CHAPTER 7

Finance and Green Transformation and Development

1 Meaning and Characteristics of Green Finance

1.1 The Meaning of Green Finance

Green finance was first proposed by the United States in the late 1990s. There is no unified definition of this concept at home and abroad. To sum up, there are five different definitions with different focuses.

The first one focuses on the role of green finance as an environmental tool or means. In this definition, "green finance" is directly defined as "environmental finance" or "sustainable finance", which is an environmental protection tool or means. For example, the *American Heritage Dictionary* (4th edition, 2000) defines green Finance as "Environmental Finance" or "Sustainable Financing". Its basic connotation is "how to use diversified financial instruments to protect the ecological environment and biological diversity". Pan Yue believes that green finance is a means of finance and capital market in environmental and economic policies, such as green credit and green insurance. Tang Bohong (2009) also pointed out that the essence of green finance is the macro-control policy required by the law of market economy with the construction of ecological civilization as the orientation, credit, insurance, securities, industrial funds and other financial derivatives as the means, the goal of promoting the coordinated development of energy

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conservation and emission reduction as well as economic resources and environment.

The second one focuses on the supporting effect of green finance on green industry. For example, He Xiuxing (1998) believes that green finance refers to the policy that the financial industry takes green industry as a key supporting project in terms of loan policies, loan objects, loan conditions, loan types and loan methods, and gives priority and preference to green industry in terms of credit supply, investment amount, term and interest rate.

The third one focusing on green finance is the scientific accounting of the value of resources and environment. For example, Qiao Haishu (1999) argued that "the core of green finance is to measure the natural resource depletion and environmental loss caused by natural resource stock or human economic activities and apply them in the field of financial resource allocation and financial activity evaluation by measuring the environmental value or economic value".

The fourth one focuses on the implementation and embodiment of the awareness of resource and environmental protection in the financial industry. This is the view of most scholars that green finance is the embodiment of resource and environmental awareness in the financial industry. Financial activities should reflect the protection of resources and environment, and give play to the role of financial instruments to promote sustainable development. For example, Gao Jianliang (1998) believes that green finance is a financial operation strategy in which the financial sector takes environmental protection as a basic national policy, embodies the "sustainable development strategy" through the operation of financial business, promotes the coordinated development of environmental resources protection and economy, and thus realizes the sustainable development of finance. For another example, Wang Junhua (2000) believes that green finance means that finance should reflect "green" in its business activities, that is, it should pay attention to the treatment of environmental pollution and the protection of ecological environment in its investment and financing activities, and promote the sustainable development of economy and the coordinated development of economy and ecology through its guiding role in social funds. For another example, Li Xinyin also believes that green finance means that the financial industry should reflect the awareness of environmental protection in its business activities. That is to pay attention to the protection of ecological environment and the treatment of environmental pollution in the investment and financing behavior, pay attention to the development of environmental protection industry and guide the role of promoting sustainable economic development and ecological coordination through the investment and financing behavior of social resources. Wen Tongai and Yue Yuxia also believe that green finance means that the green concept should be reflected in the daily business activities of the financial industry, which should take environmental protection as the basic policy, pay attention to the protection of ecological environment and pollution control in the investment and financing behavior of financial institutions, pay attention to the development of green industry and promote the sustainable development of economy and society and the coordinated development of ecology through the guidance of social resources.

The fifth one focuses on the role of green finance in ensuring the sustainable development of the financial industry. This view holds that green finance is not only a public need for resource and environmental protection, but also a need for the sustainable development of the banking industry. For example, Song Xiaoling (2013) believes that the green finance policy of the banking industry means that the banking industry takes environmental protection as a basic policy. In each link of business operation, we should fully consider and scientifically evaluate the possible environmental impact, pay attention to the protection of ecological environment and the treatment of environmental pollution. By establishing the incentive and restraint mechanism of financing environmental protection policies, it guides the allocation of social and economic resources and promotes the sustainable development of banks themselves, society and economy.

Three points can be seen from the above definitions: First, green finance plays an important role in sustainable development. Second, green finance is the implementation and embodiment of the awareness of resource and environmental protection in financial activities in the strategy of sustainable development. Third, green finance is not only to meet the public interest needs of resource conservation, but also the needs of the sustainable development of the banking industry. Given that the main body of financial activities is financial institutions, and the sustainable development strategy and ecological civilization construction is a public interest need to ensure the long-term quality of human survival, and financial activities are an important link between resources, environment and economy, which has an important impact on resources and environment, which is a double-edged sword, while based on the need of resource and environment protection, the government strengthens the regulation of resource and environment for economic activities and promotes the green transformation and development of economic activities. In this context, the financial industry consciously implementing the awareness of resource environmental protection is not only to meet the environmental protection needs of public interests, but also to avoid the risk of national environmental protection policies and actively share the investment opportunities of green development. Therefore, green finance is defined as follows: In the context of strengthening environmental regulation by the government, green finance means, based on the public responsibility awareness of resource and environmental protection and its own sustainable development needs, the financial industry consciously implements the sustainable development strategy of resource and environmental protection in financial activities, strengthens the innovation of financial instruments and makes use of abundant financial instruments to promote resource and environmental protection and ecological civilization construction.

1.2 Features of Green Finance

Compared with traditional finance, the most important feature of green finance is that the main investors in financial activities do not pursue the maximization of economic interests as their only goal, but take social responsibility and resource and environmental protection into

Table 1 Comparison between green finance and traditional finance

	Form the environment	*Characteristics*	*Goal*	*Environmental influence*
Green finance	Strong environmental awareness	Investors with social responsibility	When pursuing economic interests, conscious investors should take into account environmental protection, fairness and other social responsibilities	Good
Traditional finance	Environmental awareness is weak	Ordinary investors	Only pursue the maximization of their own economic interests	Bad

consideration. The comparison of the two is shown in Table 1. In green finance activities, investment and financing subjects not only pursue the realization of their own economic interests, but also give consideration to the fulfillment of social equity and environmental responsibility.

2 Formation Mechanism and Action Mechanism of Green Finance

2.1 Formation Mechanism of Green Finance

Marcel Jeucken, a Dutch scholar, has divided the development stage of green finance. He believes that the attitude of financial institutions towards sustainable development can be divided into four stages from low level to high level, namely defensive, preventive, offensive and sustainable. In fact, from the perspective of the development history of world finance, green finance is not formed automatically, but when the economic and social development reaches a certain stage and the sustainable development strategy becomes a consensus, the financial circle will transform its development orientation based on its own sense of social responsibility and the avoidance of investment risks and the search for new investment opportunities, and its formation has a complex dynamic mechanism. From the perspective of interest subjects, green finance involves multiple related subjects such as the government, financial institutions, enterprises and the public. It is based on their different responsibilities, obligations and interests that green finance is formed and developed. The following takes green credit of commercial banks as an example to discuss the formation mechanism of green finance.

Government Regulation on Resources and Environment
Under the framework of sustainable development strategy, the government has the responsibility to protect resources and environment and the obligation to promote the economic and social transformation and development. The most important manifestation of green transformation and development in economy is the transformation of industrial structure and the change of economic growth mode, while the development behavior of enterprises determines whether the industrial structure and growth mode can be changed smoothly. Capital is the blood of the enterprise; without the support of capital, many enterprises will

not be able to run until the final collapse. One of the most important reasons why many polluting, energy-consuming and overcapacity enterprises fail in industrial restructuring is that they are supported by bank funds. The bank itself is a profit-seeking social subject, and the pursuit of high economic returns is one of its most important operating forces. Without the mandatory constraint of relevant laws, it is difficult to curb the profit-seeking impulse of the bank solely based on its sense of social responsibility at this stage. This requires the government to make clear constraints on the operation and investment behaviors of banks. For example, banks are required to evaluate the environmental impact of the loan project and examine the environmental protection plan of the loan enterprise when lending to the enterprise, or they have the right to refuse the loan. If loan is granted, any loss caused by environmental protection shall be borne by the owner. In this way, banks are encouraged to consciously strengthen the environmental assessment, review and supervise the loan enterprises in terms of operation and investment, adjust the loan issuing direction based on their own investment interests and supervise the environmental protection behaviors of enterprises. In this way, from the perspective of the whole society, "two high and one overcapacity" enterprises should be unable to obtain relevant loans and gradually die out. However, enterprises that can survive are subject to environmental audit and supervision from banks. As a result, the environmental protection level is gradually improved, energy consumption and pollutant emission are gradually reduced, and the resource conservation and utilization of the whole society and the improvement of ecological environment are also promoted.

On the other hand, the government's financial support for environment-friendly industries has also improved the level of environmental protection technology in the whole society and greatly increased the proportion of green industry in the whole industrial structure. At the current stage of transformation and development, many environment-friendly industries are juvenile industries, which are faced with the dual constraints of imperfect technology and insufficient capital. If the government provides preferential loans through policy banks, it can solve the problem of capital shortage and optimize the allocation of other resources such as talents and equipment by alleviating the problem of capital dilemma, thus overcoming the technical problem. This has promoted the development of environment-friendly green industry and the progress of environmental protection technology, thus optimizing the industrial structure of the whole society and enhancing the strength of environmental protection technology.

Financial Institutions' Aversion to Investment Risks

For commercial banks, profit is the most important motive, while enterprises are the most important loan subjects and the most important customers. From the perspective of interest connection, banks and enterprises are community of interests. High and stable profit returns mean more profit sharing space and more stable returns for banks that lend to them. Conversely, the opposite is true. Based on this, when the country takes sustainable development, building ecological civilization and strengthening resource and environmental protection as the basic national policies, it is bound to compress the development space of polluting enterprises and require them to increase environmental protection expenditure and improve the level of environmental protection. This is bound to increase the environmental cost burden of enterprises, affect the rate of return on profits of enterprises, and thus increase the investment risk of the banking industry. For example, the "two high and one high overcapacity" enterprises with serious pollution may face the risk of going out of business for rectification, environmental punishment or even outright closure. Either treatment scheme will directly affect the normal production and profit return of the borrowing enterprise, and in turn affect the principal recovery and profit return of the lending banking industry. Once the borrowing enterprise declared bankruptcy means no interest or capital for the banking sector, which greatly increased the risk of banking operations. Today, with the increasingly high requirement of environmental protection, the cost of environmental protection expenditure of enterprises with general pollution severity cannot be ignored. The cost of environmental protection is bound to affect the rate of return on investment of enterprises, thus affecting the capital and interest of the banking industry. Moreover, for some enterprises in the resource extraction industry, high pollution not only makes them face the risk of being directly eliminated and closed, but also means that more resources are consumed and the period of resource exhaustion will come sooner. Once the resources are exhausted, resource-based enterprises will need to switch to production. Resource extraction industry itself is a capital and technology-intensive industry, which can be said to be symbiotic relationship with the banking industry. Resource-based regions are generally a unique resource-based industry, while other industries are not very developed. The withdrawal or production transformation of resource-based enterprises has a predictable impact on the local banking industry. Therefore, the banking industry, which itself pursues high profit returns, cannot choose the loan subject without considering the impact of environmental risks on its profit margin. Green finance is a wise choice for it to avoid investment risks.

In turn, the financial industry provides financial support and guarantee for the green development of enterprises, which not only helps reduce the investment risk of the financial industry itself, but also opens up new areas for investment. First of all, environmental protection and energy saving is the general trend of the world's development, which is also in line with China's current sustainable development strategy. Since this investment direction is consistent with the country's strategic direction, it is easier to obtain policy support from the country and other relevant parties. Secondly, the direction of energy conservation and environmental protection is conducive to reducing the development cost of enterprises and improving the market share of products, which is conducive to the sustainable development of enterprises and the rate of return of capital, as well as the sustainable development of the financial industry with which they cooperate. For example, with the price reform of resource products, the price of resource products keeps climbing, and reducing the consumption of energy and other raw materials can not only directly reduce the cost of raw materials, but also help reduce the environmental protection expenditure of enterprises. In addition, the energy-saving and environment-friendly products produced due to the progress of energy-saving and environment-friendly technologies are more popular in the market, which is conducive to improving the market share, which is also a positive factor for enterprises. Thirdly, the environmental protection industry has become a rising sunrise industry, and the investment-oriented environmental protection industry is a profitable new industry and a new direction for the development of the traditional financial industry. In conclusion, it is a wise choice for the financial industry to avoid environmental risks and promote its sustainable development to pay attention to the environmental impact in investment, supervise enterprises' environmental protection behaviors and select promising environmental protection enterprises.

Public Supervision of Corporate Environmental Responsibility

In the case of environmental regulation by the government, the government generally grants the public with higher environmental rights, including the right to know and the right to supervise the environment. In addition to directly supervising enterprises' environmental behaviors, the public can also urge enterprises' environmental behaviors through green finance. For example, the majority of bank loans come from the savings of the public, while the development behavior of enterprises that are not environmentally responsible will directly affect the quality of life of the public. In addition to avoiding investment risks for themselves, banks also perform conditional (mainly environmental responsibility) loan qualification supervision obligations for the public and urge enterprises to fulfill their environmental responsibility. For another example, in green securities, enterprises' listed financing needs to report their own environmental protection behaviors and their effects, and enterprises that fail to meet the environmental protection standards are refused to go public. In a word, green finance provides an effective window for the public to supervise the environmental responsibility of enterprises.

Breakthrough of Enterprises in Traditional Development Mode

Under the condition that the government strengthens the environmental regulation and the financial institution carries on the environmental protection loan audit, the traditional extensive production mode which the enterprise disregards the resources environment influence faces the dilemma: On the one hand, it directly makes it difficult for enterprises to sustain their own development. For example, extensive production consumes a large amount of raw materials, increases the expenditure cost of raw materials for resource products and weakens the market competitiveness of products. Extensive production also increases waste emissions, increases the cost of environmental protection expenditure or even faces the risk of being ordered to close; Extensive production makes the product low in technology content and unpopular in the market, which affects the sales volume and the sustainable development of the enterprise. On the other hand, the traditional extensive production mode has worsened the external living environment of enterprises. For example, faced with the increasingly severe environmental protection policy pressure from the government, financial institutions are worried about the environmental protection risks of enterprises and are not willing to provide loans or risk guarantees. The public complains or refuses to buy the products or stocks of the enterprises because of their pollution emission behaviors. However, if an enterprise carries out green transformation production, it is a path of virtuous cycle development. Although green transformation production will have some impact on the enterprise in the short term, in the long run, it will do more good than harm: Firstly, the cost of raw materials and environmental protection costs of enterprises directly decreased; secondly, it improves the social relations and living environment of enterprises. For example, there is less pressure from the government to protect the environment. Financial institutions are more confident to provide loans or risk guarantees for enterprises. The public recognizes their environmental behavior and prefers to buy their products or stocks; thirdly, it relies on the connotative development mode of technological progress to improve product quality and make it more competitive in the market. Therefore, the ultimate rational choice of enterprises is to embark on the green transformation development path, which in turn improves the survival environment of enterprises and forms a self-reinforcing virtuous circle of "green transformation and development- internal and external conditions improve-survival environment improved-green transformation and development". For the whole society, it promotes the greening of industrial structure and the intensification of economic growth model (see Fig. 1).

In Fig. 1, the first is the government's environmental regulation, which requires financial institutions to assume certain environmental responsibilities in investment and operation, which prompts financial institutions to strengthen the environmental audit of production enterprises. At the same time, the government also endows the public with certain power of environmental protection supervision, so that the public has the power and opportunity to supervise the environmental protection behavior of enterprises through certain channels. In environmental regulation, the government also requires enterprises to conduct green production and promote green transformation by means of law, economy, administration, science and technology and culture. In such an environment, enterprises have two choices: One is to continue the traditional high-pollution and extensive production mode, and the other is the environment-friendly and energy-saving green production mode. The former increases the cost of production and operation of enterprises, and worsens the relationship with government departments, financial institutions and the public, the development prospect of which

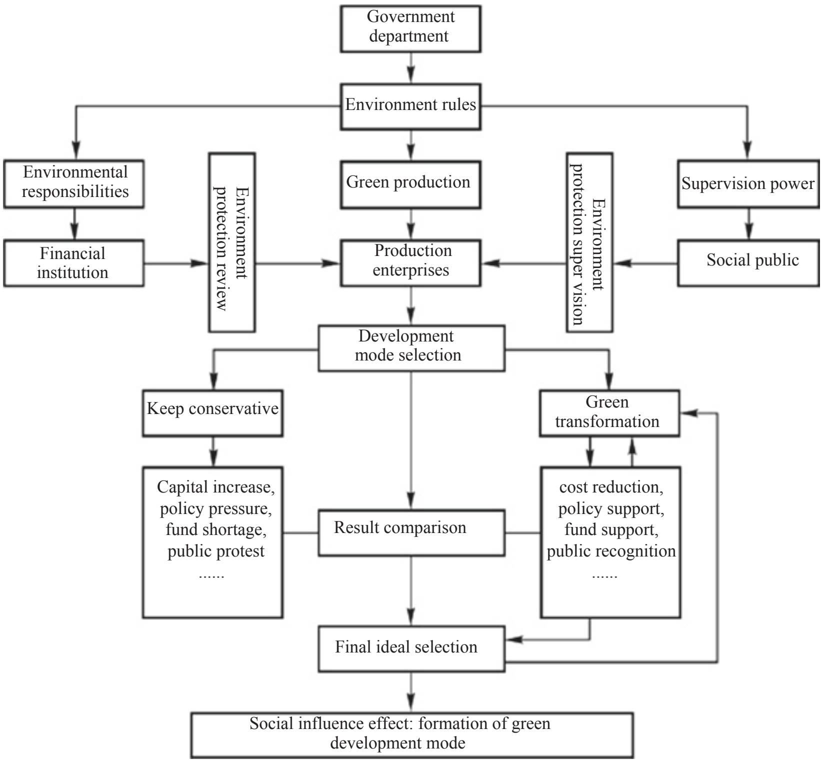

Fig. 1 Green credit formation mechanism of commercial banks

is worrying; After the short-term adjustment of the latter, the comprehensive cost of the enterprise decreases, the product competitiveness improves and the relationship with government departments, financial institutions and the public improves. The whole living environment tends to be better, and enterprises finally embark on the road of green development, and promote the optimization of the industrial structure of the whole society and the transformation of economic growth mode.

2.2 The Mechanism of Green Finance

Awareness of Environmental Protection and Correction of Market Failure
In the process of transformation and development, environmental governance will undoubtedly increase the burden on enterprises. For this reason, many enterprises try their best to avoid environmental protection. After the launch of the green finance system, due to loans, guarantees, listing and other financing needs, environmental audits are conducted and environmental certificates are provided. This makes many enterprises have to take the initiative to carry out environmental governance, so as to avoid the phenomenon of market failure in the production process, such as enterprise profiting, community suffering and government paying.

Technological Progress and Industrial Structure Optimization
The greening of the industrial structure requires a large number of advanced environmental protection technologies. Compared with traditional technologies, environmental protection technologies have the advantages of environmental protection, energy saving, emission reduction and low carbon. However, it is often a new technology that is not mature enough, which requires more research efforts and certain material support, among which capital is an indispensable element. The preference of green finance to green technology, green projects and green industry can accelerate the development of green industry and promote the technological upgrading of traditional industry, which is conducive to the greening of the entire industrial structure.

Internal Governance and Improvement of Governance Efficiency
Although the collection and payment of resource tax and sewage fee can restrain the resource consumption and pollution emission of enterprises to a certain extent, and promote the enterprises to control the environment. However, it belongs to external governance and has certain remedial nature. More often, it is difficult to effectively curb the pollution of enterprises due to asymmetric information, difficulty in accurate measurement of pollution emissions and design defects of green taxes and fees. However, due to the openness and externality of resource and environmental property right itself, its transaction cost is extremely high in the actual micro-individual behavior and cannot be effectively implemented in practice. Fundamentally speaking,

more effective environmental governance needs to be carried out from within the micro-economic subject first, and only by truly restraining the micro-economic subject's impulse of pollution emission from within can the pollution be rooted from the source. Green finance, on the one hand, through the financing of environmental audit, improves the consciousness of enterprise pollution control; on the other hand, financial support for energy conservation, pollution control, emission reduction and other environmental protection activities will help curb pollution at the source and improve the effectiveness of environmental governance.

Environmental Supervision and National Environmental Protection Culture

The investment assets of financial institutions mainly come from the savings or investment of social members, while financial institutions strengthen the environmental protection audit of enterprises in the investment behavior, which is actually responsible for the environmental welfare of social members. This is conducive to enhancing social members' sense of identity and cooperation with financial institutions and forming green residents' savings and green society investment fund. Germany's "eco-bank", Britain's "green choice account", Japan's green investment fund, etc., are green financial institutions formed by social members based on their willingness and pursuit of environmental protection. In addition, in the modern green financial system, many enterprises choose to regularly and actively announce their environmental governance reports to the society and accept the supervision of the public, which is conducive to stimulating the enthusiasm of the whole people for environmental protection and forming the social culture of the whole people actively participating in environmental protection. For example, the "socially responsible investment in Japan" advocated by the Japanese financial circle is the result of the nationwide environmental protection culture.

3 Foreign Green Finance Practices

3.1 Germination and Development Process

The green financial system originates from the exploration of sustainable development and the reflection of the financial industry on its traditional development mode. In the 1970s, the large-scale financial crisis broke out in major Western developed countries, which prompted people to rethink the traditional development model of the financial industry and began to link finance with the environment. In 1987, the world commission on environment and development put forward the concept of "sustainable development" in its report *Our Common Future*, which inspired people to explore the path and implementation tools of sustainable development, including the innovation of financial system. In 1988, more than 1200 members of the green party of the federal republic of Germany invested in Frankfurt, the financial center of the federal republic of Germany, to establish the world's first ecological bank. The bank is also known as green bank because it is mainly engaged in credit business for nature and environmental protection. Its establishment plays a decisive and groundbreaking role in the global development of green finance system and is the first step taken by green finance system in the global development process. After the Rio conference in 1992, the green revolution swept the world. The United States first put forward the concept of "green finance" in the late 1990s and made pioneering efforts to combine environmental factors with financial innovation, to evaluate environmental risks in financial activities and to develop many successful environmental financial products. So far, green finance worldwide can be roughly divided into three stages according to its popularity:

The first stage is the rise and implementation of green finance system in a few developed countries. This stage was mainly in the 1980s and 1990s, and was characterized by the small distribution range of green finance, which only emerged and implemented in a few developed countries (regions) such as Europe, the United States and Japan. As mentioned above, the first green bank in the world was established by the federal republic of Germany in 1988. After 1993, the German government increased the fund year by year to support green industry. In the 1990s, the Japanese government strongly supported the development of green industry. The United States has increased the development of green agriculture and eco-industry; The EU actively supports the production of green products through green credit, green taxation and other policies.

The second stage is that green finance has been widely accepted by Western developed countries after its achievements. After the green finance in Europe, the United States, Japan and other countries achieved results, many developed countries followed suit and increased the research on the construction of green financial system and the development of green financial products. For example, in 2004, Japan policy investment bank, a large state-owned bank in Japan, launched the financing business of "promoting environment-friendly operation", which aims to promote the development of enterprises' environmental protection work. Through its "environment-friendly enterprise evaluation" system, on the basis of scoring the enterprise's environmental performance, provide special low-interest loans for environmental protection to enterprises with excellent performance in environmental protection, and support enterprises to increase their investment in environmental protection. In Europe, there are about 45 green venture capital institutions with a total investment of 100 million euros, investing in renewable energy, water and clean technology equipment.

The third stage is the universal implementation of green finance in developing countries (regions). The success of green finance system in developed countries and the borderless nature of ecological protection have led many developing countries (regions) to introduce green finance system one after another, and green finance system has been implemented on a global scale. In the "green economy initiative" launched by the United Nations environment program (UNEP) to reinvigorate global markets, a total of 50 countries, 14 of which are developing countries, have set renewable energy targets to mobilize investment in clean technology and natural infrastructure. These include: Mexico, Argentina, Brazil, Dominica, China, India, the Philippines, Iran, Morocco, Syria, Tunisia, Senegal, South Africa and Uganda. In October 2002, the international finance corporation (IFC), a subsidiary of the World Bank, and ABN, a Dutch bank, proposed a corporate lending standard at a conference of the world's leading commercial banks in London. The guidelines require financial institutions to make a comprehensive assessment of the possible environmental and social impacts of a project when investing in it, and to use financial leverage to promote the positive role of the project in environmental protection and harmonious social development. This principle became known as the "equator principle" and became widely accepted by the international financial industry (the original name of the "equatorial principles" was "Greenwich principles", the name came from the consideration that the meeting was held at Greenwich, the prime meridian around the earth). Since its inception, the equator principle has been accepted by an increasing number of financial institutions (see Table 2). As of 16 October 2012, 77 financial institutions from 32 countries had announced the implementation of the equator

Table 2 Banks adopting the equator principles (part)

Serial number	*Bank*	*Serial number*	*Bank*
1	ABN (the Netherlands)	31	HSBC group (UK)
2	ANZ (Australia)	32	Yubao Banking Group (Germany)
3	Banco Bradesco (Brazil)	33	ING Group (the Netherlands)
4	Banco do Brasil (Brazil)	34	Intesa Sanpaolo (Italy)
5	Bank of Galicia (Argentina)	35	JP Morgan chase (United States)
6	Mascot bank (Oman)	36	United financial group of Belgium (Belgium)
7	Bank of America (United States)	37	KFW Bank (Germany)
8	Republic Bank (Uruguay)	38	The Savings Banks (Spain)
9	Montreal Financial Group (Canada)	39	Lloyds TSB Bank (UK)
10	Bank of Tokyo-Mitsubishi (Japan)	40	Manulife Life Insurance (Canada)
11	Barclays Bank (UK)	41	Mondragon Union (Italy)
12	Foreign Bank of Bilbao Vizcaya (Spain)	42	Millennium Bank (Portugal)
13	Sheng Jing Banking Group (Portugal)	43	Mizuho Industrial Bank (Japan)
14	Bank of Navarre (Spain)	44	Nedbank Group (South Africa)
15	Calyon Bank (France)	45	Noble Bank (Denmark, Netherlands, Norway)
16	Canadian Imperial Bank of Commerce (Canada)	46	Rabobank Group (the Netherlands)
17	Infrastructure finance international corporation (United States)	47	Royal bank of Canada (Canada)
18	Citigroup (United States)	48	Bank of Nova Scotia (Canada)
19	Industrial Bank (Chile)	49	Nordea bank of Sweden (Sweden)
20	Credit Suisse Group (Switzerland)	50	Sumitomo Mitsui Bank (Japan)
21	Dexia Group (France, Belgium)	51	Societe Generale (France)
22	DnB Nor (Norway)	52	Standard Chartered Bank (UK)
23	Dresdner Bank (Germany)	53	Td Banking Group (Canada)
24	Export credit fund (Denmark)	54	Royal bank of Scotland (UK)
25	E Co(United States)	55	United Bank (Brazil)
26	Export Development Canada (Canada)	56	Wachovia (UK)
27	Financial Banking Corporation (Togo)	57	Wells Fargo (United States)
28	Dutch Development Finance Corporation (the Netherlands)	58	WESTLB (Germany)
29	Fortis Bank (Belgium)	59	Westpac Bank (Australia)
30	Halifax Bank of Scotland (UK)	60	China Industrial Bank

principles. By January 22, 2013, a total of 78 financial institutions around the world have incorporated the "equator principles", and their business scope has radiated to more than 100 countries (or regions) around the world. China's Industrial Bank also announced its acceptance of the "equator principle" in 2008.

3.2 Industry Standards and Practices

Industry Standards

According to the sorting out by Song Xiaoling (2013), the green finance policies of the Western banking industry mainly adopt IFC performance standards, equator principles, *Responsible Investment Principles*, *Manual on Pollution Prevention and Reduction* and other international standards. Each bank combines international standards with its own situation to formulate its financing environmental protection policies and guidelines.

(1) The United Nations *Principles on Responsible Investment*. Focusing on the environment and sustainable development, the UN has formulated such principles and provisions as the *UN Declaration on the Human Environment, the Rio Declaration, the Framework Convention on Climate Change, Agenda 21, the Kyoto Protocol, Johannesburg Sustainable Development, the Monterrey Consensus* and *the Principles of Responsible Investment*. The UNEP Financial Action Agency developed the *Principles for Responsible Investment* in early 2005 and issued and implemented the principles in April 2006. The six investment principles proposed in the *Principles of Responsible Investment* aim to standardize financial investment decisions and enable financial institutions to fully consider the social and environmental impact of project implementation when investing in corporate projects.

(2) World Bank handbook on *Pollution Prevention and Reduction*. The World Bank in 1975 published "project environment development guidelines", since 1984, successively promulgated and revised the relevant business manuals, instructions and business process, also for the first time in 1999 published the *Pollution Prevention and Reduction Manual* (hereinafter referred to as "the manual"), and in 2001 passed the new strategy of environmental protection, have continually revised and improved

its environment policy. The *Manual* has formulated pollution prevention guidelines for more than 40 industrial sectors, fully implemented the governance concepts of strengthening pollution prevention, promoting clean production, improving energy efficiency, reducing resource consumption and improving management, and put forward quantifiable pollution reduction targets and the maximum pollution emission standards. Currently, the manual is widely used by international financial institutions, multilateral development banks, export credit agencies, private financial institutions that have signed the equator principles, industry and consultants, governments and non-governmental organizations.

(3) IFC performance standards. The IFC, part of the World Bank, is increasingly the global standard setter for environmental and social development in financial markets and the private sector. The IFC sustainable development framework, which includes social and environmental sustainability policies, performance standards, and disclosure policies, was adopted on February 21, 2006, and became effective on April 30, 2006. Among them, there are 8 performance standards, which not only involve the comprehensive evaluation and management system in the original performance standards, but also include the requirements of labor rights, human rights, community health and safety, prevention and reduction of pollution, expansion of social investigation, expansion of community participation and new comprehensive methods to protect biological diversity. On January 1, 2012, the IFC updated the sustainable development framework to better reflect the evolution of sustainable development and risk reduction practices. The new framework addresses challenging issues including supply chain management, resource efficiency, addressing climate change and business and human rights that are increasingly important to the sustainable development of businesses. The performance standard has become an important standard for financial institutions to implement the environmental policy of project financing.

(4) The Equator Principles. The Equator Principles (EPs) are a set of voluntary guidelines established by the world's leading financial institutions under the IFC's social and environmental sustainability policies and performance standards to address social

and environmental issues related to development project financing. Drafted by financial institutions including Citibank, ABN, Barclays and WESTLB, it was first announced by 10 leading international banks in June 2003. The equatorial principles constantly revise and update their policies and standards in response to changing circumstances and practical needs. On July 6, 2006, the financial institutions under equator principles modified the old EPs and released a new version of EPs (EPs II), which was officially adopted in January 2007. EPs II has carried on the significant changes to the original equator principles, which has a great progress on the breadth and depth, expanded the scope of application, raised awareness of social issues and raised standards for social and environmental issues. Then it drafted the third version of the equator principles (EPs III) draft, and on October 12, 2012, consulted with stakeholders and the public opinion. The detailed classification of equator principles, specific measures and strong guidance and operability in practice (see Table 3) have

Table 3 Classification and measures of equatorial principles

Category	*Definition*	*Preventive measures*
Category A	Projects have serious negative social or environmental impacts that are diverse, irreversible or unprecedented	1. Social and environmental assessment report 2. Action plan 3. Public information disclosure 4. Complaint mechanism 5. Independent review report 6. Contract
Category B	Projects have a certain negative impact on society or environment, and the impact is small in scope, generally concentrated in a certain area, mostly reversible, and can be easily improved through mitigation measures	Essential measures 1. Social and environmental assessment report 2. Action plan 6. Contracts Non-essential measures (partial applicable measures): 3. Public information disclosure 4. Complaint mechanism 5. Independent review report
Category C	Projects have little or no adverse impact on society or the environment	N.A.

Table 4 Comparison of green financial policies of major Western banks

Bank name	*The environmental protection regulations*	*Core system*	*Characteristics*
Export-Import Bank of the United States	1. OECD *Common Methods* 2. The World Bank's *Pollution Prevention and Reduction Manual*	Environment assessment procedure and guidance	Focuses on medium- and long-term export credits for its environmental assessment procedures and guidelines A policy consistent with the *Common Method* format
HSBC (Hong Kong and Shanghai Banking Corporation)	1. "Environmental credit and ethical investment" guidelines 2. The equator principles 3. Sectoral guidelines	Environmental credit and ethical investment	1. Environmental protection "start from yourself" 2. Expand the concept of environmental protection and influence the market and customers 3. Labor standards, human rights and environmental responsibilities 4. Accreditation of international institutions
Citibank	1. The equator principles 2. IFC environmental and social risk standard	Environmental and social risk management mechanism	1. Forest protection 2. Independent investment center 3. EPs initiator and key core and leadership roles
Asian development bank	1. Environmental policy 2. Operation manual 3. Environmental assessment	Environmental policies	1. Integration of environmental protection and operation procedures 2. Make environmental sustainability a prerequisite for economic development 3. Based on poverty alleviation
Bank of America	1. Internal guidelines 2. World Bank *Manual on Pollution Prevention and Reduction* 3. Credit guidelines for developing countries 4. Equator principles	Core business environmental incentive mechanism	Especially formulated relevant financing policies and procedures for forest and climate change-related projects
Japan bank for international cooperation	1. New environmental and social guidelines 2. Guidance on international financial operations 3. Guidelines for the operation of overseas economic cooperation	New environmental and social guiding principles	Seven basic principles for environmental and social considerations

Source Song Xiaoling. Green Finance Policy of Western Banking Industry: Common Rules and Differential Practice. *Exploration of Economic Problems*, 2013 (1) increasingly become the industry standards of the international financial industry. As of January 22, 2013, a total of 78 financial institutions around the world have accepted the "equator principles", and their business scope radiates to more than 100 countries (regions) in the world.

It is worth mentioning that financial institutions of various countries have formulated their financing environmental protection policies and guidelines according to their own situations and in combination with international financial industry standards (see Table 4).

Practical Development

Since the German eco-bank took the first step in global green finance, many international financial institutions have also penetrated the concept of green finance into their operation and management. In addition to the greening of traditional businesses such as credit, securities and insurance, green bonds have also developed rapidly in recent years.

In green credit, financial institutions, on the one hand, formulate corresponding management measures to strengthen the environmental management of loan projects. On the other hand, financial product innovation should be accelerated to induce and stimulate people's green consumption and other environmental protection behaviors (see Table 5). For example, Citibank in the United States has set up an internal environmental and social policy assessment committee and established a series of environmental management mechanisms, including environmental policy and process training mechanism, risk management mechanism for environmental and social issues, external public and private affairs cooperation mechanism and environmental protection business development mechanism. Barclays bank is committed to the promotion of sustainable development projects. At present, the projects have spread to more than 50 countries, and in the practice process, the bank has compiled a set of social and environmental credit guidelines, which have been issued to more than 170 financial institutions around the world. ABN bank has specially established the database of environmental factor analysis to study the impact of each industry on the environment and the existing environmental risks, and took the database as an important basis for evaluating and selecting loan customers and providing risk assessment. By installing wind power, water power, solar power and other

Table 5 Specific measures taken by international commercial banks to practice green finance

Banks	*Concrete practice measures*
Citibank	• Setting up the environmental affairs department to launch various green credit products and services • Announced $50 billion over 10 years to tackle climate change in 2007 • Established an environmental and social policy assessment committee and a risk management mechanism for environmental and social issues • Energy-saving mortgage products were launched for customers from middle and low-income families, and the energy-saving index was incorporated into the credit evaluation system of the lender • In 2008, together with Morgan Stanley, it announced guidelines for financing carbon emission projects
ABN (Algemene Bank Nederland)	• Providing green loan products involving socially responsible investment funds • Establish the environmental factor analysis database as an important basis for evaluating loan customers and risk assessment • Issue a climate credit card to calculate the customer's carbon dioxide emissions based on the consumption of the card as the emission reduction payment for the purchase of renewable energy • The index based on sample stocks of climate and water resources was designed, and corresponding financial products were launched
HSBC	• It has installed hydropower, wind and solar power generation equipment, clean air conditioning chillers and automatic ventilation equipment, becoming the first commercial bank in the world to achieve zero carbon dioxide emissions • Launch of the global climate change benchmark index fund • Through the guidelines of "environmental credit and ethical investment", refuse to invest and finance projects with potential environmental pollution
Barclays Bank	• Launch "green breathing card", and offer discounts to cardholders for purchasing green products • Launch the first global carbon index fund to track carbon credits in greenhouse gas emissions reduction trading

Source Zhang Ping. *Brief Analysis on Connotation, Function Mechanism and Practice of Green Finance*. Chengdu: Southwest University of Finance and Economics, 2013

power generation equipment, automatic ventilation system and clean air conditioning chillers, HSBC has realized an annual emission reduction of more than 1000 tons and become the first international commercial bank in the world to realize zero carbon dioxide emissions (Lin Xiao, 2011).

In terms of green financial product innovation, green credit products mainly include housing loans, auto loans, commercial buildings, transportation loans and green credit cards (see Table 6). For housing loans, giraffe currency launched a “carbon dioxide mortgage” with carbon emissions as part of the collateral, and participants can enjoy a discount of about 2% interest rate. The united financial services’ “eco-home loan” incorporates household energy efficiency and carbon reduction indicators into the borrower’s credit score system; Citigroup makes easy loans to homeowners who buy solar equipment. On the auto loan front, VanCity bank of Canada provides concessional rate loans to all low emission and clean energy vehicles. Australian MENU bank “Go Green car loan” program also requires lenders to plant trees to absorb the car emissions. In terms of commercial construction and transportation loans, financial institutions also encourage enterprises and individuals to support environmental protection by providing preferential loans and convenient loan services. In addition, some banks have launched green credit cards. Barclays bank has launched a “green breathing card”, offering discounts for green products and services with low borrowing rates. RABOBANK has stipulated that users of its “climate credit card” will contribute a certain proportion to the world wildlife fund after purchasing energy-intensive products or services (Lin Xiao, 2011).

Table 6 List of green financial products of foreign financial institutions

Category	*Specific case*
Housing loans	• Giraffe currency’s ‘carbon dioxide mortgage’ • United financial services ‘eco-home loan’ • Citigroup structured energy-saving mortgage products
Auto loan	• VanCity bank, Canada, “Clean air auto loan” auto loan • Australian MENU bank ‘Go Green auto loan’
Commercial buildings	• Citigroup energy-saving building loan preference • New resources bank energy efficient building credit
Transportation loans	• Bank of America’s ‘quick loan for small business administration’
Green credit card	• Britain’s Barclays Bank “green breathing card” • Rabobank “climate credit card”

Source Lin Xiao. *Research on the Development of Green Finance in China Under the Background of Low-Carbon Economy*. Guangzhou: Jinan University, 2011

In terms of green bonds, green bonds have become an important carrier of green finance in recent years, as they are more likely to be included in the investment portfolio of institutional investors (pension funds, insurance companies, etc.) as medium- and long-term financial products. Since the first "green bond" was issued by the European investment bank in 2007, the global green bond market has developed rapidly at a compound annual growth rate of more than 50%. At present, the balance of green bonds has exceeded 35 billion us dollars (Zhang Chenghui, Tian Hui, 2015). In one case, EDF's 1.9 billion green bond sale in November 2013 was twice oversubscribed. Just a day later, Bank of America issued $500m in green bonds to support its renewable energy and energy efficiency businesses. In March 2014, Unilever and Toyota issued 250 million euros and 1.75 billion dollars of green bonds, respectively. In May, Regency Centers, a real estate investment trust in Florida, issued a green bond of 250 million dollars, and Suez issued a green bond of 2.5 billion euros, breaking the record of 1.9 billion euros issued by EDF (Guo Peiyuan, Cai Yingcui, 2015).

3.3 Green Finance Practices in Typical Countries

The United States

The United States leads the world in the development of green finance, which has achieved remarkable results and has been widely imitated and accepted by other countries.

First of all, with legislative guarantee, relevant laws are improved, matched and coordinated. The United States is a country with a developed legal system, and its environmental and resource laws are no exception. Since the 1930s, a series of laws related to resources and environment have been formulated, especially in the 1970s, a large number of laws on resource and environment protection have emerged intensively (see Table 7), which has laid a good legal foundation for the development of green finance. The federal government's *Comprehensive Environmental Response, Compensation and Liability Act* of 1980, later known as the *Superfund Act*, which is the beginning of green finance in the United States. Under the bill, banks must take responsibility for environmental pollution caused by their customers and pay for repairs. It requires financial institutions to shoulder the responsibility of green society, bear the corresponding responsibility for the environmental

Table 7 Resource and environmental laws enacted in the United States

Year	*Law*	*Year*	*Law*
1936	*Bus Exhaust Control Act*	1976	*Federal Land Policy and Management Act*
1969	*National Environmental Policy Act*		*Resource Protection and Recovery Act*
1970	*Environmental Quality Improvement Act*		*Toxic Substances Control Act*
	American Environmental Education Act		
1972	*Coastal Zone Management Act*	1980	*Acid Rain Act*
	Marine Mammal Protection Act		*Motor Vehicle Fuel Efficiency Act*
	Marine Conservation Research and Closed Fisheries Act		*Biomass and Alcohol Fuel Act*
	Federal Environmental Pesticide Control Act		*Solid Waste Disposal Act*
	Noise Control Act		*Superfund Act*
1973	*Endangered Species Act*	1982	*Nuclear Waste Policy Act*
1974	*Safe Drinking Water Act*	1990	*Clean Air Act*
			Pollution Prevention Act
			Clean Air Act Amendments
1975	*The Toxic Substances Transport Act*	1992	*Energy Policy Act*

Notes According to Ni Yuxia's master's thesis *Research on Green Financial System in the United States* (Hunan Normal University, 2011), relevant materials were sorted out

pollution caused by it and urge banks to prevent and avoid all kinds of risks caused by potential environmental problems. In order to regulate the behavior of the government, enterprises and banks and adjust the relationship among the three, in addition to the *Comprehensive Environmental Response, Compensation and Liability Law*, which stipulates that banks must be responsible for environmental pollution caused by customers, there is also the *Resource Conservation and Recovery Act* for the prevention and disposal of pollution-related cleanup incidents and the *Energy Tax Act* to stimulate and promote the development of green finance industry.

Second, advanced means, the comprehensive use of economic, legal, scientific and technological means. After the 1990s, the green finance system of the US federal government was further improved, with a wider range of participants, more flexible and efficient means, and a comprehensive use of economic, legal, scientific and technological means to promote the benign mutual development of the environment and economy.

For example, the *Clean Air Act Amendment* provides for the emission trading system. The US environmental protection agency promotes the purchase and trading mechanism of emission credits for automobile engine manufacturers, advocates the improvement of product quality in the automobile industry, the development of public transportation and the use of economic leverage such as taxation to encourage the production of clean energy vehicles. The law has been effective. According to statistics, sulfur dioxide emissions in the United States in 1990 were 10 million tons lower than that in 1980. By 2000, the United States had established a relatively complete sulfur dioxide permit trading market, which saved the United States about $1 billion per year in reducing sulfur dioxide emissions and achieved the goal of creating certain economic value in pollution control (Ni Yuxia, 2011).

Thirdly, the system has been improved, and the fields of credit, securities and insurance are all green. Since the *Superfund Act* was enacted, its strict joint and several environmental liability system has spawned a series of relevant environmental management policies, such as "green credit policy" and "environmental liability insurance policy". American financial institutions have to strengthen the environmental risk management of financial activities and develop diversified green financial products to avoid the risk of environmental responsibility. For example, some export–import banks in the United States have established environmental assessment policies. Bank loans for various projects need to be evaluated for their environmental impact first, and decisions on whether to grant loans are made based on the assessment. According to the survey of 1741 member banks conducted by the American banking association in 1991, 62.5% of the banks have changed the traditional lending procedures to avoid potential environmental debts, and 45.2% of the banks have stopped lending due to the fear of environmental problems (Li Xi, 2011). In terms of green securities, in 1993, the US Securities and Exchange Commission required listed companies to make substantive reports on their environmental performance from the perspective of environmental accounting. In terms of green insurance, in order to ensure the implementation of judicial punishment, the United States has developed a sound environmental pollution liability insurance system, which mainly includes two aspects: The first is to clarify the liability of the insured for environmental damage caused by pollution of water, land or air. The second is to clearly own its own governance liability insurance, compulsory insurance will be enforced against liability for damages arising from the disposal of toxic substances and wastes. In addition, it has established a professional environmental pollution risk insurance company—environmental protection insurance company. It has provided lower premium and other preferential conditions for enterprises that attach importance to environmental responsibility risk management, and hired professional environmental experts to strengthen the prevention and control of environmental risks for the insured.

Finally, conditional construction that emphasizes environmental protection, economy, technology and other information sharing. In view of such problems as the difficulty in integrating environment and economy into green finance activities and the information asymmetry between banks and enterprises, American banks attach great importance to the improvement of their information technology systems and have established effective information communication mechanisms.

In short, the United States has established a complete set of green finance system and achieved good social and economic benefits in practice. The establishment of its green finance legal system provides legal guarantee for the development of green finance in the United States.

The UK

As an active advocate and practitioner of green finance, Britain, on the one hand, strengthens the construction of green finance system through legislation and other means, and strengthens the design of constraint mechanism and incentive mechanism. On the other hand, it actively develops green financial products and promote the penetration of green financial products in various fields.

Constraint mechanism: In 1997, the Chartered Institute of Certified Public Accountants issued the *Guidelines for the Preparation of Environmental and Energy Reports*, requiring environmental considerations in the audit of financial statements. In 2000, the government amended the pensions act to require pension trusts to consider the environment when making investment decisions. In 2002, British Prime Minister Tony Blair announced the sustainable development strategy of Britain—*London Principles for Sustainable Development*. The document calls for the full cooperation of all departments to promote the support and integration of financial markets for sustainable development strategies. It is suggested that the financial sector should make prudent decisions on the amount of financing in accordance with the principle of environmental protection and the comprehensive consideration of environmental cost and social risk cost, and that risk management products should reflect environmental and social risks. In response to this, National Westminster set up a department dedicated to environmental finance, which formulated guidelines on environmental finance for internal learning and instructed the bank to use the guidelines to effectively investigate and measure the environmental risks of loans. After years of research, the London center for financial innovation has put forward a set of innovative schemes for environmental risk rating of enterprises from the two dimensions of adverse degree to the environment and the ability to eliminate harmful factors.

Incentives: The UK has implemented a climate change tax, a climate change agreement and an emissions trading regime. The climate change tax will be levied at different rates depending on the type of energy used, but the government will return the proceeds from the tax to companies through "enhanced investment subsidies", such as encouraging them to invest in energy-efficient and environmentally friendly technologies or equipment, and setting up a carbon fund. Among them, carbon fund is an independent company between government and enterprise, which was invested by the government and operated according to the enterprise mode in 2001. The fund is mainly used for activities that can immediately produce emission reduction effects, the development of low-carbon technology and projects to help enterprises and public sectors improve their ability to cope with climate change.

Green financial products development: Green credit and green insurance development is better. Green credit is similar to giraffe money's green home loan and united financial services' eco-home loan (see related article). In addition, the British bank HSBC has set up a "green choice" account, in which customers will donate 5 pounds to the world wide fund for nature, earth watch and the climate group within a certain period of time. Its bills will be sent directly via e-mail instead of paper, to inspire and expand customer's green behavior. Green insurance has the "green car insurance" program launched by royal united insurance company, which aims to encourage more people to buy environment-friendly cars and provide insurance discounts for environment-friendly car owners. There is also the "green travel insurance" program launched by the UK climate safety travel insurance company. Under the premise that the travel company does not increase the insurance cost of passengers, it will invest part of its insurance premium into the company's environmental protection project.

The German

Green finance in Germany mainly aims at green transformation and development through sound environmental legislation, financial support from national policy banks and the development of green insurance.

Sound environmental legislation is the basis for the development of green finance in Germany. Since the *Waste Disposal Law* of the federal republic of Germany was promulgated in 1972, Germany has enacted a series of laws on environmental protection and development of circular economy, making Germany one of the countries with the most perfect green finance legislation in the world. These include the *Energy Conservation Act*, the *Waste Water Tax Act*, the *Circular Economy and Waste Materials Act*, and the *Renewable Energy Act*, which have played their respective environmental roles in various fields (see Table 8). Between 1999 and 2006, the German government also promulgated the *Law on the Introduction of Ecological Tax Reform* (1999), the *Law on the Further Development of Ecological Tax Reform* (2003) and the *Biofuel Quota Law* (2006). The implementation and promulgations of these three laws have reduced the energy consumed by the company and enterprises in their production activities, promoted the company and enterprises to invest in new energy, reduced the emission of pollutants, and protected the ecological balance (Mei Yan, 2013).

National policy banks have played the role of green financial leverage and demonstration. In addition to the ecological bank mentioned above,

Table 8 Environmental legislation and its role in Germany

Law	*Function*
Waste Disposal Act	At the beginning of the legislation, the main emphasis was on the end disposal of wastes. After the amendment in 1986, the focus shifted to reducing the waste generated in production and life
Energy Conservation Act	It sets energy conservation standards for new buildings and reduces energy consumption
Wastewater Tax Law	It stipulates that companies and enterprises shall pay taxes when discharging wastewater into water
Circular Economy and Waste Law	It systematically expounds the idea of circular economy and clarifies new measures in waste management
Renewable Energy Act	It increases the share of renewable energy in the electricity supply

Source Mei Yan. *On the Legal Regulation of Green Finance in China*. Changchun: Jilin University of Finance and Economics, 2013

Germany's national policy bank-KFW bank also actively promotes green transformation and development through green credit. For example, the discount interest loan for energy saving buildings includes two aspects: first, the energy conservation of existing buildings; second, discount loans for new ecological buildings. For projects with good performance in environmental protection and energy conservation, a preferential credit policy with a loan interest rate of less than 1% can be granted for 10 years, and the central government will subsidize the interest rate difference. In addition, KFW also actively innovates green financial products and discloses environmental information. Led by the bank, other financial institutions have also strengthened environmental risk management in financial activities. Since 2001, 30 German financial companies, including banks, savings offices and insurance companies, have published public environmental reports and continuously reported on environmental affairs, following the practice of the industry.

Green insurance strengthens the responsibility of environmental risk management. The *Environmental Responsibility Law* promulgated in 1990, based on the consideration of ensuring that the environmental tort victims can be compensated and the infringer can fulfill the obligation of compensation, Article 19 specifically stipulates that the owners of facilities must take certain preventive measures to guarantee the performance of obligations in advance. The scope of compensation of the insurance company only includes the liability caused by the accident of the production and operation of the enterprise. And the victim must put forward a claim for compensation, to those who knowingly do not comply with the relevant laws and regulations, resulting in environmental damage that is not within the scope of compensation. Germany's green insurance law specifically stipulates in the environmental liability insurance clauses that the loss found within 3 years after the termination of the policy is still responsible by the original policy unit, which is conducive to the repair and treatment of those deep and difficult to be found major environmental pollution accidents.

Japan

Japan's green finance mainly promotes green transformation and development by formulating comprehensive green finance laws, increasing investment in environmental protection industry and advocating socially responsible investment.

Comprehensive green finance legislation. Japan's rapid economic development after the war led to a serious ecological crisis. In face of this reality, the Japanese government promulgated the *Basic Law on Environment*, which stipulates the responsibilities of companies and enterprises, and provides a legal basis for future laws related to green finance. Since then, Japan has continuously formulated and improved other relevant laws to ensure sustainable development, thus becoming the country with the most comprehensive green finance legislation in the world. Japan's green finance legislation can be divided into three parts: first, on the basis of the *Basic Law of the Environment*, the *Basic Law of Promoting the Formation of a Recycling Society* has been promulgated. Secondly, the Japanese government promulgated two comprehensive laws. Through the promulgation of the *Law on the Promotion of Effective Use of Resources* and the *Law on Solid Waste Management and Public Cleaning*, the responsibilities and obligations of companies, organizations, social citizens and the government are clarified, and the evaluation objects and standards of the law are determined. Thirdly, the Japanese government has promulgated six separate laws (see Table 9), which enable the Japanese government to comprehensively regulate the development of green finance from the aspects of society, companies, associations and individuals, and point out the way for the further development of green finance (Mei Yan, 2013).

Strong support for the development of the environmental protection industry. In 1993, in order to further promote the development

Table 9 Green finance legislation and its role in Japan

Law	*Function*
Law on Classified Recovery and Recycling of Packaging	It establishes a system of classified recovery of packaging and containers
Law on the Recovery of Household Electrical Appliances	It stipulates the legal responsibilities of natural persons
Law on the Recovery of Construction and Materials	It stipulates the legal responsibilities of the company and the society, and promotes the recovery and utilization of various construction wastes
Food Recovery Act	It details the responsibilities of governments, companies and consumers
Green Procurement Act	Through government influence demonstration, it affects the production and sales of green products, thus promoting the development of green finance
Law on the Recycling of Scrapped Automobiles	It will properly and reasonably recycle scrapped automobiles to reduce the waste of resources

Source Mei Yan. *On the Legal Regulation of Green Finance in China*. Changchun: Jilin University of Finance and Economics, 2013 of energy-saving technologies and increase the financial investment and loans related to energy and environment, the total amount increased from 560 billion yen in 1992 to 970 billion yen. In order to support the reduction of environmental pressure and better promote enterprises' investment in environmental protection, Japan policy investment bank carried out "promoting environment-friendly operation financing business" for large state-owned banks in 2004 and provided special low-interest loans for enterprises with outstanding performance in environmental protection to encourage enterprises to invest in environmental protection.

Socially responsible investing. Japan attaches great importance to the social responsibility in investment, especially the responsibility of public environmental protection. Policy banks, commercial banks and private investment funds emphasize the environmental protection in investment. From 2006 to 2007, Japan policy investment bank introduced updated business contents on the basis of the original environment rating financing business and put forward relevant countermeasures to reduce carbon dioxide emissions so as to control the greenhouse effect. In early 2006, a new score was introduced to "promote the achievement of Kyoto protocol targets", and in 2007, with the strong support of the ministry of environment, Japan policy investment bank launched the environment rating discount loan business again. In addition, commercial banks can also make full and reasonable use of the environmental rating system of policy banks to evaluate and supervise various loan target enterprises, so as to avoid investment risks in a more practical way and improve investment efficiency. In terms of social investment funds, although Japan started relatively late, it developed rapidly. So far, Japan has 11 funds, including eight eco-funds (six domestic funds and two international funds) and three socially responsible investment funds (one domestic fund and two international funds), which hold about $100m.

South Korea

South Korea's green finance is mainly to formulate the strategy of transformation and development, support the development of green industry, participate in international financial cooperation and create conditions for the development of green finance.

It has implemented the new green policy to promote the country's green transformation and development. The Korean government attaches great importance to green transformation and development, and elevates the implementation of the "Green New Deal" to the national strategic wisdom, aiming to create jobs and enhance future growth momentum through the implementation of the "Green New Deal". It has basically established the low-carbon growth strategy and the green national image, and turned the financial crisis into an opportunity for development. Therefore, it has formulated a series of relevant policies and regulations to promote green transformation and development. For example, in 2008, the *Low-Carbon Green Growth Strategy* was introduced, providing a policy framework for green development. In 2009, through the "green project" plan, it is planned to invest about 38 billion US dollars in the construction of ecological infrastructure, low-carbon technology development and the creation of a green living and working environment in the next four years, so as to provide new growth momentum for the future development of South Korea. In 2010, the *Basic Law on Low-Carbon and Green Growth* was promulgated, which clarified the trading system of carbon emission rights and planned to reduce the greenhouse gas emissions to 30% of the "estimated greenhouse gas emissions (BAU)" by 2020. At the same time, it summarizes the green technology R&D of energy corresponding to climate change and the green land, city, building, transportation, green life and other green growth programs that provide policy support for the transformation of green industrial structure. South Korea has also set up a green growth council under its President. The green growth council and eight affiliated departments jointly published the *Low-Carbon and Green Life Implementation Development Plan*. The program invests in ecological infrastructure, low-carbon technology development and the creation of a green living and working environment to provide new growth drivers for South Korea's future development. The above national green development policies provide opportunities and guarantees for green finance.

Energy and environment in parallel, actively supporting the development of green industry. South Korea is a country short of energy. In the financial crisis, energy problem is not only a resource and environment problem, but also a security problem related to the stable development of its economy. Therefore, energy and environment become an important part of its "green New Deal", and the government actively promotes the development of green industry through green finance. To this end, the Republic of Korea government has invested nearly US $30 billion to support the development of green industries and give full play to the employment effect of green industries. In 2008, the South

Korean government formulated the *National Basic Energy Plan*, hoping to improve the deteriorating international balance of payments caused by excessive dependence on crude oil imports. It proposed to achieve the development goal of 11% of new and renewable energy, the highest level of energy technology in the world and 40% of oil and gas self-development rate by 2030. Since 2009, the South Korean government has invested about $38 billion to develop 36 ecological projects, which are planned to create 960,000 jobs in four years (Chen Tong, 2011). In addition, the financial industry has also adopted flexible and diversified support programs for green industry, such as green financial assistance policies and financial support programs for green industry. By April 2009, South Korea had 28 publicly listed environmental and social governance funds and environmental protection funds, with total assets under management of 619 billion won. In 2009, Korea Development Bank invested about 1 trillion won in environmental protection and supporting equipment business. In terms of carbon emission trading market, in 2007, Korea investment trust management company firstly established Korea carbon emission reduction fund and Korea carbon emission reduction credit fund (Zhang Zhenmin, 2013). In order to promote green credit, South Korea has formulated and introduced the green tax rate system, giving credit preferential treatment and credit preference to green enterprises. For the green industry export enterprises, on the one hand, it has increased the credit line; on the other hand, it has set up a 100 billion won carbon fund through the export–import bank.

To participate in international cooperation and promote green finance in Korea. South Korean financial institutions have actively participated in the international agreement on green finance to promote the green transformation and development of the country's financial industry and improve the management level of environmental risks. By 2009, 53 organizations had signed contracts with the global reporting initiative, 8 with the financial initiative of the UNEP, 14 with responsible investment principles of the United Nations, 169 with the United Nations global compact, and 16 with carbon emission disclosure projects (Li Ruihong, 2011).

Actively create conditions to support green financial development. Green finance is a new type of compound finance, which needs the support of technology, information and talents. In order to achieve a low-carbon society, fulfill South Korea's long-term plan of "low-carbon and green growth" and promote the development and popularization of green finance more quickly, the south Korean government actively creates the conditions needed for the development of green finance to support its rapid development. From 2009 to 2011, South Korea held hearings for experts, industry and NGOs in related fields, introduced the low-carbon commodity certification system for products and services at the earliest, actively trained green finance practitioners, and established green finance infrastructure such as environmental information database.

In addition to these typical countries, the Australian government has also taken active measures in green finance. For example, in 2001, the *Financial Services Reform Bill* (FSRB) was amended by the Australian Senate to explicitly require all financial institutions to take into account the labor standards of their customers, the environmental awareness of enterprises and the sense of social responsibility when making loans to their customers and reports to the Australian government on the extent and scope to which these environmental and social responsibility factors influence the choice, retention or investment of banks.

3.4 Foreign Green Finance Development Enlightenment

Attach Great Importance to the Role of the Government

In green finance, the role of government is multiple and indispensable. First, the government is the advocate of the green development model, and all the green finance practices in the above typical countries are the result of the government's promotion. It is under the promotion of the government that all sectors of society respond to promote the development of green finance. The most typical ones are South Korea and the UK. The former promoted green development as a national strategy and made green development a weapon to successfully resolve the financial crisis. The latter issued the *London Principles for Sustainable Development*, which requires financial markets to support and respond to the sustainable development strategy. Second, the government is the regulator of financial activities. Sustainable development requires certain regulatory means, and finance is one of the edge tools. Therefore, the government makes financial regulations for the financial industry and financing enterprises to promote sustainable development through environmental legislation, financial legislation, administrative management and other means. The United States, Germany and Japan have all been active in this regard. Third, the government is a supporter of green industry development. In the process of green transformation and development, on the one hand, the government should restrict the development of those “two high and one overcapacity” enterprises, cultivate the development of green industry, and promote the comprehensive green transformation of industrial structure. Therefore, the government should restrict the development of “two high and one overcapacity” industries in finance, finance and technology. On the other hand, it needs to promote the development of green industry; Germany, Japan and other countries make use of policy banks to actively support the development of green industry by means of loan preference and environmental protection behavior. Fourth, the government is the condition creator of green finance development. Green finance is a new type of compound finance. Practitioners need not only knowledge of economics, but also knowledge of environmental technology such as environmental protection and energy saving. Financial institutions need not only economic data, but also environmental protection data related to enterprises. Therefore, the government must strengthen the training of green finance talents, the research on green technology and its evaluation, and the construction of green information and data sharing network among the government, financial institutions and enterprises. Fifth, the government is the overseer of green finance. Although regulations such as green and technology can play a preventive role, the government, as an administrator, must also strengthen the supervision of green finance practice. For example, whether banks really follow the rules, whether enterprises conceal environmental information, whether the public’s right to environmental information is protected and whether members of the government are corrupt or derelict.

Strengthening Legislation on Resources and Environment

In green finance, resource and environment legislation must come first and complete laws should be made. This is because: On the one hand, the behavior of resource and environmental protection in individual profit-seeking behavior generally requires mandatory restraint. Whether it is a financing enterprise or an investment institution, as a rational “economic man” in economic activities, his main motivation is to pursue the maximization of economic interests. The externality and lag of environmental problems as well as the impact of environmental governance on their economic interests make individual rational “economic man” generally choose to avoid environmental governance, which requires environmental legislation and financial legislation to clarify the environmental responsibility of investment and financing enterprises and force them to carry out environmental protection. On the other hand, green finance is based on sound environmental legislation. Effective green finance is based on a deep understanding and accurate grasp of the law of environmental protection behavior, and the environmental protection field involves all aspects, and the environmental protection control in all fields is based on a scientific understanding of its environmental protection law. Although with the development of green finance, finance and environmental protection overlap to a certain extent, they are always relatively independent fields. Comprehensive legislation in all walks of life in the environmental field is the basis for the development of green finance, especially the innovation and development of green financial products. This can be seen from the complete environmental legislations of United States, Germany, Japan and others and its role in promoting the development of green finance.

Enrich Financial Product Development

Environmental protection is a systematic project that requires the participation of all members of the society and a variety of constraints and incentives. The traditional green finance with green credit and green securities as the main content cannot meet this demand. First, green credit is mainly pre-prevention, and green securities play a major role in process supervision. The lagging nature of environmental outbreaks (which may occur decades or even centuries later) requires late compensation. This needs green insurance, which makes investment financing companies dare not conceal environmental protection information, shirk responsibility, undertake sufficient precaution and active management in advance and executive process, however; although serious problems are discovered later, the victim also can get sufficient compensation. Even when serious problems are discovered afterwards, victims are adequately compensated. America's *Superfund Act* and Germany's green insurance take the lead, so the development of financial products should be serialized, which can be determined according to the law of generation and governance of environmental problems. Secondly, the current development of green financial products is mainly based on the inducement mechanism of economic benefit distribution design. However, with the popularization and popularity of green culture, moral and cultural mechanisms are also important generation mechanisms of green finance.

Therefore, in the design of financial products, not only the economic interest induction mechanism is needed, but also the moral supervision mechanism and cultural identity mechanism should be considered. The “green choice” account at HSBC, a British bank, is worth referring to. In the future, with the popularization of the environmental protection movement, it is also an important marketing direction to develop green financial products according to the characteristics of different groups of social members, such as the consumption characteristics of women and the development of green financial products, the target pursuit of young people and the development of green financial products, and the consumption characteristics of the elderly and the development of green financial products. Third, the current development of green financial products is mainly targeted at financing enterprises. In fact, residents’ consumption and government purchase are also very important components, and green financial products can be further developed for these subjects. For example, green consumer financial products (green car loans, energy-saving building loans, etc.) developed for residents’ consumption in Britain and the United States are some examples.

Increase the Construction of Supporting Conditions

Green finance needs the support of culture, talents, science and technology, information and capital, among which talents, science and technology and information are “hardware requirements” and essential elements. However, the insufficient supply of these three elements directly restricts the development of green finance. For example, for practitioners in the traditional financial industry, green finance is a new “technical activity”. Environmental impact assessment, environmental protection prevention programs, environmental risk management and environmental financial product development are all based on environmental protection science and technology. This is no doubt very difficult for the practitioners of economic professional background; financial institutions will also have concerns about the development of green finance due to the shortage of green finance talent supply. For another example, in the aspect of science and technology and information, science and technology need scientific assessment of environmental risks and effective management means to make it economically possible for financial institutions to assess and supervise the environmental protection of loan enterprises. In terms of information, financial institutions and financing enterprises need environmental information sharing network to avoid information asymmetry. The sharing of environment, information and technology in green finance activities in the United States is worth learning, which is one of the important supporting conditions to promote the development of green finance.

Strengthen International Industrial Cooperation

Different from green finance, green consumption and green urbanization, green finance is a commercial activity with strong industry and originated from abroad. At present, the international experience and practices are generally more mature than China's, with a relatively mature evaluation and operation system. China should strengthen international cooperation in this regard. South Korea signed an international financial cooperation agreement, on the one hand, to make its banks enhance environmental awareness and develop green finance; on the other hand, through the cooperation with relevant international industry institutions, to greatly improve the level of green finance development of domestic financial institutions. In this regard, it is worth learning for China. Given the public nature of green finance and the fact that talent cultivation is a medium- and long-term strategic investment, it is suggested that commercial banks should pay full attention to the cultivation of green finance talents in international cooperation and exchange in the future.

Reverse the Concept of Green Finance

The development of green finance in Japan and Germany shows that green finance is a concept of transformation and development embedded with the concept of sustainable development. From the awareness of environmental protection in financial activities to the discovery of business opportunities in environmental activities, this process is gradually established, which also means the painful transformation and development of the financial industry to a certain extent. The government should support the green transformation of the financial industry through ideological propaganda, knowledge education, talent training, information assistance and financial support. Only by alleviating the degree of "pain" can financial institutions, as the main body of financial activities, completely reverse their "resistance" or "fear" of green finance to a certain extent and make green finance develop rapidly.

4 The Development Status and Existing Problems of Green Finance in China

4.1 Development Status of Green Finance

System Construction

Although the construction of China's green financial system started late, in recent years, with the emphasis on environmental protection, the implementation of sustainable development strategy and the promotion of ecological civilization construction, the pace of green financial system construction has been greatly accelerated and a series of systems have been formulated (see Table 10). In 1995, the *State Environmental Protection Administration issued the Notice on Using Credit Policies to Promote Environmental Protection*, requiring credit policies to promote environmental protection; In 2001, the State Environmental Protection Administration and China Securities Regulatory Commission jointly issued the *Announcement on Environmental Audit of Listed Companies*; In 2003, it also issued the *Announcement on Further Environmental Audit of Listed Companies or Stock Refinancing* and *Suggestions on Environmental Information Disclosure of Listed Companies* to implement the green securities system. In 2004, the China Banking Regulatory Commission (CBRC) issued a *Notice on Earnestly Implementing the National Macro-Control Policies and Further Strengthening Loan Risk Management*, requiring strict loan examination and approval system for industries with excess production capacity and "two high", and starting to use financial means to restrict the development of industries with "two high and one overcapacity". In 2007, when the green credit system was officially implemented, the General Office of the China Banking Regulatory Commission issued the *Notice on Preventing and Controlling Loan Risks in Highly Polluting Industries*. This marks the beginning of the formal implementation of green credit in China. In July of this year, the State Environmental Protection Administration, the People's Bank of China and the China Banking Regulatory Commission jointly issued the *Opinions on Implementing Environmental Protection Policies and Regulations and Preventing Credit Risks*. In November 2007, CBRC further issued the *Guideline on Credit Granting for Energy Conservation and Emission Reduction*. For example, in December 2007, the state environmental protection administration and the China insurance regulatory commission jointly issued the guideline on environmental

Table 10 China's Green Finance System Construction

Time	*Green financial system*
1981	The State Council promulgated the *Decision on Strengthening Environmental Protection Work in the Period of National Economic Adjustment*
1984	The State Council issued the *Notice on the Provisions on Funding Channels for Environmental Protection*
1995	The People's Bank of China issued the *Notice on the Implementation of Credit Policies and the Strengthening of Environmental Protection Work*
	The State Environmental Protection Administration issued the *Notice on the Use of Credit Policies to Promote Environmental Protection*
2001	The State Environmental Protection Administration and China Securities Regulatory Commission jointly issued the *Announcement on Environmental Audit* of *Listed Companies*
2003	The State Environmental Protection Administration and China Securities Regulatory Commission jointly issued *Announcement on Further Environmental Audit of Listed Companies or Stock Refinancing* and *Suggestions on Environmental Information Disclosure of Listed Companies*
2004	The National Development and Reform Commission, the People's Bank of China and the China Banking Regulatory Commission jointly issued the *Notice on Further Strengthening the Coordination and Cooperation of Industrial Policies and Credit Policies to Control Credit Risks*
	The China Banking Regulatory Commission (CBRC) has issued a *Notice on Earnestly Implementing the State's Macro-Control Policies and Further Strengthening Loan Risk Management*, calling for a strict loan examination and approval system for industries with excess production capacity and "two high levels"
2005	The State Council issued the *Decision on Implementing the Scientific Outlook on Development and Strengthening Environmental Protection*
May 2007	The National Development and Reform Commission and other eight ministries and commissions jointly implemented the *Notice of the State Council on Carrying Out Special Inspections for Industries with High Energy Consumption and High Pollution*
July 2007	The General Office of the China Banking Regulatory Commission issued the *Notice on Preventing and Controlling Loan Risks in Industries with High Energy Consumption and High Pollution*
	The State Environmental Protection Administration, the People's Bank of China and the China Banking Regulatory Commission jointly issued the *Opinions on Implementing Environmental Protection Policies and Regulations and Preventing Credit Risks*
November 2007	China Banking Regulatory Commission issued the *Guidance on Credit Granting for Energy Conservation and Emission Reduction*
December 2007	The State Environmental Protection Administration and the China Insurance Regulatory Commission jointly issued the *Guiding Opinions on the Work of Environmental Pollution Liability Insurance*

(continued)

Table 10 (continued)

Time	*Green financial system*
January 2008	The State Environmental Protection Administration and the World Bank International Finance Corporation jointly formulated the *Green Credit Environmental Protection Guide in Line with China's Situation*
February 2008	The State Environmental Protection Administration issued the *Guidance on Strengthening Environmental Supervision and Management of Listed Companies*
August 2008	*Circular Economy Promotion Law of the People's Republic of China* was promulgated
October 2008	The State Council issued a 4 trillion Yuan investment plan, of which about 210 billion Yuan was for ecological projects and energy conservation and emission reduction projects
2009	The People's Bank of China, the China Banking Regulatory Commission, the China Securities Regulatory Commission and the China Insurance Regulatory Commission jointly issued the *Guidance on Further Improving Financial Services to Support the Restructuring and Revitalization of Key Industries and Curb Overcapacity in Some Industries* China Banking Association issued *Corporate Social Responsibility Guidelines for Chinese Banking Financial Institutions*
2010	The State Council issued the *Notice on Opinions on Accelerating the Implementation of Contract Energy Management and Promoting the Development of Energy Conservation Service Industry* The People's Bank of China and the China Banking Regulatory Commission jointly issued the *Opinions on Further Doing A Good Job in Supporting Energy Conservation, Emission Reduction and Elimination of Backward Production Capacity Financial Services*
2011	The State Council issued the *Comprehensive Work Plan for Energy Conservation and Emission Reduction in the 12th Five-Year Plan*, and *Opinions on Strengthening Key Environmental Protection Work*
2012	The China Banking Regulatory Commission issued the *Green Credit Guidelines*
February 2013	The General Office of China Banking Regulatory Commission issued the *Notice on Doing A Good Job in Rural Financial Services in 2013*
July 2013	The China Banking Regulatory Commission and the State Forestry Administration jointly issued the *Opinions on the Implementation of Mortgage Loans for Forest Rights*
September 2013	China Banking Regulatory Commission issued the *Guidance on Further Improving the Financial Services of Small and Micro Enterprise*
2014	The General Office of China Banking Regulatory Commission issued the *Notice on the Issuance of Key Evaluation Indicators of Green Credit Implementation*
January 2015	The China Banking Regulatory Commission and the National Development and Reform Commission jointly issued the *Notice on the Issuance of Energy Efficiency Credit Guidelines*

pollution liability insurance, and the green insurance system began to sprout and establish. For example, in December 2007, the State Environmental Protection Administration and the China Insurance Regulatory Commission jointly issued the *Guideline on Environmental Pollution Liability Insurance*, and the green insurance system began to sprout and establish. In August 2008, the *Circular Economy Promotion Law of the People's Republic of China* was promulgated to provide legal guarantee for the development of circular economy and green finance; In 2009, the China banking association issued the *Guidelines on Corporate Social Responsibility of China's Banking Financial Institutions*, which required financial institutions to strengthen industry self-discipline and assume social responsibility. In 2010, the state council issued the *Notice on Opinions on Accelerating the Implementation of Contract Energy Management and Promoting the Development of Energy Conservation Service Industry*, which specifically issued opinions on promoting the development of contract energy management service industry. Since 2012, there have been more and more guiding documents with technical guidance and normative operation such as *Green Credit Guidelines* issued by China Banking Regulatory Commission in 2012, the *Notice on the Issuance of Key Evaluation Indicators of Green Credit Implementation* in 2014 issued by the General Office of China Banking Regulatory Commission, the *Notice on the Issuance of Energy Efficiency Credit Guidelines* jointly issued by the China Banking Regulatory Commission and the National Development and Reform Commission in January 2015. In short, in terms of institutional construction, China's green financial system is becoming more and more refined and improved, from the original rough outline to the current specific guidance in the key implementation steps or key control indicators, with significantly enhanced operability, which is conducive to the popularization and promotion. In addition, in terms of institutional construction subjects, there are not only traditional government institutions, but also institutions within industry associations, which reflect that the concept of green finance has received social response, with more and more participants and extensive social support.

Institutional Action

On the whole, the development of green finance in China lags behind, but some institutions started earlier, and in recent years, all institutions have carried out green finance activities to varying degrees.

Industrial Bank is the first financial institution in China to implement the green finance concept. In 2005, Industrial Bank began to cooperate with the IFC on energy efficiency financing projects, which was a prelude to Industrial Bank learning from advanced international models and integrating new green finance concepts with daily business operations of commercial banks. In October 2007, China and the United Nations Environment Programme (UNEP) signed the *Declaration on Environment and Sustainable Development by Financial Institutions*, which further strengthened the concept of environmental risk management. In October 2008, Industrial Bank publicly promised to adopt the equator principle and became the first equator bank in China.

In practice, Industrial Bank has established a relatively complete professional management system. Under the guidance of the equator principle, Industrial Bank gradually established a relatively complete green financial management system from the aspects of strengthening decision-making management, optimizing organizational structure and improving system construction: At the decision-making level, the board of directors and operation management of Industrial Bank established the leading group for social responsibility and the leading group for equatorial principles, and merged the two groups into the leading group for social responsibility in early 2013, which is fully involved in sustainable development and the implementation of the equatorial principles to ensure their full and thorough implementation. In terms of organizational structure, the energy efficiency financing professional team was established in 2005, and the sustainable finance center was established in 2009. In 2012, the sustainable finance center was upgraded to the sustainable finance department of the head office, gradually improving the organizational structure of sustainable development. At the institutional level, in accordance with the requirements of the equator principle and in combination with the relevant guidelines on energy conservation and emission reduction credit granting work of the China Banking Regulatory Commission, the green credit guidelines and the characteristics of the existing credit procedures of Industrial Bank, Industrial Bank has formulated a series of normative documents, including systems, supporting tools, model texts and relevant guidance, to form a complete system of "basic systems- management methods-operating procedures" like *Environmental and Social Risk Management Policy, Measures for the Administration of Project Financing Applicable to the Equator Principles, Guidelines on the Classification of Project Finance under the*

Equator Principles and Environmental and Social Risk Expert Assessment Standards. In terms of business process and management mechanism, Industrial Bank has established and improved the environmental and social risk management system and business process. While comprehensively sorting out and improving relevant business systems and strengthening hard institutional constraints, supporting investigation tools, analysis tools, risk monitoring tools and legal documents were introduced to comprehensively improve the level of project risk management. In terms of cultural implantation, we should integrate green business philosophy into corporate culture, actively integrate corporate culture, corporate social responsibility and green finance, deliver the concepts of green finance and corporate social responsibility internally, build green finance capacity, strive to reduce our own carbon emissions and promote green operation.

In practice, Industrial Bank has intensified the innovation of green financial products and services, mainly introducing three types of financial services: The first type is energy saving and emission reduction financing service; the second type is emission right trading service; and the third type is personal low-carbon financial service. In terms of financing services for energy conservation and emission reduction, the company cooperated with IFC to launch energy efficiency financing products for the first time in China in 2006, and then launched "8+1" financing service modes according to different demands and project types of customers for energy conservation and emission reduction. In the emission trading services, Industrial Bank has created products of pledge financing, platform construction, trading services and information consulting and a variety of service products and models that serve all aspects of emissions trading, which have developed special products and services for international carbon trading, domestic carbon trading pilots and emission rights trading pilots. In terms of personal low-carbon financial services, Industrial Bank launched China's low-carbon credit card nationwide in January 2010. Relying on the industry experience accumulated in green finance, green finance was extended from the enterprise project field to the personal consumption field, providing a feasible new way for individual customers to realize "carbon neutrality". By the end of December 2014, Industrial Bank had issued a total of 319,500 low-carbon credit cards and purchased 75,616 tons of voluntary carbon emission reduction, which was equivalent to neutralizing the carbon emissions generated by 544,000 people taking airplanes and flying for 1000 kilometers.

In addition to Industrial Bank, other banks have also actively carried out green finance activities. For example, in 2013, the former Wanjiali Road Sub-Branch of the Bank of Changsha was renamed as the Environmental Protection Sub-Branch, providing credit support for the energy conservation and environmental protection industry and promoting the environmental protection concept. Energy conservation and environmental protection projects can enjoy the green channel of preferential loans and moderately relaxing credit conditions in the bank, and the credit release in the "two high levels and one overcapacity" industry will be strictly controlled. Typical practice measures of green finance of various financial institutions in China are shown in Table 11.

Table 11 Typical practical measures for China's financial institutions to develop green finance

Financial institutions	*Typical practical measures to develop green finance*
China Development Bank	• *Open Financial Cooperation Agreement* signed with the Ministry of Environmental Protection • Develop the first *Opinions on Development Review and Formulation of Solar Power Generation* in the industry
Export–Import Bank of China	• Joint implementation of China energy efficiency financing project with World Bank
Industrial Bank	• China's first and only "equator bank", the first bank that promoted energy efficiency loan in China • Signing of the UNEP *Statement on the Environment and Sustainable Development by Financial Institutions* • Jointly released China's first low-carbon credit card with the Beijing Environment Exchange
Industrial and Commercial Bank of China	• Implemented credit classification and implement "one vote veto system for environmental protection" • Launched "Credit via Network", "Easy Financing" and other network financing green financial products
Agricultural Bank of China	• Launched China's first environmental protection theme credit card-Jinsui environmental protection card • Implemented the plan to build an energy-saving agricultural bank of China that will allow banks to operate without paper and save energy as much as possible
Bank of China	• Developed the clean development mechanism (CDM) project financing business and the green heart benefits through environmental protection deposit business

(continued)

Table 11 (continued)

Financial institutions	*Typical practical measures to develop green finance*
Bank of Communications	• Initiated the implementation of environmental management system for all credit customers and businesses
China Merchants Bank	• Participated in the second phase of China-France green credit project cooperation • Promulgated *Marketing Guidelines for Renewable Energy Industry* and *Green Finance Credit Policy*
China Minsheng Banking	• Set up its first green finance franchise in Beijing
China Everbright Bank	• Took the lead in the launch of sunshine financial low-carbon public welfare products and green zero-carbon credit card • Created "personal green file" in Beijing Environment Exchange
China Construction Bank	• Implemented the plan of "promoting the recycling of office supplies and reducing office energy consumption through various ways" • Issued the *Plan on Strengthening the Management of Emission Reduction and Credit Extension of China Construction Bank* • Issued the "Korean pine dragon card" credit card with the theme of nature conservation
Shanghai Pudong Development Bank	• Launched the *Green Credit Integrated Service Scheme* • Issued the *Building A Low-Carbon Bank Initiative* • Develop "Contract energy management future earnings right buyout factoring" products

Source Zhang Ping. *Connotation, Function Mechanism and Practice of Green Finance*. Chengdu: Southwest University of Finance and Economics, 2013

Effectiveness Prospects

On the whole, green credit business in China's green finance is developing well. According to the China banking regulatory commission, by the end of 2013, China's major banking institutions had outstanding loans of 5.2 trillion Yuan for green credit projects, accounting for 8.7% of all outstanding loans. In terms of energy conservation and emission reduction, the green credit projects supported by China's major banking institutions are expected to save 18.671 million tons of standard coal, 43.807 million tons of water and 47.902 million tons of carbon dioxide per year. By the end of June 2014, loans outstanding for energy conservation and environmental protection projects and services at 21 major banking institutions totaled 4.16 trillion Yuan, accounting for 6.43% of their loans, according to data released by the China Banking Regulatory Commission.

Individually, green finance such as Industrial Bank has achieved remarkable results. From 2007 to the end of 2012, Industrial Bank provided a total of nearly 200 billion Yuan of "green finance" financing for thousands of enterprises, among which the loan balance accounted for nearly 10% of the balance of public credit, and green finance developed on a large scale. By the end of 2012, the projects supported by Industrial Bank could save 255,790,600 tons of standard coal annually in China, has achieved an annual reduction of 66,834,700 tons of carbon dioxide, 886,500 tons of chemical oxygen demand (COD), 15,100 tons of ammonia nitrogen, 43,600 tons of sulfur dioxide, 6900 tons of nitrogen oxides, 15,012,900 tons of solid waste and 2,557,990,600 tons of water with significant environmental benefits.

On the other hand, enterprises are the main body of bank loans. With the promising development prospect of the environmental protection industry, the demand for green loans from banks will further increase, which in turn will stimulate the development of green finance business and form a benign pattern of mutually promoting the development of green industry and green finance. For example, in 2014, most of the 17

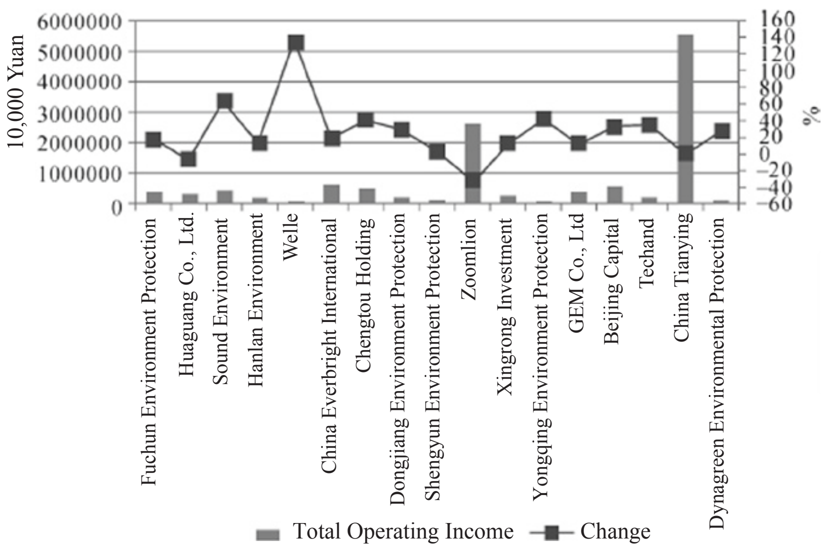

Fig. 2 Operating income of 17 listed waste treatment companies in China in 2014 and the increase or decrease range (*Data source* http://huanbao.bjx.com.cn/news/20150527/623308.shtml)

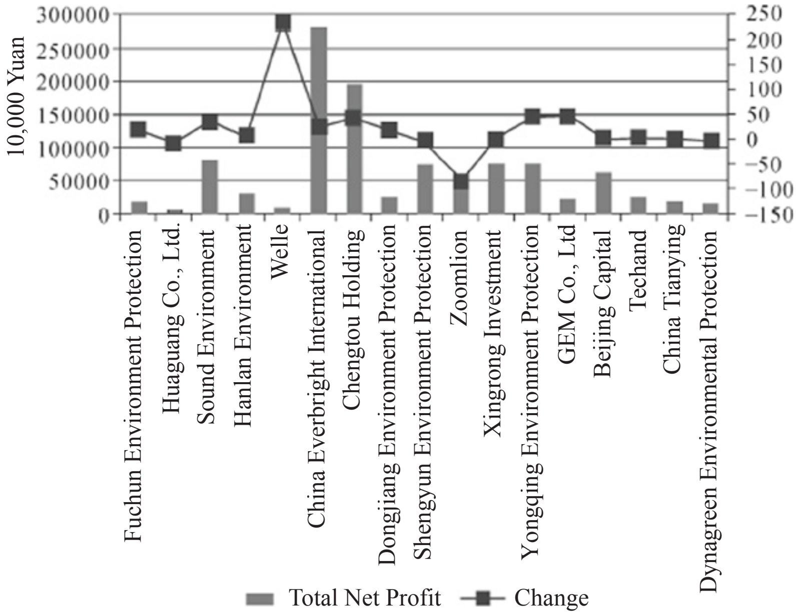

Fig. 3 Net profit of 17 listed waste treatment companies in China in 2014 and the increase or decrease range (*Data source* http://huanbao.bjx.com.cn/news/20150527/623308.shtml)

listed waste treatment companies or those concurrently engaged in waste treatment business achieved profitability in terms of operating revenue and net profit (see Figs. 2 and 3). This also means that in the future, enterprises will be more active in the development of green industry, and the demand for green loans from banks will be further increased. The development of green finance will have market momentum and have an expected prospect.

4.2 *Existing Problems in Green Finance*

The Scale Is Too Small to Meet the Demand

Data from several commercial banks surveyed show that the balance of green credit is small, accounting for less than 2%. The *2014 Annual Report on the Development of Low-Carbon Finance in China* shows that the green credit balance of the 18 major commercial banks ranked high in total assets accounts for about 1.81% of the total assets, among which the green credit of Industrial Bank ranked first only accounts for 3.46%. According to the report, green financing demand is expected to reach 2.75 trillion Yuan in 2020. At present, green financing accounts for only about 1% of the assets of China's commercial banks, and the capital gap is as high as 20 times of the existing financing, far from meeting the actual needs.

Incomplete Environment and Lack of Coordination Conditions
Green finance is a systematic project. In the transition period, the development of green finance requires certain collaborative conditions as the environment for its development, including the environment of economic strategy, cultural concept, legal system and information construction. Although China has set resource conservation, environmental protection, transformation development and construction of ecological civilization as the basic strategic principles, there is still a lack of corresponding synergistic conditions in cultural concepts, legal systems, information construction and other aspects. For example, in terms of cultural concepts, local government officials who lead local economic development, employees of financial institutions engaged in investment and financing activities, and enterprise managers engaged in production, service and other industries still do not take environmental and social responsibilities in economic activities into consideration in their decision-making. In terms of legal system, although China now has resource and environmental regulations on financial activities, there is still a lack of top-level design, overall design and systematic design. Low-level legal effectiveness and fragmentation of management regulations can be seen everywhere. In terms of information construction, the information construction of government agencies, production enterprises and financial institutions is carried out independently. Information concealment and information asymmetry are very serious. In particular, due to the restrictions of management power and scope of knowledge, financial institutions have no direct grasp of enterprise environmental protection information.

Insufficient Talents and Limited Development Business
Green finance is an emerging and intersecting industry, which integrates economy, finance, environment, chemical industry, law, information, architecture and engineering. It is highly practical and skilled. Compared with traditional industries, the talent standard of green finance shows the characteristics of high quality and compound. Green finance started late

in China and professionals are scarce, which directly affects the development of green finance. Particularly in business product development, being failure to understand, be familiar with, or grasp the knowledge of energy saving, environmental protection, low carbon and other aspects of related industries, it dares not carry out or does not know how to carry out many green finance activities, it can only stay in the shallow level, or follow the footsteps of peers. The product development innovation ability is very limited and the effect is low.

5 China's Vision for the Development of Green Finance

5.1 Basic Thinking

From the current situation of China, the current economic transformation and development and industrial structure upgrade need green finance to promote. Although China's green finance has achieved good development in some financial institutions, its development level is still very low. The most important reason is that green finance is a comprehensive and systematic project, which needs all-round and multi-subject promotion. At present, green finance in China has gradually strengthened the regulatory role of the government, but the supporting and encouraging role still lags behind. Financial institutions have different degrees of sensitivity to green finance. Some of them consciously strengthen their awareness of environmental and social responsibility, and make full use of their business opportunities to actively develop financial products. And some are still in a state of resistance, passive acceptance of green finance government norms. The reason for this is the lack of necessary conditions to support the green transformation of traditional finance in addition to the current interest factors. If the development conditions can be fully cultivated and the transformation costs can be reduced, the development of green finance will be more dynamic. Therefore, the current promotion of green finance development is to construct the system engineering of green finance development, strengthen the role norms of each subject, establish an effective driving mechanism, accelerate the construction of supporting environment and formulate a number of effective policies.

5.2 Strengthen the Norms of the Main Roles

Government

In the green transformation process of traditional finance, the primary role of the government is regulation, followed by assistance, supervision and finally regulation. Regulation is to compulsorily promote the green transformation of traditional finance by means of law, administration, technology and so on. The support includes various forms, such as discount loan, tax reduction and exemption, information supply, talent training, entrepreneurial opportunities and other forms to support the development of green finance. Supervision mainly includes inspection, information release, reward and punishment on green finance of financial institutions and financing enterprises. Regulation mainly refers to the balance between the development of green financial products and supply, such as increasing the supply of green insurance products to meet the governance needs of different environmental problems.

Financial Institutions

In the green transformation process of traditional finance, the main task of financial institutions is to fulfill the social responsibility of environmental protection, consciously abide by the national laws and regulations on green finance, find and use the business opportunities of green finance, develop a variety of green financial products and realize the growth of their own economic benefits while meeting the green financing needs of enterprises and social and environmental protection.

Enterprises

Enterprises should conscientiously fulfill their environmental protection obligations, make use of relevant national policies to win the support of green finance for the transformation and development of enterprises or the cultivation of green industry and actively disclose the environmental protection status of enterprises to the public and the media, so as to build a responsible positive social image of enterprises and strive for the long-term sustainable development of enterprises.

Social Public

The public should actively exercise three rights in green finance: the right to know, the right to supervise and the right to choose. The right to know means that the public has the right to know and obtain information, including the environmental impact and risk in the process of project implementation, the behavior of enterprises to eliminate or reduce environmental risks and their efforts. Supervision right mainly means that the public has the right to supervise whether enterprises fully fulfill their environmental protection obligations and actively take effective measures to reduce adverse effects. Options include two aspects: First, in terms of consumption, enterprises should choose the products or services they produce and resolutely refuse the products or services with negative environmental impacts, so as to encourage enterprises to provide environmentally friendly products or services. Second, in terms of production, financial institutions or production enterprises are selected through capital supply. For example, with the help of information disclosure by the government and social media organizations, people refused to take deposits and other obligations in banks with low awareness of environmental and social responsibility, so as to reduce their capital supply and refuse to buy shares of listed companies that are not environmentally responsible, which will affect their stock prices.

Media Organizations
In the green transformation process of traditional finance, media organizations should not only assume the basic responsibilities of traditional information dissemination and diffusion, but also the tasks of information bridge, public opinion guidance and popular science. To be specific, in addition to reporting the green finance policies of government institutions, it is also necessary to make use of the information gathering and diffusion advantages of the media to investigate the problems existing in the development of green finance, disclose relevant restrictive factors actively, and promote the participation of all parties, such as scientific research institutions, in the construction of green finance. To actively expose environmental dereliction of duty by government agencies, financial institutions or production enterprises, so as to urge them to perform their duties and assume environmental responsibility in corresponding positions; In view of the weak situation of green finance development in China at present, the experiences, models and measures of green finance abroad as well as the options and methods that can be improved in China are introduced.

Research Institutions
Scientific research institutions should serve and support green finance. To be specific, the government should provide effective and easy-to-operate key concise indicators and policy tools for green finance

regulation, supervision, regulation and other functions. Similarly, financial institutions should also provide convenient tools for auditing, evaluating, supervising and controlling enterprises' environmental behaviors. For production enterprises, scientific and technological research should be strengthened to provide scientific and technological support for effective environmental governance and cost reduction. To the public and media, should have the effect such as popular science, dispel suspicion. To the public and media, it should have the effect such as popularization of science and clearing up doubts.

5.3 Establish an Effective Driving Mechanism

Legal Regulation Mechanism
From the perspective of power source, in the transition period, the formation of green financial market mainly comes from the government's legal mandatory regulation and the stimulation of economic interests, among which legal regulation is the primary premise. From the perspective of the subject, legal regulation should at least make corresponding regulations for the following three related subjects: First, the social public is the consumer of products and services, and the green consumption of the public is the condition to promote the generation of green products and services; Second, the supply of products and services to enterprises, forcing these enterprises to green production and green services to effectively promote the green transformation of enterprises; Third, financial institutions are required to assume environmental responsibility in their financial activities so that financial institutions can consider environmental impact in their investment activities. Therefore, green finance should not only be regulated by relevant laws, but also be systematized and regulated in consumption, production, investment and financing activities. It is suggested to strengthen the legislation in the field of green consumption according to the current legal system in China, especially to regulate the environmental impact in the process of bulk procurement and consumption by the government and enterprises.

Economic Induction Mechanism
Both for consumers, production enterprises and financial institutions, green transformation needs to pay a certain cost and face some uncertain risks. Therefore, in the process of transformation, certain economic benefits need to be induced and stimulated and certain risk guarantee

conditions need to be provided to reduce the cost and risk loss of transformation. Price subsidies, low-interest loans and tax incentives may be provided to consumers. Although low-interest loans and tax incentives can also be adopted for production enterprises, they are different from individual consumers in that the transformation costs are high and the risk uncertainties are more. It is suggested that the government, in addition to low-interest loans and tax incentives, should take the forms of risk guarantee, conditions (talents, technology, information, etc.) support and product (service) procurement to make production enterprises more confident in transforming production. For financial institutions, the government can use direct tax relief to stimulate them, but more importantly, it should actively create conditions to greatly reduce the cost of transformation, such as green finance talent training and education, green finance network information construction, green finance supervision technology research and so on.

Information Disclosure Mechanism

The concealment, hysteresis and specialty of environmental problems need to strengthen information disclosure. This includes environmental information disclosure in the process of consumption, information disclosure in the process of production and information disclosure in the process of investment and financing. Information disclosure in the process of consumption makes consumers choose green products and reject products that are harmful to the ecological environment and their health. Information disclosure in the production process enables enterprises to consciously carry out green production and environmental protection in order to shape their own good image and improve the living environment. For example, the public can know the environmental protection behaviors and efforts of enterprises by regularly releasing the environmental audit announcements of enterprises, so as to make consumption or investment choices on the products, services and stocks of enterprises. Information disclosure in the process of investment and financing exposes the awareness of environmental responsibility of production enterprises and financial institutions to the public, and prevents them from colluding to cause moral failure. From the current situation of our country, we should strengthen the environmental audit information disclosure system of production enterprises and the green investment report disclosure system of financial institutions.

Cultural Construction Mechanism
Although legal regulation, economic inducement and information disclosure can promote or stimulate the development of green finance from the perspective of external motivation to varying degrees, the formation of green finance is more dependent on the internal consciousness of a kind of cultural consciousness. For example, the birth of the German eco-bank and the formation of the equatorial principle were initially based on the managers' internal awareness of environmental and social responsibility of financial institutions, which was the result of an internal cultural consciousness. Therefore, only a whole environmental protection cultural identity consciousness from the whole society can continue to promote the development of green finance. As previously analyzed, only the terminal green consumption demand from the market can make the production enterprises finally make up their minds to realize the transformation production. Only with a strong sense of internal environmental protection can financial institutions consciously strengthen environmental audit in the process of investment and strengthen the development of green financial products. Cultural construction is a prerequisite for the development of green finance and ultimately determines how far it can go.

5.4 Accelerating the Construction of Supporting Environment

Strengthen Legal Environment Construction
Improve legislation and formulate systematic laws to promote the development of green finance. There are two aspects: first, formulate the basic law of green finance; second, improve the relevant laws for green finance. In view of the drawbacks of low legal effectiveness, scattered legislation and weak professional regulation of green finance in China, it is imperative to formulate a green finance basic law that is more systematic and has stronger regulation effect. Among the related laws needed to form green finance, they mainly involve green production law, green consumption law, green transportation law and green waste disposal law. Due to the promulgation of *Environmental Protection Law*, *Circular Economy Promotion Law* and other relevant laws, laws on green production are relatively mature, while laws on green consumption law, green transportation law and green waste disposal law are relatively backward. Improving green legislation in these areas is one of the important conditions to promote the further development of green finance.

Strengthen the Construction of Information Environment

Information supply improves the basic environment of green finance development. Functionally, such information mainly includes information on industrial investment opportunities, information conducive to supervision and management, information on technological progress of enterprises, information on promoting rational choice of the public and information on international exchanges and cooperation. Information on industrial investment opportunities mainly refers to the green investment opportunities brought by the green transformation and development. In particular, because of the green investment opportunity information brought by the national green transformation and development strategy, profitable green investment information will attract more enterprises and financial institutions to join the green finance industry. Information conducive to supervision and management mainly refers to the current situation that the environmental information of the government, enterprises and financial institutions which are independent, non-sharing and asymmetric, etc. The information sharing network construction enables the information of the three parties to be networked and shared, which is accurate and transparent, so as to make the government and financial institutions more effective and efficient in environmental supervision of enterprises on the premise of ensuring the accuracy, effectiveness and consistency of basic information. Information about technological progress of enterprises refers to the fact that under the background of green finance, enterprises are also faced with unprecedented pressure of environmental protection. From the perspective of its internal motivation, seeking effective, simple and low-cost environmental protection technology is one of its basic needs. The information provided by the government is one of the necessary conditions to promote its green production transformation and realize green finance. Information on promoting the rational choice of the public mainly refers to the release of information on the environmental and health impacts of product consumption, the environmental governance of enterprises and the responsible investment of financial institutions. Information on international exchange and cooperation refers to the current situation that China's green finance industry is underdeveloped and backward in management. By releasing information on international exchange and cooperation, China's green finance industry will have the opportunity to learn foreign advanced management methods and experience, so as to improve the management level of China's green finance industry.

Strengthen the Construction of Cultural Environment
Cultural construction creates a green financial formation of the cultural environment. Fundamentally speaking, the construction of green cultural environment needs to "start from the baby", starting from the formal education in schools, and cultivate their cultural consciousness of protecting the environment, saving resources, green production and green consumption from childhood. In the transition period, apart from the development of green environmental education in schools, it is more important to cultivate people's awareness of green culture through mass media and community activities, so as to promote their green consumption, green savings and supervise the environmental protection behaviors of financial institutions and production enterprises. In view of the disadvantages of excessive commercialization and low awareness of public responsibility for environmental protection in China's current mass media fields such as TV, Internet and newspapers, it is suggested to introduce the promotion measures of green culture publicity and management for mass media, stipulate that mass media must produce and release a certain number of green culture creative promotion advertisements, so as to enhance the awareness of green culture identity of the whole society.

Strengthen External Environment Construction
International exchange improves the green finance industry management level. It must be admitted that the management level of China's green finance industry lags behind that of European and American capitalist countries. In view of this objective fact, it is suggested that the country strengthens international cooperation in this field, such as promoting the cooperation between domestic financial institutions and foreign financial institutions in investment and financing, and learning foreign experience in green financial management. In the fields of education and scientific research, special funds will be set up in the form of public and private investment, and domestic financial institutions will be encouraged to strengthen cooperation with international organizations in personnel training, technology research and development, and project management.

5.5 Some Specific Operational Suggestions

Set up a Special Green Bank
For example, a special green investment bank will be set up with the government's contribution and the participation of social capital. The bank mainly invests in large-scale projects related to environmental protection,

energy conservation, new energy, clean transportation and other environment-related projects. The government provides certain preferential policies and innovation incentives. For example, interest subsidy, tax exemption and deregulation, allowing them to issue green bonds for financing, developing green financial products independently and having certain green investment preference.

Formulate Green Loan Incentives
Set aside a certain amount of financial funds to set up special funds to subsidize green loans. For example, different discount rates are set according to the environmental contribution of energy-saving and emission-reduction renovation. The higher the environmental contribution, the higher the subsidy ratio will be.

Establish a Green Credit System
Banks are required to strengthen environmental risk control when lending, such as setting up internal environmental risk management institutions, formulating environmental risk assessment and control management methods, and regularly publicizing the implementation of green credit.

Improve Environmental Information Disclosure
It is mandatory for listed companies and enterprises issuing bonds to regularly issue social responsibility reports, disclose their environmental impact information, including environmental risk control information, environmental pollution control information, environmental impact information of product or service consumption, and accept public supervision and selection.

Promote Green Insurance System
A basic green insurance system should be established to encourage enterprises to develop green insurance products, and green insurance products should be purchased for potential consumers in projects with long-term environmental risks.

Establish an Information Sharing Network
An environmental information sharing network should be established among production enterprises, government departments and financial institutions to ensure the authenticity, accuracy and consistency of information, and provide data basis for the supervision, regulation and cooperation between government departments and financial institutions.

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