita from 2005. Other cities such as Dalian, Shanghai, and Tianjin have attained more modest improvements so far, but trends are similar. Now, China is a pioneer in the global green investment market, with a green finance mechanism gradually taking shape. In December 2015, China became the first country to issue official rules on green bonds (Kidney and Oliver, 2014). Both Shenzhen Stock Exchange and Shanghai Stock Exchange rolled out pilot corporate green bonds in March and April 2016, while the People’s Bank of China (PBOC) is mulling over developing green bonds services for local markets. According to a report by credit rating agency Moody’s, China replaced the US as the top issuer of green bonds in the first quarter of 2016, with US\$7.9 billion of green bonds issued in Q1, nearly half of the global total.

The China Banking Regulatory Commission has instructed Chinese banks with on and off balance sheet assets worth over CNY1.6 trillion to disclose 12 key indicators according to the Basel Committee of Banking Supervision. Some of these banks are Industrial and Commercial Bank of China, Bank of China, Agricultural Bank of China, China Construction Bank, Bank of Communications, and China CITIC Bank. Banks are required to disclose claims on liabilities to other financial institutions, outstanding

securities, or other financial instruments, cross-border assets, and liabilities, amongst others.

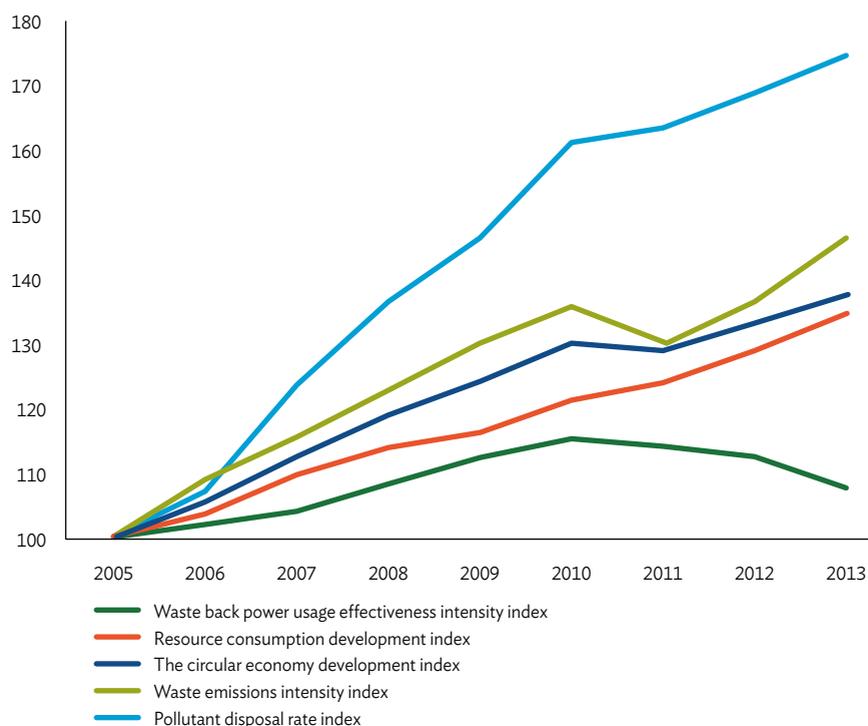
The Ministry of Environmental Protection has blacklisted products that contain high pollution risks. The list includes 722 products and 92 crafts, and the ministry has provided the information to government bodies such as PBOC and the ministries of commerce and finance. The list aims to educate companies and organisations to identify toxic products and consider the implications in the production, safety supervision, decision-making, use, manufacturing, or export of those items. The Shanghai Stock Exchange has established the Listed Companies' Information Disclosure Consultation Committee, which will be responsible for increasing regulatory supervision over listed companies. Furthermore, Greenovation Hub has launched a series of new reports assessing China's latest efforts to prioritise environmental issues through carbon trading, bank lending, and mining regulations. China is substantially improving its environment (see Table 2). The circular economy has undergone great progress in terms of different circular economy development indices (see Figure 3). The next step is for the Chinese government to aid the legitimacy of economic and environmental decisions concerning resource use and trade, including the development of a circular-economy-oriented indicator system (e.g. energy indicators, considering all available energy input directly or indirectly required to generate a product). However, there is still a lot to do, ranging from policy, to ideas and products.

Table 2. Environment and Protection: Achievement and Goals

Measure	Targeted decrease in total output (%)	
	2005–2010	2011–2015
Chemical oxygen demand	12.45	8
Ammonia	-	10
Sulphur dioxide	14.29	8
Nitrogen oxides	-	10
Measure	Targeted water/air quality improvements (↑↓%)	
	2005–2010	2011–2015
Area of polluted surface water	↓ 8.4	↓ 2.7
Area of quality surface water	↑ 14	↑ 5
Portion of country-level cities with quality air	↑ 2.6	↑ 8

Source: Based on Ministry of Environment Protection, China.

Figure 3. China's Circular Economy Development Index in 2005–2013 (%)



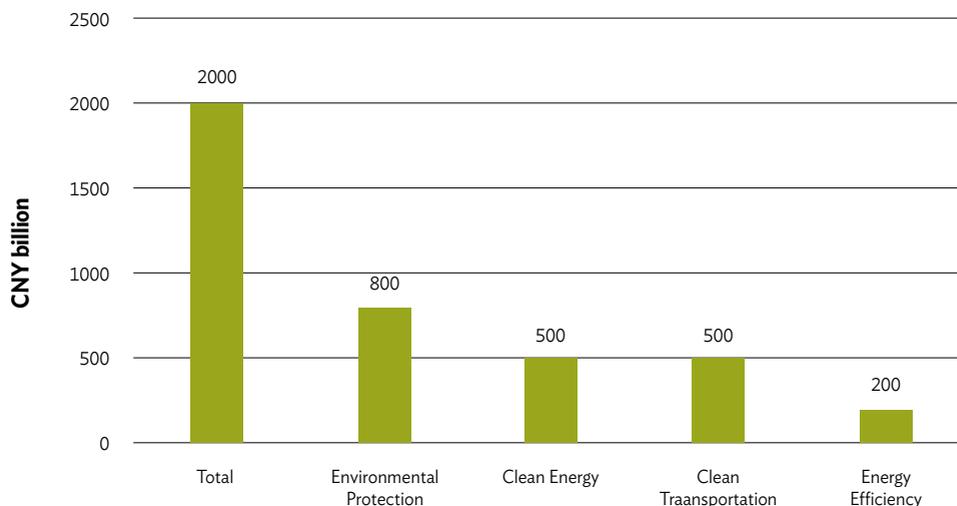
Source: Based on data from the Ministry of Environment Protection, China.

The finance gap is still huge. According to the modelling of the Energy Research Institute, China's total financing need for de-carbonising its energy industry and for energy efficiency (for industry, building, and transportation) under a 2-degree Celsius scenario will reach CNY2.8251 trillion (US\$453 billion) per annum in 2030. As the annual average climate finance from 2008 to 2012 in China was only CNY546 billion (US\$87.6 billion), the gap could potentially reach CNY2.3 trillion (US\$370 billion) by 2030. According to the latest estimates of a research conducted by PBOC,¹ achieving the targets of moving towards a green economic development and building an ecological civilisation requires an annual investment in the green sector of at least CNY3 trillion during the period 2015–2022, and CNY2 trillion (US\$320 billion or more than 3% of GDP) for the next 5 years (2015–2020). Only 7% of current financing in China could be currently described as 'green'. Given that provision of finance reached about

¹ Estimate based on (1) The 12th Five-Year Environmental Protection Plan and the Ministry of Environmental Protection, (2) the Plan on Water Pollution Prevention and Control (issued in 2014, total investment planned at CNY2 trillion), (3) the Plan on Air Pollution Prevention and Control (issued in 2014, total investment planned at CNY1.7 trillion), (4) China Railway Annual Report (a fixed investment of CNY800 billion is planned for 2014; realized investment in 2013 was CNY663.8 billion), (5) the Renewable Energy Policy Network (in 2013, China's investment in wind, solar, and other renewable energy projects (excluding natural gas) was US\$56.3 billion, or approximately CNY350 billion), and (6) Bloomberg (China's investment in renewable energies (excluding natural gas) was US\$67.7 billion in 2012, or CNY420 billion).

CNY10 trillion in 2015, the public investment alone is far from sufficient. Since the growth rates of government expenditure and fiscal revenue have both declined in recent years, the government can only be expected to contribute around 10%–15% of all green investment, while private capital will need to contribute the remaining 85%–90%.

Figure 4. China’s Green Investment Needs During 2015–2020



Source: People’s Bank of China, Green Finance Task Force Report, 2015.

4.3 Experience and Implications

The enthusiasm of enterprises to enter the national pilot range is very high, but the enterprises that can enter the pilot range is limited.

Enterprises are needed to implement and promote the circular economy. At present, China’s pricing system does not fully reflect the negative externalities of polluting projects and the positive externalities of green projects. The latest data from the National Statistics Bureau shows that private enterprises have occupied over 90% of national corporations in China; that the circular economy industry mainly depends on inter-corporation and private lending to support few high-margin items; and that support from banks is quite limited. Loan investments of main commercial banks on relevant industries of the circular economy only account for 7% of total green investments. A significant portion of banks’ lending portfolio consists of loans to state-owned enterprises, which are dominant in most traditional industrial sectors such as steel, base metals, and chemicals. The strategic emerging sectors such as clean energy and high-technology manufacturing receive more than 70% of bank lending (Szamosszegi and Kyle, 2011).

It also lacks financial guarantees and insurance for private financing. For example, in the energy services sector, contract energy management operations largely depend on specialised energy services companies to make a profit. But most of them are small to medium-sized enterprises, with few assets, poor management, and relatively low financial quality. They have little money to lend, and the majority have never dealt with banks. Project funds lack liquidity owing to the long recycling time, so energy service companies must bear the costs. Consequently, commercial energy-saving project loans are difficult to obtain from banks.

Understanding how to restrict excessive investments in polluting sectors and incentivise private investments in green industries, as well as how to use limited government funding to leverage several times more in private investment, will be the key to promoting circular economy development and building an ‘institutional system for ecological civilization’. This is also a major challenge that confronts China’s economic restructuring.

4.3.1 Lack of effective financial system safeguards although the state strengthens financial support efforts

China is still far from having an ideal green financial regime and the volumes required to meet the demand for green investment. Although the government actively promoted marketisation in the field of sewage and garbage disposal for many years because of its strong public welfare, the majority of projects were still financed by government investment.

In terms of the 2012 Wind Database, bank loans are currently the primary source of external finance to enterprises in China, which is 2.7 times more than financing from issuing stocks or bonds in the capital market. PBOC has policies relating to green finance since the 1990s, limiting lending to polluting and energy-intensive industries. Later, in 2007, the China Banking Regulatory Commission put forward guidelines for green lending. Several years later, the commission announced that it would release guidelines on green credit ratings. China’s Environmental Pollution Liability Insurance system was also relatively early on the scene, and is subject to ongoing improvement. While these efforts are not yet mature, they are on the table and markets are preparing to react. Opportunities for green building, for example, present major challenges for the financial sector. Commercial banks have difficulty pricing energy savings as an asset. Investors are still not comfortable with factoring water and energy performance into property-pricing decisions. Property investors need clear guidelines for green investment. Home buyers want to cut their energy costs and ensure good air quality for their children. City

officials want to limit the expenditure of resources for public infrastructure. All these expectations must be part of green finance assessments.

As stressed by the decisions of the Central Committee of the Communist Party of China on several major issues concerning the comprehensive deepening of reform adopted at the Third Plenum of the 18th Communist Party of China Congress (CPC Central Committee, 2012), efforts must be made to establish ‘a systematic and full-fledged institutional system of ecological civilization for the protection of eco-environment,’ and ‘a market-based mechanism that channels private capital investments to the protection of eco-environment’. The General Office of the State Council on the Implementation of Third Party Governance of Environmental Pollution (State Council, 2014) also stipulates that ‘the People’s Bank of China, the China Banking Regulatory Commission, the China Securities Regulatory Commission, and the China Insurance Regulatory Commission work together with the government agencies to formulate financial policies that support the development of environmental service industry’. The No.12 Opinions of the State Council on Accelerating the Ecological Civilization Construction’ (State Council, 2015) puts ‘green’ into the core of modernisation, and takes ‘green development, cycle development, and low carbon development’ as the basic way towards the ecological civilisation of China.

4.3.2. Lack of E&S for most Chinese banks

Most Chinese banks choose to focus on issues directly related to government policy, including limiting the growth of ‘high-pollution, energy-intensive, and over capacity’ industries, improving energy efficiency of necessary industries, and developing renewable energy. For example, China’s Industrial Bank, Shanghai Pudong Development Bank, China Development Bank, China Merchants Bank, etc. have all established a dedicated ‘sustainable finance’ team. The portfolio of green credit products across banks is diverse, catering to different sectors and regions. Several banks that already have interest in green finance actively identified clients at risk. The Shanghai Pudong Development Bank uses E&S risk management as an indicator to assess the performance of local branches for loans made to clients. Many banks recognise the lack of knowledge and skills internally and the need to improve this through formal and informal methods like training programmes and meetings with banks with best practices.

But only a few banks are taking the lead to develop green finance. The Industrial Bank of China is the first Chinese Equator Principles bank and is recognised as the ‘greenest Chinese bank’. The Shanghai Pudong Development Bank is publicly recognised as a leader in green finance. For most banks, profitability is a key factor that they consider if

they should go for further commitment on green finance since this concept is still at an early stage. The relatively low share of green credit compared to the overall loan portfolio means training on E&S issues is not a high priority for many banks.

Most domestic banks rely on environmental impact assessment reports by borrowers to assess risks. In rare cases, banks have specific E&S in place. ‘One-vote veto’ is fully implemented across the banking sector, but additional assessment on E&S issues and post-loan monitoring are not common at present. Leading international banks’ compliance and performance monitoring efforts may vary depending on the nature of the transaction. Failure to effectively identify and control E&S risks could lead to financial, legal, and reputational damage to both the company and the bank (PwC HK, 2013).

In addition, the financial regulatory authorities have no specific industry standards for low-carbon industries, lack detailed instructions, and have no environmental risk-rating standards for projects. These have made green credit policy too unclear for implementation at an operational level.

4.3.3. Lack of financial guarantees and insurance for private financing

As an example, contract energy management operations largely depend on specialised energy services companies to make a profit. But most of them are small to medium-sized enterprises, with few assets, poor management, and relatively low financial quality. They have little money to lend, and the majority have never dealt with banks. Project funds lack liquidity owing to the long recycling time, so energy service companies must bear the costs. Consequently, commercial energy-saving project loans are difficult to obtain from banks.

4.3.4 Lack of capacity, training, and knowledge of financial institutions in E&S issues

Technical capacity and skills in non-technical aspects such as managerial and senior level engagement are important factors that will help drive the expansion of green finance. Furthermore, the legal system is still behind. Legislation does not impose strict enough penalties, including newly released regulations. Enforcement is also ineffective and the cost and pricing of environmental impacts are still problematic. The negative cost of pollution and emissions is not factored into economic statistics.

In addition, in China, statistics on investments and financing have not been established. Most data about circular economy investments take environmental-protection investments as reference basis. Also, data on environmental protection and circular economy investments are often mixed. Investments and financing policies on environment protection mainly focus on environment protection and not the circular economy. Thus, environmental-protection investments and financing policies only help the implementation of the circular economy to some degree. Some environmental-protection investments can be attributed to investments on the circular economy. Although some environmental-protection investments have the environmental-protection effect, they do not fall under the scope of the circular economy in a strict sense. Due to the lack of accurate statistical data on the circular economy, the preparation of policy for the circular economy lacks accurate data support and scientific basis, which undoubtedly brings many difficulties for guiding and promoting the development of the circular economy.

Green finance requires additional screening of E&S risks and knowledge of emerging projects. The new opportunities for green finance are therefore associated with extra costs to banks. Due to the lack of green finance information and data disclosure, it is hard to find direct quantitative linkages between green finance practices and financial performances in Chinese banks.

5. Establishing Green Finance System to Support the Circular Economy: Policy Recommendations for ASEAN Countries

Guided by the foregoing framework and drawing on international practices and experiences to promote green finance, the ASEAN governments must prepare the following finance-related policies:

- formation of financial resources and capital support for green economy and green industry;
- development of diversified financial products and services to support green growth;
- revitalisation of private investment on the construction of foundation facilities;
- strengthening of public notice systems on green management information of companies and expansion of financial support for green companies;
- enhancement of capabilities to support green finance; and
- promotion of global cooperation.

5.1 Broaden and Enhance the Formation of Financial Resources and Capital Support for Circular Economy Projects through Innovation

Compared to financial institutions in developed countries, financial institutions in developing countries generally lack green finance experience, especially when introducing E&S to the traditional financial business. Governments need to provide the corresponding training and technical support, and even preferential fiscal arrangements and taxation to promote the market access.

Greening the banking system. The role of bank lending in financing industrial transformations means that promoting green finance is an important lever to ensure that countries can meet their environmental target. The role of the government and regulator will also be crucial in shaping the lending decisions of commercial banks. Banks need to demonstrate that they are acting in an environmentally sensitive way. The greening of the banking system also needs further clarification to guide and explain the terminology and, more importantly, propose a framework and standard protocols for E&S risk management across the whole lending activities for banks to use. Lender liability for environmental pollution by borrowers should be introduced, and environmental liability insurance should be mandatory for selected industries. Transparency in the implementation of the Green Credit Policy and Guidelines needs to be enhanced. If banks' standards and performance are publicly defined, reported, and accessible, companies will be able to build trust with stakeholders and demonstrate their management of social and environmental issues.

Greening the capital market. Capital markets can react positively to the announcement of rewards and explicit recognition of superior environmental performance. Currently, the capital markets manage trillions of dollars that could be directed towards a green economy. Public and private institutional investors, banks, and insurance companies are increasingly looking at portfolios that minimise environmental, social, and governance risks, while capitalising on emerging green technologies. While in many ASEAN countries, the capital market is less developed, financing through the capital market for green industries is limited. In this sense, it is necessary for some Asian countries to study the successful experience by introducing new varieties of product innovation and trading market, gradually forming perfect multilevel capital market system, and, to further improve present enforcement of issuing conditions, release information on disclosure procedures, provision for supervision and management, and legal liability. The governments can harness market forces of capital market by introducing structured programmes to release firm-specific information about environmental performance. Stock exchanges would mandate investor-relevant environmental reporting and

encourage the development of green indices and linked exchange-traded funds. (Another form of a public disclosure mechanism is the Global Reporting Initiative). This initiative invites voluntary participation of stakeholders outside the regulatory public institutions of the country to implement the industrial environmental evaluation.

Creation of a new green investment bank. Governments can actively explore and encourage the creation of new green banks, funded mostly by private capital, then introduce practices and experiences in green financing from the eco-finance business divisions of more established commercial banks. A new green bank will provide at least five major benefits. First, it will enhance the public's confidence and risk preference for green projects and help steer more public funds. Second, a new green bank can easily adopt the Equator Principles from its inception and match international best practice in environmental principles and risk management. Third, innovative financing methods for targeted industry sectors and market needs will be implemented more easily. Fourth, countries will have a much more flexible ownership structure to attract private investors. Fifth, a specialised green bank can outperform normal commercial banks in controlling risks and non-performing loans, as seen from experiences of other countries.

Encourage innovative financing by supporting discounted green loans, issuing green bonds, green funds, improving the mechanism of green initial public offerings, green bonds, and other finance innovations. Green bonds are debt instruments that associate the proceeds of a bond issue to environmental or social activities, creating ring-fenced debt finance for green investments. China and India, pioneers in Asia's nascent green bond market, are expected to be prominent drivers of regional issuance over the coming years given their governments' ambitious targets on building renewable energy capacity. What governments need to do is encourage incentives for buyers on a set of green bond guidelines. Green funds will serve as the platform through which private capital can converge into professionally managed green investments and provide an important supplement to green credits. Furthermore, leasing finance is a powerful and flexible tool with which to finance sustainable energy equipment. Leasing energy-saving and emission-reduction technology and equipment was the solution used for Beijing's Chaoyang District and it established a 'green role model' in China. Another example is energy management contracts. Energy management contracts will affect the focus of the eight predetermined, high energy-consuming industries, including steel, cement, metallurgy, coke, calcium carbide, coal, glass, and power. Moreover, carbon finance is a new branch of environmental finance. The market for the purchase of carbon has grown exponentially since its conception in 1996.

Setting up a network of financial institutions and other stakeholders. Financial institutions can become familiar with the entire product value chain by partnering with contractors and manufacturers to offer green financial products; can align green financial product and service development with federal, provincial, state, regional, or municipal environmental and energy policies, targets or incentives; and can collaborate with environment-focused non-governmental organisations and academic groups to design and offer green financial products. It is also necessary to set up a network of green investment banks and groups of commercial banks.

5.2 Some Special Mechanisms are Needed to Further Boost Lending and Risk-taking Capacity for Higher Risk Circular Economy Projects with the Aim of Mobilising Private Capital

Giving innovative small businesses access to the stock market. Governments should encourage and support resource recycling enterprises to meet the conditions for domestic and foreign listing and refinancing, actively develop credit innovation products that are relevant to the circular economy, and broaden guarantee range and innovate guarantee schemes. Regulatory authorities can list the approved public offerings and ‘green’ channels to accelerate the financing of green measures in the capital market. Greater disclosure of environment risks to investors is necessary as well. In the US, Japan, and Europe, the second board markets serve as one of the main mechanisms for the exit of green industry funds from their investors. Similarly, Asian countries should hasten their pace in lowering the listing criteria and transaction costs of the Growth Enterprises Market Board, improve the transparency and regulation of the market, and implement strict delisting regimes.

Offering financial guarantees or insurance to help remove barriers to private investment. Financial guarantees or insurance can be provided by governments, normally through government-owned or -controlled corporations, central banks, ministries, or other government departments; national, multinational, or multilateral export credit agencies; and private sector guarantors or insurers. Several public finance instruments can help remove barriers to private investments, such as loan guarantees, which enable borrowers to obtain lower interest rates, as the lender is protected against default; or mixed-equity funds, which lower the risks for private equity investors, including public capital in the fund. The need for a modern grid infrastructure is an example of when private capital must be mobilised along with government infrastructure spending. The use of ‘green’ mortgages for green buildings could help finance energy-efficient houses, enabling homeowners to pay the accrued energy savings over time. The People’s Bank of China can launch financing pilot programmes for commercial banks, technology service

providers, and companies that need energy-saving innovation. Some of this money will be allocated as non-performing loans, and local governments can join in offering funds.

Creating green funds to encourage private capital. The government can encourage creating green industry funds through public-private partnership (PPP) arrangements. The level of government involvement in a green industry fund should depend on the nature of the fund. PPP green industry funds can be thought of as an innovative extension of the traditional PPP model. First, they can enjoy the favourable policies applicable to individual PPP projects. Second, as an innovation, PPP green industry funds can possess characteristics typical of PPP arrangements, which will make them significantly different from other industry funds. For green start-up companies, green industry funds will have difficulty pulling their funding support from these companies.

Encourage innovative business models in the circular economy, especially supply chain finance. Supply chain financing means commercial banks connect core enterprises with upstream and downstream enterprises through expanding services of core enterprises, from raw material purchase, intermediate products, finished products to the delivery of the products to consumers through sales networks. Innovative business models are needed to allow better access to products, components, and materials during and within the post-usage loops. Business model innovation will be critical to mainstreaming the uptake of the circular economy principle in more business-to-business setups, and in business-to-customer setups. Industry chain financing can break through traditional loan modes. The service is not oriented to producers, manufacturers, sellers, and other independent enterprises in the industry chain in the market. Thus, large core enterprises in the supply chain can provide larger financial support for the industry chain. Therefore, industry chain financing services can make small and medium-sized enterprises enter the credit system. Meanwhile, industry chain financing can mobilise commercial banks to research and develop more financial products to improve operation initiatives and flexibility as well as the profit space of commercial financial institutions. It is required to actively improve credit rating mechanisms implemented for small and medium-sized enterprises according to distinct characteristics of small and medium-sized enterprises.

5.3 Enhancing the Basic Financial Infrastructure and Capacity Building

For a full-scale market to develop, solid foundations need to be in place, including a framework of definitions and standards, institutions, and capacity for assessment, and networks and platforms for trading.

The first problem facing most Asian countries is information asymmetry between industry and the financial sector. Most financial institutions tend not to evaluate green performance of firms. Green certification, a green rating system, and environmental information disclosure are examples for serving this purpose. Efforts should be made to investigate the pathways and degrees of the impact of green factors on sovereign governments, local governments, and corporate rating.

Moreover, carbon and pollution trading markets are important financial infrastructures for the promotion of emissions abatement at lower costs and with higher efficiency. National legislation and top-level design should be strengthened and optimised to accelerate the development of a national carbon trading market, set appropriate cap and trade mechanisms, fully leverage price incentive to polluters, and increase market liquidity. For key river systems and air-pollutant monitoring regions, governments should establish trial programmes that allow pollution rights trading across administrative divisions, and implement a system for regular evaluation and adjustment that links total regional pollutant emission with the carrying capacity of the local environment.

Furthermore, governments can promote the use of circular economy development indices that orient the capital market to the circular economy industry. Financial institutions can publish greener and sustainability stock indices with reference to successful earlier experiences to expedite the development of relevant investment products. Exchanges and index companies may provide platforms for realising sustainability indices and information.

It is also necessary to constantly increase the information volume of the database, starting with listed companies and major polluters. Based on publicly disclosed environmental information or corporate social responsibility reports, the inputs of environmental cost accounting can be arrived at (such as the categories, emissions, and local emission pricing of various pollutants) and the environmental costs of companies can be calculated and included in the database. With growing public demand for the disclosure of environmental information, more enterprises can be included in the database over time.

Increasing the environmental and social responsibility of regulators, financial institutions, investors, and consumers is also necessary. Firms need to be more aggressive and innovative in introducing green management. Firms should invest in green management and seek competitive advantage through achieving green management. It is also necessary to improve environmental experts' inspections of listed companies, training mechanisms, evaluation mechanisms, and incentive mechanisms; and linkage to environmental protection departments, the securities information regulator, and the

local environmental protection department regulator, and others. The professionals in green finance should be educated. The experts in banks and capital markets need to have professional knowledge about socially responsible investing investment, carbon trading, and carbon tax.

Governments also need to accelerate the formation of legal infrastructures by, for example, setting up a national compulsory green insurance system and promulgating regulations on the compulsory pollution liability insurance. Countries including the US, Germany, and Russia have enforced compulsory insurance requirements for enterprises or equipment with high environmental risks. Singapore and Taiwan have also promoted the green insurance market during the early stages of their development through compulsory insurance requirements. Stock exchanges should formulate rules on compulsory environmental information disclosure, identify environmental information as an indispensable component of corporate information disclosure, and formulate compulsory rules of environmental information disclosure.

5.4 Encourage International Cooperation, and Widen International Financing Channels

Some international banks such as the Asian Development Bank have already started the green business in Asian countries. The World Bank Group has a wide range of concessional financing instruments that can cover the incremental costs and risks associated with low-carbon investments (World Bank, 2016). Examples include the Global Environment Facility projects for energy efficiency, renewable energy, new clean energy technology, and sustainable transport projects; the Carbon Partnership Facility to generate a flow of carbon credits for up to 10 years after 2012; the Clean Technology Fund towards clean technologies; and the Strategic Climate Fund to support targeted programmes with dedicated funding to pilot new approaches with potential for scaled-up, transformational action aimed at a specific climate change challenge or sectoral response. The International Finance Corporation, a member of the World Bank Group, also provides direct debt and equity financing.

The Green Climate Fund, founded within the framework of the United Nations Framework Convention on Climate Change, is a mechanism to transfer money from the developed to the developing world to assist the developing countries in adaptation and mitigation practices to counter climate change. Its objective is to raise US\$100 billion a year by 2020. The long-term financing of the Green Climate Fund aims to raise US\$100 billion per year by 2020.

Further, large venture capital/private equity and funds are beginning to look for low-carbon investments. The past few years have seen an explosion of interest in clean energy by venture investors. New Energy Finance has identified over 1,500 separate venture and private equity groups, all searching for the clean energy equivalent of Cisco, Dell, Amazon, or Google. Wind is the most mature clean energy technology and it accounts for more than one third of capacity investment, more than either nuclear or hydroelectric power. Solar energy is the fastest-growing sector. The P8, an initiative of the Cambridge Programme for Sustainability Leadership and HRH Prince of Wales's Business and Environment Programme, is a group of senior leaders from some of the world's largest public pension funds, working together to contribute to take the lead in the move towards a low carbon economy. The P8 started as a group of eight of the largest pension funds and now involves 10 leading global pension funds and sovereign wealth funds, including representatives from Europe, Asia, Australasia, and North America. They are working closely with development agencies and multilateral development banks to identify specific investment opportunities.

In this sense, the governments can assist the local finance projects by coordinating with international and local financial institutions, and use the multilateral development banks' knowledge-sharing platform to speed up international knowledge transfer and learn international advanced management experiences and technology. For this, it is necessary to strengthen the capacity of government officials to help enterprises realise these potential international alternative financial products. Governments can encourage commercial banks to strengthen the cooperation with domestic and international finance intermediaries to jointly explore the development of green finance market and learn from the cooperation.

6. Conclusions

The development of the circular economy is not only beneficial to the effective protection of the ecology and the sustainable exploitation of the resource but also to the adjustment and upgrade of the industrial framework. The circular economy is characterised by low consumption, low discharge, and high efficiency. Policy financing is an effective booster and important guarantee for promoting the circular economy development and transformation of an economy to development mode.

However, in most Asian countries, because the circular economy is a long-term project and has a wide involving range and higher technical research and development investment, fund demand is quite huge and financing for small and middle-sized enterprises is especially difficult. Taking China as an example, its current thcircular

economy industry mainly depends on inter-corporation and private lending to support few high-margin items, and operation of the project with general margin is struggling. Meanwhile, limited by policy and mechanisms and worrying about risk and reward, private capital cannot always be injected into the booming industry market.

Given the financing challenges to develop the circular economy, we suggest that a green financial system that supports the circular economy in ASEAN countries should have the following characteristics:

First, the establishment of a sound green financing mechanism will be a systemic project that requires the coordination amongst central authorities, local governments, financial institutions, and enterprises. In the process, governments have a key role to play in strengthening domestic policy frameworks, better aligning and reforming policies across the regulatory spectrum to overcome barriers to green investment, and providing an enabling environment that can attract both domestic and international investments. Three types of policies and mechanisms can be designed: increase returns to the circular economy projects; reduce returns to polluting projects; and increase investor, corporate, and consumer responsiveness to these signals.

Second, enable direct long-term investment and sustained financing by encouraging new green financing channels and financial products innovation. In prompting the greening of existing banking channels to green credits, governments can consider the creation of a new green investment banks by undertaking huge capacity-building exercises across relevant institutions. The capital market shift, the evolution of market instruments such as carbon finance, and green stimulus funds established in response to the economic slowdown are opening spaces for financing a transformation. For this, regulators and key market players need to promote the development of the global green bond market and improve the consistency of green bond standards to develop environmental information disclosures for publicly traded entities and develop environmental stress testing by financial sectors and/or firms.

Third, innovation to scale up institutional investment and large-scale private investment needs to be mobilised to close the funding gap. To steer private capital to the circular industry, a series of policies, institutional arrangements, and related infrastructure building are necessary. Green bonds are an optional policy because, as typically tax-exempt bonds, they are issued by federally qualified organisations and target institutional and retail investors and, therefore, can help raise additional funds from consumers and the private sector rather than from general taxation.

Fourth, international cooperation and knowledge sharing is crucial. International organisations, national banks, institutional investors, and banking associations can enhance cooperation to promote the adoption of high environmental standards by lending institutions around the world and enhance their ability to conduct green investments. National governments should actively nurture intermediaries, including the trading platforms, consulting, assessment, legal, accounting, and other intermediaries' services, to cultivate and improve the cultivation of the right to participate in green finance.

References

Bürer, M.J., and R. Wüstenhagen (2009), 'Which Renewable Energy Policy is a Venture Capitalist's Best Friend? Empirical Evidence from a Survey of International Cleantech Investors', *Energy Policy*, 37, pp.4997–5006.

CPC Central Committee (2012). Decisions of the CPC Central Committee on Several Major Issues Concerning the Comprehensive Deepening of Reform adopted at the Third Plenum of the 18th CPC Congress.

Equator Principles Association (2013), *Equator Principles III*. London: Equator Principles Association.

European Investment Bank (2013), 'Energy Lending Criteria: EIB and Energy Delivering Growth, Security and Sustainability – EIB's Screening and Assessment Criteria for Energy Projects', *EIB Handbook*. Luxembourg: EIB. http://www.eib.org/attachments/strategies/eib_energy_lending_criteria_en.pdf (accessed 02 March 2016).

Kidney, S. and P. Oliver (2014), *Greening China's Financial Markets Growing a Green Bonds Market in China*. Winnipeg, Canada. International Institute for Sustainable Development.

People's Bank of China and United Nations Environment Programme (2015), 'Establishing China's Green Financial System', Report of the Green Finance Task Force. <http://www.unepfi.org/fileadmin/communications/EstablishingChinasGreenFinancialSystem.pdf> (accessed 02 March 2016).

PricewaterhouseCoopers Hong Kong (PwC HK) (2013), *Exploring Green Finance Incentives in China*. Shenzhen, China. PwC Consultants (Shenzhen) Limited. <https://www.pwchk.com/en/migration/pdf/green-finance-incentives-oct2013-eng.pdf> (accessed 02 March 2016).

State Council (2014), The General Office of the State Council on the Implementation of Third Party Governance of Environmental Pollution, State Council [2014] no. 69, http://hzs.ndrc.gov.cn/newzwx/201501/t20150115_660287.html (accessed 02 March 2016).

State Council (2015), Opinions of the State Council on Accelerating the Ecological Civilization Construction, State Council April 25, 2015, <http://www.scio.gov.cn/xwfbh/xwfbh/yg/2/Document/1436286/1436286.html> (accessed 02 March 2016).

Szamoszegi, A. and C. Kyle (2011), *An Analysis of State-owned Enterprises and State Capitalism in China*. US–China Economic and Security Review Commission. Washington, DC, US-China Economic and Security Review Commission. https://www.uscc.gov/sites/default/files/Research/10_26_11_CapitalTradeSOEStudy.pdf (accessed 02 March 2016).

United Nations Environment Programme Finance Initiative (UNEP FI) (2007), ‘Green Financial Products & Services: Current State of Play and Future Opportunities’, A Report of the North American Task Force (NATF) of the UNEP. Geneva: UNEP FI. http://www.unepfi.org/fileadmin/documents/ceo_briefing_green.pdf (accessed 02 March 2016).

World Bank (2016), *World Bank Green Bond Project Selection Criteria*. Washington, DC: World Bank. <http://treasury.worldbank.org/cmd/htm/GreenProjects.html> (accessed 02 March 2016).