



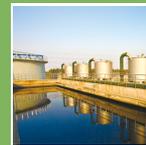
**GREEN
IMPACT**

Impact Report on **Green SMEs in China**

Information Center of Ministry of Industry and Information Technology, China

Institute for Environment and Development

New Ventures Global



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Impact Report on Green SMEs in China

Written by: Walter Ge, Cynthia Zhang, Dongqing Yang, Weijia Ye

Edited by: Emily Chew, Tao Zhang, Hejia Wang

Data Analysis Supported by: Christine Yip

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Executive Summary

In 2011, China announced the 12th Five-Year Plan for National Economic and Social Development ('the 12th FYP') which, for the first time, introduced the concept of the "green development." It emphasized that sustainability of economic development should be realized by adjusting the current economic growth model. Among the more than 20 key targets for economic and social development it defined, 12 targets relate to the environment and ecology, 11 of which are mandatory targets¹. Realizing these targets is closely related to development of the green economy.

The supportive green economic policies implemented in recent years have ushered in a "golden age" of development for green SMEs. Taking the energy efficiency and conservation industry as an example, according to *the 2011 Annual Report of China's Energy-Saving Service Industry*, in 2011 the gross production output of China's energy-saving service industry reached a total value of more than RMB 100 billion among 3,900 companies, as compared to RMB 4.7 billion among 76 companies in 2005. As the leader out of the seven national "Strategic Emerging Industries," the energy efficiency industry is mainly comprised of new enterprises and small enterprises – a common feature of all green industry sectors. In this sense, green SMEs have become a powerful engine in spurring independent innovation, creating employment opportunities, and accelerating the transformation of the antiquated mode of economic development. To achieve the goals set by the 12th FYP, and to realize industrial upgrading and green transformation, green SMEs must become active change agents and facilitators of this process.

However, in the current economic environment, the potential and impact of green SMEs in energy efficiency and emissions reduction are yet to receive their deserving attention; and the overall sector remains under-developed. On one hand, some green SMEs are weak in management and have poor access to information. On the other hand, they are poorly understood by the society as a whole, and there is not a corresponding system of measurable indicators to evaluate their performance on this front.

Against this background, the Information Center of the Ministry of Industry and Information Technology (MIIT), the Institute for Environment and Development (IED), and the New Ventures China program supported by the World Resources Institute (WRI) jointly prepared the *Impact Report on Green SMEs in China* ('the report'), the first report targeting the green SME sector in China. It focuses on the following four aspects:

- Exploring and developing a methodology to evaluate the business, environmental and social performance of green SMEs;
- Evaluating and quantifying the contribution that green SMEs have made to China's economic transformation;
- Highlighting the challenges to the development of green SMEs, and discovering their needs;
- Exploring different ways in which SMEs can realize "environmentally friendly development" and "resource-saving" development

¹Editorial note: The 12th FYP sets a number of targets that apply at the central government and provincial level in China. 'Mandatory' targets highlight those that are considered most important and against which the performance of government officials will be measured together with GDP growth.



The report is based on the Impact Performance Indicators System ('the Indicators System') (for more specific information, see Chapter 2) developed for SMEs in China. The Indicators System has been jointly developed by New Ventures, IED, and the Information Center of MIIT. It incorporates certain research findings from the International Labour Organization, as well as survey data, and also takes China's national conditions into account. On one hand, the Indicators System sets qualitative indicators for the strategies and management models of companies. On the other hand, it has more quantitative metrics for the business, environment, and social performance of the enterprises. The Indicator System reflects the financial conditions of SMEs, their growing potential, and the resource utilization efficiency of their internal operations. Moreover, it helps reveal the environmental intent and social contribution of SMEs, particularly in terms of energy efficiency, emissions reduction, and natural resources preservation. The system can also serve as a basic reference tool for monitoring SMEs' industrial upgrading and green transformation efforts.

Major findings of this report:

- 1. With the implementation of supportive policies, green SMEs generally enjoy rapid growth.** The formulation of supportive policies, laws, and regulations has greatly encouraged the development of a large number of green SMEs. During the period from 2008 to 2010, the average growth rates of total assets, revenue, and pre-tax profit of the enterprises reviewed were 204%, 315%, and 94% respectively.
- 2. Different policies implemented in various sectors mean that green SMEs enjoy different levels of development.** Different supportive policies, ways of promotion, and characteristics of each and every sector have stimulated different levels of development. Laws and regulations with an encouraging, guiding purpose exert a far more positive influence on the development of a sector than those with a restrictive purpose.
- 3. There exists a high barrier for applying for government funds and subsidies, which poses a bigger challenge for green SMEs.** As China has put more emphasis on energy conservation and environmental protection, both central and local governments have allocated specific funds and subsidies for green SMEs, and implemented corresponding tax relief policies to promote their development. However, some policies are simply difficult to implement due to flaws in design such as high eligibility thresholds. In reality, some of the government subsidy policies are still biased towards large enterprises over SMEs for such reasons.
- 4. Financing difficulties are more serious for green small and micro businesses.** A vast majority of green small and micro enterprises have a hard time passing conventional bank loan appraisals, due to the incomplete and unclear industry value chain where they find themselves, and also because of their "asset-light" business models. Moreover, some banks do not have a clear understanding of energy efficiency and low-carbon technology, and have reservations about the financial management of SMEs, which increases these SMEs' difficulty of getting their loan applications approved.
- 5. Green SMEs generally have embedded "green genes" for sustainable**



development. A vast majority of green SMEs have an inherent concern for environmental issues. Quite a number of them are clearly conscious of sustainable development (namely, striving for a balance between economic gains, environmental protection, and social contribution), and have integrated this goal into each and every step of the product lifecycle, thus forming their own competitive edge and strategic development mode.

6. Green SMEs have great potential in contributing to energy efficiency, emissions reduction, and natural resources conservation. In 2010, the environmental outcomes achieved by the companies surveyed were as follows:

- Energy saved was approximately 680 thousand tons of coal equivalent, and emissions reduced were 1.77 million tons of CO₂ equivalent, amounting to energy savings and CO₂ reduction from shutting down for one year of a medium-sized power plant with 400 thousand KWH of generating capacity;
- 1.14 million tons of solid waste were disposed;
- 80.50 million tons of sewage were disposed;
- 20.8 thousand cubic meters of wood were saved;
- Approximately 7.2 million mu² of land were sustainably used;
- The biodiversity of 7 million mu of forest was protected.

² Editorial note: a 'mu' (亩) is a Chinese unit of area, equal to approximately one fifteenth of a hectare.



Introduction

The Impact Report on Green SMEs in China (this report) is based on data provided by companies that participated in the study, as well as information gathered during on-site visits. It was compiled objectively and impartially.

The data used in this report originates from the Evaluation Form on the Impact of Green SMEs (Evaluation Form) completed by companies which registered and applied for the first Green SME Impact Role Model Initiative (Role Model Initiative). The companies can be divided into three broad categories: 1) companies that are supported by the New Ventures China Program co-launched by the World Resources Institute (WRI) and the Institute for Environment and Development (IED); 2) companies recommended by IED's cooperative partners; and 3) companies that directly registered for the Role Model Initiative online.

The Role Model Initiative drew widespread attention, with votes received from 1.2 million Internet users, and active participation of nearly one hundred companies. After a rigorous and objective selection process, 56 companies that submitted valid Evaluation Forms were accepted to be part of the study. The organizing committee and the judging panel verified the submitted data and information carefully and objectively, mainly in two ways:

1. Data verification via telephone interview with the company's nominated contact person;
2. Fieldtrip visits to companies (due to time and geographic limitations, 28 companies were visited).

All companies studied in this report have met the following eligibility criteria:

1. Founded no later than 2010;
2. Annual revenue of no more than RMB 300 million;
3. Delivered positive impact on improving the natural environment through innovative technologies, products, and/or business models;
4. Doing business in the following industry sectors:
 - Renewable energy
 - Energy efficiency and conservation
 - Water resources management
 - Pollution prevention and waste management
 - Environmentally friendly new materials and processes
 - Sustainable land use
 - Biodiversity protection
 - Other related green fields





Introduction to Seven Green Sectors

This report is focused on seven green industry sectors that include: renewable energy, energy efficiency and conservation, water resources management, pollution prevention and waste management, environmentally friendly new materials and processes, sustainable land use, and biodiversity protection. The classification is based on both IED and New Ventures' practical research experience in green industry development over the past eight years.

Definition of each field:

- **Renewable Energy**

Renewable energy refers to the energy that can be constantly regenerated and consumed in nature. It causes no damage, or very little damage, to the natural environment; it is widely available and can be readily developed. Renewable energy mainly includes solar energy, wind power, water energy, bio energy, geothermal energy, and marine energy. Compared to the traditional fossil-based energy, renewable energy generally causes less pollution, and has a large reserve available, and thus is significant in tackling serious environmental pollution and resource exhaustion worldwide.

- **Energy Efficiency and Conservation**

As defined by the World Energy Council (WEC) in 1979, energy efficiency refers to



using energy more efficiently by taking any measures that are technologically possible, economically reasonable, and which are environmentally and socially acceptable.

Generally, energy efficient enterprises would use new materials, technology, and resources to help consumers or enterprise customers effectively utilize energy. This process can be realized by cutting down consumption, reducing losses, and controlling effluents. China designates the following fields as most important for energy efficiency: major industries (including the electric power, steel, non-ferrous metals, petroleum and petrochemicals, building materials, and coal and mechanical industries), transportation, construction, household appliances and office equipment, and lighting equipment.

- **Water Resources Management**

Water resources refer to fresh water resources that are highly related to the life, productivity and social development of the human community. With today's rapid economic development and urban expansion, the whole world suffers from serious water shortages and pollution. In developing a green economy, water resources management includes: 1) gradually changing the traditional patterns of overexploitation, wasting and polluting of water resources; 2) properly developing and exploiting water resources by taking economic, environmental, and social benefits into consideration; and 3) preventing, controlling and recycling polluted water resources.

- **Pollution prevention and waste management**

At present, the main sources of environmental pollution are industrial emissions, agricultural waste and household refuse. Pollutants and waste – taking all of solid, liquid, and gaseous forms – pose direct or indirect threats to ecology, species, and human health. Pollution prevention and waste management refers to administrative, legislative, economic, research, and educational measures to prevent the occurrence of pollutants and waste; as well as the comprehensive management of the sources, control processes and treatment of pollution. The enterprises involved in pollution prevention and waste management generally operate their business in the field of materials reuse and recycling.

- **Environmentally friendly new materials and processes**

Different from traditional materials and processes which cause environmental pollution, environmentally friendly new materials and processes refers to researching and developing new materials and innovating the process that cause no harm to or even benefit the environment, and which save natural resources at the same time.

- **Sustainable land use**

Land is one of the most valuable natural resources, and is of great significance to guarantee the life, productivity, and economic development of human society. Sustainable land use refers to 1) protecting land from any irreversible harm caused by unsustainable utilization; 2) using land in a way that can meet the growing demand for the land precipitated by an ever-growing population and people's ever-improving living standards. At present, these enterprises are mainly engaged in green agriculture, soil and grassland renovation and protection, as well as sustainable forestry and farming.



- **Biodiversity protection**

Biodiversity refers to organisms and their ecological environment, as well as all associated ecological processes. It operates at three levels: hereditary (genetic) diversity, species diversity, and ecosystem diversity. Biodiversity not only provides invaluable resources for the biological diversity of human society, but also helps to maintain the balance of nature to achieve the safe functioning of the natural environment. Thus, it is one of the bases for the sustainable development of humanity.



Overview of China's Laws and Policies on the Green Economy

- 1.1 History of China's Laws and Policies
on the Green Economy
- 1.2 Brief Analysis of Laws and Policies
on the Green Economy



1.1 History of China's Laws and Policies on the Green Economy

China's green economic policies, which are issued and implemented by different bodies with different geographic or industrial coverage, are to be found in policy documents and regulations stipulated by the central and local governments, both of which are usually issued as standalone documents and embedded into other broader policy frameworks. This section summarises the background and context for the Central Government's long-term policies and regulations related to the green economy, and identifies some possible future trends.

Laws and policies related to the green economy began with the launch of the environmental protection policy at the end of the 1970s, which continues to serve as the main policy in this field. In 1989, the Environmental Protection Law was promulgated by the Standing Committee of the Chinese National People's Congress, the top legislative body of China. However, this law did not receive proper attention as China began a period of rapid economic development starting from the beginning of the 1990s. It was the 2002 Cleaner Production Promotion Law that provided a clearer definition on cleaner production, government functions, related stakeholders, target groups and goals – guidance which had become necessary given the rapid pace of economic development throughout the 1990s. This law paved the way for conceptualising China's economic transformation in light of its environmental impact. As a result, from 2002, a large number of environmental NGOs, academic and research organizations focused on investment and research on green technologies, and other organizations seeking opportunities in green markets, have emerged.

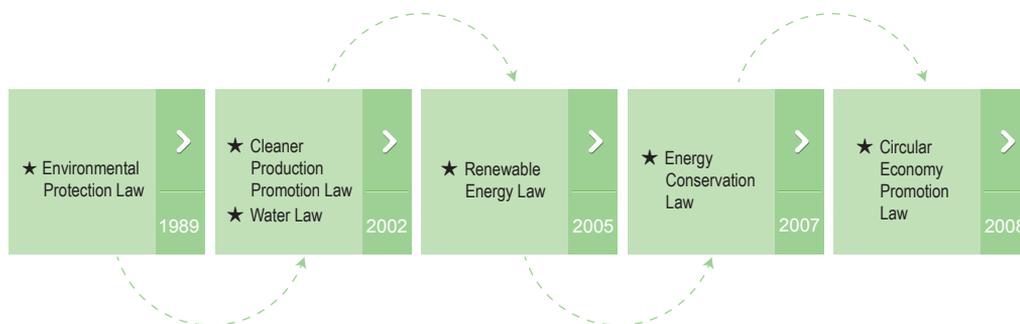


Figure 1. Six Fundamental Laws on the Green Economy, 1989 to 2008

In the years since then, other environmental laws have been issued which together form the six fundamental laws on the green economy (Figure 1). It is worth noting that these laws are subject to constant reform and amendment. For instance, the 1989 Environmental Protection Law is currently in the final stages of being overhauled. Laws are supplemented through policies and regulations issued by the central and local governments.



1.2 Brief Analysis of Laws and Policies on the Green Economy

The six fundamental laws have spawned a detailed body of regulation and legal infrastructure that collectively forms the legal framework for China’s green economic development. The various laws can be categorized into the following sub-systems:

- Legal system of environmental protection laws
- Legal system of ecological and natural resources protection
- Legal system of water resources protection
- Legal system of economic and industrial activities

More than one law exists under each system. For example, the Environmental Protection Law and the Environmental Impact Assessment Law are included in the legal system of environmental protection laws. The Forest Law, Grassland Law, Law on the Protection of Wildlife, Nature Reserve Law and Marine Environmental Protection Law, among others, fall under the legal system of ecological and natural resources protection, while the Cleaner Production Law, Renewable Energy Law and Circular Economy Law come under the system on economic and industrial activities. These numerous and comprehensive laws and regulations constitute the legal framework of China’s green economic development.

China’s green economy is a largely policy-driven market. Table 1 highlights how the green economy capitalizes on the power of environmental laws by using two terms commonly used in economics and business management. The first term is “demand push,” i.e. the laws and policies from the government serve as rules on what to do and what not to do and, as a result, create demand for certain technologies, products and services to form the market, which in turn promote the development of a green economy. The other term is “demand pull,” which means laws and policies from the government aim to encourage and guide the development of new market demand and new industries. While theoretically the green economy benefits from both forces, the demand pull laws tend to be more effective at creating benign conditions for innovative development as they put a positive emphasis on new technologies, new applications and the development of new markets.

Table 1. The Function and Effect of Laws in Relation to the Green Economy

Law	Basic Function	Government Role	Effect on Green Business
Environmental Protection Law	Restrictive	Administrative	"Push" to provide solution
Water Law	Restrictive	Administrative	"Push" to provide solution
Clean Production Law	Promotive & Restrictive	Guiding	"Pull" & "Push" to provide solution
Renewable Energy Law	Promotive	Administrative & Guiding	"Pull" to provide solution
Energy Efficiency Law	Promotive & Restrictive	Administrative & Guiding	"Pull" to provide solution
Circular Economy Law	Promotive	Guiding	"Pull" to provide solution



Apart from the legal systems discussed above, the Central Government is currently considering a number of other laws and regulations related to green economic areas, such as climate change, a low-carbon economy and carbon trading. Further legal frameworks on these issues are expected to emerge in the years to come, which will in turn promote the development of related industries and enterprises.



Impact Performance Indicators System

2.1 Objectives

2.2 Features

2.3 Key Indicators

2

2.1 Objectives

The impact performance indicators system (the ‘indicators system’) has been co-developed by New Ventures, IED, and the Information Center of MIIT. It focused on the following four objectives:

- Propose an evaluation methodology for green SMEs’ commercial, environmental, and social performance using the ‘triple bottom line’ principle**

To help green SMEs understand the progress of their economic, environmental and social performance (e.g. carbon emissions, water resources utilization) and potential opportunities for improving and perfecting effective and sustainable solutions.
- Evaluate the contributions of green SMEs to China’s economic transformation**

To provide a guide for investors, academia, media, the public and consumers to focus not only on enterprises’ financial return, but also on the positive impact of their operations, products and services to environment and society.
- Highlight the problems and needs that arise in the development of green SMEs**

To identify the problems and needs in the development of green SMEs, and lay the foundation for further policy making efforts that support green SME development
- Research the development path by which SMEs can become both “environmentally friendly” and “resource-saving”**

Most indicators in the system can be applied widely, and can provide a reference for the upgrading and green transformation of SMEs as a whole. In the future, the indicators system will gradually broaden its coverage to include more SMEs from industry sectors that are not environmentally focused, and thereby develop evaluation methods for measuring the two targets (i.e. “environmentally friendly” and “resource-saving”) set for enterprises by the Chinese Government, suited for the SME context.³

2.2 Features

The most significant feature of the indicators system is that it records green SMEs’ “double green” attributes. “Double green,” on one hand, means the evaluation of the environmental benefits of the green products and services companies proactively provide through the market, this being the core indicator that characterizes green SMEs. The green SMEs featured in this report mainly create environmental benefits in seven industry sectors (see Introduction to Seven Green Sectors above). On the other hand, “double green” means the evaluation of the enterprises’ environmental performance during their own operations, such as carbon emissions management and water resources management.

³ Editorial note: The establishment of “environmentally friendly” and “resource-saving” enterprises was initially proposed at the Fifth Plenary Session of 17th CPC Central Committee in late 2010.



2.3 Key Indicators

The impact performance indicators system is based on the "triple-bottom line principle" (the integration of corporate profits, environmental responsibilities and social responsibilities) recognized widely by the international community, including the UN Environment Programme and the World Bank. It sets fundamental performance indicators for enterprises in terms of economic, environmental and social outcomes, taking into consideration the status quo of China's SMEs and the target of developing "environmentally friendly and resource-saving" companies proposed by the government. This system of indicators is intended for use by SMEs to collect and assess data. The indicators will enable SMEs to further clarify their environmental and social objectives when collecting data, find levers for continuous improvement, and adjust their development strategies and management processes – all of which will in turn lead to sustainable business opportunities, profit increases and more impactful environmental and social performance.

Table 2. The Green SME Impact Indicators Framework

First-Level Indicators	Second-Level Indicators	Third-Level Indicators
Strategy & Management	Value proposition	Environmental protection and social contribution objectives defined in the strategies
	Management policies	Growth and operations model
	Business Models	Products, customers, markets and competitive advantages
Performance	Economic	Basic financial and financing indicators over the most recent three years
	Environmental	<ul style="list-style-type: none"> • Environmental performance created by technologies and products • Companies' internal environmental management
	Social	<ul style="list-style-type: none"> • External: various social contributions • Internal: job creation, work environment

The indicators system is designed to emphasize that the sustainable development of enterprises should be not only built on maximizing earnings, but also through integrating corporate profits, environmental responsibilities and social responsibilities. The indicators system pays special attention to performance in:

- **Corporate development strategy and management:** evaluates enterprise performance on sustainable development strategies, via reviewing the enterprise's initial business model and strategic objectives.
- **Economic performance:**
 - Three main financial indicators are used to examine the economic performance of green SMEs: total assets, revenue and pre-tax income growth rates.
 - External funding support is also studied (including those from equity investors, government support funds, etc.)



- **Environmental performance:** examines enterprise environmental performance in terms of external environmental impact and the effectiveness of internal operations:
 - External environmental impact: the impact created for customers, consumers and communities by the enterprise's technologies and products; environmental impact generated by green SMEs in their industries. There are approximately 2-5 indicators for each industry.
 - Internal environmental management in operations: examines resources management in operations, including:
 - Carbon emissions management
 - Water resources management
 - Energy efficiency management
 - Resource utilization efficiency management.
- **Social performance:** evaluates enterprise social performance in terms of external social performance and internal staff management.



Data Analysis of Sample Green SMEs

3.1 Basic Information

3.2 Analysis of Business Strategies

3.3 Economic Performance

3.4 Environmental Performance Analysis

3.5 Analysis of Social Performance

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3.1 Basic Information

Prior to analyzing the strategies and economic, environmental and social performance data of the 56 companies surveyed for this report, an overview of basic commercial information is provided, such as registered capital, total number of staff, FY2010 revenue and industry focus.

3.1.1 Sample Companies' Registered Capital and Total Employees

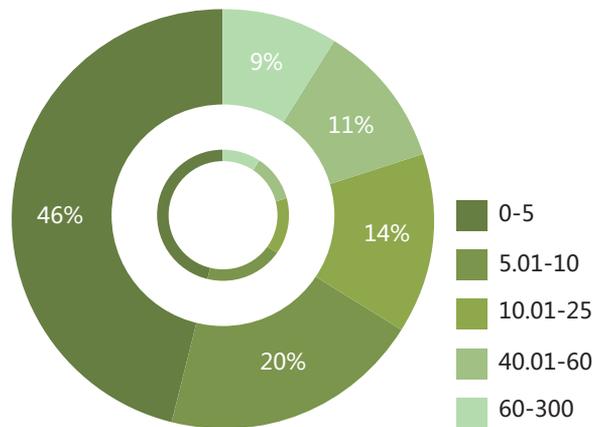


Figure 2. Registered Capital of Sample Companies (RMB Million)

As shown in Figure 2, nearly half of the 56 sample companies have registered capital of less than RMB 5 million (46%)⁴; 20% between RMB 5.01 and 10 million; 14% between RMB 10.01 and 25 million; 11% between RMB 40.01 and 60 million; and only 9% exceed RMB 60 million.

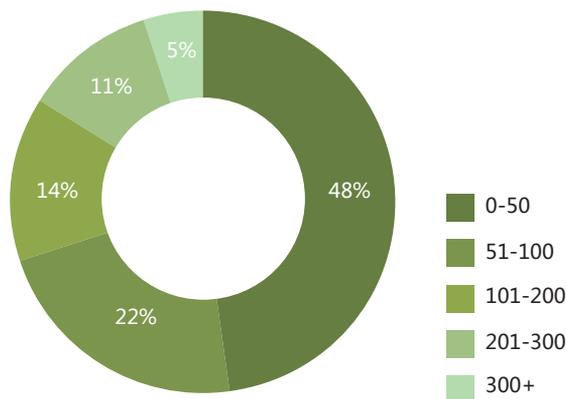


Figure 3. Analysis of Total Number of Staff in Sample Companies

⁴ Editorial note: As at mid-January, when data collection for this report was completed, RMB 5 million was equivalent to approximately USD 793,000.



Figure 3 shows that 48% of sample companies have less than 50 employees (including full-time and part-time); 22% between 51 and 100; 14% between 101 and 200; 11% between 201 and 300; and only 5% exceed 300.

3.1.2 Analysis of Industry Distribution and Ages of Sample Companies

The sample companies cover the seven major green industry sectors: renewable energy (RE), energy efficiency and conservation (EE), water resources management (WRM), pollution prevention and waste management (PPWM), environmentally friendly new materials and processes (EFNMP), sustainable land use (SLU) and biodiversity protection (BP).

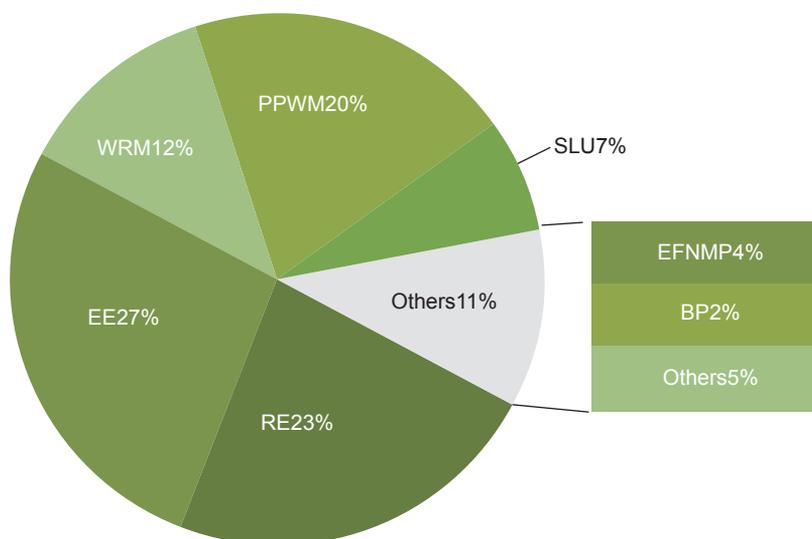


Figure 4. Industry Sector Distribution of Sample Companies

As shown in Figure 4, the largest number of sample companies is from the energy efficiency industry sector (27%), with smaller concentrations in renewable resources (23%), pollution prevention and waste management (20%), and water resources management (12%) in a decreasing order – together, these four industry sectors represent 82% of the total sample companies. Sustainable land use, environmentally friendly new materials and processes, and biodiversity protection, only represent 7%, 4% and 2% respectively, with 5% in other types of enterprises. This composition largely reflects the current structure and characteristics of China's green sector.

Besides industry distribution, the year of enterprise establishment is also an important indicator, and bears a close relationship with the companies' development stages, operating capacities, strategies and financing needs. The average age of sample companies is 6.7 years, with 19 years being the oldest and 1 year being the youngest. This number reflects the history of the development of China's green industry as, in general, these companies have been founded during the first decade of the 21st century. As an emerging industry, its



development still has a long way to reach maturity. Data published by the NDRC (National Development and Reform Commission)⁵ predicts that investment in China's green industry will reach RMB 3 trillion during the period of the 12th FYP. Large numbers of green SMEs will emerge in response to this trend, and their healthy growth will be directly related to the transformation of China's development and growth model.

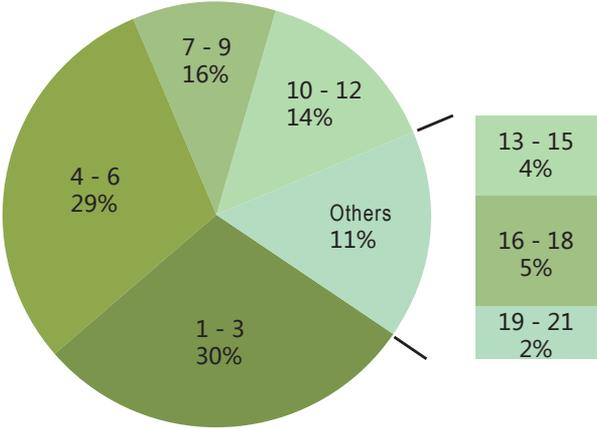


Figure 5. Age of Sample Companies (Year)



Figure 6. Average Age of Sample Companies by Sectors (Year)

Figure 5 reflects the age distribution of sample companies. Of the total sample, companies established for less than 3 years, between 4 and 6 years, and between 7 and 9 years, represent 30%, 29% and 16% respectively. The rest are companies over 10 years old. Analysis of the data indicates that sample companies in different sectors have different average ages. As shown in Figure 6, in the four sectors with the largest number of sample companies, renewable energy companies have an average age of 4.8 years, energy efficiency 6.1 years, water resources management 8.5 years, and pollution prevention and waste management 6.8 years.

⁵ Editorial Note: The NDRC is one of the most influential ministries in the Chinese national government system, responsible mainly for formulating and implementing strategies for national economic and social development, medium-term and long-term programs, annual economic plans, price policies and comprehensive industrial policies



As mentioned above in the "Overview of China's Laws and Policies on the Green Economy," relevant laws and policies have promoted the development of green SMEs. Among the four main industry sectors in the sample set, water resources management companies have the longest average history while companies in the other three sectors are relatively younger. These trends correlate with the timing of promulgation of relevant laws: i.e. the Water Law was issued in August 2002, followed by the Renewable Energy Law, the Energy Conservation Law and the Circular Economy Promotion Law. This strongly suggests that green industries in Chin have largely been driven by laws and policies.

3.2 Analysis of Business Strategies

The awareness of sustainable development (namely, striving for a balance between economic profit, environmental protection, and social contribution) should be reflected in a green enterprise's business strategy, and then implemented through the specific design of the company's management and operations. Thus, the report conducted research into the strategy of sample companies.

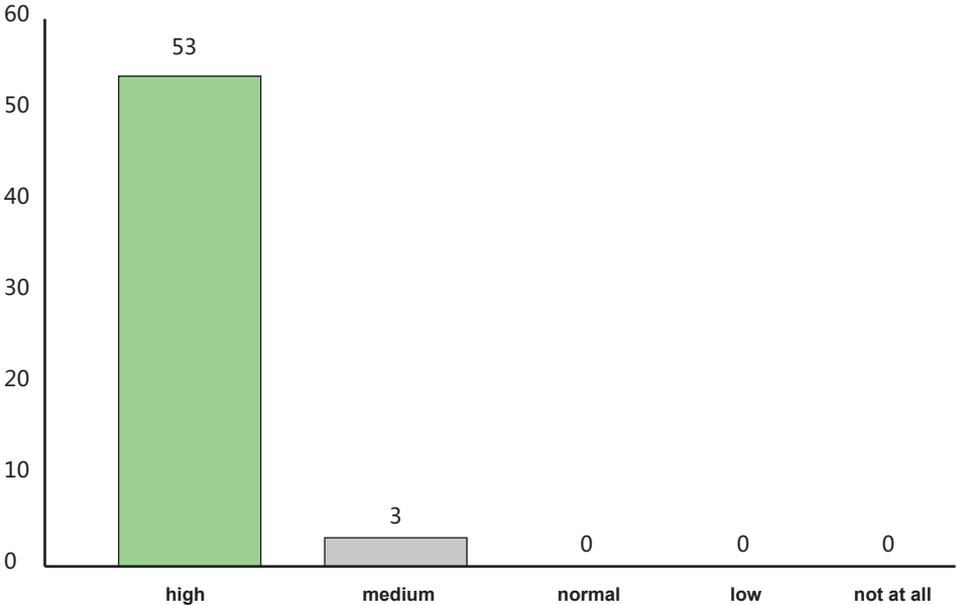


Figure 7. The Importance of Sustainable Development in Business Strategy

When asked how important "sustainable development" was for their company strategy, 53 out of 56 sample companies indicated it was "highly important," accounting for 95% of the total; a final three selected "medium-level importance," with no enterprises selecting other items. This indicates that the concept of sustainable development is widely acknowledged among green SMEs surveyed.

When examining the specific practice of sustainable development, this report focused on



three aspects, namely, product features, internal operations, and external environmental management and responses.

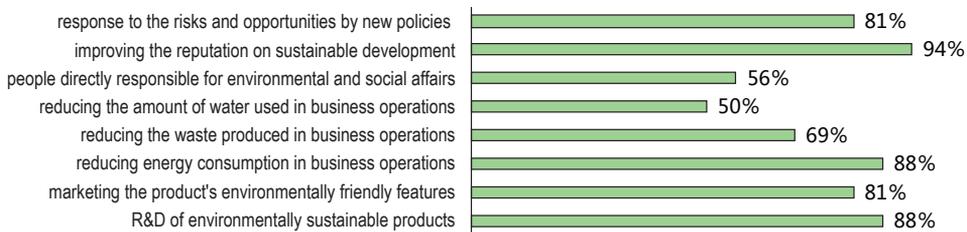


Figure 8. Consideration of “Sustainable Development” in Business Strategy

The results indicate that all sample companies have taken “sustainable development” into consideration, particularly in terms of the following three aspects:

- **Product Features:** Over 80% of enterprises focus on researching and developing technology and products with “environmentally sustainable” features, and will target customers through the sustainable features of their products;
- **Operations Management:** Over half of the enterprises have specific personnel who take charge of the environmental and social affairs of the company, and pay close attention to energy conservation as well as emissions reduction;
- **Environmental Management and Response:** 94% of enterprises stress the important of improving their own social reputation in terms of sustainable development, and 81% have a positive attitude to the challenges and opportunities brought by new policies and supervision.

Questions that arose during company visits:

Through fieldtrip visits, we found that a strong awareness of “sustainable development” is in the “green genes” of many green SMEs, which were established with an explicit objective of solving specific environmental problems using unique solutions. Therefore, most green SMEs are inherently conscious of sustainable development, and are able to integrate such concepts into the entire product life cycle, and thus form individual competitiveness and strategic development model.

Notably, a vast majority of the enterprises surveyed have independent research and development departments. Some also cooperate with international or national universities and research institutions to enhance the technical advantages of their products.

3.3 Economic Performance

An enterprise’s economic performance directly determines its fate. This report conducted research and analysis on three key areas, being green SMEs’ financial growth, financing situation, and receipt of government support, thus rendering a better understanding of SME development in various green industry sectors.



3.3.1 Financial Growth Analysis

We used three indicators to analyze the financial growth of sample companies: total assets growth rate, revenue growth rate and pre-tax profit growth rate.

Total Assets

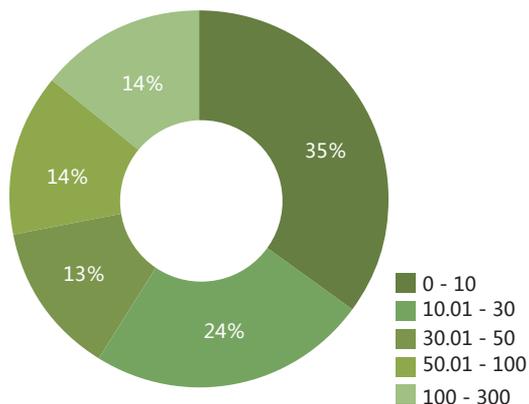


Figure 9. Sample Companies' Total Assets Distribution in 2010 (RMB million)

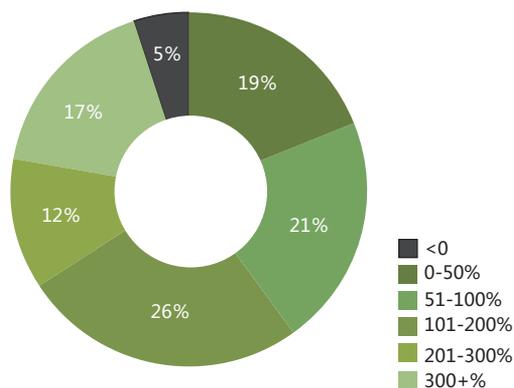


Figure 10. Sample Companies' Total Assets Growth Rate from 2008 to 2010

Total assets is the key metric to evaluate an enterprise's business size and development stage. As illustrated in Figure 9, nearly 60% of the sample companies had less than RMB 30 million in total assets in 2010, with 50% of them less than RMB 10 million. Thus, SMEs in the green sectors are still relatively small. Figure 10 indicates that nearly 80% of the 43 sample companies established no later than 2008⁶ have growth rates exceeding 50% from 2008 to 2010, with 50% of them exceeding a 100% growth rate, and 17% exceeding a 300% growth rate. Thus, on one hand, the sample companies are mostly early stage companies with small total assets, and therefore a significant growth rate is to be expected. On the other hand, these trends also reflect that favorable government policies in the past few years have in general led to positive growth among green SMEs.

The asset growth rates of different industries vary notably due to different degrees of policy support, as well as industry development patterns. These differences are illustrated in the four most represented industries in the sample (renewable energy, energy efficiency and conservation, water resources management, pollution prevention and waste management). In recent years, the renewable energy sector, and the energy efficiency and conservation sector, have received the largest degree of policy support, reflected in the asset growth rates of sample companies in these industries reaching 300% and nearly 250%, respectively, from 2008 to 2010. Sample companies in the pollution prevention and waste management sector also experienced growth rates of nearly 200% over the past 3 years. In comparison, companies in the water resources management sector have achieved only a 44% average growth rate.

⁶ The 10 companies set up in 2009 and 2010, and three companies that provided incomplete financial data, are not included in this analysis.



Revenue

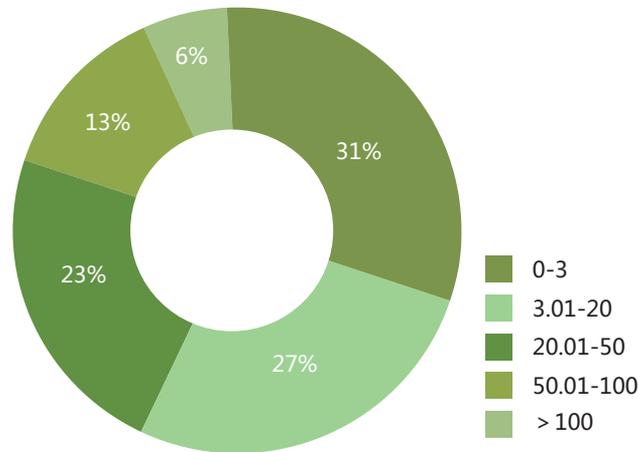


Figure 11. Sample Companies' Revenue Distribution in 2010 (RMB million)

Revenue is certainly an important measure for evaluating a company and an industry. According to MIIT's latest Small and Micro Businesses Categorization Standards (which provides the definition for SMEs across a number of industries), among the 53 companies in this research that provided complete revenue data, 31% of the sample companies are micro businesses with annual revenue below RMB 3 million, 27% are small businesses and 42% are medium businesses. The average FY2010 revenue of all sample companies was RMB 31.1 million with a median of RMB 16.5 million.

Table 3. Distribution of Revenue by Size and Year (2008 and 2010)

Revenue Distribution (RMB)	2008	% of Total Sample Companies	2010	% of Total Sample Companies
<3 million (micro business)	15	34%	16	31%
3 million – 20 million (small business)	15	34%	14	26%
Above 20 million (medium business)	14	32%	23	42%
Total	43	100%	53	100%

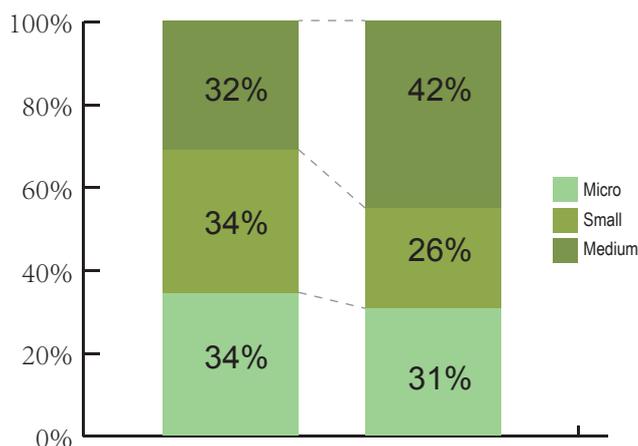


Figure 11A. Growth of Sample Companies between 2008 and 2010



A comparison of 2008 and 2010 statistics in Table 3 shows that medium businesses represented only 32% of the sample set of SMEs in 2008; in 2010, there were 9 more medium businesses, and thus medium businesses represented to 42% of the set. The number of micro businesses increased by one, and small businesses decreased by one, and thus the representation of these two categories among the set reduced by 3% and 8% respectively. Considering that 10 new companies were founded between 2009 and 2010, these revenue figures indicate that a sizeable number of the micro businesses in 2008 developed into small businesses by 2010, and that several of the small businesses in 2008 developed into medium businesses by 2010.

Table 4. Revenue Distribution by Industry Sector (2010)

2010 Revenue	Renewable Energy		Energy Efficiency and Conservation		Water Resources Management		Pollution Prevention and Waste Management	
	# of Companies	% of Sample	# of Companies	% of Sample	# of Companies	% of Sample	# of Companies	% of Sample
<3 million	7	54%	3	20%	1	14%	3	27%
3 million – 20 million	3	23%	5	33%	1	14%	2	18%
Above 20 million	2	15%	6	40%	5	71%	6	55%
Total	12 ⁷	100%	14	100%	7	100%	11	100%

Revenue differs significantly across sectors. These differences are illustrated through comparing the four most represented sectors in the sample (renewable energy, energy efficiency and conservation, water resources management, pollution prevention and waste management). 54% of renewable energy companies' revenue in 2010 was less than RMB 3 million, while this proportion was 20% for energy efficiency and conservation companies, 14% for water resources management companies, and 27% for pollution prevention and waste management companies. 23% of companies in the renewable energy sector are small businesses with annual revenue between RMB 3 to 20 million, while this proportion was 33% for energy efficiency and conservation companies, and less than 20% for the other 2 sectors. The water resources management sector had highest percentage of sample companies with annual revenue above RMB 20 million (71%), while pollution prevention and waste management, energy efficiency and conservation, renewable energy each had 55%, 40% and 15%, respectively.

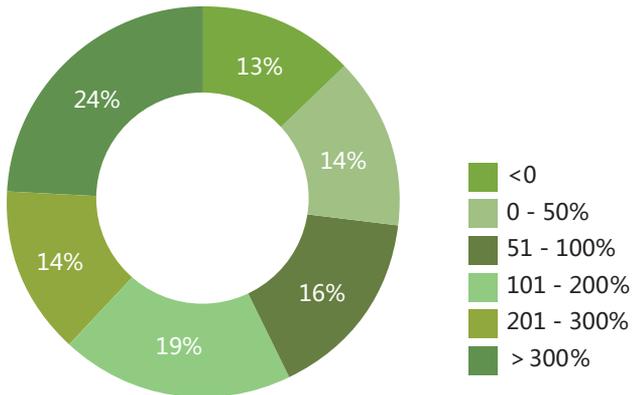


Figure 12: Sample Companies' Revenue Growth Rates from 2008 to 2010

⁷ Revenue in 2010 was unclear for 2 companies in the renewable energy and energy efficiency and conservation sectors.



The research revealed that from 2008 to 2010, the growth rate of sample companies' annual revenue reflected a similar trend as that of the total assets growth. Nearly 80% of companies experienced a 50% increase in revenue, 50+% experienced a 100% increase, and 20+% experienced a 300% growth rate.

Similarly, growth rates between different industry sectors vary significantly. Comparing the four most represented industry sectors in the sample (renewable energy, energy efficiency and conservation, water resources management, pollution prevention and waste management), the growth rate of annual revenue for water resources management companies was 78% from 2008 to 2010, while growth rates of companies in the other three industry sectors all exceeded 100%. Notably, the annual revenue of energy efficiency and conservation companies saw a growth rate of above 500%, which is closely linked to the important contribution of the government's policy on energy conservation and emission reduction.

Pre-tax Profit Growth Rate

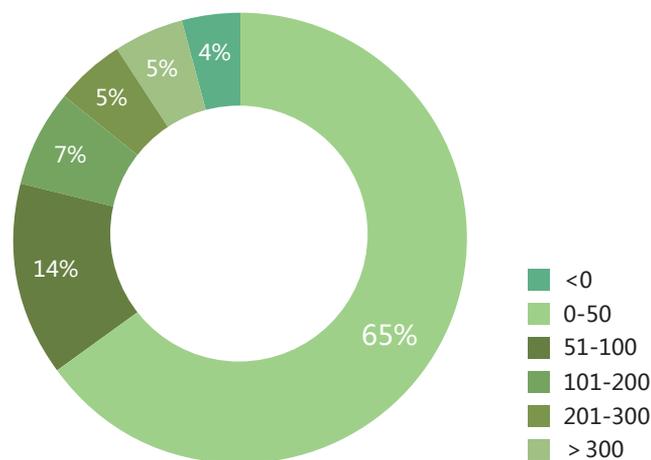


Figure 13. Sample Companies' Pre-Tax Profit Growth Rates from 2008 to 2010

Approximately 4% of sample companies experienced a stagnant pre-tax profit growth, while 65% of companies experienced a growth rate below 50%. 14% of companies experienced growth between 50-100%, 7% between 100-200%, 5% between 200-300%, and 5% above 300%.

Two thirds of the sample companies experienced a pre-tax profit growth rate below 50%, while more than 80% of companies experienced a revenue growth rate above 50%. This inconsistency between growth rates of these two indicators could be caused by three reasons:

1. Companies have lowered the price of their products / services due to increasing competition in the market. This pricing strategy results in a rising revenue but a lower profit.
2. Rising costs (raw materials, labor, etc.) lowered profits.



3. Suboptimal management proves insufficient to support a rapidly expanding business.

We have found that most of the companies surveyed generally faced the three trends above to some extent during the time period of our study (2008-2010).

Summary

In sum, the growth rates of green SMEs' total assets, revenue and pre-tax profit are high on average. We note that the sample size of this study is not considered large, and that the statistical data collected is skewed to reflect the early-stage growth phase of micro and small companies which tend to experience higher rates of growth in their early years. However, the high growth rates are nonetheless significant because they indicate that the green sector is growing, and has a positive outlook in terms of potential for profit and revenue. This sends a positive message to companies, the government, and organizations and people interested in the green sector.

Table 5. Growth Rates of Major Financial Metrics by Sector

Sectors	Number of Businesses	3-year Growth Rates (2008-2010)		
		Total Asset	Revenue	Pre-Tax Profit
Renewable Energy	13	303%	189%	96.7%
Energy Efficiency and Conservation	15	242%	559%	80.1%
Water Resources Management	7	44%	78%	19.4%
Pollution Prevention and Waste Management	11	195%	434%	202.1%

Table 5 indicates that the four most represented industry sectors in the sample (renewable energy, energy efficiency and conservation, pollution prevention and waste management industries) are growing rapidly. The water resources management sector is also growing, but its growth rate is much smaller than the other three. As discussed in the section “Overview of China’s Laws and Policies on the Green Economy” above, the Chinese government has passed laws (Water Law, Renewable Energy Law, Energy Conservation Law and Circular Economy Promotion Law) related to these four industry sectors in the 21st century. The promulgation and application of these laws has effectively facilitated the development of relevant industries and companies. Meanwhile, these four laws differ in the methodologies and degree of effect: the Water Law is restrictive, emphasizing regulations that businesses need to comply with and actions they cannot do; the other three laws are facilitative, emphasizing guidance of market development and catalyzing new market demands. These latter three laws are more conducive to fostering innovation and development of the green economy since they are focused on development of new technologies, new applications, and new markets.



3.3.2 Analysis of External Finance

An enterprise's financing structure is always a key question – whether it be big or small, state owned, privately owned or foreign. This research focuses on three of the most common sources of finance for green SMEs: equity investment (including seed funds, angel investment, venture capital and private equity), bank loans, and government funds.

Table 6. External Financing Received by Sample Companies during 2008-2010

Equity Investment	No. of companies	% of total	Bank Loans	No. of companies	% of total	Government Funds	No. of companies	% of total
RMB <10 million	6	35%	RMB < 5 million	6	26%	RMB < 1 million	8	33%
RMB 10 – 50 million	9	53%	RMB 5 – 10 million	5	22%	RMB 1 – 5 million	11	46%
RMB >50 million	2	12%	RMB >10 million	12	52%	RMB >5 million	5	21%
Total	17	100%	Total	23	100%	Total	24	100%

About 60% of sample companies received some sort of external financing between 2008 and 2010. Among them, 17 companies received equity investment, including 6 companies (35%) with an investment below RMB 10 million (approx USD 1.6 million), and 9 companies (53%) between RMB 10 to 50 million (approx USD 1.6 – 8 million). 23 companies received bank loans, with 50% of them having secured loans above RMB 10 million. Different government funds also play an important role in green SME financing: a total of 24 sample companies received various amounts of financial support from governments, including 33% having received funds below RMB 1 million (approx USD 160,000), 46% between RMB 1 to 5 million (approx USD 160,000 – 800,000), and 21% above RMB 5 million.

The data above seems to indicate that green SMEs do not face the same financing challenges as other “traditional” SMEs. However, if we deep dive into the data (Table 7), sorted by company size, then a different conclusion emerges: in fact, green small and micro businesses are facing more serious challenges in accessing financing.

Table 7. Analysis of external financing by sample company size

Company Size	Equity Investment	%	Bank Loans	%	Government Funds	%
Micro Enterprise	6	35%	1	4%	6	25%
Small Enterprise	2	12%	5	22%	5	21%
Medium Enterprise	9	53%	17	74%	13	54%
Total	17	100%	23	100%	24	100%

Table 7 indicates that growing and expanding medium businesses are very likely to receive external financing, while micro and small businesses are much less likely to get



funded. Only one out of 23 companies that received bank loans is a micro business (which represents only 4% of the companies that received support), compared to 5 (22%) small businesses and 17 (74%) medium businesses. As to equity investment and government funds, half of companies that have received such support are also medium businesses.

Table 8. Sample Companies Receiving Bank Loans by Industry Sector

2010 Revenue (RMB 1million)	Renewable Energy		Energy Efficiency and Conservation		Water Resources Management		Pollution Prevention and Waste Management	
	No. of Companies	% of total	No. of Companies	% of total	No. of Companies	% of total	No. of Companies	% of total
<3	0	0	1	7%	0	0	0	0
3-20	1	8%	3	20%	1	14%	0	0
> 20	2	15%	4	27%	2	29%	5	45%

Table 8 provides further information on bank lending for the four most represented industry sectors. Only one micro business that specializes in energy efficiency and conservation received bank loans among this sub-set. Most bank loans were obtained by medium businesses, especially those in the pollution prevention and waste management sector; and all five of these companies achieved revenue of above RMB 20 million in FY2010.

Questions that arose during company visits:

Although this research did not collect data on the ages of companies when their received their first external financial support, we found during fieldtrip visits that green SMEs, consisting of largely private companies, were most likely to seek loans from banks. However, micro and small companies at their start-up and early growth stages generally faced great difficulties in receiving bank loans. The main reasons include:

- The value chains of the industry sectors in which most green SMEs operate are incomplete;
- Green SMEs tend to have “light assets” that do not qualify for banks’ conventional leasing requirements;
- Banks do not have a sufficient understanding of energy conservation and low carbon technologies;
- Significant management gaps exist in SMEs.

All of these reasons exacerbate SMEs’ difficulty in accessing bank loans.



Table 9. External Financing Received by Industry Sectors

Industry	Equity Investment	% of sample companies in their industry	Bank Loans	% of sample companies in their industry	Government Funds	% of sample companies in their industry
Renewable Energy	5	38%	3	23%	4	31%
Energy Efficiency and Conservation	5	33%	8	53%	9	60%
Water Resources Management	1	14%	3	43%	2	29%
Pollution Prevention and Waste Management	3	27%	5	45%	5	45%

Amongst the four most represented industry sectors, SMEs in renewable energy, and energy efficiency and conservation, were the most attractive to venture capitalists. Five companies from these two sectors (representing 38% and 33% of the sample companies that operated in these sectors) received equity investment from VCs. Banks provided more support to companies in the energy efficiency and conservation (8 companies, 53%), water resources management (3 companies, 43%) and pollution prevention and waste management (5 companies, 45%) sectors. Government funding is more concentrated in energy efficiency and conservation companies (9 companies, 60%) as well as pollution prevention and waste management companies (5 companies, 45%).

Vcs and banks are inclined to invest in industry sectors which are supported by national policies, and government funds directly reflect the government's policy bias. Again, national policies have effectively fostered the development of certain companies.

3.3.3 Analysis of the Distribution of Government Support Funds

Favorable national policy is one of the main drivers for the green industry. Government is paying increasing attention to energy conservation and environmental protection in recent years. Both national and regional government entities have announced policies on special funds, subsidies and tax credits to promote the development of green SMEs. This section focuses on the subsidies, grants, and tax benefits received by sample companies.



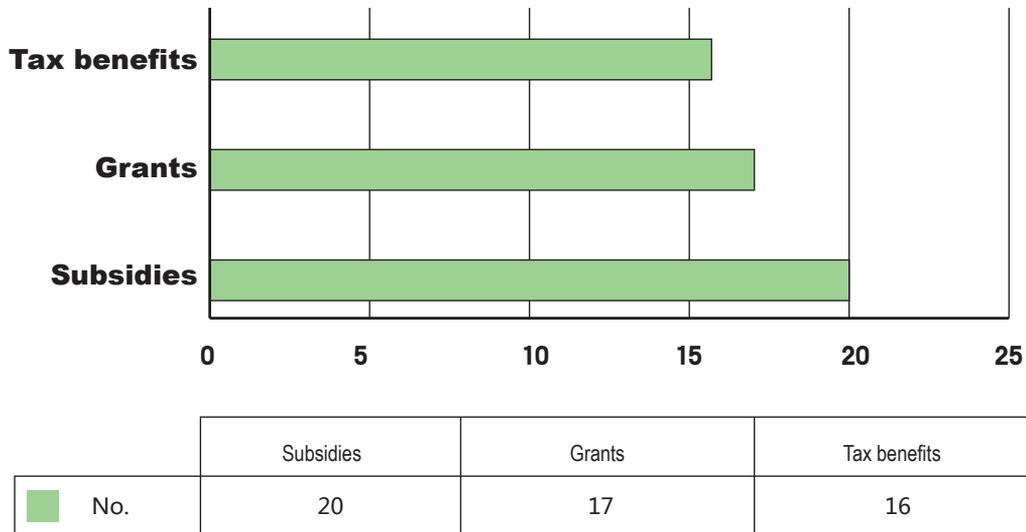


Figure 14. Government Support Funds Received by Sample Companies

The research revealed that 50% of sample companies had received different types of subsidies, grants, and tax benefits due to their contributions to energy saving, water saving, recycling and other areas. 20 companies (representing 36% of all sample companies) received subsidies; 17 companies (30%) received grants; and 16 (28%) received tax benefits.

Table 10. Distribution of Government Support Funds by Company Size

Company Size	Subsidies	% of total	Grants ⁸	% of total	Tax Benefits	% of total
Micro Enterprise	4	20%	2	12%	3	19%
Small Enterprise	6	30%	5	29%	4	25%
Medium Enterprise	10	50%	10	59%	9	56%
Total	20	100%	17	100%	16	100%

As Table 10 illustrates, compared to medium enterprises, micro and small enterprises were also disadvantaged in receiving government support. Half of companies that received government subsidies were medium enterprises, as were 59% of those that received grants and 56% of those that received tax benefits.

⁸ Editorial note: This category includes simple grants, conditional grants to incentivize certain behavior, rebates, and rewards and prizes from competitions.



Table 11. Distribution of Government Support Funds by Industry Sectors

Industry	Subsidies	% of sample companies	Grants	% of sample companies	Tax Benefits	% of sample companies
Renewable Energy	5	38%	3	23%	3	23%
Energy Efficiency and Conservation	9	60%	6	40%	7	47%
Water Resources Management	2	29%	1	14%	3	43%
Pollution Prevention and Waste Management	4	36%	4	36%	3	27%

Sample companies that received the three types of government support were mostly from the renewable energy, energy efficiency and conservation, water resources management, and pollution prevention and waste management industry sectors, representing 92% of all recipients of such support. Companies from the energy efficiency and conservation sector benefited the most. For subsidies, 9 companies (60% of sample companies in the sector) were focused on energy efficiency and conservation; 5 (38%) were from the renewable energy sector; and 4 (36%) were specialists in pollution prevention and waste management. For grants, companies from the energy efficiency and conservation sector received the largest proportion of support with 6 companies (40%) as beneficiaries; whereas 4 (36%) were from the pollution prevention and waste management sector, and 3 (23%) from the renewable energy sector. Only one company from water resources management received a grant. As to tax benefits, the energy efficiency and conservation industry once again stood out – 7 companies (44%) from this sector received such benefits, whereas only 3 companies from each of the other sectors received tax benefits. The data again illustrates that national policies support green SMEs at different levels of priority, with renewable energy, energy efficiency and conservation, and pollution prevention and waste management industries benefitting the most.

Questions that arose during company visits:

From company fieldtrip visits, we found that green SMEs had pressing needs for further policy incentives and government subsidies in the form of tax rebates and loan guarantees and, for some companies, business related to government procurement. A number of companies commented that some of the policies are not easily enforceable or implementable; some of the government subsidies had unnecessarily strict requirements and were inclined to favor large enterprises.

Notably, information asymmetry was a critical development problem facing green SMEs. For example, if an enterprise did not know about or understand a relevant policy, its development would be restricted or negatively impacted in its industry sector. On one hand, enterprises relied on information releases and announcements from the government and related associations to understand supporting policy, subsidies, rewards and tax benefits, and their experience indicated that the distribution channels and timeliness of government



information would need to be further enhanced. On the other hand, they lack the adequate channels to educate their customers about how to take advantage of the relevant policies. In the energy efficiency and conservation industry sector, for instance, demand side customers are not familiar with the relevant industry policy and therefore have no incentive or government pressure to purchase energy saving products and services. As a result, the market cannot easily grow, which in turn limits the development of both the enterprises operating on the supply side and the sector as a whole.

3.4 Environmental Performance Analysis

3.4.1 Diversification of Environmental Contribution

In this research, companies that create environmental impact for customers, consumers, and communities through their products, technologies, and services fall into seven industry sectors that are also called seven environmental intents in our terminology: renewable energy, energy efficiency and conservation, water resources management, pollution prevention and waste management, environmentally-friendly new materials and processes, sustainable land use, and biodiversity protection. Among the 56 sample companies, only two did not have their main businesses directly related to these seven environmental intents. Therefore, the following analysis of corporate environmental intent is based on the information and data provided by the big majority of the 54 sample companies.

Although the main business of these 54 sample companies focuses on one single industry sector, the environmental intent of the use of their technology and their products is very much diversified. This diversification reflects that most current green technologies and products are able to solve multiple environmental problems as well as satisfy various environmental needs. Such diversification, and SMEs' willingness to maximize the environmental contribution of their business models, may become a trend in the future development of green technologies, and will be prominent in differentiating the relative competitiveness of green SMEs. According to the data in this report, 31 of the sample companies are able to achieve two or more than two environmental intents. Among these, 5 companies can contribute to four or five environmental goals with their technology and products. The distribution of companies is shown below according to the seven environmental intents:



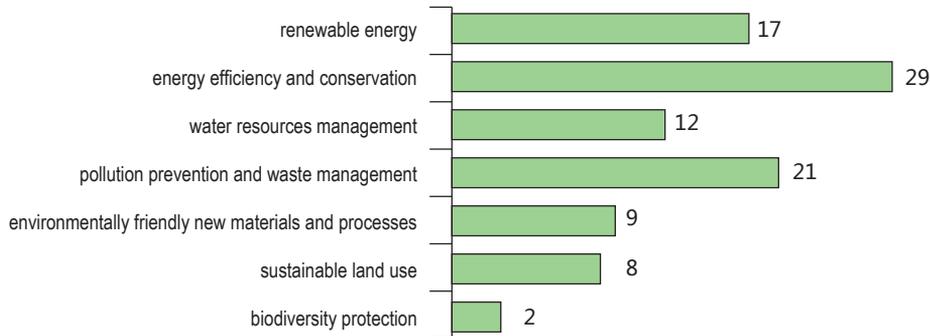


Figure 15. Distribution of Companies Based on Seven Categories of Environmental Intent

We can see from Figure 15 that:

- As the Chinese government have implemented energy saving and emissions reduction goals at both the central and local levels, energy efficiency and conservation products and technologies are in high demand, prompting relevant businesses to flourish. More than half of the 54 companies (29 companies, 54%) can help their customers achieve energy efficiency goals. To improve the structure of energy consumption, the development and utilization of new energy is as important as energy efficiency. Thus, the third-ranked environmental intent among the sample were 17 companies (31%) engaged in renewable energy, which provide technologies, products and equipment related to new energy such as solar energy, bio energy, wind power, and geothermal energy.
- The second-ranked environmental intent was 21 companies (39%) dealing with pollution prevention and waste management. The increasing number of companies in this sector partly reflects the growing popular awareness of the Chinese government and the public about protecting the natural environment. Changes in policy implementation and capital investment have resulted in a significant increase in business opportunities in this field, and have encouraged companies with expertise in minimization and decontamination of solid waste, gas, and sewage water to actively participate in these developments.
- The protection and supply of water resources are areas in which prominent problems have existed in China in recent years. Some companies have emerged and played an important role in the protection and sustainable use of water resources by paying special attention to water efficiency, clean water, and recycling water. A total of 12 companies (22%) from the sample are in this field.
- 9 companies (17%) and 8 companies (15%) are pursuing an environmental intent in environmental-friendly new materials and processes, and sustainable land use, respectively. The former group mainly focuses on replacement of traditional technologies and products with flawed environmental impacts with materials and production processes that are beneficial or harmless for the environment. The latter group specializes in the scientific use and protection of land and water with



agricultural production technology, agricultural capital goods innovation, biotechnology, environmental technology, etc.

- Due to the lack of overall planning and balancing of interests in the process of China's commercial development, as well as the destructive exploitation of resources, some regions of China have suffered biodiversity destruction followed by a series of ecological problems which have even threatened people's survival. However, the good news is that some companies have already started to play an effective and ongoing role in protecting biodiversity through scientific methods and business operations. In this evaluation, 2 companies (4%) make an obvious contribution in this regard.

In addition, the two companies pursuing businesses that are not directly related to the seven environmental intents are still classified as "green SMEs" because of their direct and prominent performance in the area of social intent. One provides loan guarantees to small and micro businesses in order to increase employment, and it stresses applicants' balancing of economic, environmental, and social performance when reviewing their loan applications. The other company not only preserves the traditional culture of Chinese ethnic minorities, but also helps improve the livelihood of low-income people by forging strong and positive relationships between modern designers and traditional craftswomen. Growth of these types of green SMEs is an integral part of the social and economic development of China. They not only play a role in promoting fairness in distribution of wealth, but also represent good and conscientious efforts to lay a solid foundation for China's community-based economic development.

3.4.2 Analysis of Seven Environmental Intents

The Chinese government has set a series of targets for the nation's economic and social development during the "12th Five-Year Plan" period. Among the 12 targets related to resources and environment, only one is prospective (regarding effective utilization of agricultural irrigation) while the rest are mandatory (see Table 12). This shows China's determination to change its development pattern over the course of the 12th Five-Year Plan.



Table 12. Targets Related to Resources and Environment in the “12th Five-Year Plan”

Targets		2010	2015	Average Growth per Year
Farmland reserves (billion Mu)		18.18	18.18	0
Water consumption per unit of value-added industrial output				30
Effective Consumption rate of Agricultural Irrigation Water		0.5	0.53	0.03
Non-Fossil Fuels in Primary Energy Consumption Ratio		8.3	11.4	3.1
Reduction of Energy Consumption per Capita GDP				16
Reduction of CO2 Emission per Capita GDP				17
Reduced Emissions of Major Pollutants	COD			8
	SO ₂			8
	Ammonia 10			10
	Nitrogen Oxides			10
Growth of Forest Coverage	Forest Coverage	20.36	21.66	1.3
	Forest Stock Volume (billion Cubic Meters)	137	143	6

Source: Adapted from “National Economic and Social Development of the Twelfth Five-Year Plan of the People’s Republic of China”, Xinhua News Agency, March 16, 2011.

As shown in the following analysis, given the seven environmental intents in which the 54 sample companies are engaged in 2010, green SMEs, as tiny economic units, can still make amazing contributions to the protection and restoration of natural resources and the environment. Together, they will become active practitioners and leading forces for transforming the economy and achieving the targets in the 12th Five-Year Plan.



Renewable Energy

Renewable energy is mainly represented by clean, non-fossil energy such as wind power, solar energy, hydraulic power, bio energy, geothermal energy, and marine energy. China's long-term development goal in this area is to increase the ratio of renewable energy in primary energy consumption from the current 7% to 16% in 2020. This opens up huge market potential for companies engaged in the renewable energy industry sector.

Among the 54 sample companies, 17 are able to provide renewable energy. Five companies engage in bio energy, four produce biogas, three deal in solar heating systems and two specialize in geothermal energy. Additionally, one company focuses on solar power generation, one on wind power generation, and the last one on hydrogen fuel cell production. This distribution helps support the fact that, in the field of renewable energy, most SMEs are concentrated in areas like biomass briquettes and equipment, biogas, and solar heating systems, whereas large companies that own more advanced technologies and have stronger financial resources dominate the field of solar and wind power electricity generation. Most SMEs in these latter fields supply equipment and components, as well as provide operational services, to large companies in the industry value chain, whereas others choose to develop smaller solar/wind power devices on their own.

According to the data gathered, in 2010 the 17 companies produced a total volume of renewable energy equivalent to 52,480 tons of coal via their products and services. This helped to reduce 136,448 tons of carbon dioxide emissions (see table 13).

Table 13. Renewable Energy Production of 17 Sample Companies

Types of renewable energy produced	Total amount
Solar power generation	3.78 million kwh
Solar heating	77.2 billion kj
Biomass	120,000 tons
Bio Gas	7 million cubic meters
Geothermal energy	160 million kwh
Biomass power generation	9 million kwh
Total coal equivalent	52,480 tons
Reduction of CO₂ emissions	136,448 tons

Energy Efficiency and Conservation

China designates the following fields as most important for energy efficiency: major industries (including electric power, steel, non-ferrous metals, petroleum and petrochemicals, building materials, and coal and mechanical industries), transportation, construction, household appliances and office equipment, and lighting equipment. Statistics show that industrial energy consumption accounts for 70% of the country's total energy consumption, while construction-related energy consumption accounts for about 20%. Therefore, energy-saving products for industrial and construction-related energy efficiency



have received unprecedented attention in recent years and ushered in a period of major development in the energy-saving industry, during which new companies engaged in manufacturing energy-saving products and providing energy-efficient services have sprung up massively. According to the 2011 Annual Report of China's Energy Efficiency Service Industry, the total output of China's energy service industry achieved a breakthrough that was valued at over RMB 100 billion (approximately US\$15.8 billion) in 2011, and the total number of companies in this sector shot up to nearly 4,000.

More than half of the total sample companies (29 of 54) have helped their clients save energy. This is directly related to the fact that various types of energy service companies have been set up in recent years to meet the strong demand for energy efficiency services. Of these 29 companies, 18 of them directly or indirectly save electricity. Electricity saving services is the mainstream business in the current energy efficiency services market, with businesses of the sector's practitioners markedly diverging in scale and targets. Some of them provide electricity-saving services to large industrial manufacturing processes, while some others try to save electricity on small household appliances. In addition, 13 companies (45%) help clients save or replace coal. Five companies (17%) help save natural gas, three companies diesel, and one liquefied natural gas.

According to the reported data, these 29 companies helped clients save up to 630,000 tons of coal equivalent, which amounts to a reduction of 1.638 million tons of carbon dioxide emissions (see table 14).

Table 14. Energy Saved by 29 Sample Companies in 2010

Types of energy saved	Total Amount
Electricity	198.8 million kwh
Coal	0.59 million tons of coal equivalent
Fuel	1,000 tons
Diesel	792 tons
Natural gas	9.98 million cubic meters
Liquefied natural gas	675 tons
Total coal equivalent	0.63 million tons
Reduction of CO₂ emissions	1.638 million tons

When combined with the sample companies that produce renewable energy, in 2010 alone, the sample companies in energy efficiency helped save and replace a total amount of energy equivalent to 0.68 million tons of coal. This is also equivalent to 2 billion kwh of electricity generated from a coal-fired power plant, or shutting down of a middle-sized power plant with a 400,00 kwh generating capacity for one year. Thus, SMEs are becoming an important force in China's development of renewable energy, as well as in meeting its goals of carbon emissions reduction. As carbon tax is currently being explored by the



Chinese government, high demand for carbon efficiency is expected to continue, which will create more business opportunities for SMEs in both the renewable energy and the energy efficiency sectors.

Pollution Prevention and Waste Management

The sources of pollution in China are mainly industrial emissions, agricultural production and garbage. Pollutants and waste are emitted in solid, liquid, and gas forms. Currently, most companies engaged in pollution prevention and waste management promote resources reuse and recycling. They contribute their technical expertise and business talents in various areas that run across the production cycle, including sourcing control, process control, post-production waste control and end-of-life product waste management. These contributions not only help alleviate the ecological risks caused by environmental pollution, but also provide great opportunities for related businesses to emerge.

Twenty-one companies from the total 54 contribute to pollution prevention and waste management: 14 companies (67%) deal with solid waste disposal; three (14%) in sewage disposal; and four (19%) in flue gas treatment. In recent years many Chinese cities have suffered from an overflow of solid waste and electronic garbage in their landfill. The solid waste disposed of by the 14 companies involved in this area includes small objects like milk cartons, juice bottles, or batteries, as well as mid-sized objects such as abandoned furniture and discarded photocopiers. Some companies in this sector also help incorporate recycling and waste management into major production processes, such as recycling the waste catalyst and organic exhaust gas during the production process, and rehabilitate large areas of hazardous waste land. These business explorations and environmental contributions will be crucial for the development of China’s circular economy.

According to the reported data, the following table shows the total environmental contributions of the 21 SMEs operating in the field of pollution prevention and waste management in 2010 (see table 15).

Table 15. Waste Disposal of 21 Sample Companies in 2010

Type of waste disposed/ emissions reduced	Total amount
Solid waste	1.14 million tons
Waste water	14.51 million tons
Flue gas	266.5 million cubic meters
Agricultural and forestry waste	60,000 tons
Heavy metallic sludge	500,000 tons
Heavy metallic residue	5,000 tons



Water Resources Management

On January 12, 2012, the State Council of China issued “Opinions on Implementing the Most Stringent Water Management System” outlining the three most severe problems in water resources management which are the over-exploitation of water resources, water pollution and inefficient water use. In response to these problems, they established the so-called “Three Red Lines”⁹ standard of water resources management. This document is primarily intended to exert control over the increasingly excessive use of water, improving efficiency of water use, and strictly limit the total amount of sewage emitted into rivers and lakes. Given that it is expected that China will reach its peak of water use in 2030, water conservation and a high quality standard for water are not only long-term goals for China’s water resources management, but also represent market opportunities for companies that are engaged in water resources management.

Twelve of the sample companies contribute to water resources management, 7 (58%) of which focus their businesses on sewage disposal, and 5 (42%) are committed to water-efficient products and water-saving technologies.

Based on the reported data, these 12 companies made the following environmental contributions in the field of water saving and water purification in 2010 (see Table 16).

Table 16. Water Conservation and Sewage Disposal of 12 Sample Companies in 2010

Type of Water Resources	Total Amount
Fresh water conserved	1,977.5 thousand tons
Sewage disposal	80,538.3 thousand tons

Environmentally Friendly New Materials and Process

Among the 54 sample companies, nine companies are committed to the research and development, as well as production, of new materials or innovative production processes that are less harmful or harmless to the environment or which help conserve natural resources. Three companies produce mineral resources-saving products while three others help save fossil energy, and another three help save trees. Among these latter three, one company produces recycled paper from used milk cartons, and another one carries out internet-based market research in order to save paper. Overall, the amount of wood these SMEs saved in 2010 could prevent the felling of 104,100 trees.

According to the reported data, the total amount of natural resources saved or replaced in 2010 by these nine companies’ new materials and production processes is shown below (see table 17).

⁹ Red lines on water resources exploitation, on water use efficiency and on the pollution limit on functional water zones



Table 17. Natural Resources Saved or Replaced by Nine Sample Companies in 2010

Type of Natural Resources	Total Amount
Wood	20,800 cubic meters
Minerals	240,000 tons
Fossil energy	151,000 tons

Sustainable Land Use

Eight of the 54 sample companies contribute to sustainable land use with their agricultural cropping technology, farming technology, biotechnology, or land management solutions. Four companies (50%) protect arable lands; three protect forests; and one contributes to the control of desertification. Companies in this field generally face obstacles to growth in the form of less advanced technology and geographical restrictions. There can also be barriers and difficulties in establishing trust and effective communication with farmers in rural areas in order to build the collaborative relationships on which sustainable land use companies depend.

According to the reported data, the environmental contributions of these 8 companies resulted in a total of 7.2 million mu of land being managed using sustainable use solutions (see table 18).

Table 18. Sustainable Land Use by 8 Sample Companies in 2010

Type of land protected	Total amount
Arable land protected	60,000 mu
Forests protected	7.05 million mu
Desertification prevented	90,000 mu
Sewage under control	2,220 mu
Saline land under control	1,800 mu
Total	7.204 million mu

Biodiversity Protection

Two of the total 54 sample companies are in businesses directly related to biodiversity protection, and both contribute to the protection of forest species. One controls the breeding and spreading of harmful alien plants as they turn these plants into natural additives to stock feed or into effective organic pesticides. This innovation not only helps protect arable land, but also reduces the damage to original species that are native to the forest. The other company uses organic farming and bee pollination techniques to help maintain the diversification of forest species.



According to the reported data, these two companies helped maintain biodiversity in 7 million mu of forest in 2010.

3.4.3 Clean Production and Green Operations

Apart from the external environmental impacts created via the green-inherent business models of the companies, environmental management in their own operations is also very important. Imagine if a so-called energy efficient products manufacturer was to have high energy consumption, created heavy pollution in its production processes, and lacked awareness in environmental management and control measures – such a company cannot qualify for being a "green company." Therefore, in addition to focusing on the external environmental impacts created by these companies via their products and services, this report also pays special attention to how they achieve goals of energy saving, emissions reduction, environmental protection, and other forms of internal environmental intent from their own operations.

The *Clean Production Promotion Law of the People's Republic of China* (Clean Production Law), published in June 2002, specifically stipulated that within Chinese territory, "any units or individuals engaged in activities relating to production or provision of services and their corresponding management agencies must organize and implement systems for cleaner production in accordance with the provisions in this Law." It also emphasized that "for the State Council and local governments that are higher than county level, clean production should be included in national economic and social development plans, as well as be a major consideration in the planning for environmental protection, resource utilization, industrial development, and regional development." This demonstrates China's determination to encourage and promote clean production. The Clean Production Law provided a clear definition of "clean production" as "the continuous application of measures for design improvement, utilization of clean energy and raw materials, the implementation of advanced processes, technologies and equipment, improvement of management and comprehensive utilization of resources to reduce pollution at source, enhance the rates of resource utilization efficiency, reduce or avoid pollution generation and discharge in the course of production, provision of services and product use, so as to decrease harm to the health of human beings and the environment." We can see that "clean" is required throughout the entire production process.

Moreover, for aspects such as raw materials use, resource consumption and utilization, and pollutant generation and disposal, cleaner technology and equipment with high efficiency in improving resource utilization and reducing pollutants will be given high priority. It has been 10 years since the Clean Production Law was established. More and more companies have implemented its requirements through specific management measures. It is also being gradually integrated into companies' policies and accounting systems, offering these companies competitive advantages to broaden their markets and better serve their customers.

Research for this report found that the vast majority of the 56 sample companies saw energy saving/emissions reduction and water/raw materials saving and recycling as being of great importance (see Figure 16). They actively search for administrative methods and specific measures of green operations that seek to continuously reduce operational



carbon emissions and improve water efficiency and use of other non-renewable resources. From the “Strategic Analysis” section above, we can see that at least half of the 56 sample companies have considered reduction of operational carbon emissions, energy consumption, waste and water use in their strategic plans. Further, close to 90% of them incorporate considerations of energy consumption into their operational strategy. Although not many companies have a clear understanding of the lifecycle carbon emissions of their own products, and they rarely try to regularly measure their own carbon footprints, four companies from the energy saving and renewable energy sectors have voluntarily reported their efforts to help customers reduce large amounts of greenhouse gas emissions, such as CO₂ and SO₂.

Compared with companies in developed countries, Chinese companies are yet to catch up in areas such as average energy consumption, water consumption, and resource utilization efficiency. The experience of the sample companies studied in this report indicates that clean production and green operations are not only important indicators of enterprise cost control and effective management, but also are important measures by which companies can sharpen their competitive advantage and improve their status and pricing power in the global supply chain system. This is particularly important to Chinese SMEs that have traditionally passively operated at the low end of the industry value chain. Clean production and green operations are increasingly becoming benchmarks against which the sample green companies use to improve management of their internal operations and processes.

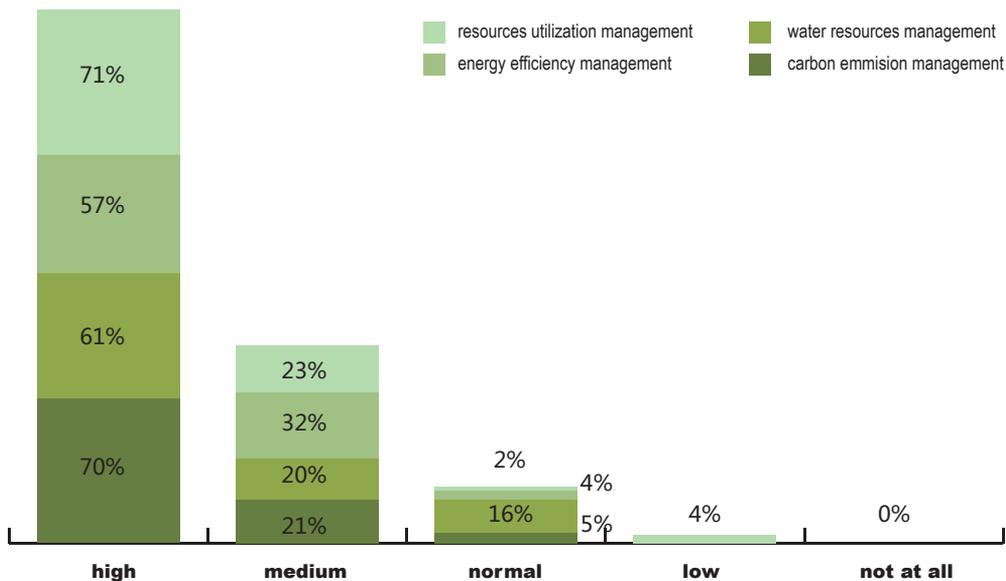


Figure 16. Levels of Importance Placed on Environmental Management by Sample Companies in Their Own Operations

Carbon Emission Management and Measures

Companies’ carbon emissions management and quality control are an important part of their environmental management. In recent years, the importance of green operations has gradually been recognized by the sample companies. There has been an increasing attention from companies to technologies, measures and business opportunities that



help reduce carbon emissions. The trend is not only requiring changes in the methods of company management, but is also directly helping to improve access to government-sponsored financial benefits. Among the 56 sample companies, 51 of them (91%) consider operational carbon emissions management “very important” or “rather important.” Thirty-nine companies (70% of the total sample), think it is “very important.” Three companies have an opinion of “slightly important,” and two others did not respond.

The recognition of the importance of carbon emissions management among the 56 sample companies originated from their day-to-day operations. Fifty-four (96%) have already implemented certain approaches in order to reduce carbon emissions in their production and office functions. Some commonly used methods, utilized by over 40 companies (70%), include: “reducing the amount of printed materials,” “workplace rules set to conserve electricity” and “energy consumption reduced in production.” More than half of the sample companies are carrying on their own energy-saving efforts by restructuring office buildings or factories, and encouraging employees to choose low-carbon modes of transportation to go to work or travel. Nearly half of the companies utilized renewable energy in their own operations. Three self-motivated companies are even trying to measure their carbon footprint, and two participated in the “Carbon Neutral Project.”

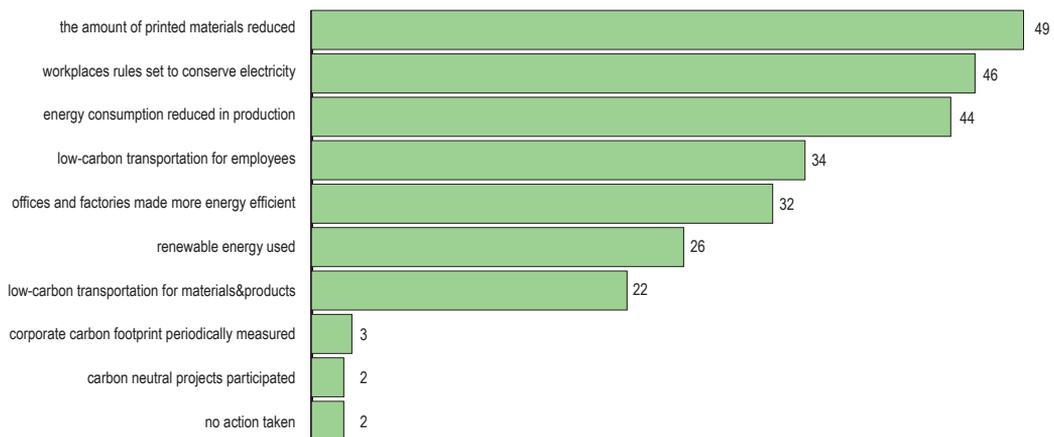


Figure 17. Forms of Carbon Emission Management among Sample Companies

In addition to the options listed in the figure above, many companies also reported additional carbon reduction and environmental protection measures that include, among others, participating in the national voluntary emissions reduction project, applying to be a national environmental education base that helps promote environmental awareness for visiting groups (which is particularly popular, for example, in the recycling industry), encouraging employees to bring their own chopsticks for lunch, refusing to use disposable tableware, placing beverage bottle recycling machines in public spaces of office buildings, and promoting garbage separation and recycling.

Water Resources Management and Measures

Regardless of whether a company’s line of business is directly related to water resources,



water consumption is without a doubt indispensable in its operations. Water resources can be used by a company as an important source of production, or just as a cleaning source or drinking source for offices. Among the 56 sample companies, 45 (80%) consider water resources management “very important” or “rather important” in their business operations. Thirty-four companies, 60% of the total sample, think water resources management is “very important.” Nine companies consider it “slightly important,” and two companies failed to respond. Compared to the other three areas of operational environmental management, namely, carbon emissions, energy efficiency, and resource utilization efficiency, the degree of attention paid to water resources management is the weakest. No less than 50 companies all nominated the other three management areas as “very important” or “rather important.”

Awareness of water conservation is widespread in China. More and more companies in China also pay greater attention to water costs due to rising water prices or expected price increases. They have begun to take measures to improve technological process so as to achieve water recycling and conservation purpose. Fifty-two companies (96% out of the total sample of 56) have implemented some form of water resources management. Thirty-six companies (64%) have chosen to develop and implement internal rules and regulations on water conservation, as this is a relatively easy measure to adopt. Twenty-six companies (46%) claimed to have the capability to recycle water in their business operations.

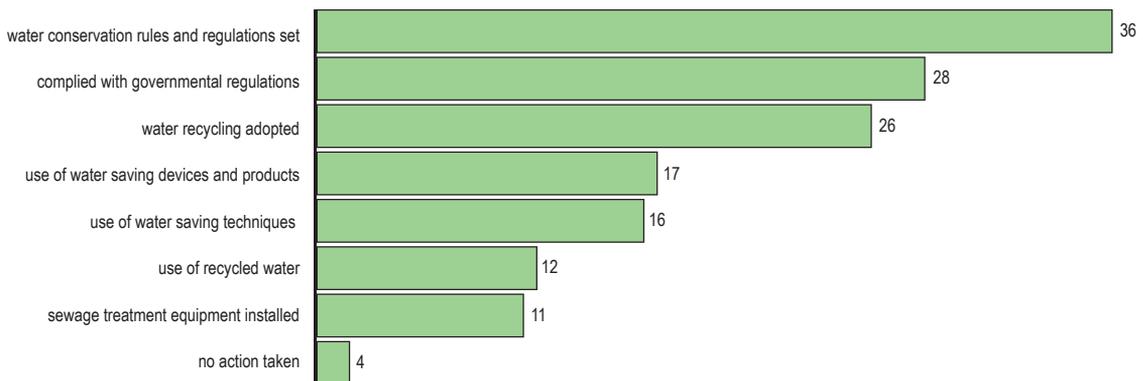


Figure 18. Forms of Water Resources Management among Sample Companies

In addition, several companies have implemented water conservation measures with specific characteristics. For example, some companies require employees not to drink bottled water in office areas to avoid unnecessary plastic waste. Some have adopted a saline drip loop recycling system to conserve freshwater resources.

Energy Efficiency Management and Measures

The importance of saving energy and improving the efficiency of energy use to generate more economic benefit is reflected in the daily management of many companies. Among the 56 sample companies, 50 (89%) place energy efficiency management as “very important” or “rather important.” Thirty-two of them (57%) consider it “very important.” Two companies think it “slightly important” to have energy efficiency management while another two nominated “less important” as their choice as they use very little energy in their technological processes. Two



companies did not respond.

Fifty-two sample companies (93%) indicate that they have taken several measures to improve energy efficiency management. Twenty-two companies (39%) declare their use of renewable energy, where solar energy was the most frequently used (11 companies), followed by bio energy (7 companies) and geothermal energy (5 companies). Some other companies also mentioned use of wind energy and air energy¹⁰. Sixteen companies (29%) take advantage of waste heat, such as water, steam and flue gas created from the production process.

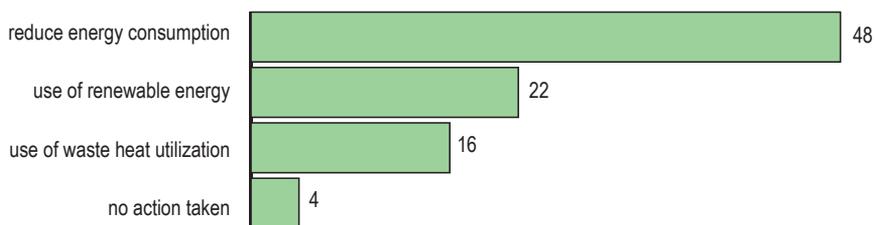


Figure 19. Forms of Energy Efficiency Management among Sample Companies

Resource Utilization Management and Measures

Many companies have recognized the importance of improving resource utilization. Among the 56 sample companies, 53 (96%) think efficient resource utilization is “very important” or “rather important.” Forty companies consider it “very important.”

Fifty-three companies (95%) recycle some raw materials. Forty-eight companies (86%) are capable of recycling paper while 18 companies (32%) can recycle metal and/or wood. Twelve companies (21%) recycle plastics.

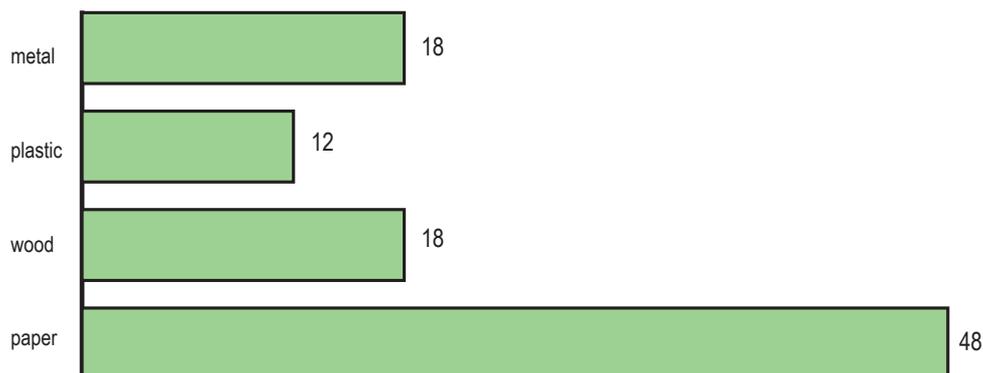


Figure 20. Forms of Resource Utilization among Sample Companies

¹⁰ Editorial note: air energy is becoming more popular in China for deployment in simple (household) devices that use compression and condenser systems to exploit differences in air temperature to create energy.



3.5 Analysis of Social Performance

3.5.1 Social Benefits

Most green enterprises are built to solve one or more environmental problems, being equipped with green technology, business ideas and a fair sense of corporate responsibility. This kind of "green genes" impels enterprises to integrate economic, environmental and social interests into their business operations, and to attach importance to training of staff for an improved awareness of environmental protection and social responsibility during daily management. This approach is fully reflected in the 56 sample companies.

This report defines social benefits as the combined contribution to employment, income, quality of life and other employee benefits from enterprises' economic activities. Of the 12 social benefits listed by our survey, 52 enterprises (93%) indicated that they believe they help "increase employment opportunities," 29 (52%) believe they "promote community development" and "increase productivity," 28 (50%) "improve health conditions," 21 (38%) "make clean energy available" and 19 (34%) "improve people's professional skills." Moreover, a number of enterprises create special social benefits, such as helping minority groups to preserve traditional embroidery skills and inherit their local culture and improve people's living conditions.

As mentioned above, two of the 56 sample companies are not directly contributing to the seven areas of environmental impact, but more directly and significantly create social impact by promoting employment and alleviating poverty. One company is committed to preserving and promoting traditional handcrafts, i.e. to improve embroidery and handcraft skills of rural women in poor areas in order to increase their income. In 2010, around 120 rural women received training and customer orders from the company, resulting in each of them receiving an additional RMB500 (approximately US\$80) in annual income. Another company provides financing guarantees to small businesses. In 2010, it helped about 159 small businesses get funding of RMB520.4 million (approximately US\$82.6 million), in turn helping to generate employment for nearly 12,000 people.

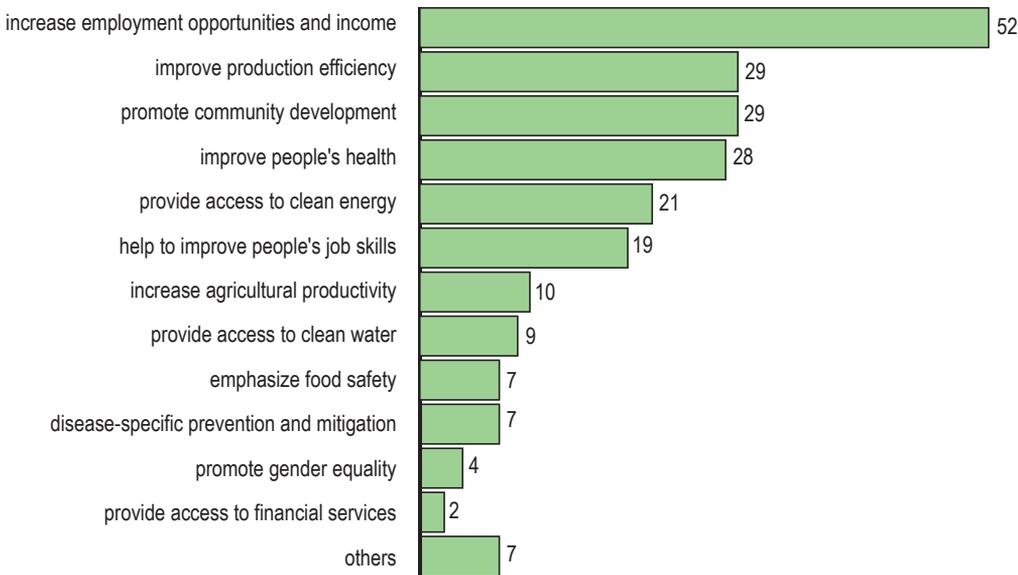


Figure 21. Social Benefits Created by Sample Companies



3.5.2 Environmental Protection Awareness and Public Service

In 2010, 55 of the 56 sample companies (98%) educated their staff about environmental protection and social responsibilities. Fifteen of them held four or more training sessions, 28 (50%) held between two to four sessions, and 12 held one session. Forty-three companies (77%) initiated or participated in environmental protection or social responsibility activities: 11 companies (25%) took on this exercise more than four times, 17 (40%) between two to four times, and 15 (35%) at least once. These figures demonstrate green SMEs' keen interest in developing their staff's awareness of environmental protection and also engaging in public service. To strive for a balanced development of business, environment, and social benefits, they join big Chinese and multinational corporations in environmental protection campaigns and public service activities. Our investigation shows that 53 of the 56 sample companies (94.6%) pay attention to improving their social reputation in relation to sustainable development, and 35 (62.5%) assign personnel to be specifically in charge of environmental and social affairs. These methods help companies raise their awareness of environmental protection and public service, and to carry out practical actions to pursue these aims in business operations.

3.5.3 Job Creation

Recent years have witnessed the rise and development of the green industry, which has attracted a large number of talented and skilled workers, and contributed significantly to job creation. Our investigation shows that ideas of serving the public and creating lasting value for society are prevalent among the sample SMEs. They are proactive in creating a decent workplace for staff and, during their business expansion, are willing to bring economic and environmental benefits to poor areas and people with low incomes. The 56 sample companies provided 5,685 jobs in 2010 (5,128 full-time positions, 557 part-time positions), representing an average of 102 jobs per company.

Regarding the distribution of employment among the seven green industry sectors, energy saving has been the most productive, with the largest number of companies among the survey set (15) and the most jobs created in 2010 (1,291). Renewable energy ranks the second in terms of the number of companies (13), and third in terms of jobs created (1,085). Companies and jobs in these two sectors respectively account for as much as 50% and 42% of all employment among the sample companies. The flourishing of SMEs in these industry sectors indicates that when Beijing's policies in energy saving and emission reduction are being implemented by local government bodies, new business opportunities and new jobs naturally emerge.



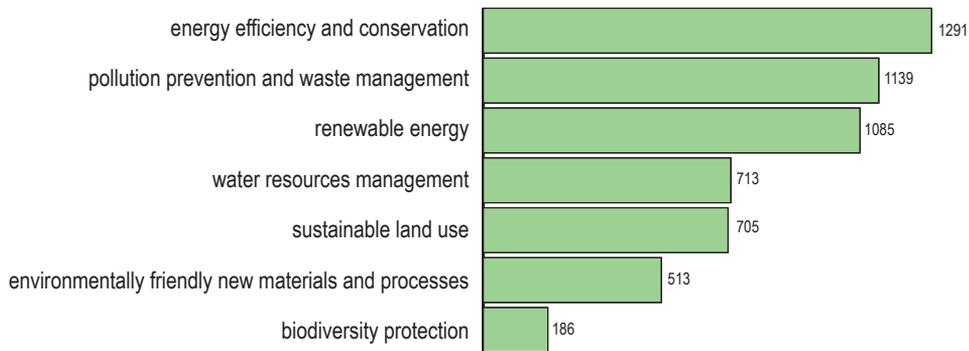


Figure 22. Total Number of Employees Sample Companies Created in the Seven Sectors of Green Industry

Energy saving companies have an average number of 86 employees, and renewable energy companies an average of 83. They employ the fewest numbers of employees from among the seven green industry sectors, with their core competency coming from highly-educated workers. On the contrary, companies from the biodiversity protection and sustainable land use sectors employ an average of 186 and 176 workers, respectively, as the biggest employers compared with others. As both these two sectors rely on close interaction with farmers, companies in these sectors need to base their main businesses in rural areas. Work in these sectors remains labor-intensive, with company functions in raw material supply, production and processing requiring a large rural labor force and seasonal workers. These two sectors also enjoy a considerable advantage in absorbing low-income work force, and therefore bear graver responsibilities in enhancing the quality and professional skills of their staff.

3.5.4 Decent Work

In evaluating their social impacts, we find that green SMEs not only help increase employment opportunities, but also contribute to the realization of a decent work environment. Our research investigated wages, career development, work safety, occupational health, and other aspects.



Wages

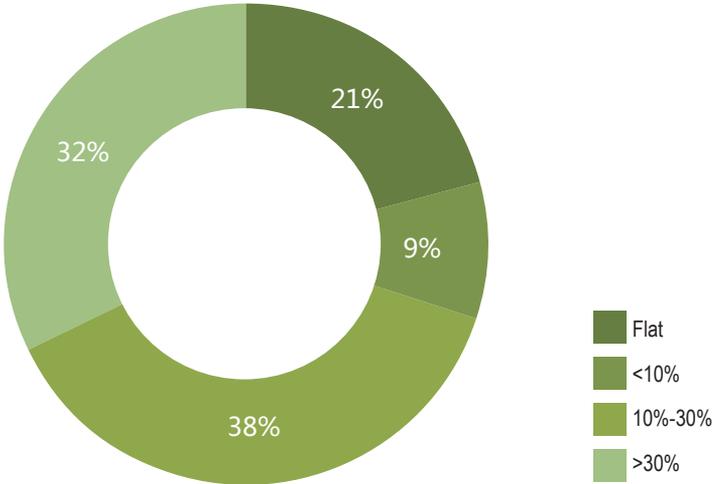


Figure 23. Percentage by Which Entry-Level Wages Exceed Local Minimum Wages in 2010

Our research results suggest that entry-level wages at green SMEs are generally higher than the local minimum wage, this being the case for 44 sample companies. Among these companies, the starting wages of 32% exceed the local minimum wage by more than 30%. See Figure 23 for more details.

Moreover, when career development is considered, 98% of the sample companies have held professional skills and development training for their staff at least once in 2010, and 55% held such training sessions more than four times. For occupational health and safety, the results show that 86% of green SMEs have established detailed labor safety goals and 93% had labor safety and occupational health training in 2010.



Key Findings

4

As the first research report targeting green SMEs in China, this report has outlined the SMEs' current level of development as well as their important contributions to China's economic reform. Furthermore, through processing and analyzing the data, the report has indicated areas for improvement in SMEs' internal operations and external supported needed for scaling up the impact of these SMEs. Moreover, this report provides a reference guide and a number of suggestions aimed at policy-makers, and for helping investors explore the developmental trends of green SMEs.

Key findings are as follows:

1. The development of green SMEs is greatly policy-driven

- **With the implementation of supportive policies, green SMEs generally enjoy rapid growth.** The formulation of supportive policies, laws, and regulations has greatly encouraged the development of a large number of green SMEs. During the period from 2008 to 2010, the average growth rates of total assets, revenue, and pre-tax profit of the enterprises reviewed were 204%, 315%, and 94%, respectively. We note that the sample size of this study is not considered large, and that the statistical data collected is skewed to reflect the early-stage growth phase of micro and small companies which tend to experience higher rates of growth in their early years. However, the high growth rates are nonetheless significant because they indicate that the green sector is expanding, and has a benign outlook in terms of potential for profit and revenue growth. This sends a positive message to companies, the government, and organizations and people interested in the green sectors.
- **Different policies implemented in various sectors mean that green SMEs enjoy different levels of development.** Different supportive policies, ways of promotion, and characteristics of each and every sector have stimulated different levels of development. Laws and regulations with an encouraging, guiding purpose exert a far more positive influence on the development of a sector than those with a restrictive purpose.
- **There exists a high barrier for applying for government funds and subsidies, which poses a bigger challenge for green SMEs.** As China has put more emphasis on energy conservation and environmental protection, both central and local governments have allocated specific funds and subsidies for green SMEs, and implemented corresponding tax relief policies to promote their development. However, some policies are simply difficult to implement due to flaws in design such as high eligibility thresholds. In reality, some of the government subsidy policies are still biased towards large enterprises over SMEs for such reasons.

2. There is a growing awareness of sustainable development among green SMEs and they face a lot of obstacles in their development



- **Financing difficulties are more serious for green small and micro businesses.** A vast majority of green small and micro enterprises have a hard time passing conventional bank loan appraisals, due to the incomplete and unclear industry value chain where they find themselves, and also because of their “asset-light” business models. Moreover, some banks do not have a clear understanding of energy efficiency and low-carbon technology, and have reservations about the financial management of SMEs, which increases these SMEs’ difficulty of getting their loan applications approved.
- **Green SMEs generally have embedded “green genes” for sustainable development.** A vast majority of green SMEs have an inherent concern for environmental issues. Quite a number of them are clearly conscious of sustainable development (namely, striving for a balance between economic gains, environmental protection, and social contribution), and have integrated this goal into each and every step of the product lifecycle, thus forming their own competitive edge and strategic development mode.
- **Information asymmetry is a critical development problem facing green SMEs.** On one hand, enterprises’ experience indicates that the distribution channels and timeliness of government information needs to be further enhanced. On the other hand, they lack the adequate channels of communications to educate their customers about how to take advantage of the relevant policies.

3. Green SMEs are making increasingly important environmental and social contributions

- **Green SMEs have great potential for contributing to energy efficiency, emissions reduction, and conservation of natural resources.** In 2010, the environmental outcomes achieved by the companies surveyed were as follows:
 - Energy saved was approximately 680 thousand tons of coal equivalent, and emissions reduced were 1.77 million tons of CO₂ equivalent, amounting to energy savings and CO₂ reduction from shutting down for one year of a medium-sized power plant with 400 thousand KWH of generating capacity;
 - 1.14 million tons of solid waste were disposed;
 - 80.50 million tons of sewage were disposed;
 - 20.8 thousand cubic meters of wood were saved;
 - Approximately 7.2 million mu of land were sustainably used;
 - The biodiversity of 7 million mu of forest was protected.

It is worth noting that, among the sample companies, the environmental intents via the use of their technology and their products are very much diversified. This diversification reflects that most current green technologies and products are able to solve multiple environmental problems as well as satisfy various environmental needs. Such diversification, and SMEs’ willingness to maximize the environmental contribution of their business models, may become a trend in the future development of green technologies, and will be prominent in differentiating the relative competitiveness of green SMEs.



- **There is a high recognition of the importance of green operations among green SMEs.** Over 80 percent of the sample companies recognized the importance of green operations. They actively search for administrative methods and specific green operational measures that seek to continuously reduce operational carbon emissions, and improve water efficiency and use of other non-renewable resources.
- **Green SMEs have played a significant role in creating employment opportunities for technology-savvy people as well as low-income groups.** The sample companies created 5,685 job opportunities in 2010, with an average of 102 per company. The rise and development of the green industry has attracted a large numbers of high-educated and technology-savvy workers, and will continue to play a significant role in creating employment opportunities for these people. While the energy efficiency and renewable energy sectors attract talent from the technology field, enterprises focusing on pollution prevention, waste management and sustainable land use tend to absorb large numbers of people from low-income groups as they operate in labor-intensive industry sectors.
- **Others.** Two enterprises whose main businesses are not directly related to the seven environmental intents are still included as role model enterprises. This is because they make significant social impacts by either providing financial services for small and micro businesses or improving the living standards of women in poor regions. Growth of these types of impact-oriented SMEs is an integral part of the social and economic development of China. Such companies not only play a role in promoting fair distribution of wealth, but also illustrate conscientious efforts to lay a solid foundation for China's community-oriented economic development.



Appendix.
List of 15 Green SME
Impact Role Models
in China

5

In parallel to the Impact Report on Green SMEs in China, the First Green SMEs Impact Role Model Initiative was launched to select model green SMEs nationwide in terms of the triple-bottom line principle. 15 green SMEs outshone the others and won the title of "Impact Role Models". The following is a brief description of the 15 companies on the green impacts they created.

Renewable Energy

Shanghai Suntrix Co., Ltd.

Year of establishment: 2009

Website: <http://www.suntrix.cn>

Green impact

The company is committed to providing cleaner, more advanced and more efficient green energy solutions for customers through HCPV technology. Since commercialization, their products have had an annual electric output of more than 3 million KWH cumulatively, or 1,260 tons of coal equivalent.

Beijing Shengchang Bioenergy S&T Co., Ltd.

Year of establishment: 2006

Website: <http://www.bj-sbst.com.cn>

Green impact

In the past three years, the company has sold in total more than 100,000 tons of biomass fuel, replacing about 60,000 tons of coal. It has provided biomass thermoelectricity for more than 5 million square meters and has reused nearly 150,000 tons of agricultural and forestry residue. This has reduced emissions of 150,000 tons of carbon dioxide, 1,340 tons of sulfur dioxide, and a large amount of nitrogen oxide and smog.

Energy Efficiency

Beijing Ecoso Co., Ltd.

Year of establishment: 2009

Website: <http://www.ecoso.com.cn>

Green impact

The company provides energy-saving solutions of compressed air systems for industrial manufacturing enterprises. In 2010, it helped enterprises reduce electricity usage by 20 million KWH, equivalent to nearly 20,000 tons of carbon dioxide or 7,200 tons of coal equivalent.

Beijing Huakong Automation System Co., Ltd.

Year of establishment: 2006

Website: <http://www.hkasys.com>

Green impact

The company provides overall energy management solutions for enterprises. In 2010, it saved about 9.8 million KWH electricity, 45,000 tons of coal, and 8,000 cubic meters of gas



for its customers, which is equivalent in total to about 147,800 tons of carbon dioxide or 300,000 tons of water.

Beijing Huatong Xingyuan Energy Technology Co., Ltd.

Year of establishment: 2006

Website: <http://www.htenergy.cn>

Green impact

The company provides energy-saving services for heating for primarily residential boiler houses. By the end of 2011, it had retrofitted over a hundred large heating systems in Beijing and elsewhere. Its services in Beijing cover more than 15 million square kilometers. Since establishment, it has saved 10 million KWH electricity and 30 million cubic meters of gas in total, equivalent to a saving of RMB 66.5 million.

Beijing Sinen Entech Co., Ltd.

Year of establishment: 2004

Website: <http://www.znhk.com>

Green impact

The company's technology of high temperature steam condensation water processing has huge potential for application in steam power systems in several industries, such as petroleum, petrochemistry, electricity, steel, metallurgy, coal and pharmacy. In 2010, the company helped its customers save 200,000 tons of coal, 520,000 tons of carbon dioxide, and 20 million tons of water.

Jiangsu MacMic Science & Technology Co., Ltd.

Year of establishment: 2006

Website: <http://www.macmicst.com>

Green impact

The company provides green and efficient energy-saving electronic products and power electronic system solutions. In downtown Changzhou alone, for example, after the installation of dynamic energy-saving lighting power, about 16 million KWH electricity are saved annually, equivalent to 5,520 tons of coal and 13,800 tons of carbon dioxide equivalent.

Water Resources Management

CSD (Beijing) Environmental Protection Development Co., Ltd.

Year of establishment: 2008

Website: <http://www.zchb.net>

Green impact

Through its wastewater treatment operation services, the company has treated 137.97 million tons of wastewater in 2010, saving 2.759 million KWH of electricity. It treated 40,000 tons of sludge for municipal wastewater treatment plants.

Beijing Landwasher Science & Technology Development Co., Ltd.

Year of establishment: 1999

Website: <http://www.landwasher.com>

Green impact



The Landwasher water-free flushing toilet has saved large amounts of water resources. If each of the 10,000 sets of Landwasher water-free flushing toilets operating in the Chinese market are used an average of 100 times every day, 1.64 million tons of water would be saved annually.

Pollution Prevention and Waste Management

Nanjing Ecostar Reprographic Equipment Co., Ltd.

Year of establishment: 1992

Website: <http://www.ecostar.com.cn>

Green impact

The company recycles and remanufactures used copiers to improve the performance of the original machines, and thus increases resource utilization rate. Compared with new copiers, one set of remanufactured copiers can save more than 90% in raw materials and reduce energy consumption by more than 95%. In 2010, the company reduced discharge of 6,000 tons of solid waste, and electronic waste containing more than 1,000 toxic metals. Its remanufacturing of quick printing equipment has reduced wastewater discharge by 81%, solid waste by 62%, and carbon dioxide emissions by 72%. The business of renting recycling machines can prolong the service life of quick printing equipment by an average of 5 years.

Huaxin Environmental Protection Development Co., Ltd.

Year of establishment: 2006

Website: <http://www.hxepd.com>

Green impact

The company treats 35,000 tons of waste electric and electronic products annually, including about 930,000 sets of used cathode ray tube (CRT) screens and monitors, 110,000 sets of used refrigerators, 125,000 sets of used air-conditioners and 135,000 sets of used washing machines – being a total of 1.3 million items of waste electric and electronic products. It has recycled all kinds of waste materials, saved relevant mineral resources and cut down on petrochemical products, including 115,000 tons of iron, nearly 10,000 tons of aluminium, 19,000 tons of copper, 77,000 tons of plastic and 106,000 tons of glass. Dangerous waste and other poisonous materials (including heavy metals, chlorofluorocarbons, etc) are thereby prevented from entering the natural environment, and ozone-depleting substances and greenhouse gases are thus reduced.

Hangzhou Fulun Ecology Technology Co., Ltd.

Year of establishment: 1994

Website: <http://www.fulunpaper.com>

Green impact

The company has recycled nearly 20,000 tons of waste milk cartons, produced 15,000 tons of recycled paper, 6,000 tons of recycled plastic particles, and 1,500 tons of recycled aluminum powder. The amount of wood saved is equivalent to planting 104,000 trees aged 10 years. Moreover, more than 9,000 tons of petroleum and nearly 20,000 tons of aluminum ore are saved.



Environmentally Friendly New Materials and Processes

Henan ZhongTuo Petroleum Engineering Technology Co., Ltd.

Year of establishment: 1998

Website: <http://www.ztxf.com.cn>

Green impact

The company's pipeline cleaning, pressure testing and drying technology can reduce water usage and energy consumption during operations. In 2010 alone, the company's services saved 460 tons of freshwater and 213 tons of diesel.

Sustainable Land Use

Beijing Organic Farm Development Co., Ltd.

Year of establishment: 2000

Website: <http://www.organicfarm.com.cn>

Green impact

Since its establishment in 2000, the company has protected and improved more than 35,000 mu of farmland. Including partner farms, the emission of approximately 20,000 tons of chemical fertilizer and about 60,000 tons of chemical pesticide are avoided every year. This in turn reduces environmental pollution and improves food safety.

Nanjing Ruikang Bee Co., Ltd.

Year of establishment: 1993

Website: <http://www.ruikang.com>

Green impact

Using the "company+beekeepers" production and operation model, the company has nearly 10,000 core organic bee colonies. The colonies of its beekeeping bases cover 7 million mu and 130 beekeeping families have signed contracts with the company.



MEDIA SUPPORT

A faint, light-colored outline map of the Asian continent and surrounding regions, including parts of Australia and New Zealand, is visible in the background of the page.

ABOUT INSTITUTE FOR ENVIRONMENT AND DEVELOPMENT (IED)

IED is an independent research institute that offers reliable intellectual support to stakeholders in the field of sustainable development and seeks feasible solutions to environmental and development issues.

Add: Room 310, Wanbo Office Building, No. 53, Ganyu Hutong, Dongcheng District, Beijing, China Postal Code:100006

Tel: +86-10-65123767 65282762

Email:info@ied.cn

Fax: 86-10-65123787