

Corporate Strategy and Competitive Advantage in China's War on Pollution

Pursuing the New Chinese Consumer

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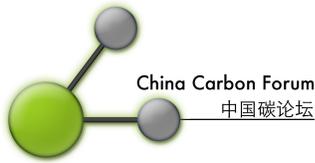
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The China Carbon Forum is delighted to facilitate and publish *Corporate Strategy and Competitive Advantage in China's War on Pollution: Pursuing the New Chinese Consumer*, authored by our colleagues at Renmin University of China's School of Environment & Natural Resources, Professors Craig Hart and Ma Zhong, and post-graduate researchers Ying Jiahui and Zhu Jiayan, with funding from the Norwegian Embassy, Beijing.

In China's policy environment, industry is now seeking answers to the "War on Pollution" and the Anti-Corruption Campaigns, both of which challenge industry to improve environmental and business practices. At the same time, China is undergoing reforms to make its businesses more competitive. How can Chinese companies build a corporate strategy that would turn these challenges into business opportunities that enhance competitiveness as well as environmental and social quality? Many Chinese companies already understand these challenges, but how do they make the most of the opportunities?

Corporate Strategy and Competitive Advantage in China's War on Pollution: Pursuing the New Chinese Consumer tackles these and other questions critical to the success of firms operating in China. Intended for a business audience, the report focuses on corporate strategy to enhance firm competitiveness, through promoting sustainable practices that enhance profits and lower the risks faced by businesses.

Our authors focus on the opportunities and challenges firms that produce environmentally superior goods and services must overcome to attract and influence the "new Chinese consumer", reminding us that this consumer as we know it today has only existed for little more than a decade. In China's rapidly evolving business environment, the Chinese consumer is increasingly realizing its power to influence the business and regulatory environment, and to impact the fortunes of enterprises in the process.

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Dr. Anton Smitsendonk

Chair, China Carbon Forum
Beijing, China

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Executive Summary

China's government, its citizens and its industry are increasingly focusing their attention on the environmental challenges the country faces in its continuing development. China is introducing new, tougher environmental laws. At the same time, China is marketizing its economy, introducing reforms intended to make industry more competitive and to harness market forces to promote more sustainable environmental outcomes. In this highly dynamic policy setting, China's business environment is evolving and industry is forced to respond to pressure from both government and consumers, at home and abroad.

This report aims to assist enterprises doing business in China in developing their strategy for meeting the challenges posed by China's environmental conditions and government mandates to embrace sustainable business practices. While our focus is the business community, this report should also be useful to government, civil society organizations, and academic institutions that seek to support or influence them.

The report examines the challenges firms operating in China face in meeting the demands posed by domestic government policies requiring greater sustainability in their operations, and the requirements of foreign markets and the standards these markets impose on goods and services supplied by Chinese firms. It considers the evolution of Chinese domestic consumers and how their preferences will impact firms serving the Chinese market. In approaching corporate strategy to respond to the changing policy and market environment, we explore environmental, social and governance criteria (ESG) as a tool for Chinese firms to improve their "game" in preparation for more stringent sustainability requirements imposed by government, their supply chains, and to position themselves successfully vis-a-vis increasingly sophisticated consumers. Our objective is to help corporate leaders "make the business case" for sustainable practices that enhance profits and lower the risk of business in a highly dynamic business environment.

The business case for enhancing environmental, social and governance practices hinges on producing higher quality products, lowering operating risks and ultimately achieving higher profitability. Chinese companies are only at the beginning stages of recognizing and acting upon larger societal concerns that must be addressed through higher environmental and product quality standards. We believe Chinese firms that strategically position themselves based on higher quality and standards will enjoy competitive and regulatory advantages of being relatively early movers in a market shift that is inevitable due to government regulation both at home and abroad, as well as the actions of their competitors. The continued evolution of China's economy and its leading companies in many

respects depend on these companies following the path towards higher quality and environmental standards.

The report is organized into five chapters. The first chapter argues that government, supply chain and consumer pressures all point to the need for Chinese firms to improve their performance in terms of environmental stewardship, and that this can be profitable for them. While there are significant challenges to improving environmental performance, among them the challenge posed by income inequality among Chinese consumers, significant physical and institutional drivers for change are emerging. Chinese industry will be forced to adapt to the changing business environment and will require new corporate strategies to do so.

The second chapter discusses Chinese government policies that are driving reforms and how these will impact Chinese business. We focus specifically on the new market-based policies, which have emerged as major elements of China's efforts to address environmental challenges.

Chapters three and four look at two key aspects of firm strategy for competitive advantage - operations and consumers. Chapter three presents how corporate strategy can build competitive advantage through embracing ESG and streamlining operations along the entire supply chain to enhance productivity and reduce environmental impact.

Chapter four explores China-specific research on consumer preferences for the sustainability impact of consumer products and general attitudes toward ESG, and how these preferences can form the basis of corporate strategy to market products to consumers and build brand awareness around environmental performance.

Chapter five concludes by identifying several trends and themes that we believe enterprises should observe in adapting their corporate strategy in light of the changing business environment in China, which we summarize here below.

3 *Corporate Strategy in China's War on Pollution*

Key Trends and Themes

We identify the following trends and themes that will shape how China's leading enterprises raise their environmental standards in order to better serve China and its citizens.

China's War on Pollution is Intensifying Environmental Enforcement

Under the aegis of *China's War on Pollution*, government leadership is now responding to the environmental crisis as a national priority and there is mounting evidence that enterprises and officials conspiring to violate pollution laws will be prosecuted under environmental laws and criminal laws. Together with the issuance of more rigorous industry-specific standards for pollution emissions, sanctions and other measures in the new Environmental Law all signal a new era in environmental enforcement.

China's Anti-Corruption Campaign Bolsters the War on Pollution

Corruption and pollution are interrelated in China. China's Anti-Corruption Campaign will strengthen its broader efforts to redress environmental violations and to promote a cleaner environment under China's broad War on Pollution by holding liable the individuals responsible for violation of environmental laws where graft or corruption is involved.

Leading Companies Care about Reputation

China's leading companies - those that are responding to the government's call to become global leading brands - care about their reputation. Our own survey of Chinese and foreign corporations operating in China confirmed that companies that have fostered a public image in China's domestic marketplace are seeking to build and protect their brand.

A Change in Thinking Among Consumers is Underway

The new generation of Chinese consumers are urban, "wired", typically well educated, enjoy rising levels of disposable income, and, as a result of living in increasingly crowded and polluted cities, concerned about environmental issues that have a direct impact on their wellbeing. These consumers are important economically and are in the process of discovering that when empowered with information, they can play a vital role in solving environmental problems, sometimes with dramatic consequences for the companies involved.

A Change in Thinking Among Investors will Follow

Socially responsible investment is still at an initial stage in China, however there is evidence that Chinese public companies are increasingly paying attention to this trend. We believe that increasing participation of Chinese companies in international capital markets and concern about environmental issues among Chinese consumers will intensify the focus of investors on these same themes.

ESG and Green Consumption Gaining Recognition in China

China-specific studies of demographic factors such as age, education level, disposable income, marital status and children show that certain characteristics influence consumer attitudes towards ESG and environmental products. Companies that produce environmentally superior products and services are positioned to shape the views and behavior of consumers.

Evolving Role for NGOs and the Media in China

While our own survey suggested that non-government organizations (NGOs) are less influential than the government in the eyes of Chinese consumers, it is equally clear that NGOs are gaining in stature and increasingly important. NGOs already play an important role in environmental protection and advocating green consumption.

We see NGOs and the media playing an increasingly important role in environmental supervision and green consumption advocacy in China. NGOs and media that disseminate information about companies, supply chains and products, and possess credibility in the public's view can play an especially important role in influencing consumer preferences related to green products.

Competition for Foreign Markets as Drivers of Domestic Policies

China's leading companies are vying not only for domestic market share, but also for leadership in the international marketplace. Regulatory standards in major markets such as the European Union and the US typically drive standards in other markets and across industry supply chains. Chinese firms that can meet the most rigorous international standards can exploit this as a competitive advantage especially if the superiority of the product is perceptible to the consumer.

Overcoming Income Disparities Among Consumers

Corporate strategy based on higher quality products that are more sustainable for the environment and healthier for the consumer will require firms to persuade consumers to accept the associated costs for those products, thereby enabling corporations to scale up green production. Wealthy, urban consumers represent a starting point for corporate strategy, however for firms to reach full economies of scale they will need to market their products to a broader segment of Chinese consumers.

Note on the Term "ESG"

We use the term "environmental, social and governance" or "ESG" throughout this report. ESG is commonly used by investors to evaluate corporate behavior and to determine the future financial performance of companies (Financial Times, 2015). When describing specific third party research, we will at times refer to the related concept of corporate social responsibility (CSR) where appropriate. CSR is a movement aimed at encouraging companies to be more aware of the impact of their business on the rest of society, including their own stakeholders and the environment (Financial Times, 2015).

1. Business Case for Change: China's Changing Business Environment

China's development stands at a crossroads. China has emerged as the world's second largest economy and, at current growth rates, will become the world's largest economy well before mid-century. Chinese companies have established global supply chains within almost every industry. Chinese companies are listing their shares on domestic and foreign stock exchanges and some are already household names internationally.

Yet, to achieve the Chinese government's mandate to become "leading global companies" and to remain competitive both at home and abroad, Chinese companies must take the next step in their evolution.

This report examines how Chinese corporate strategy must inevitably evolve to meet future challenges. Increasing stringency of domestic and international regulation, greater investor scrutiny, supply chains exerting influence on Chinese manufacturers, and the impact of consumer preferences are central to these challenges. How Chinese firms respond to these challenges are integral to the successful evolution of China's economy and society.

This first chapter outlines the changing business environment that Chinese companies face at home and abroad. Our overview of the business environment is divided into three broad parts. First, we discuss the challenge presented of a rising consumer class in China - the challenges of catering to both rich and poor - and the implications that intensifying inequality poses for companies operating in China. Inequality in society poses a potential barrier to advancing environmental objectives, potentially holding back the forces driving change towards better environmental standards in China. The second part of this chapter focuses on environmental drivers to change - pollution, energy security, climate change and other issues such as food safety. Environmental drivers are significant both due to the magnitude of the environmental challenges facing China and because they are closely related to broader social and governance challenges that Chinese companies face in the globalized economy. The final section concentrates on the institutional factors driving change - domestic and foreign regulation, self-regulatory organizations such as exchanges, and market forces such as ESG and the sustainable investment movement.

1.1 Challenges of Prosperity and Poverty

China's growth has given rise to a new phenomenon - the Chinese consumer - and with it the dual challenges of dealing with prosperity and poverty.

China's Gini co-efficient, a measure of relative equality within society and an indicator a social stability, stood at 0.474 in 2012 according to the Chinese Academy of Sciences, down from 0.491 in 2008, but much higher than that of the OECD countries which range typically from 0.25 to .040 (The Economist, 2013).¹

China's current levels of inequality are widely recognized as cause for concern (See, e.g., Global Times, 2012). From our viewpoint, the divergence between wealthy and poor harbors profound implications for the way companies approach China's emerging consumer market, how these companies meet their broader corporate social responsibilities to society, and ultimately the impacts of growing consumerism on China's environment.

Rise of China's Affluent Classes and Growing Consumption

China's rapidly increasing consumer spending is driven by social, economic and demographic trends, which are fueled by rising levels of disposable income among growing numbers of upper- and middle-class citizens. Rising incomes have enabled millions to enjoy an affluent lifestyle characterized by, among other things, demand for modern conveniences, made possible only recently. The Chinese consumer, as we know it today, came into existence within the past decade. The economic reforms started in the late 1970s, streamlining of bureaucratic controls starting in the late 1990s, transformation of the labor market from factory to knowledge-based jobs in the 2000s, combined with the policy dating back to 1949 of encouraging women to enter the workforce resulting in two-earner families, have all supported rising household incomes. The private economy is more competitive, and with the emergence of a new class of professionals and semi-professionals, there is greater demand for modern conveniences that are now deemed essential to the daily lives of Chinese consumers.

With a population of 1.36 billion people, rising income levels and a rapidly growing middle and upper-income class, China has transformed into one of the fastest growing markets for consumer spending. In the past decade, China's

¹ A Gini co-efficient of 0 indicates perfect equality and a coefficient of 1.0 indicates a society in which a single person possesses all wealth.

annual gross income per capita rose to 31,727 RMB (roughly US \$ 5,125) in 2013, an increase of over three times from 2003 levels in real terms (National Bureau of Statistics, 2014). McKinsey & Company estimated that Chinese consumer spending grew 25 percent year over year from 2007 to 2009, and projects that with incomes continuing to rise, a majority of Chinese consumers will become "mainstream" earners of US \$16,000 to US \$34,000 per year and another 6 percent of the population becoming "affluent" with incomes in excess of US \$34,000 per year by 2020 (Newsweek, 2010; McKinsey & Company, 2012). The explosive growth of Chinese consumerism reflects both prosperity and decades of pent-up demand. Surveys show that the majority of Chinese consumers expect their incomes to increase and that, while they still remain tremendous savers, they are spending an increasing portion of their disposable income. Chinese consumers have good reason to be optimistic. The Chinese economy tripled in size in real terms from 2000 to 2010 (National Bureau of Statistics, 2014). During the present decade Chinese consumer spending is expected to double to US \$4.8 trillion annually, making China the second largest consumer market in the world behind the United States (McKinsey & Company, 2011), and urban disposable income is similarly expected to double along with the economy (McKinsey & Company, 2012).

These rising upper and middle classes, however, still represent a minority of the population. China's uneven development has resulted in an ever-widening income distribution. While China has lifted over 500 million people out of extreme poverty since the 1980s (World Bank, 2014b), many remain trapped in low-income poverty while China's middle and upper classes continue to grow in size and wealth. As of 2011, the most up-to-date statistics available, 84 million Chinese still earn less than US \$1.25 per day, placing China second only to India in terms of the largest number of poor in the world (World Bank, 2014c). Over 804 million continue to earn less than US \$5 per day in China. In 2010, the top 10 percent of the population earned a third of national income, and the top 20 percent earned over 47 percent, while the bottom 20 percent earned only 4.67 percent of national income. Among the bottom 40 percent of income earners, mean income per capita stood at US \$1.9 per day (World Bank, 2014c).

This inequality is most strongly felt in the difference between wealthy urban and poor rural areas. Private sector jobs in large cities for candidates with advanced education command much higher salaries than jobs in smaller cities involving less education. In 2013, per capita disposable income averaged 26,955 RMB in urban areas, compared to 8,896 RMB in rural areas. Per capita disposable income for Shanghai was 8.2 times that of Gansu province (National Bureau of Statistics, 2014). Minimum wages, when complied with, are as low as 680 RMB per month in the poorest provinces for certain jobs, just over US \$100 per month (German Chamber of Commerce in China, 2014).

9 Corporate Strategy in China's War on Pollution

Even those who have succeeded in entering the “middle class” remain in a precarious position economically (See, e.g., Li, 2009 and Luhby, 2012 defining the “middle class”). Many struggle with increasing costs of food, housing, clothing, transport, health care, and education. Averaging 5.72 percent per annum from 1986 to 2014, China's inflation peaked as high as almost 9 percent over the past decade, and at the end of the 1980s and again in the mid-1990s reached almost 29 percent (Trading Economics, 2014). Thus, for many relatively affluent Chinese, inflation threatens to erode their earning potential.

Even among China's rising young professionals, a new social class of elites who arguably have the greatest future opportunities, those who are now entering the workforce face the challenges of purchasing a home in major cities such as Beijing, where the price of real estate is now determined by the market. Conditions are even more challenging for urban residents that have migrated from the countryside with savings from the sale of farmland but without regular employment, higher education or an all-important *hukou* (residence permit) that entitles the person access to publicly subsidized basic services such as healthcare and schooling for children. Urban residents who lack access to better jobs and the opportunities afforded by China's growth face marginalization in China's rapidly changing economy.

However, the most disadvantaged communities remain those who supply cheap labor and who suffer the debilitating results of lax environmental regulation that has been one of the foundations of China's industrial growth. The upward trajectory in Chinese consumer spending, together with export-oriented production, have severely stressed China's natural environment, particularly in the poorest regions of the country. While air pollution is commonly associated with large affluent cities like Beijing, air, water and soil pollution in rural communities that host industry threatens the ability of China's farmers, who still account for roughly 46 percent of the population, to live off the land (National Bureau of Statistics, 2014). In 2013, 31.4 percent of river water failed to meet level III of the Surface Water Quality Standard, indicating whether water is safe for direct contact with humans and aquaculture (Ministry of Water Resources, 2013; see Ministry of Environmental Protection, 2002 for additional information on the standard). At the same time, more than 16.1 percent of China's soil exceeded government minimum standards for pollution levels (Ministry of Land and Resource and Ministry of Environmental Protection, 2014). In extreme cases, pollution can be so severe that the health of entire communities is threatened, such as in China's infamous “cancer villages”, towns that show markedly higher morbidity rates or mortality rates due to cancer (See, e.g., Gong and Zhang, 2013).

Overcoming the Low-Cost High Environmental Impact Product Cycle

While high-income consumers are clearly willing to pay more for higher quality goods and services (McKinsey & Company, 2011), the challenge will be to capture the portion of the market that represents huge buying power in the aggregate but is composed of lower-income consumers. Companies have traditionally marketed products to consumers that are segmented by extreme differences in income levels by adopting an "hourglass" approach to product differentiation - superior quality for high income consumers and inferior quality for others – often with attendant negative impacts for the environment.

Embracing a corporate strategy that builds competitive advantage through higher-quality, lower environmental impact products requires overcoming the low-cost high environmental impact product cycle that characterizes much of China's domestic product markets and production. Breaking this cycle will require a combination of actions by enterprises to streamline their production and mainstreaming green products to enhance their price competitiveness, which we discuss in detail in this paper. We believe that a key element of overcoming this cycle will be driving higher standards through regulation. Companies that offer superior products should exploit this advantage by promoting more stringent regulation that will enhance their market position.

We recognize that the cycle of the past is tied to a great degree to historically low levels of disposable income. However, as China urbanizes and income levels rise, a new class of Chinese consumers has emerged that has the potential to make choices based on quality and environmental impact. We believe that the future of China's business practices and green consumerism is tied directly to these new consumers.

Research of the Chinese market strongly suggests that Chinese consumers will respond to green consumer and environmental appeals as described in Chapter 4 of this report. Our own survey of 201 Chinese consumers conducted for this report in January and February 2015 confirms that roughly three quarters of consumers are willing to pay more for green products. Another survey of 3,000 Chinese consumers in the cities of Beijing, Shanghai, Wuhan and Shenzhen carried out from 2009 to 2013 by the China Chain Store & Franchise Association and Renmin University of China found that that almost 84 percent of consumers surveyed were willing to pay some premium for green products, citing environmental protection concerns. However, the research also shows that almost 54 percent of consumers were motivated by expectations of cost savings, suggesting that notwithstanding consumer willingness to pay a premium for a product or service, retailers must remain conscious of the need to deliver some tangible economic benefit over the product's life (Li et al., 2014).

1.2 Environmental Drivers of Change

China's phenomenal economic growth since it began its reform and opening-up policy in 1978 has produced an average annual growth rate of approximately 10 percent over almost four decades, far in excess of the world annual average growth rate.

Yet, this same growth is driving China's consumption of energy and water, and emission of greenhouse gases and other pollutants. Growth is testing the outer limits of energy and resource security. And rising greenhouse gas emissions and other pollution are drawing domestic and international attention to China's environmental problems that have reached crisis proportions.

China's Energy Security and Greenhouse Gas Emissions Challenges

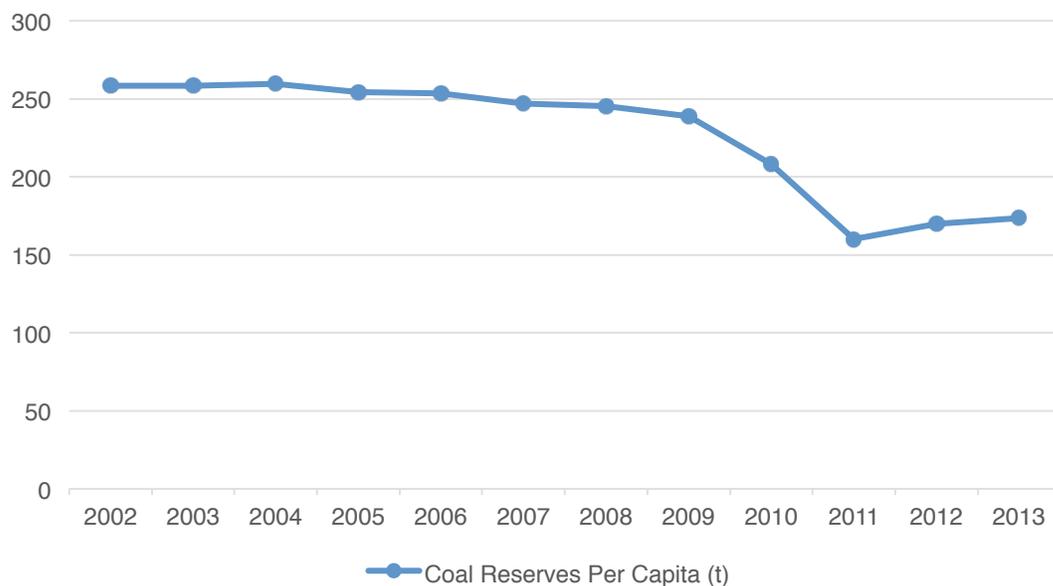
Much of China's dramatic growth benefits the rest of the world and yet imposes a heavy resource and environmental cost on China. China produces only 12.2 percent of the world's GDP (World Bank, 2014a), though its industry consumes a much larger percentage of global energy resources in order to supply commodities to the world. As of 2013, China was the world's largest energy consumer, accounting for almost 22.4 percent of global primary energy consumption, 50.3 percent of global coal consumption and 12.1 percent of global oil consumption, over 60 percent of which is imported from other countries (BP, 2014). In 2013, China deployed its resources to supply 58 percent of global cement production, 48 percent of global steel production, and 45 percent of global aluminum production (U.S. Geological Survey, 2014). Among China's top three energy-consuming sectors, industry accounts for almost 70 percent of China's final energy consumption, while the residential and transportation sectors only account for 11 and 8.7 percent, respectively (National Bureau of Statistics, 2014).

China's energy consumption and CO₂ emissions are rising rapidly. Over the last few years China surpassed the United States as the world's largest emitter of CO₂ and its emissions continue to rise rapidly. As of 2013, China accounted for almost 28 percent of global greenhouse gas emissions. Although historically its emissions are much lower than emissions from developed countries on a per capita basis, based on data compiled by the Global Carbon Project, China's per capita greenhouse gas emissions exceeded those of the EU for the first time in 2013 at 7.2 tons of CO₂ per person compared to the EU's 6.8 tons per person (Global Carbon Project's Global Carbon Atlas, 2014).

Energy, Water and Food Nexus

Scarcity of energy and water resources, and their nexus to food production, are emerging as powerful drivers that will influence government policy, corporate operations and consumer perceptions and preferences in the near future. Natural resource availability could even constrain China's development, presenting limits to its continuing prosperity and, for consumers, impose higher costs for basic foodstuffs. As illustrated in the chart below, the availability of common energy resources such as coal reveals that China already faces intensifying scarcity on a per capita basis.

China's Per Capita Coal Reserves (2002-2013)



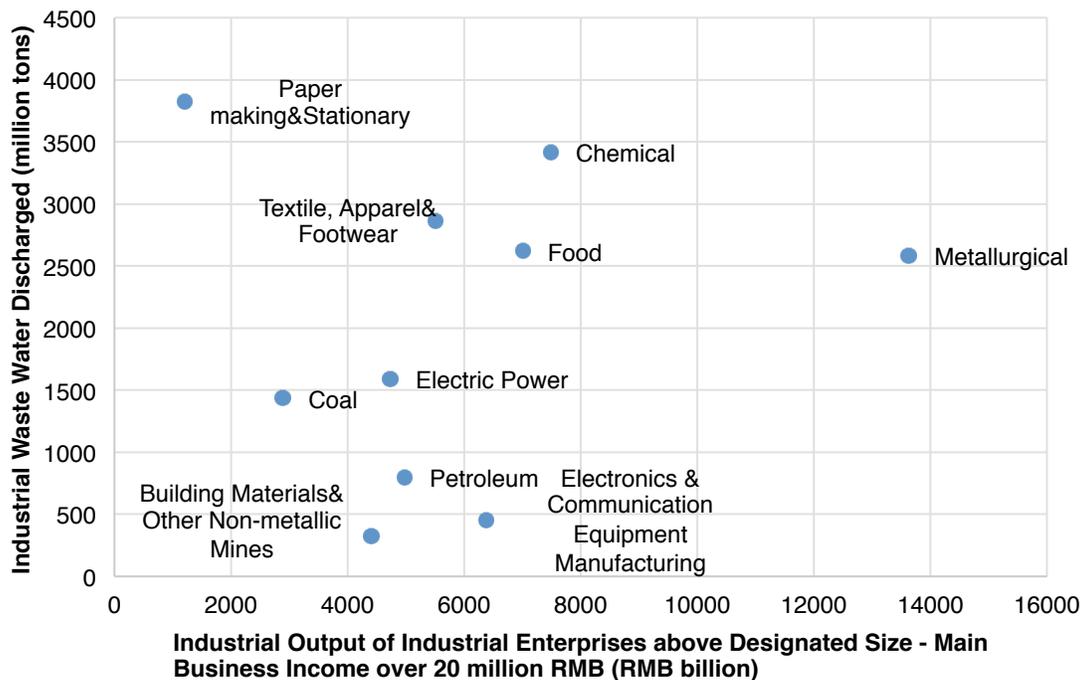
Source: National Bureau of Statistics of China.

Water scarcity is already a reality in Northern China and is expected to spread to most parts of the country over this century due to climate change. One study estimates that by 2030 China faces a potential gap of over 50 per cent of supply relative to demand (2030 Water Resources Group, 2009). The Chinese government's policy of food self-sufficiency coupled with rising food consumption and changing diets deriving a greater portion of calories from meats and processed foods will increase demands on water supplies. About 80 percent of China's agricultural output is supported by irrigation, making Chinese food production heavily dependent on scarce groundwater resources. Water scarcity will increasingly impact China's industry and the general population. By 2030, agriculture will remain China's largest water user at between 50 to 63 percent of demand, depending on estimates (2030 Water Resources Group, 2009; People's

Daily, 2011). However, the greatest growth in water demand is expected from the industrial and urban sectors, with China alone accounting for as much as 40 percent of the increase in global water demand among developing countries in the near future (2030 Water Resources Group, 2009).

Chinese agriculture and industry can greatly improve its water resource conservation efforts through implementing efficiency measures. In the agricultural sector, water conservation methods such as drip irrigation and evaporation prevention combined with reduced use of chemicals and more sustainable farming techniques can not only reduce costs but can also enable companies to offer a safer, healthier product in an exploding market niche serving those concerned with food safety. In the industrial sector, China's export-driven industries are severely water-inefficient, wasting and polluting water. For many products, China is essentially exporting its precious water resources embedded in its products. Introduction of water efficiency measures and tighter water pollution discharge standards in such industries as textiles, apparel, footwear and papermaking, which together account for 34 percent of China's industrial water pollution, can not only reduce the risks posed to industry by increasingly severe water supplies, but can also help increase the resource efficiency of industry, resulting in enhanced profitability (Tan, 2014).

2011 Top 10 Most Polluting Industrial Sectors: Industrial Wastewater Discharge vs Industrial Output



Source: Tan, 2014; Ministry of Environmental Protection and National Bureau of Statistics, 2012; National Bureau of Statistics, 2012.

Scarcity is not the only problem. Water pollution in China is pervasive. China's Ministry of Environmental Protection reported in its 2014 Environmental Status Report that over 45 percent of the 202 large and middle-level cities surveyed are supplied with "relatively seriously contaminated water" (较差级的监测), and over 16 percent with "seriously contaminated water" (极差级的监测). Overall, 61.5 percent of Chinese cities' underground water is polluted. Rivers and lakes serving cities are also heavily polluted (Ministry of Environmental Protection, 2015). The problem is not contained to cities. China's State Council estimates that 298 million people in rural areas also lack access to up-to-standard drinking water (State Council of China, 2012). Thus, even where water resources are abundant, they are often unusable or dangerous.

The Chinese government is taking active measures that will be more fully implemented starting in 2015 to combat all forms of pollution. Under the revised Environmental Law, polluters face hefty fines, shutdown of factories, and criminal penalties for polluting a body of water (See Articles 60, 68 and 69, Environmental Protection Law of China, 2014). Water pollution in particular can expose polluters to liability because even relatively modest volumes of pollution can seriously damage water ecosystems. Together with the issuance of industry-specific standards for water and other pollution emissions and the more rigorous water pollution caps outlined in China's 12th Five Year Plan (2011-2015), the new sanctions in the Environmental Law signal a new era in environmental enforcement.

Climate change will further intensify stresses on water and food supplies. Changes in precipitation patterns and warmer temperatures could cause water shortages and even drought in many parts of the globe (Dai, 2012). Sea-level rise could cause salt-water intrusion of fresh water aquifers. For China, melting of Himalayan glaciers is accelerating and could cause water shortages for major population centers in China, Southeast Asia and the Indian sub-continent. In addition to the effects of water scarcity on agriculture, there is mounting evidence that climate change could threaten food security as temperatures increase beyond an optimal band for agricultural production. The emerging scientific consensus suggests global warming is likely to decrease crop yields in important agricultural regions, especially where temperature become extreme. Analysis of observed data collected at the International Rice Research Institute (IRRI) in the Philippines for the period 1993 to 2003 shows that rice yields decline by 10 percent for each 1°C increase in growing-season minimum temperature (night time temperature in the dry season) (Peng et al., 2004). A broader study using data collected by IRRI from 1994 to 1999 of rice yields in 227 irrigated rice farmers in six important Asian rice-growing countries also found yields declined due to increased minimum temperatures (Welch et al., 2010).

For Chinese agriculture and industry, tighter supplies of energy and water are likely to increase the costs of production. The potential for the general population to experience inflation due to increasing costs of energy, water and closely related food prices will require government to step in and demand implementation of energy and water efficiency measures. Further, inflation fueled by energy, water and food prices could trigger the Chinese consumer to start to consider a broader set of factors in its purchasing decisions that will include aspects of environmental performance that indirectly contribute to higher prices of immediate concern to them, an issue we discuss further below in relation to consumer perception and preferences in Chapter 4 of this report.

1.3 Institutional Drivers for Sustainability

Driven by concerns over domestic energy security, air pollution, and the need to respond to international pressure to address climate change, China has set aggressive renewable energy targets, set goals to reduce its carbon intensity by 40 to 45 per cent of 2005 levels by 2020, and to source 15 per cent of its total energy use from non-fossil fuels by 2020. Under China's 12th 5-year Plan, the 2020 goals are supported by 5-year targets to reduce carbon dioxide emissions by 17 per cent per unit of GDP, achieve 11.4 per cent of non-fossil fuel usage, and improve energy efficiency by 16 per cent per unit of GDP by 2015.

These goals have redirected policy at all levels of government towards sustainability. The Chinese government is implementing an array of policies to achieve these targets, including:

- Aggressively expanding R&D funding to clean energy and renewable energy technologies that have export potential and can support job growth;
- Providing grant capital, concessional loans, tax holidays and credits, and other incentives for renewable energy and energy efficiency projects;
- Government procurement policies favoring domestically produced renewable energy technologies to support the development of indigenous technologies;
- Entering into voluntary agreements with industry to reduce emissions and increase efficiency;
- Requiring industry to upgrade or close highly polluting, inefficient power and industrial facilities;
- Experimenting with regional carbon trading pilots towards establishing a national system;
- Consolidating industry into larger, better capitalized, and more technologically advanced companies capable of reducing their own greenhouse gas emissions; and

- Introducing sustainability metrics in performance reviews of government officials.

China's efforts to address sustainability and environmental problems intensified in 2014 when the government announced its "War on Pollution". Although prompted by the air pollution problems in China's major cities, the War on Pollution encompasses responses to pollution affecting land, air and water.

China is backing these efforts with massive investment in cleaner energy and in cleaning up its environment, making China a leading source of clean energy investment. In 2013, China accounted for over US \$56 billion of investment in clean technology, the largest of any country and over 26 percent of total global investment (REN21, 2014). In addition, China's investment in environmental protection measures is similarly increasing. In March 2014, China's Premier Li Keqiang announced China's "War on Pollution", a pledge that will be backed by trillions of RMB of investment. In February 2014, the government pledged to invest 2 trillion RMB (US \$330 billion) in protecting scarce water resources from pollution, and in March 2014 the Ministry of Finance said China would spend RMB 21.1 billion on energy conservation and environmental protection in 2014, up 7.1 percent on 2013, and RMB 64.9 billion for agriculture, forestry and water conservation, up 8.6 percent (Martina et al., 2014).

China's ramping up of investment in cleantech and environmental solutions creates opportunities for Chinese companies domestically that can meet this growing demand. Chinese companies that are successful in the domestic markets are well positioned to expand internationally. Chinese government investment in a sector coupled with domestic policy and other support has enabled Chinese firms to earn healthy profits at home that fuel international expansion, enabling these firms to become global competitors in the wind, solar and hydropower sectors. And, importantly, it sends the strongest possible signal to Chinese industry of the future direction of policy.

China's War on Pollution and Anti-Corruption Campaign

Corruption and pollution are interrelated in China. Bribery of government officials to obtain business licenses, to gain access to land or raw materials, to ignore violations of health and safety regulations, to fail to investigate or prosecute companies that produce products that harm the public or the environment, or to misreport pollution emissions of industrial facilities, are examples of the ways in which corruption has undermined the enforcement of China's laws and regulation intended to protect the public and the environment.

Decades of failure by the government to enforce environmental laws, resulting in the gradual but tangible degradation of the environment and the quality of life

experienced by ordinary Chinese, have significantly contributed to a crisis of public confidence in the Party and the government. In response, China's leadership led by President Xi has launched measures to address two of the most serious challenges to China: corruption and pollution. Although separate policies, the anti-corruption campaign will reinforce and give teeth to the government's "War on Pollution." As we have noted above, under the new Environmental Law, polluters face hefty fines, shutdown of factories, or even criminal penalties. Enterprises and officials that have conspired to violate pollution laws are opening themselves up to prosecution under China's anti-corruption laws as well.

Given that the problems of corruption and environmental pollution are recognized by China's leadership as directly threatening their own legitimacy and the long-term stability of Party rule and ultimately social stability, we think the dual campaigns are genuine efforts that significantly increase the risks of business as usual by companies that flout environmental laws. Thus, we believe that China is at a turning point in terms of stepping up enforcement of environmental crimes, especially when they are linked to corruption.

Chinese Environmental Policy Shifts towards the Center

We believe China has initiated a long-term transition toward greater centralization over environmental policy, which will result in higher environmental standards. China's central government adopts laws, regulation and policies that must be implemented at the provincial and ultimately local government levels. In the area of environmental regulation, the Central government has emerged as a force for higher levels of standards, whereas provincial and local government have often sought to lower regulatory standards to attract investment. This central-local dynamic, which has played out in other policy areas throughout China's recorded history, has recently shifted towards the center on environmental issues as the central government is seeking to rein in pollution in the face of pressure both at home and abroad over a range of issues from air quality to climate change.

The central government's move to raise environmental standards and assert greater control over their implementation at lower levels of government is perhaps best demonstrated by China's adoption of the environmental accountability system. This system is intended to address the age-old problem of weak enforcement of the central government's policies and to restore credibility to environmental policy. The system is designed to ensure that the performance of local government officials in enforcing environmental regulations is taken into account in annual job reviews and promotion decisions. The objective is to properly align the interests of government officials with proper environmental supervision and management by linking their professional opportunities to an environmental index. In the 11th Five-Year Plan, China's

central government announced overall emission-reduction standards for chemical oxygen demand (COD) and sulfur dioxide (SO₂). In the 12th Five-Year Plan, it expanded overall reduction standards to also cover nitrogen oxides (NO_x) and ammoniacal nitrogen (NH₃-N). To guarantee achievement of the standards, the State Council implemented the environmental accountability system on an administrative basis. Although presently limited in scope, the environmental accountability system is to be expanded to other environmental pollutants and active debate is taking place as to how it might be used to address issues such as climate change.

For enterprises, China's environmental accountability system signals a move towards more rigorous enforcement and greater scrutiny of local officials tasked with enforcing and monitoring environmental compliance. It signals a potential shift in the way China will treat polluters and potential opportunities for companies that can not only contribute to local economic development but also protect the environment in the process.

Capital Markets Responding to Environmental Policy

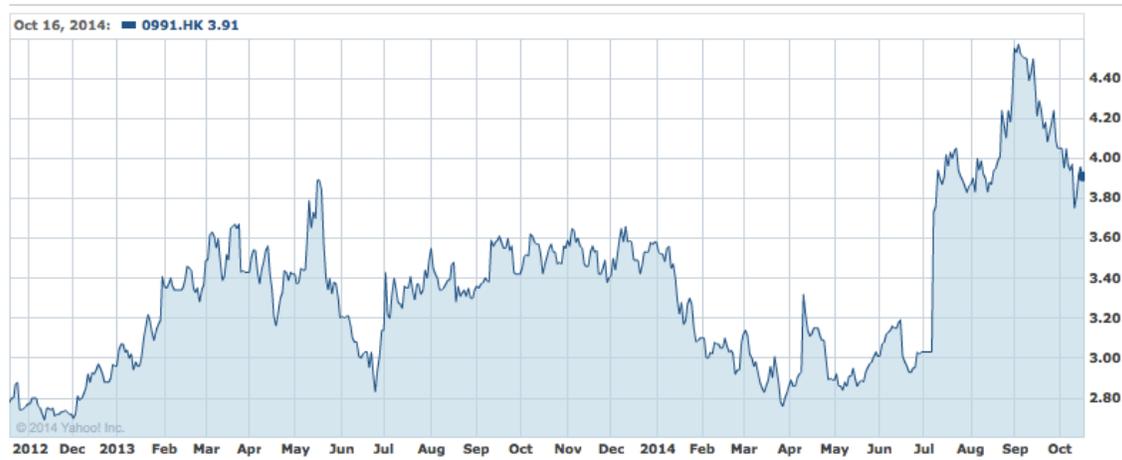
Chinese firms and financial markets are responding to the Chinese government's increasing emphasis on renewable and sustainability policies. Major policy initiatives announced in Five-Year Plans and supported by credible implementing policy at the national and provincial levels provide clear signals to markets, directing investment priorities for Chinese industry.

China's changing stance towards coal illustrates how Chinese government sustainability policies can shift markets. China is the most coal-dependent major economy on earth. While coal has fueled the country's phenomenal economic growth, it is a major cause of China's air quality problems and a contributor to water quality problems. Coal is also the reason China is now the leading emitter of CO₂.

In 2014, the Chinese central government announced its intention to reverse its dependence on coal by adopting aggressive coal control measures. As of the time of writing, 12 Chinese provinces had pledged to reduce coal consumption by accepting caps on growth from 2 percent (Jilin and Liaoning) per year to reductions of 50 percent (Beijing) of 2013 levels by 2017. These measures are expected to reduce China's coal consumption by as much as 655 million tons by 2020 (Greenpeace, 2014), with implications for the entire global coal value chain. The effect of these measures has already been dramatic. During the first three quarters of 2014, China's production and consumption of coal decreased by over 1 percent compared to 2013, depressing the price of coal to its lowest level in years due to reduced demand.

The impact of the government's coal policy can already be seen in financial markets. In July 2014, Datang Power, one of China's largest power companies, sold its coal-to-gas division. The decision was motivated by a number of factors, including problems experienced in operations and cost overruns, with market fundamentals driven in part by the government's coal control measures. Markets reacted to Datang's sale, resulting in a 20 percent increase in share valuation on the Hong Kong Stock Exchange the day following the announcement.

Datang Share Price on the Hong Kong Stock Exchange, 2012 - October 2014



Source: Yahoo! Finance (October 19, 2014).

The market's approval of Datang's decision to divest itself of its coal to gas division is consistent with capital markets reaction to coal stocks generally. Coal companies are facing declining profits and an uncertain future. The Market Vectors Coal (symbol KOL) exchange traded fund (ETF), which is comprised of global coal industry stocks, shows the sector's performance has been in constant decline or stagnation since 2011. US, Chinese and Australian companies account for almost three quarters of the index at 38.6 percent, 22.6 percent and 10.7 percent of assets, respectively (Van Eck Global, 2014). Tightening environmental standards in the United States are making the construction of new coal plants using existing conventional technologies all but impossible. Cap and trade policy in Europe, a shift to cleaner, cheap natural gas in North America and elsewhere, and China's own coal control measures accompanied by reinstatement of coal import tariffs have dampened demand for coal globally.

KOL ETF Price, 2009 - October 2014



Source: Yahoo! Finance (October 19, 2014).

Capital markets' reaction in the coal example suggests that companies that take strategic decisions to reposition themselves in response to environmental policy considerations stand to benefit.

Consumer Preferences and the Information Economy

The Chinese consumer, as we know it today, has existed for little more than a decade. Chinese consumers are only now beginning to realize the potential influence they can exert on society in perhaps the most democratic of fora - the marketplace.

Consumer power is bolstered by the free flow of information. Chinese consumers are among the most wired individuals on the planet. By 2014, China boasted over 730 million mobile user accounts and over 1.2 billion cell phones in use (Xiong Lei, 2015; National Bureau of Statistics, 2014). Using the internet and smart-phone based applications like "weibo" and "weixin", Chinese consumers can spread information over a large portion of the population with rapidity, and Chinese rely on these sources of information especially where the state-run media fails to promptly and accurately cover stories. With China continuing to urbanize, now with over half of the population already living in cities, news and information can spread much more rapidly and with greater impact for companies than ever before. Transparency of information and engagement with the public has been a weak point among Chinese companies, and the free flow of information via electronic media makes it imperative that companies take initiative in communicating their performance publicly, which we take up in Chapter 3 of this report in the section on corporate reporting of ESG metrics.

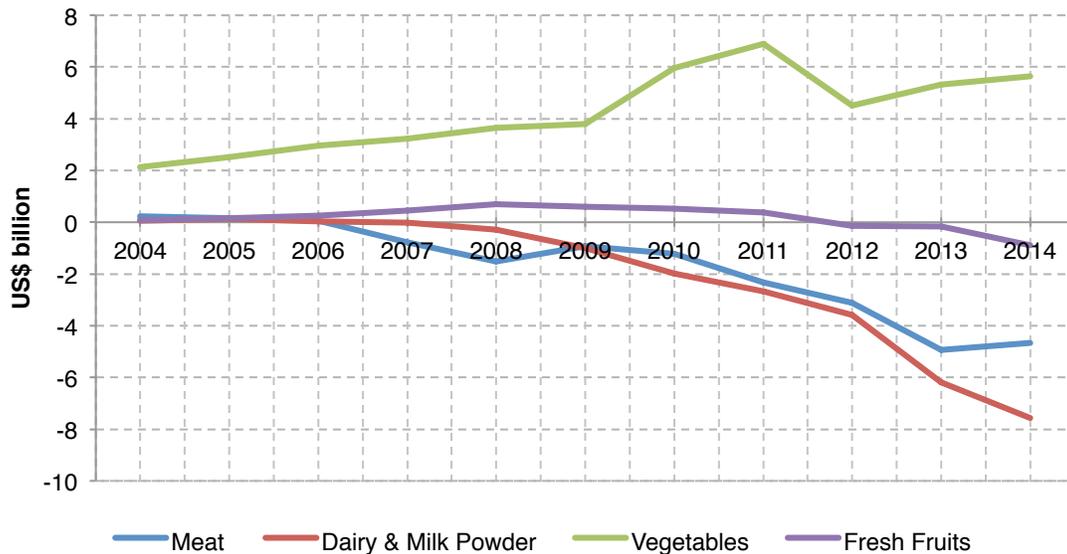
Consumers empowered with information can play a vital role in solving environmental problems, sometimes with dramatic consequences for the

companies involved. Consumer awareness has driven demand for disclosure of environmental information about products and the companies that make them. The 2008 milk scandal, in which the industrial chemical melamine was intentionally added to milk, illustrates the power of consumers to drive change in response to environmental, health and safety concerns. In response to farmers diluting milk with water in order to boost profits, China's government required tests to measure nitrogen levels in milk as an indicator of protein levels. In order to meet government standards, farmers continued diluting milk with water, but some started adding nitrogen-rich melamine, an industrial chemical used for producing plastics, adhesives and other products. Milk and baby formula tainted with melamine caused the death of at least six infants due to kidney failure, hospitalization of 52,000 children with kidney stones and related illnesses, and another 250,000 children to suffer milder forms of kidney and urinary problems (Pei et al., 2011). The milk scandal has been followed by successive discoveries of high levels of chemicals being added to chicken products and unsafe practices at meat processing plants resulting in rotting meat entering the food supply and exposing widespread non-compliance with food safety and labor laws. The series of food scandals have caused upheaval in government and triggered demand among Chinese consumers for safe, high-quality food. The melamine scandal alone imposed costs of €58 million on the public (Pei et al., 2011). Chinese companies have been bankrupted in the scandal and public confidence in the government and legal system shaken in what has been a massive and systemic failure of government regulation and enforcement of food safety laws (Katz, 2012).

In the wake of government failure to protect the public, consumers acting through the market took steps to protect themselves. Sales of organic foods in China have risen from negligible levels before the scandal to a US \$1 billion market in 2013. Since 2008, China's trade balance in meats and dairy products has dropped significantly, running negative balances today by over US \$5 billion and US \$7 billion, respectively (Cui, 2014). Consumers acting individually but with collective conscience have exercised their power in the market, penalizing firms with questionable practices by costing them lost sales.

For companies that are compliant with food quality, labor and other standards, distinguishing themselves from their competitors is critical. In the language of competitive advantage, this is an opportunity for product differentiation, one of the two major strategies to build and maintain competitive advantage.

China Food Safety Concerns Boost Imports and Depress Exports



Source: Cui, 2014, courtesy of Gavekal Dragonomics based on data from International Trade Center.

Based on the consumer survey we conducted and other survey work in China, we believe the Chinese consumer already grasps its power to influence society through markets. However, at present the exercise of this power appears to be limited to issues of immediate concern to them, such as food safety. It is less clear whether they will seek to use their power for environmental issues that are more remote to their immediate concerns. This possibility, however, should not be discounted, especially given that the Chinese consumer is still maturing. In Chapter 4 of this report we explore how Chinese companies can prepare themselves to respond to potential changes in consumer behavior and position themselves in the marketplace for such changes.

Foreign Regulation of Chinese Producers

Transitioning to a low carbon economy depends upon industry reducing its greenhouse gas emissions through innovation. In the immediate term, a company's ability to reduce its emissions is defined by the state of available technology in its industry, but in the longer term a firm can innovate and adjust its business strategy to reposition itself to reduce emissions and be more competitive.

Companies with manufacturing bases in the European Union where carbon emissions are regulated are already responding to regulation through innovation. Companies that are subject to efficiency standards, such as those based in Japan, are innovating their products to meet those standards. As markets are global, companies regardless of location have incentives to innovate to comply

with requirements in the major markets they serve. Financial markets are driving some of these trends. With increasing attention paid to climate change, socially responsible investing and venture capital finance increasingly focused on environmental technologies.

As supply chains are global, divergent regulation in major markets such as the European Union, the United States and Japan increase production costs for manufactured goods. Regulations exert influence far beyond the borders of the countries that adopt them, imposing cost and requirements across the entire supply chain. Chinese manufacturers must comply with these requirements for the international markets to which they export, and may adopt those innovations into their products intended for domestic markets.

The European Union has played an especially important leadership role in ratcheting up regulatory requirements for important products such as the air emissions of automobiles and the reporting and registration of chemicals products. China has adopted EU standards for vehicle emissions starting in 2000 with the adoption of Euro I standards, and successively increasing standards since then. In the chemicals industry, the European Union's Regulation on Registration, Evaluation, Authorization and Restriction of Chemicals (REACH) regulations must be followed by all manufacturers and importers of chemicals producing for EU markets. As a result, China's chemical regulatory authority is adopting EU REACH principles into Chinese domestic laws, which benefits Chinese firms that export to the EU.

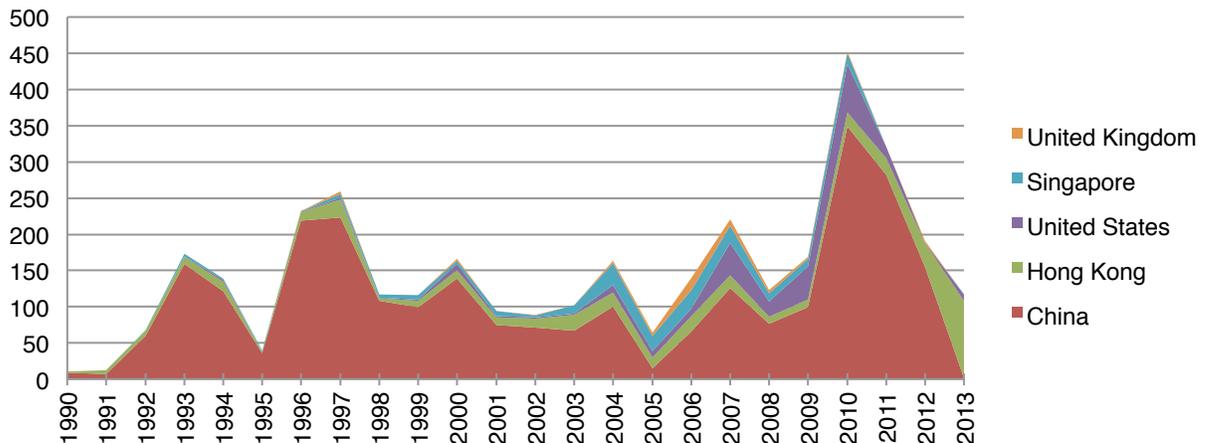
Foreign Securities Regulation and Socially Responsible Investing

As Chinese companies increasingly raise capital in global capital markets and list their shares on foreign exchanges such as the Hong Kong, New York, Singapore, London and other international exchanges, Chinese enterprises are increasingly subject to international investor scrutiny and foreign securities regulations. Regulatory authorities such as the U.S. Securities and Exchange Commission require a high standard of disclosure, and are now requiring publicly traded companies to report climate change related information that could have material financial impact on company performance, such as through regulation, changes in market conditions or physical impacts (U.S. Securities and Exchange Commission, 2010). Additionally, listing on an international exchange raises a company's profile and increases coverage by the financial analyst community, creating strong incentives for Chinese companies to comply with laws and best practices at home.

As Chinese companies are now taking center stage in global capital markets, accounting for some of the largest public offerings in history, these companies must adhere to global standards for regulation and disclosure. Their ability to

raise capital and their reputation in the global marketplace depend upon it. As a result, foreign regulation in the securities and governance arena are increasingly shaping the behavior of leading Chinese companies.

Chinese Initial Public Offerings by Jurisdiction of Listing Exchange



Source: Authors, DRCNET Statistical Database.

Chinese companies that are listed on foreign exchanges are not only exposing themselves to foreign regulation and increased analyst scrutiny, but they inevitably will pay attention to their share price on foreign exchanges and by extension institutional investor sentiment. One of the most rapidly growing investment areas in Europe and North America is "socially responsible investing", often referred to as double or triple bottom line investing. Socially responsible investing is based on the premise that superior company performance in the environmental, social, and governance areas leads to superior financial performance. Socially responsible investing has grown to an estimated US \$3.07 trillion investment market, or over 12 per cent of the U.S. investment market, and is one of the fastest growing segments of financial markets (US SIF Foundation, 2013). Most of this demand is from large institutional investors, such as pension funds, universities, corporations, hospitals, foundations, insurance companies, nonprofit organizations, and religious institutions. With socially responsible investing representing a large and growing segment of the institutional market, companies cannot ignore their social and environmental performance.

1.4 The Business Case for Sustainability: Profits

The business case for sustainability is predicated on a simple argument - higher profits. Embracing sustainability and enhancing social and governance performance are powerful tools for firms to evolve their corporate strategy for a global marketplace that increasingly demands higher performance in these key areas.

On both the cost and revenue side of the profits equation, Chinese firms stand to gain by enhancing their sustainability performance in the rapidly evolving regulatory and market environment. On the cost side, cost reductions through lower enterprise risk and capital costs, as well as lower costs of production due to reduced consumption of inputs are measureable and verifiable benefits of sustainability efforts.

Reducing greenhouse gas emissions complements an enterprise's ability to reduce its exposure to energy and commodities prices. Companies whose manufacturing processes consume significant amounts of energy and raw materials, the costs of which are determined by worldwide supply and demand beyond a firm's control, will benefit by reducing their exposure to uncontrollable forces and likely reducing their overall costs of production.

From a revenues viewpoint, restructuring production to reduce the firm's environmental footprint opens opportunities to restructure product offerings to produce lower carbon products in higher value markets, and eliminate production of higher carbon, lower margin products. Public perception of corporate and social responsibility enhances the firm's brand image in the marketplace, which can enhance sales and marketing efforts.

In the chapters that follow we explore these themes in greater detail. The next chapter, which focuses on emerging market-based regulation, illustrates how China is moving toward the market not only as a means to allocate capital, raw materials and labor, but also as a means to supplement traditional command-and-control regulation. The Chinese government is increasingly employing the profit motive to accomplish traditional regulatory objectives of protecting the environment. Chapters 3 and 4 then explore how enterprises can respond to these challenges posed in Chapters 1 and 2 through corporate strategy and approach to the consumer in order to enhance profits and improve environmental performance.

2. China's Emerging Market-based Environmental Policies

Since its founding in 1949, China's central government has relied on command-and-control measures to direct all aspects of the country's development. Implemented through a series of five-year plans, for the first three decades China's policies focused on economic development and the reorganization of the economy under centrally controlled state-owned enterprises. With the government and market reforms instituted by Deng Xiaoping starting in 1978, the central government began introducing markets as a feature of the economy, and have in the last several years stepped up its efforts to "marketize" the economy.

Environmental protection has, until recently, been largely disregarded in China's almost single-minded quest for economic development. Only in the 1990s did China's leadership start to publicly recognize the environmental consequences of its path, culminating today in China's "War Against Pollution" and President Xi's recent call for an "Energy Revolution." Similar to economic policies, environmental policy has operated on the basis of command-and-control methods. Pollution control policies such as forcing the closure of small, highly polluting and inefficient coal-fired power plants (Gao et al., 2009) and manufacturing facilities typified Chinese policies. These policies have, to a point, been highly effective. As discussed in Part I and below, China's coal control measures have changed the market dynamics for coal production and use in China, as well as the world.

However, as with China's broader approach to national development, the government has recognized the inherent limits in command-and-control policies and the need to expand its arsenal of policy options by embracing market-based mechanisms to help solve the country's environmental problems. A raft of policy reforms designed to internalize the cost of pollution and thereby provide an incentive to reduce pollution is underway. The movement towards market-based approaches was strengthened in 2011 when China issued the 12th Five-year Plan (2011-2015) and China's State Council issued the Decision to Strengthen Priority Work of Environmental Protection and reiterated the policy to establish environmental markets as a means to achieve environmental goals.

The policies we address in this part are market-based approaches that are intended to influence market actors through incentives. We review selected policies, specifically carbon markets, environmental taxes, green credit, green securities and green consumption policies. These policies represent a new breed of policy and Chinese policymakers are at the beginning of experimenting

with regulation through the market. These policies operate by increasing the costs of operation for polluters or generate revenue for those that produce products more efficiently and with less pollution. We believe these policies are significant for exactly this reason - the Chinese government is now equating regulatory compliance with profits.

2.1 Selected Policies and their Impact

China's Pilot Carbon Programs - Towards a National Carbon Market

China has pledged to reduce its CO₂ emissions per unit of GDP by 40 to 45 per cent compared to 2005 levels by the end of 2020. Towards this goal, China's 12th Five-Year Plan for Economic and Social Development (2011 – 2015) set a target of 17 per cent CO₂ emission reduction per unit of GDP by 2015. The plan calls for the development of a greenhouse gas emissions trading market known as "cap and trade", adoption of low carbon product standards, identification and certification systems, and promotion of low carbon pilot projects.

How Cap-and-Trade Schemes Work

Cap and trade schemes set limits on greenhouse gas emissions by covered emitters while enabling market participants to determine how and by whom the emissions reductions will be made. Under cap and trade programs, a regulatory authority determines the allowed quantity of emissions of regulated pollutants (e.g., carbon dioxide) during each compliance period (e.g., year, multiple year, etc.) by regulated sources and sectors. The regulator will issue allowances to each covered emitter up to their emissions limit, each allowance being based on one metric ton of CO₂ or its equivalent in other greenhouse gases based on global warming potential.

The cap is the means to achieve the desired environmental goal. Caps may be adjusted downward over time, typically on an annual basis or at the commencement of each phase of the program comprising several years. The cost of regulation is directly linked to the stringency of the cap and the supply of allowances and offsets credits that are available to be used toward meeting emissions limits. The selection of regulated sources and sectors should cover that portion of emissions that will be effective in achieving the desired level of reductions, be administratively feasible, and minimize the potential for shifting production outside the geographic area or industrial sector covered by the cap and trade system (known as "leakage").

Allowances are distributed to regulated emitters, typically at the firm or facility level, through a combination of allocation at no cost, purchased for a fixed fee,

and/or auctioned on a competitive basis. Each compliance entity must submit an allowance for each ton of CO₂-e they emit for a particular compliance period. Regulated entities may also trade allowances, enabling emitters to select their compliance strategy to meet their individual emissions limits, thereby decreasing the cost of complying with regulation on an economy-wide basis. Emitters may reduce their emissions (such as by investing in abatement technologies) and sell their unused allowances to pay for the costs of emissions reduction equipment, or purchase allowances from other regulated firms that have excess allowances. Emitters whose emissions exceed the allowances surrendered face a penalty.

Cap and trade systems can be designed with a variety of cost-containment measures to reduce the cost of compliance for regulated emitters and to prevent adverse economic impacts from extreme increases in carbon prices. These mechanisms include price caps, emissions banking (saving allowances for use against emissions in future periods) and emissions borrowing (enabling firms to emit now against their allocations in future periods), and the use of offsets.

Cap and trade systems generally exempt small-scale emitters where the cost of regulation is too great or not justified on administrative grounds based on the emissions reductions achieved. Covered emitters may initially be given free allowances until they gain familiarity with the program or if they are subject to competition from jurisdictions that do not impose emissions limits on their industry. Most systems introduce a high percentage of free allocations at the beginning and then gradually reduce or eliminate free allocation in favor of auctioning. The proceeds of auctions can be used to support clean energy development, alleviate the economic impact of greenhouse gas regulation on low-income households, fund adaptation efforts, or be applied toward the general budget or non-climate priorities.

In order for cap and trade systems to work effectively, a system of emissions monitoring, reporting and verification is essential. The starting point is an accurate, publicly available inventory of emissions by each source regulated under the cap and trade system. Periodic reporting and verification of actual emissions in a transparent manner is necessary to facilitate the effective regulation and efficient operation of emissions markets. Periodic reporting and verification helps ensure that the carbon price reflects supply and demand relationships and that stakeholders view the system as fair and credible.

China Experiments with Cap-and-Trade towards a National Carbon Scheme

Prior to the 12th Five-Year Plan, China's power sector had already conducted simulations of cap and trade schemes and had experimented on a limited basis with inter-grid power trading (Wu Qian, 2011). China's Ministry of Housing and Urban-Rural Development had also initiated experimental allowance trading

schemes for residential building, non-residential building and heat supply facility sectors (Greiner et al., 2011).

China's government had also issued energy savings targets for 1,000 enterprises in 2006 and later expanded these targets to energy savings and carbon reductions targets expressed in terms of standard tons of coal for 10,000 enterprises and entities nationwide in 2012 (NDRC et al., 2006; NDRC et al., 2011). Although not formally part of a trading system, these reduction goals, especially the 2012 goals, were clearly a preparatory step towards emissions trading.

Sectors Included in China Carbon ETS Pilots

Sector	Shenzhen	Shanghai	Beijing	Guangdong	Tianjin	Hubei	Chongqing
Aluminum							●
Automobile						●	
Aviation		●					
Buildings	○		●	○			
Building Materials		●					
Calcium Carbide							●
Caustic Soda							●
Cement			●	●		●	●
Ceramics				○			
Chemical Fibers		●					
Chemicals		●			●	●	
Commerce		●					
Electricity	●	●		●	●	●	●
Ferroalloy							●
Finance		●					
Glass						●	
Heat Supply		●	●		●		
Hotels							
Iron and Steel		●		●	●	●	●
Marine Ports		●					
Nonferrous Metals		●		○		●	
Oil and Gas					●		
Paper		●		○		●	
Petrochemicals		●	●	●			
Plastics				○			
Railway		●					
Rubber		●					
Textile		●		○			
Thermal Power			●				
Transit	○			○			
Water Supply	●						

Source: CCICED, 2014. ● Included in first year ○ May be included in future years

Efforts to develop an emissions trading market pursuant to the 12th Five-Year Plan are far more extensive than these early efforts. Seven regions in China are currently conducting trial emissions trading in preparation for the nationwide cap and trade program mandated by the 12th Five-Year Plan. China's regional pilot systems differ from each other in design in order to enable experimentation. As shown on the table above, carbon-intensive industries to be covered include the power sector, cement, iron and steel, petrochemicals and pulp and paper.

China's Emissions Trading Pilots in Beijing, Shanghai and Guangdong

	Beijing	Shanghai	Guangdong
Trial Period	2013-2015	2013-2015	2013-2020
Gases	CO ₂	CO ₂	CO ₂
Annual Thresholds	10,000 tons	20,000 tons for major sectors, otherwise 10,000 tons	20,000 tons
Major Sectors	Heat supply, power, cement, petrochemical, car manufacturing and public buildings	Steel, petrochemical, chemical, non-ferrous metal, power, building materials, textile, paper, rubber, chemical fiber	Power, cement, steel, ceramics, petrochemical, non-ferrous, plastics, paper
Other Sectors	Not available	Airline, power, airport, railway, commercial, hotel and finance	Transport and building
Baseline	2009-2011	2009-2011	2011-2014
Allocation Methods	<ul style="list-style-type: none"> • Free allocation for 2013 based on 2009-2011 emissions • 2014-2015 allocations based on prior year • Limited auctioning 	<ul style="list-style-type: none"> • Free allocation for 2013-2015 based on 2009-2011 emissions considering growth • Benchmarking used where appropriate • Auctioning to be considered 	<ul style="list-style-type: none"> • Mainly free allocation with limited auctioning
Borrowing & Banking	No borrowing, banking permitted	No borrowing, banking permitted	Not specified
MRV	<ul style="list-style-type: none"> • "Enterprise Guidelines on Carbon Emission Measurement" • Enterprise emissions inventory • 3rd party verified emissions • No penalties specified 		
Offsets	Allowed project offsets such as China Certified Emissions Reduction		
Trading Platform	Beijing Environmental Exchange	Shanghai Environmental and Energy Exchange	Guangdong Emission Exchange

Source: Wu Qian, 2012.

Beyond differences among the sectors and sources covered, the pilot programs also experiment with different approaches to fundamental aspects of emissions trading system design: eligibility thresholds, allocation methods, selection of

baseline years. Details of the Beijing, Shanghai and Guangdong pilots are set out in the table above to provide a picture of how the pilot programs are evolving and how China's national emission trading program may evolve. These pilots feature free allocation of allowances and contemplate limited auctioning. The programs will accept China-specific project offsets produced based on standards developed in consultation with the National Development and Reform Commission.

Acting under the guidance of the national authorities, these pilot projects undertaken at the provincial level will provide invaluable experience in designing what will ultimately become a national market. Variations among programs enable Chinese authorities to test different approaches under conditions prevailing in China. The regional pilots also provide local authorities and the thousands of enterprises covered by them with experience in setting up and complying with a GHG cap and trade regime. Regional regimes have also helped establish elements of the foundation for the national regime, such as GHG emissions reporting mechanisms.

Whether one or more of these regional programs will serve as the model for a uniform national system focusing on selected sectors, or whether these regional trading systems will be subsumed within a national framework allowing diversity of regimes with other provinces, link together or with outside systems, or some other arrangement is as of yet unresolved. However, China's National Development and Reform Commission issued a seminal regulation in December 10, 2014 that is the first step in defining China's national carbon market (NDRC, 2014). The regulation provides:

- The NDRC will serve as regulator;
- Sectors to be included in the system are to be determined;
- Caps for ETS sectors and non-ETS sectors will be determined by the NDRC for each province, and adjusted annually;
- Provinces will have authority to tighten caps and expand the sectors covered within their jurisdiction;
- Initially most permits will be allocated at no cost with the regulator entitled to withhold some permits, which they can (a) sell into the market to ensure companies pay for some of their emissions, or (b) keep in a price control reserve;
- CCERs will be eligible for compliance purposes
- Forward contracts might be allowed, subject to approval by China's financial market regulator; and
- Penalties will be determined for illegal activities among regulated entities, trade organizations, verification organizations, and competent department and their staffs.

Although not stated in the regulation, the NDRC is aiming to launch the national market in 2016 in accordance with the 12th Five-Year Plan target, however only for those provinces ready to commence operations. Full participation is expected by 2020. Also, it is estimated that the national market will cover 3-4 billion tons of CO₂ by 2016 (S. Reklev, personal communications, 2015). We further expect that that NDRC will specify quantified penalties for failure to comply with caps and violations of trading system rules, with especially harsh penalties for fraud in reporting.

Importantly, the allocation methodology and cap-setting rules are not yet resolved. This is a critical issue because reductions must occur within certain sectors or facilities and the allocation and caps will determine which sectors and enterprises "win" or "lose" under the policy.

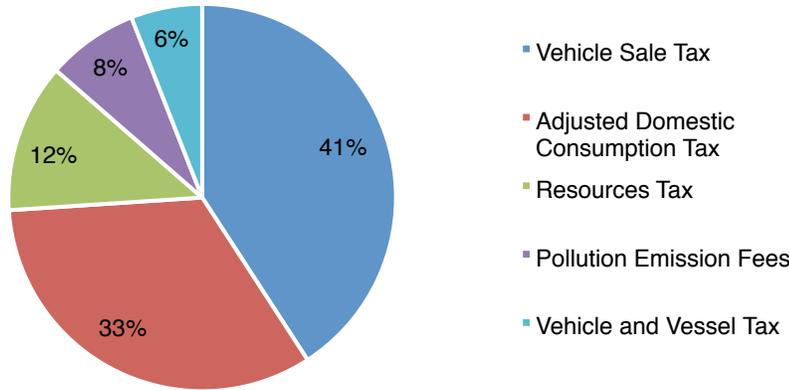
China's carbon markets will far exceed the scale of any other market now in existence. China's emissions trading market will surpass the EU ETS in size if China is to achieve its policy objectives. These markets will create an entirely new asset class for China and the value of this market will itself exert influence on other aspects of policy that force companies to adhere to more strict environmental standards.

Environmental Taxes

China began implementing dedicated environmental taxes two decades ago, however discussion of environmental taxes as a means to curb pollution through internalizing externalities, finance environmental policies and projects, as well as to raise revenues have become a focus of policy discussions in the 2000s. In 2007, the government issued the *Notification of Work Program of Energy Conservation and Emissions Reduction* (State Council of China, 2007), announcing the government's plans to research and eventually adopt new environmental taxes, which was followed in 2011 by a similar statement by the State Council of China (State Council of China, 2011).

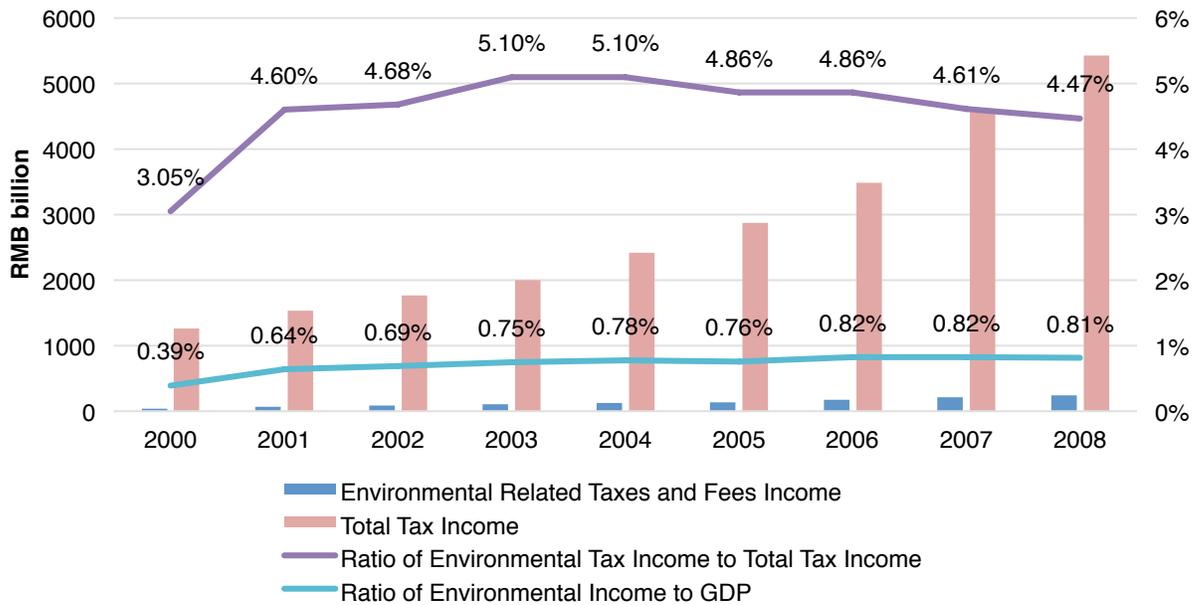
Several types of environmental taxes are already collected in China - the most significant being elevated sales taxes for vehicles and petroleum fuel, followed by resources taxes (mainly on crude oil, natural gas and coal), pollution emissions fees, and annual vehicle and vessel taxes. The charts below shows the relative importance of these taxes in terms of fees collected as of 2008.

China's Environmental Taxes and Fees in 2008



Source: Su, 2014.

China's Environmental Taxes and Fees

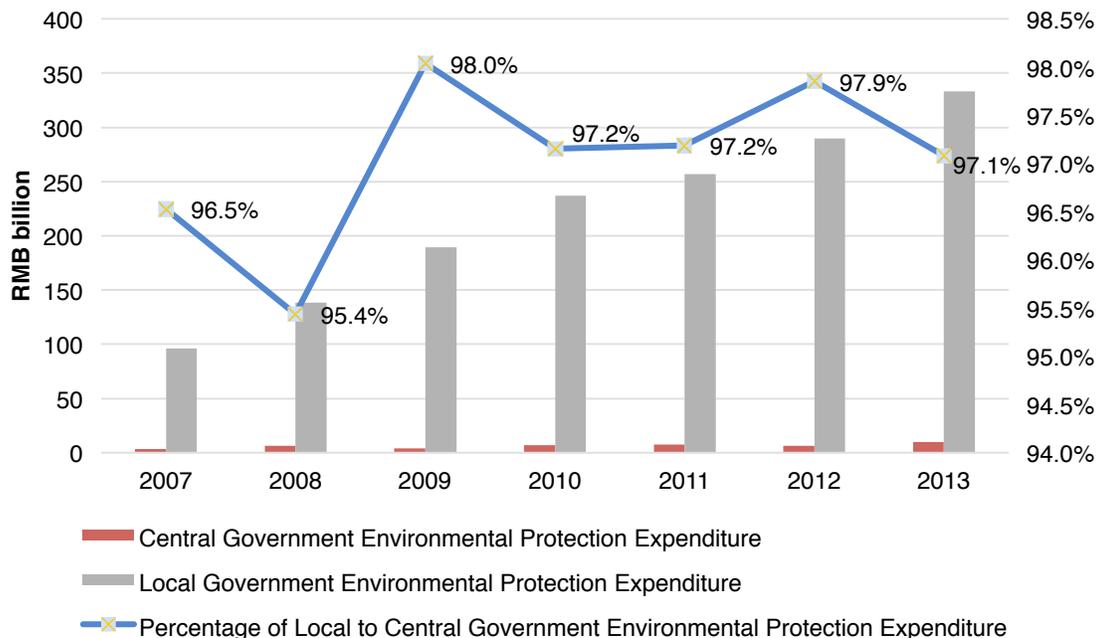


Source: Su, 2014.

Financing state pollution treatment facilities and environmental enforcement was the original purpose for environmental taxes, however in the early 1980s fee revenues were often diverted to other purposes (Li, 2011). In 2003, the State Environmental Protection Administration published *The Regulation on Usage of Pollution Emission Fees* (Ministry of Environmental Protection, 2003a), which requires pollution emission fees to be treated as special funds to protect the environment and only used primarily for environmental programs and pollution

prevention. It stipulates that 90 percent of fees charged by local government could be retained by the local government, and the remaining 10 percent remitted to the central treasury. This distribution roughly reflects the relative responsibility between central and local government for environmental programs, with local environmental expenditure accounting for more than 95 percent of total expenditure after 2007, as shown below.

China's Central and Local Government Environmental Protection Expenditures



Source: Authors, China Statistical Yearbook 2008-2014.

Policymakers and academics are actively debating reform and expansion of environmental taxes as a policy tool. Contemplated reforms seek to reduce abuse or corruption in the administration of these taxes. Expansion of environmental taxes would potentially extend these to include pollution emission taxes (targeting emissions to air, water and land), pollution production taxes (targeting products like fuel, motor vehicles, pesticides and mercury-containing batteries), and carbon taxes (targets on fossil fuels like coal, oil and natural gas). Carbon taxes, in particular, are being debated as a possible substitute or complement to a cap and trade regime, and could play a significant role in reducing air pollution generally (Ministry of Environmental Protection, 2014a).

Preparation of legislation on environmental taxes is underway, suggesting that expansion of environmental taxes as a policy instrument is a strong possibility in the near future. In November 2014, the Ministry of Environmental Protection and State Administration of Taxation completed and submitted to the State Council the draft *Law of China's Environmental Protection Taxes*. In March 2015,

Premier Li announced the draft law will be deliberated at the earliest possible opportunity (Beijing Youth Daily, 2015).

Green Credit Policy

China's green credit policies seek to curb pollution and carbon emissions by limiting access to bank lending and requires banks to impose, monitor and enforce environmental conduct requirements on their borrowers.

China's development of green credit policies can be characterized as proceeding in three phases: start-up phase (1995-2005), steady stage (2006-2008), and rapid development stage (2009-now) (Yan, 2012). In the initial phase, the concept of green credit began to appear in policy documents. However, the concept was not fully developed. In the middle stage, the environmental and financial sectors began developing mechanisms for sharing environmental information, laying the foundation for an operational system. In the current stage, the financial sector is embracing the importance of environmental protection in the provision of credit, and is issuing a series of documents that specify how the system will operate.

These stages can be observed through the evolution of government agency actions that are gradually erecting a green credit system. Since 1995 China's National Development and Reform Commission (NDRC), Ministry of Environmental Protection (MEP) and the People's Bank of China (PBC) have developed policies related to green credit. In 2007, MEP, PBC and the China Banking Regulatory Commission (CBRC) jointly released the *Instructions on the Implementation of Environmental Policies and Regulations to Prevent Credit Risks*. Publication of this opinion made "green credit" an official policy instrument of credit management for banks operating in China. In 2012, the CBRC released the *Green Credit Guide*, which sets general standards for bank management, policy systems and capacity building, credit processes and internal control for Chinese banks. The table below lists China's key green credit policies.

China's Green Credit Policies

Year	Lead Agency	Document
1995	People's Bank of China	<i>Notification on Implementing Credit Policy and Strengthening Environmental Protection Work (CBRC [1995] No. 24)</i>
2004	National Development and Reform Committee, People's Bank of China, China Banking Regulatory Commission	<i>Notification on Strengthening Regulation on Credit Risk by Coordinating with Industrial Policy and Credit Policy (NDRC [2004] No. 746)</i>
2006	People's Bank of China, State Environmental Protection Administration	<i>Notification on Sharing Corporate Environmental Protection Information (CBRC [2006] No.450)</i>
2007	People's Bank of China State Environmental Protection Administration, China Banking Regulatory Commission, People's Bank of China China Banking Regulatory Commission China Banking Regulatory Commission	<i>Instruction on Improving and Enhancing the Financial Service in Energy-Saving (CBRC [2007] No.215)</i> <i>Instruction on the Implementation of Environmental Policies and Regulations to Prevent Credit Risks (SEPA [2007] No.108)</i> <i>Notification on Preventing and Controlling Credit Risk on High Energy Consumption and High Pollution Sectors (CBRC [2007] No.161)</i> <i>Instruction on Credit Work in Energy-Savings and Emissions Reduction</i>
2008	State Environmental Protection Administration, China Banking Regulatory Commission	<i>Agreement on Information Communication and Sharing</i>
2009	Ministry of Environmental Protection, People's Bank of China Ministry of Environmental Protection People's Bank of China, China Banking Regulatory Commission, China Securities Regulatory Commission	<i>Notification on Further Implementing Credit Policy and Improving Information Sharing (MEP [2009] No.77)</i> <i>Notification on the Implementation of Limiting Certain Industries' Excess Capacity and Redundant Construction to Guide Healthy Industrial Development (MEP [2009] No.127)</i> <i>Instructions on Further Implementing Financial Services for Industrial Adjustment and Excess Production Capacity Restriction in Key Sectors (CBRC [2009] No.386)</i>
2010	People's Bank of China, China Banking Regulatory Commission	<i>Instruction on Further Implementing Financial Services to Support Energy Savings and Eliminate Lagging Productivity. (CBRC [2010] No.170)</i>
2011	China Banking Regulatory Commission	<i>Notification on Summaries of Credit Work in Energy-Saving and Emission Reduction and Completing Green Credit Related Work (CBRC [2011] No.60)</i>
2012	China Banking Regulatory Commission	<i>Green Credit Guide (CBRC [2012] No.4)</i>

Source: Yan, 2012.

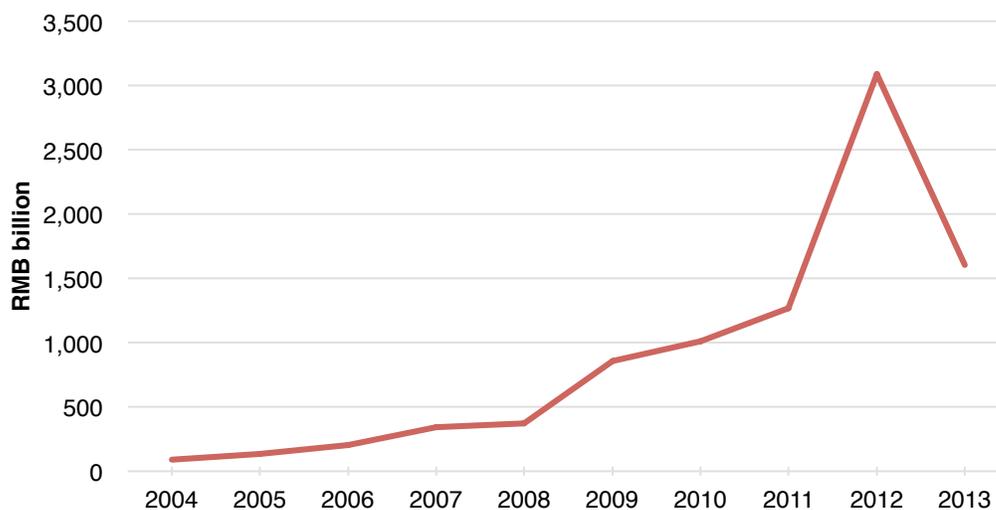
The ultimate goal of China's green credit policy is to raise the cost of capital, or even withdraw access to bank loans, for heavily polluting or inefficient industries. It is part of the broader effort of the state to direct resources towards those enterprises and industries that support China's sustainable development. Based on statistics from the *China Banking Social Responsibility Report* (CBA, 2009-2014), we can see that during the 2004-2013 period, lending to energy conservation and environmental protection projects is gradually increasing, notwithstanding a sudden decline in 2013.

Energy Conservation and Environmental Protection Project Loans

Year	Total loan balance (RMB billion)	Percentage of all lending	Number of loans	Number of companies receiving loans	Growth rate (loan balance)
2004	88.53	1.86	882	1,395	
2005	132.31	1.87	1,334	1,847	49.45%
2006	202.89	2.65	1,999	2,649	53.35%
2007	341.10	2.70	2,715	3,505	68.12%
2008	371.02	3.11	2,983	3,615	8.77%
2009	856.05	8.93	6,412	4,099	130.73%
2010	1,010.73	-	7,259	4,558	18.07%
2011	1,265.84	-	9,349	-	25.24%
2012	3,088.66	-	10,874	-	144.00%
2013	1,604.50	-	14,403	-	-48.05%

Source: CBA, 2009-2014.

Energy Conservation and Environmental Protection Project Loan Balance



Source: CBA, 2009-2014.

Although loans for energy conservation and environmental protection projects increased during the 2009-2011 period for which we have data, loans to polluting industries were also increasing in absolute monetary value. Only as a percentage of total lending, loans to polluting industries declined slightly year over year. The table below describes lending to the steel, cement, flat glass, coal and coal chemicals, and shipbuilding industries.

Loans to Dirty Industry

Industry		2009	2010	2011
Steel	Loans (RMB billion)	624.72	702.89	792.72
	% all loans	2.13%	1.98%	1.95%
Cement	Loans (RMB billion)	113.4	149.25	156.61
	% all loans	0.39%	0.42%	0.39%
Flat Glass	Loans (RMB billion)	12.68	15.4	14.84
	% all loans	0.04%	0.04%	0.04%
Coal Chemicals, Calcium Carbide	Loans (RMB billion)	87.29	98.41	106.81
	% all loans	0.30%	0.28%	0.26%
Shipbuilding	Loans (RMB billion)	81.84	84.5	77.53
	% all loans	0.28%	0.24%	0.19%
All	Loans (RMB billion)	919.93	1,050.46	1,148.52
	% all loans	3.14%	2.96%	2.82%

Source: CBA, 2011.

Our brief empirical review reveals that China's green credit policies face two challenges. First, lending to energy conservation and environmental protection project loans, while increasing, remains modest and is not yet adequate to solve the magnitude of China's environmental problems. Second, loans to polluting enterprises are difficult to curb. China is clearly at the beginning of a long-path towards building a green credit policy that can transition the country to a low-carbon, low-pollution future.

What future steps might China take in order to strengthen its green credit policies? Chinese scholars provide insight into the future path of China's green credit policies. Song (2011) contends that China's green credit policies exert weak influence because energy conservation and environmental protection projects offer too low a rate of return. Although we do not survey project rates of

return in this study, we do note that China has been strengthening incentives for these projects through feed-in-tariff-type policies for power generation.

Fan and Li (2012) argue that the current policies are guidance rather than mandatory. Without mandatory policy, commercial banks in China lack incentives or constraints and thus perpetuate established practices. Green credit policies must be backed by clearly established lending categories and environmental risk rating standards and, as Fan and Li (2012) argue, adequate information about borrower operations in order for banks to implement the green credit policy. Finally, the green credit policy will be ineffective if it only covers the banking sector because private sources of capital and other non-bank capital will lend to these enterprises.

Green Securities Policy

Green securities policy as used here refers to the application of environmental criteria in approving or certifying companies for listing their securities on national exchanges, or in its more recent evolution, requiring enhanced environmental disclosure as a condition of the privilege of listing securities. Enterprises that are highly polluting and energy inefficient are required to comply with environmental performance standards. The central government has moved to influence the development of these companies by constraining their access to capital markets, or at least to introduce an additional element of risk for these companies seeking access to capital markets.

China adopted a green securities policy in 2003 when the State Environmental Protection Administration (now the Ministry of Environmental Protection) issued the *Notification of Implementing Environmental Protection Inspection of Companies that Go Public and Listed Companies that Apply for Refinancing* (Ministry of Environmental Protection, 2003b). This policy instituted certification requirements for 13 high pollution industrial sectors: metallurgy, chemical engineering, petrochemicals, coal, thermal power, building materials, brewing, pharmacy, fermentation, textiles, tanning, and mining. Provincial level environmental protection bureaus were directed to conduct on-site verification, the results of which would be published online and serve as one of the criteria in government approval for companies to list their securities on national exchanges (State Environmental Protection Administration, 2007). The China Securities Regulatory Commission subsequently issued the *Notification of IPO Application in Companies from Heavy Pollution Sectors*, which required companies in sectors identified in the SEPA's earlier notice and other industrial sectors to obtain an opinion from SEPA as a condition of listing approval (Securities Regulatory Commission of China, 2008).

During the period of the policy's implementation from the latter half of 2007 to beginning in 2009, SEPA had reviewed more than 37 companies, and declined to certify 10 companies with severe environmental pollution problems. Vice-minister of Ministry of Environmental Protection Pan Yue observed that the rule prevented companies from raising funds totaling more than RMB 10 billion by 2008 (21st Century Business Herald, 2008).

China's Green Securities Policies

Year	Lead Agency	Document
2001	State Environmental Protection Administration	<i>Notification of Implementing Environmental Protection Inspection of Listed Companies</i>
2003	State Environmental Protection Administration	<i>Notification of Implementing Environmental Protection Inspection of Companies that Go Public and Listed Companies that Apply for Refinancing</i>
2007	State Environmental Protection Administration	<i>Notification on Further Standardizing Inspection System for Public Application or Environmental Inspection of Refinancing Activity in Heavily Polluting Sectors</i>
2008	Ministry of Environmental Protection	<i>Instruction on Strengthening Environmental Supervision of Listed Companies</i>
	China Securities Regulatory Commission	<i>Notification on IPO Application Document for Heavily Polluting Industry</i>
	Shanghai Stock Exchange	<i>Environmental Information Disclosure Institution in Shanghai Stock Exchange</i>
2008	China Securities Regulatory Commission	<i>Notification on IPO Application Document in Heavy Pollution Industry</i>
2010	Ministry of Environmental Protection	<i>Notification on Further Tightening Environmental Inspection System of Listed Companies and Strengthening Supervision</i>
2014	Ministry of Environmental Protection	<i>Notification on Reform and Adjustment of Environmental Inspection Regime for Listed Companies</i>

Source: Authors.

Although the policy was ultimately discontinued in 2014 in favor of a policy of disclosure of environmental performance in market disclosure documentation, the policy pressed the limits of the exercise of government authority to restrict access to capital for polluting enterprises and highlighted the environmental compliance problems among Chinese companies. In 2011, the Chinese Academy for Environmental Planning published its *Evaluation Report on Environmental Performance of Listed Companies*, which showed that among 161 companies reviewed only ten companies were evaluated to possess a high level of disclosure and 40 companies or 25 percent were deemed non-compliant (Economic Information, 2011).

In October 2014, the Ministry of Environmental Protection announced it would cease inspecting listed companies and certifying their corporate environmental performance. In its place, the Ministry announced its intention to rely on market disclosure by listed companies in order to impose greater rigor in environmental protection (Ministry of Environmental Protection, 2014b). The China Securities Regulatory Commission similarly stated that environmental compliance continues to be one of its key points of review, and that they will further strengthen requirements in environmental information disclosure and verification as part of their duties (Securities Regulatory Commission of China, 2014).

Green Consumption Policies

China's green consumption principles are reflected in several Chinese laws and regulations. Some of these principles are general in nature, making them difficult to enforce, and reflect more the intent to encourage sustainable behavior rather than a strict standard or requirement. However, as with other sustainability policies, the government is gradually developing increasingly detailed regulation that signals their intended direction.

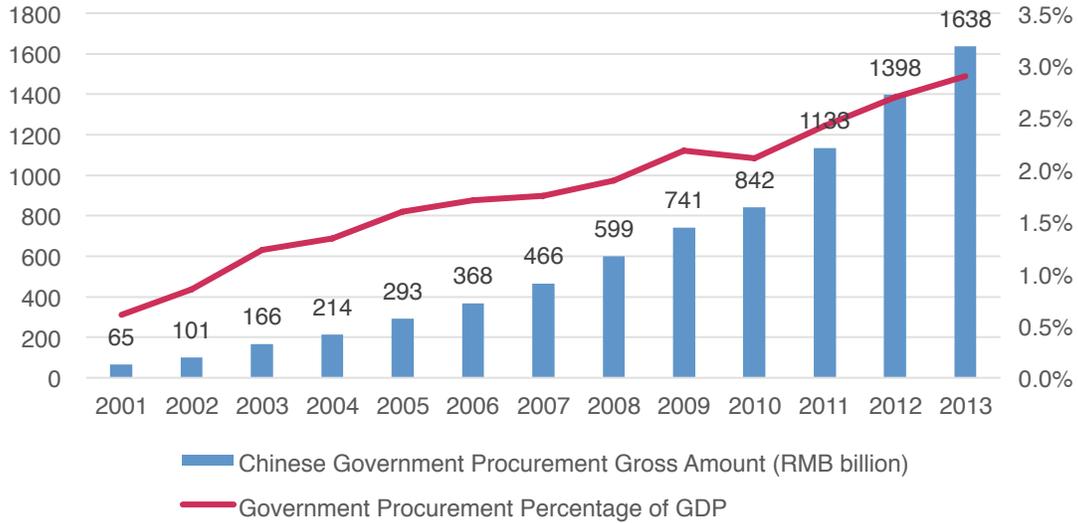
Green consumption in China operates at the government, industry and the consumer levels. We review each category of policy in turn.

The concept of green consumption policy is established in the Clean Production Promotion Law of the People's Republic of China (2002). Article 16 requires all levels of government to give priority in procurement decisions to products that are environmentally friendly and conserve resources. This encompasses products that save energy, water and promote recycling.

The Government Procurement Law, which became effective in 2003, specifically identifies government procurement as a tool to protect the environment. Article 9 stipulates that government procurement be used to support environmentally friendly production and to acquire goods that meet environmental protection standards. Goods and their suppliers that fail to meet environmental standards can be designated as ineligible for government procurement under Article 22.

As shown in the table below, China's government is an increasing source of demand within the Chinese economy. The ratio of central and provincial government procurement to GDP has steadily increased during the past decades, reaching nearly 3 percent in 2013.

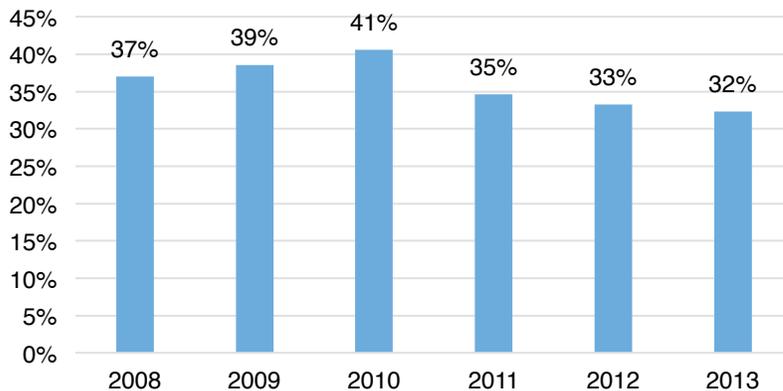
China's Government Procurement



Source: China Statistical Yearbook 2002-2014; Chinese Government Procurement Yearbook 2003-2013; Ministry of Finance, 2014.

We note that procurement from state-owned or state-holding companies are not included in these figures, which could be deemed “Potential Government Procurement”. According to current government procurement laws, only government offices, public institutions and organizations are included in the scope of government procurement regulations, but not state-owned companies. Procurement from state-owned enterprises is actually quite large. Although data on their expenditures as a percentage of GDP is not available, the following chart of capital investment of state-owned and state-holding companies to total capital investment economy-wide suggests that SOEs account for one third of economic development activity in China.

Percentage of Capital Investment from State-owned Holdings to China's Whole Capital Investment



Source: China Statistical Yearbook 2008-2014.

The Circular Economy Promotion Law of 2008 requires that governments above the county level (meaning cities, provinces and the central government) establish a responsibility system to promote circular economy. Article 8 proscribes that these government bodies should use policy, fiscal, and investment authority, as well as procurement, to promote circular economy. One of the critical implementing elements of the law is Article 18, which specifies that the government will develop a "catalogue of technologies, processes, equipment, materials and products" that are encouraged, restricted or prohibited for purchase by the government.

Article 9 imposes a duty on enterprises and institutions to "establish a sound management system and take measures to reduce resource consumption and the generation and discharge of waste, and improve levels of recycling and resource recovery." Article 11 encourages trade associations to play an active role in providing technical guidance to support adoption of the policy among their members. Additionally the law provides for information sharing, establishment of recycling programs, product labeling, tax and other incentives programs, the provision of industry-specific guidance for resource-saving measures, and industry-specific monetary penalties for noncompliance.

In addition to those provisions directing government agencies to implement green procurement and enterprises to adopt recycling and conservation measures, Article 10 of the Circular Economy Promotion Law imposes a duty on every citizen to embrace green consumption. It stipulates that "every citizen should strengthen awareness of environmental protection, practice reasonable consumption and save resources. China encourages and guides the public to use energy-saving, water-saving, and material-saving products and recycled products, reduce waste and emissions."

The Chinese government has taken a number of steps to implement resource conservation and recycling as contemplated in the Circular Economy Promotion Law at the individual consumer level. Many of the consumer policies are implemented through regulation (see CCICED, 2013, describing regulatory measures adopted by the Chinese government). For example, the *Notification on Limiting Production and Sale of Plastic Bags (12/2007)* introduced prior to the Circular Economy Promotion Law (1/2009) has reduced China's consumption of more than 24 billion plastic bags and 600 million tons of raw plastic. This is equivalent to more than 5 million tons of standard coal and represents avoided emissions of 10 million tons of CO₂ (China's Preparatory Committee for the United Nations Conference on Sustainable Development, 2012), a small step in the right direction recruiting consumers to help solve the problem.

2.2 Future Directions of Market-Based Policy Instruments in China

China's environmental policymakers are in the process of moving from environmental policy instruments to environmental markets. The transition is at the early stages. The policies reviewed here - carbon markets, green credit policy, green securities and green consumption policies - all remain works in progress. However, even at this early stage, they represent a clear shift in policy towards influencing enterprises' costs and revenues. These policies are establishing the foundation for entirely new approaches to the regulation of environmental problems in China.

3. Corporate Strategy for Competitiveness and Environmental Performance

Globalization has opened markets for Chinese companies, enabling them to export the vast majority of their production - making China the "world's factory." Liberalization of market access rules facilitated by China's entry into the World Trade Organization, some of the world's lowest labor costs, access to raw materials at low (often below market) prices, lax legal and environmental compliance standards, a strong educational system, and China's strong institutional support for economic development all have contributed to China's success in the business arena.

Markets are ever changing and, as we described in Chapters 1 and 2 of this report, new challenges are on the horizon for Chinese companies. Concerns at home about the quality of China's environment, the health of its citizens and the misuse of the country's natural resources have prompted the government to launch a "War on Pollution" while foreign countries are ratcheting up environmental standards for products entering their markets. China's traditional source of competitive advantage - comparatively cheap labor - is gradually eroding as China's central and provincial governments raise minimum wage requirements and set guidelines for wage growth to in order to improve Chinese standards of living and keep pace with inflation, putting pressure on Chinese companies to increase wages. Today, China competes within Asia with Vietnam, Thailand, India and other economies elsewhere to attract manufacturing facilities and jobs. The manufacturing and products markets that have been essential to China's rise are becoming increasingly competitive.

This chapter focuses on corporate strategy, the goal of which is to build and maintain competitive advantage. At the firm level, competitive advantage is achieved through one of two basic strategies - lower costs relative to competitors or differentiation of a company and its products (Porter, 1985). Through these strategies, a company outperforms its competition by building a superior position in the market, enhancing the capabilities of the organization and its people, and superior access to resources.

For China to retain its competitive advantage in the global marketplace, new strategies are needed. These strategies must build on China's strengths - strong educational system and its institutional support for development - while transitioning away from environmentally damaging practices that are discouraged or prohibited by national policy.

Whether a firm pursues a cost-based strategy or a production differentiation strategy, which we call an innovation-based strategy, enhanced firm performances in environmental, social and governance aspects of a firms operations can improve competitive advantage. In light of the changing dynamics facing firms operating in China outlined in Chapters 1 and 2 and above, we believe improved performance along these metrics is essential.

In this chapter we examine the tools enterprises can employ to build and maintain competitive advantage. We consider lean manufacturing approaches to lower the costs of production and innovation in product design, especially where these enhance environmental compliance. We then discuss the closely related topic of supply chain management. Next, we consider various ESG approaches such as risk management and enhanced disclosure, and how these methods can improve governance and better position a firm in capital markets. Each of these tools provides a means to engage key stakeholders in building competitive advantage: regulators, the capital markets and supply chain suppliers, customers and the public. Finally, we present the results of our own enterprise survey showing that China-based firms are concerned about increasingly stringent regulation and are responding through initiatives to improve their environmental performance.

3.1 Lean Manufacturing in China

Below we outline examples of strategies that firms can employ to build and sustain competitive advantage. These strategies are not exhaustive. And although we present these as either cost-based or innovation-based strategies, many of these strategies can produce enhanced products worth more in the marketplace, and often at lower cost through improved operational efficiency.

Examples of Cost- based strategies

- Product and packaging redesign to reduce material inputs and transportation costs
- Redesign manufacturing processes to eliminate steps and save cost
- Reduce waste output, handling and regulatory costs
- Recycle materials reducing purchasing costs and potentially creating new business lines (raw materials)
- Enhancing reputation through ESG facilitating decreased advertising or public relations costs
- Save electricity costs through conservation or process change

Examples of Innovation-based Strategies

- Introducing products that are new or improved in terms of environmental or energy efficiency performance
- Exploiting "technology forcing" legislation requiring products to meet enhanced environmental standards
- Superior access to markets by meeting standards set by importing countries
- Enhanced opportunities to sell to intermediate supply chain purchasers subject to higher standards
- Enhanced disclosure with salutary effects on perceptions of key stakeholders including government regulators, supply chain, consumers, labor, and shareholders
- Enhance use of information technologies to reduce shipment of physical products or to "dematerialize" products wherever possible
- Bundling physical products with other services to result in energy- or resource-saving that enhances profits and reduces costs

Increasingly, companies are viewing pollution as an indication that their production process is inefficient, and reducing pollution for these companies is a metric of success in achieving improved efficiency and quality. Reducing waste not only results in a greener operation, but can also increase a company's competitiveness. Especially when eliminating waste is spurred by regulation, companies that embrace this challenge are finding they are able to turn it into a competitive advantage. As one senior executive of Toyota Motor Corporation explained, "if you are polluting excessively, there are probably other improvements that can be achieved as well, such as improving efficiency" (Watanabe, personal communications, 2009).

The leading companies in every industry invariably practice "lean manufacturing" techniques. Lean manufacturing is a production practice that strives to eliminate the use of resources that do not add value to the product for the end consumer. The techniques include redesign of products, simplification of processes to eliminate steps and resources, substitution of materials, and recycling.

Companies that adopt lean manufacturing techniques have demonstrated that greener business practices enhance competitiveness. Two surveys, one of which covered over a thousand companies, found that lean manufacturing techniques enables companies to reduce costs, reduce lead-times, improve production quality and design, reduce waste, and improve market position and sales (Bergmiller and McCright, 2009; Melnyk et al., 2003).

Lean manufacturing is increasingly receiving attention in China among academic researchers engaged in improving manufacturing performance, including applied research focusing on certain companies and sectors such as power, coal, oil and gas. Universities, such as Peking University, Shanghai University of Finance and

Economics and Renmin University of China have offered lean management training to companies, as are websites such as *Chinese Lean Management*.

Chinese companies are increasingly embracing lean manufacturing techniques. Lean production has been employed for several decades in China's automotive sector (Lu, 2008). As described above, China's Circular Economy Promotion Law of 2008 promotes lean manufacturing practices by requiring enterprises to recycle materials and encouraging them to reduce their overall resource requirements. Recently, companies like Daqing Petrochemical Company, Southwest Oil and Gas, and Postal Saving Bank have started to explore and implement lean manufacture on a limited basis, such as in local branches and specific departments. Other companies are making a fuller commitment. For example, in 2014, the China Railway Group announced that they will implement lean management and are developing detailed guidance for lean manufacturing operations companywide (China Railway Group, 2014). These early leaders signal that China's state-owned companies are increasingly pursuing lean manufacturing.

3.2 Greening China's Supply Chain

The role of supply chains as a tool to enhance competitiveness and environmental performance in a new regulatory and business environment is perhaps the single most important element of any corporate strategy. The ability to green supply chains is determined by various factors, including motivation, financial and human resources, technological options and institutional capacity. For an enterprise, we see both domestic and external motivations for focusing on supply chains: Chinese government regulations, export market requirements and customer demands and consumer preferences.

Chinese policies requiring firms to reduce greenhouse gas emissions and energy use will force close examination of supply chains. Export market regulations too can force scrutiny of supply chains where the burden of compliance falls upon suppliers of raw materials through processing to end product. Consumer preferences may exert pressure on supply chains, especially where information about supply chains is made available through non-governmental organizations or publicized through the media.

Emissions Reductions through China's Supply Chains

Chinese enterprises, policymakers and expert organizations have well considered the potential emission reductions achievable in corporate supply chains. Substantial research has been conducted in China during the past decade, much of it analyzing potential policy effects on competition among firms

and industries along the relevant supply chain. These studies typically suggest a positive relationship between supply chain emission reductions and competitive impact; however the results are not uniform.

Much of the domestic research on supply chain emissions reduction concentrates on the coal industry. Recent examples of this research include Jiang (2013)'s research on supply chain emissions reduction processes and measurement for coal-fired electricity generation. Yu (2011) analyzed the coal industry's supply chain in China, which he found to be characterized by more intermediary nodes than is optimally efficient, dominated by state-owned enterprises and largely influenced by natural reserves and natural environmental conditions. This study modeled the supply chain based on possible carbon emission reductions from coal consumption. Qu and Qin (2009) argue the negotiation power of coal and electricity companies is mainly derived from economic relationships, market structure, and governmental regulation. Tan et al. (2014) constructed a linked equilibrium model between coal price and grid electricity prices based on cost variations.

Scholars have also analyzed emission reduction strategies implemented through the supply chain in light of consumer preferences as a driving factor. Ma (2013) separately analyzed three systems: carbon taxation, strict emission allowance, and carbon trading to effect emissions reduction. Ma believes that due to increasing consumer preference for low-carbon products, successful strategies for supply chain emission reduction would not only help companies to manage their supply chain, but also improve the market competitiveness of these companies, so that these companies could benefit from carbon reduction efforts. Shi and Zhao (2013) similarly focus on cooperative alliances among members of a supply chain in voluntary emission reduction markets for mutual competitive advantage among partnering companies.

We believe Chinese companies' efforts to improve the performance of their supply chains is an opportunity to build competitive advantage. According to Ryan Schuchard and Daniel Gross in BSR (2010), China's supplier factories are five times less efficient than factories in the United States. As a result, energy-efficiency investments in China are more cost-effective compared with similar initiatives in industrialized countries. This presents China with significant opportunities to enhance competitive advantage while meeting national environmental objectives. Conversely, if mainland China's enterprises do not embrace this opportunity, they might find themselves at a competitive disadvantage. Companies locating in other Asian jurisdictions such as Hong Kong, Taiwan and Singapore have thrived by identifying energy-saving opportunities.

Most research in this field in China remains limited to theoretical analysis, and studies that incorporate empirical analysis are relative rare. The reason for this is

probably that research institutions lack access to the data needed to conduct this type of analysis, as corporations restrict access due to confidentiality considerations. We believe this area presents an opportunity for firms that are willing to work with outside research institutions and NGOs under appropriate agreements to ensure confidentiality considerations are respected to enable a better understanding of their products and improve their own operations.

Export Market Influence on Domestic Supply Chains

As other countries adopt increasingly stringent requirements regulating the emissions of greenhouse gases and other environmental characteristics of products, and these regulations apply to products imported into their countries, China's manufacturing supply chains face external pressure from foreign regulatory agencies of countries to which China exports. These regulations have direct impact in China, essentially "reaching into" China via the supply chain and requiring Chinese manufactures to comply with external regulations and standards. Chinese enterprises that export their products must comply with these regulations in obtaining import approvals and in concluding sales with intermediate companies located in export countries.

The European Union has played an especially important leadership role in ratcheting up regulatory requirements for products imported from other countries. European Union environmental regulation thus has de facto extraterritorial effect through the supply chain. EU environmental regulation of products has had a profound influence on China in its own domestic legislation in various areas, including the examples of automobiles and chemicals cited in Chapter 1 of this report. In response to competitive concerns, China adopted EU standards for vehicle emissions starting in 2000 with the adoption of Euro I standards, and successively increased automotive standards to the present Euro IV standards nationwide in 2011. Chinese provinces are starting to adopt Euro V on an individual basis, starting with Hong Kong in 2012, Beijing in 2013 and Shanghai in 2014. The table below shows the progression of Chinese automotive standards influenced by European Union regulation.

EU Passenger Vehicle Emissions Standards: Adoption in EU and China

Tier	EU	China	CO	HC	NOx	HC+NOx	PM	P*
			g/km					#/km
Euro 1	1922	2000	2.72 (3.16)	-	-	0.97 (1.13)	-	-
Euro 2	1996	2004	2.2	-	-	0.5	-	-
Euro 3	2000	2007	2.3	0.2	0.15	-	-	-
Euro 4	2005	2011	1	0.1	0.08	-	-	-
Euro 5	2009	2018	1	0.1	0.06	-	0.005**	-
Euro 6	2014		1	0.1	0.06	-	0.005**	6.0×10 ¹¹

Source: DieselNet, 2014, and Author's Research. *P means particulates.

In the chemicals area, manufacturers and importers of chemicals must follow the European Union's Regulation on Registration, Evaluation, Authorization and Restriction of Chemicals (REACH). Under REACH, manufacturers and importers must register all chemicals used in quantities of one metric ton or more, submit information on their composition and evaluation of environmental and social risks posed by them, and obtain authorization for chemicals that based on evaluation are deemed "substances of very high concern". These requirements apply to the entire supply chain starting with the first point of manufacture or purchase in the EU. In order to comply with EU regulations, Chinese exporters to the EU must supply REACH information to their EU purchasers. This requirement in effect extends EU REACH's rule to the entire supply chain in the country of production. In response, China's chemical regulatory authority is adopting EU REACH principles into Chinese domestic laws, which benefits Chinese firms that export to the EU. The pressure for China to embrace REACH in its own chemicals industry is reinforced by the fact that its major competitors throughout Asia and other regions- South Korea, India, Japan (a pre-EU REACH policy), Vietnam - are all adopting REACH measures into domestic legislation. Thus, regulation in key export markets and competitive pressures are promoting enhanced standards for chemicals globally.

The European Union has also sought to influence China and other countries that supply goods to it through its proactive use of ESG. The EU *Responsible Supply Chain Management* project targeted stakeholders globally who can help shape the development of appropriate and effective employment and social legislation and policies. The project focused on three industrial sectors - cotton, sugar cane and mobile phones - in relation to five key ESG supply chain management issues - child labor, freedom of association and collective bargaining, adequacy of standard of living, unfair price levels, and biodiversity. The EU has also released ESG guidance for smaller business and practical human rights guidance for enterprises. These efforts are aimed not only at European firms that are directly subject to EU regulation and guidance on ESG, but also squarely on their suppliers who are deemed integral to compliance with EU regulations.

Supply Chain Intermediate Purchasers

Suppliers at every step in the supply chain are subject to requirements of their purchasers. Responding to both government regulation and consumer preferences, retailers and marketers are increasingly seeking enhanced environmental performance from products and more complete information about their performance. Supply chain management is now an essential tool for meeting these objectives. Supply chain customers increasingly can demand their suppliers meet environmental requirements or find another supplier.

Active supply chain management for environmental and information competitive advantage is perhaps most strongly demonstrated by the international retail firm Wal-Mart. Wal-Mart launched its Supplier Energy Efficiency Program as part of a drive to reduce 20 million tons CO₂ equivalent of greenhouse gas emissions from its operations on a lifecycle basis by 2015. Wal-Mart will accomplish this principally through its supply chain, and the program will have profound impacts in China, which is one of Wal-Mart's principal supplier countries. As early as 2008, Wal-Mart announced that the company would improve the energy efficiency of its top 200 China-based suppliers by 20 percent by 2012. In the first year alone, the program recorded an increase in efficiency of more than 5 percent in more than 100 factories, and revealed that the suppliers had the capacity to do much more. Using GHG Protocol "Scope 3" accounting approaches for supply chains, Wal-Mart is in the process of developing a comprehensive supply chain reporting system featuring product labeling that will not only enhance its environmental footprint, but will also enhance its competitive advantage vis-a-vis its suppliers and competitors, and its image with consumers (Hart, 2013).

One of the requirements that purchasers and importing countries are imposing on the supply chains is labeling. Labeling is required, for example, under EU REACH legislation. Labeling has long been understood to have implications for trade and development. For example, based on a study of export of aquatic products from China, Zhang et al. (2014) concludes that the use of carbon labels would to some extent control GHG emission, but would also raise the possibility of creating trade barriers. Similarly, Li and Wu (2014) analyzed different impacts of carbon labels on developing and developed countries, concluding that impacts could vary by technology and accounting standards in particular, and that governments and NGOs could play a critical role in shaping potential impacts.

As described above, Wal-Mart is similarly moving towards a system a carbon emissions labeling for its products, enforced through its enormous purchasing power. By quantifying GHG released over the entire lifecycle of a product, and presenting the information in a customer-friendly format, carbon labeling can support competitive advantage by positioning a brand in the eyes of consumers and customers that are concerned about consumer perceptions of corporate

environmental performance. We believe that Chinese companies that can provide accurate and preferably third party verified labels will have a competitive advantage over those that cannot. We also believe that carbon labels could find application in China's domestic market. The relatively sparse research that has been done on the implications of carbon labels in China suggests that carbon labels would influence consumers' preferences and market demand (Zhang, 2014).

With global corporate practices shifting towards aggressive action on climate change, we expect more countries and companies to adopt carbon labeling. We see this as both an opportunity and risk depending on how Chinese enterprises respond to the challenge. In this area, partnerships with other firms as well as NGOs can play a significant role in helping firms meet the requirements of regulators as well as purchasers, and enhance their competitive advantage in the process.

3.3 ESG to Address Capital Market and Investor Stakeholders

Enterprise Risk Management

Reducing a company's environmental footprint and evaluating its position relative to competitors in taking steps to shield it from risks associated with regulatory, market and climate-related physical risks are important aspects of enterprise risk management. One of the challenges for enterprises and the risk management industry is to adapt to the changing risk landscape. This requires a re-evaluation of how various types of risk will change in light of climate change, the limits of traditional methods of risk management, and how innovation in the area of firm operation and use of risk management instruments can help address these new risks.

Increasing risks posed by climate change will, we believe, impact enterprises through capital markets. A firm's valuation, its ability to raise capital through offerings of equity, and the cost of borrowing funds are all likely to be affected for those firms adversely affected by climate change. The variety of impacts on enterprises and the potential for these impacts to be felt through capital markets is illustrated by responses to the Carbon Disclosure Project, which conducts a global survey of major firms across multiple sectors every year. The banking industry responses were of particular interest because of their role as lenders and advisors in capital markets transactions. Over the past decade of the Carbon Disclosure Project, banks have been asked to respond to a simple question among others in the survey to which they have identified a number of risk: "Do you believe climate change, the policy responses to climate change and/or adaptation to climate change represent commercial risks and/or

opportunities for your company?” The table below shows the frequency of banks identifying certain risks in response to the first three years of the CDP in which 69 banks were surveyed from North America, Europe, Asia, Latin America and the Middle East, of which 84 percent responded.

Banks Identify Risks in Carbon Disclosure Project Survey

Risk	Examples of Climate Risk	Respondents Identifying Risk
Supply Risk	New technology rare materials/energy Weather disrupt supply chains Carbon credits	26%
Market Risk	Climate affects short/long term demand/market Changing consumer attitude and preference Reputation risk for emissions/environment	28%
Environmental Regulatory Risk	Cost recovery for carbon neutral technology Cost recovery for climate-related events Taxation Regulation (including competitive effects) Litigation or liability Increasing complexity of regulation Uncertain or fragmented regulation Increased disclosure obligations	53%
Operating Risk	Climate events increase operations costs Complex technology increase O&M Reduced capacity estimate risk and plan Increased demands on technical capacity Increased demands on management resources Climate reduce ability to pursue strategic plan Reduced capacity to undertake prevention	51%
Capital Markets/Finance Risk	Credit erosion, default, collateral impairment Financial asset values Accounting/financial disclosure Innovation causes capital obsolescence Market disruption/volatility Scale/transaction cost	57%

Source: Hart, 2007, based on tabulation of banks’ responses to first three years of Carbon Disclosure Project survey.

China's SOE Reforms towards Mixed Ownership

At the 2013 Third Plenum of the Communist Party of China's 18th Party Congress, Party officials renewed their commitment to reforming state-owned enterprises. An important tool for enhancing profitability and monitoring performance of state-owned enterprises is introducing mixed state and private ownership of these corporations, thereby harnessing the oversight that comes from listing shares on capital markets. The strategy implicitly recognizes the limits of SASAC's ability to impose discipline on the companies in its portfolio, and possibly transition it to a more modest role of the state's investment manager, while securities and financial regulators and the market play a regulatory oversight function.

The policy is significant because it intentionally exposes Chinese companies to outside scrutiny and pressure to perform according to market-based performance indicators. Mixed ownership will likely change the composition of SOE boards of directors or their subsidiaries, with independent, outside directors appointed by strategic investors or through agreements required by external investors. Several large Chinese state-owned companies, like China National Pharmaceutical Group and China National Building Material have been selected to implement pilot reform by the State-owned Assets Supervision and Administration Commission of the State Council (SASAC), the government entity that regulates state-owned enterprises (Chinese People's Political Consultative Conference Report, 2014). The goal is to seek external investors, including strategic domestic investors, strategic foreign company investors and investment funds that will require changes in corporate governance and corporate strategy in the pursuit of profit maximization and enhanced share value. Key sectors such as oil, electricity and infrastructure have been among the first to react to the new policy (Shanghai Securities News, 2014). Companies that have announced their intention to seek mixed ownership include China National Petroleum Company, Sinopec, China National Offshore Oil Corporation, and China Telecom (China Petroleum News, 2014; Security Daily, 2014). Enhanced corporate governance practices at the subsidiary level should provide an important model for Chinese companies to follow suit in adopting better practices at the parent level.

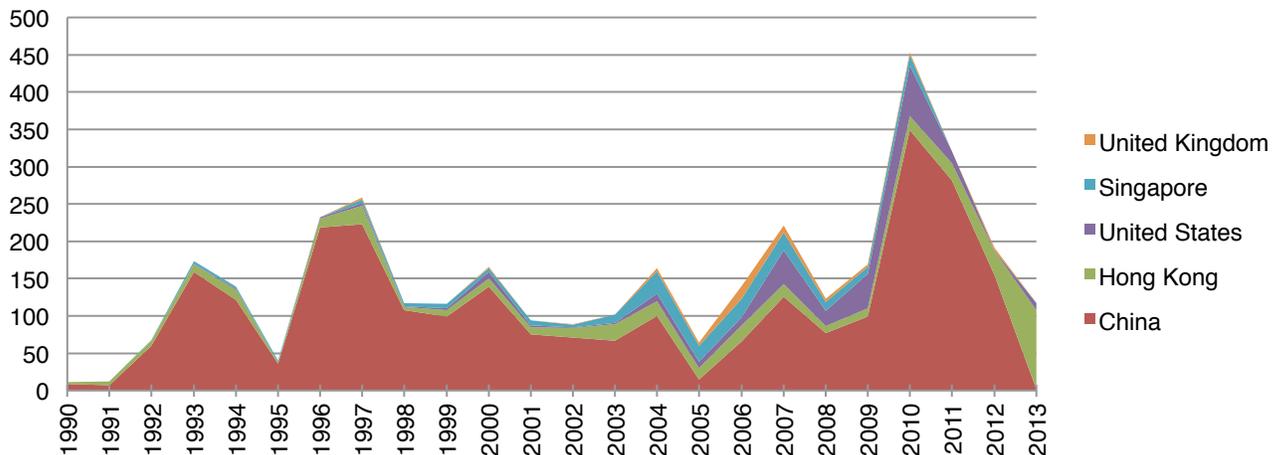
Foreign Securities Regulation and Exchange Rules

As Chinese companies increasingly raise capital through global capital markets and list their shares on foreign exchanges such as the Hong Kong, New York, Singapore, London and other international exchanges, Chinese enterprises are increasingly subject to foreign securities regulations, the rules of these foreign exchanges and international investor scrutiny. Regulatory authorities such as the U.S. Securities and Exchange Commission require standards of disclosure that may be higher than those presently employed in China. Additionally, the financial

analyst community is constantly evaluating companies for risk and compliance, creating strong incentives for Chinese companies to comply with the laws and best international practices.

As Chinese companies are now taking center stage in global capital markets, accounting for some of the largest public offerings in history, these companies must adhere to global standards for regulation and disclosure. Their ability to raise future capital and their reputation in the global marketplace depend upon it. As a result, foreign regulation in the securities and governance arena are increasingly influential in the Chinese business community.

Chinese Initial Public Offerings by Jurisdiction of Listing Exchange

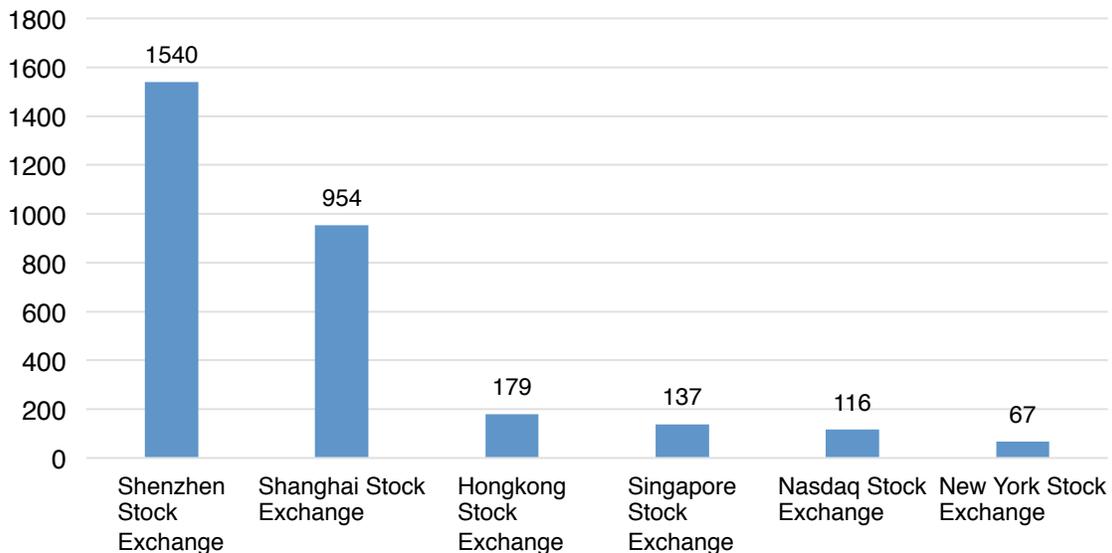


Source: DRCNET Statistical Database.

Chinese companies that are listed on foreign exchanges are not only exposing themselves to foreign regulation and increased investor scrutiny, but they inevitably will pay attention to their share price on the exchange on which they list and by extension institutional investor sentiment.

Outside of mainland China, the Hong Kong Stock Exchange is the most important exchange for Chinese companies seeking to raise capital in public capital markets. At the end of 2014, over 530 Chinese companies are publicly listed on the HKEX, which is almost twice the number of those listed on the second most important foreign exchange for Chinese companies, the Singapore Stock Exchange, and almost four times that of the NYSE and NASDAQ. With China's outward expansion, the advantages of proximity, integration and culture are likely to enhance the HKEX's role as the preferred exchange for Chinese companies capital raising efforts. In 2013, a year in which the Chinese government imposed a moratorium on IPOs on mainland exchanges, 103 Chinese companies listed securities on the Hong Kong Stock Exchange.

Listings of Chinese Companies by Exchange



Source: National Bureau of Statistics, 2014; NYSE Euronext, 2013; Taiwan Economic Journal Data Bank, 2013; NASDAQ Search, 2014.

Significantly, the Hong Kong and Singapore exchanges have the highest standards for corporate governance among exchanges in Asia (CSLA, 2014). The HKEX in 2012 developed ESG guidelines that encouraged companies to disclose detailed information to the market about their environmental, social and governance practices. HKEX plans to require listed companies to comply with the guidelines by 2015 or explain their failure to do so as part of their reporting. The HKEX ESG Reporting Guidelines provide specific key performance indicators (KPIs) in the following areas:

Workplace quality

- A1 Working conditions
- A2 Health and safety
- A3 Development and training
- A4 Labour standards

Environmental Protection

- B1 Emissions
- B2 Use of resources
- B3 The environment and natural resources

Operating Practices

- C1 Supply chain management
- C2 Product responsibility
- C3 Anti-corruption

Community Involvement

- D1 Community Investment

Singapore's SGX has similarly developed voluntary sustainability guidelines and plans to require companies to comply or explain their failure to do so in the future. In addition to SGX's own guidelines, the Monetary Authority of Singapore issued the Code of Corporate Governance which defines a corporation's board of directors' role to consider sustainability issues (environmental and social factors) as part of its strategic mission, and to set the company's values and standards (including ethical standards) to ensure that obligations to shareholders and other stakeholders are understood and met.

Greater exposure to global capital markets increases expectations that firms will comply with international best practices. In addition to exchange-imposed ESG requirements, an increasing number of Chinese firms participate in voluntary disclosure programs such as the Carbon Disclosure Project, which collects and publishes greenhouse gas emissions data and information relating to climate change risk and opportunities from over 2,500 companies. Similarly, many leading Chinese firms are electing to publish sustainability reports using third party standards such as the Global Reporting Initiative, a widely used sustainability reporting framework that sets out principles and indicators that organizations can use to measure and report their economic, environmental, and social performance.

Warming Up to ESG - China's Exchanges and State-Owned Enterprises

Hong Kong and Singapore ESG requirements are not only important in advancing ESG for companies that list on their exchanges, but also in providing leadership that we believe sets an example for China. According to the World Federation of Exchanges' 2009 study of member exchanges' sustainable investment initiatives, the Shanghai Stock Exchange (SHSE) and the Shenzhen Stock Exchange (SZSE) adopted voluntary guidelines for listed companies requiring them to report on specific ESG issues in their annual reports. The Shenzhen Stock Exchange published *Guidance on Corporate Social Responsibility* in 2006 and the Shanghai Stock Exchange published the *Notification on Strengthening Listed Companies' Corporate Social Responsibility* and *Guidance on Companies' Implementation of Corporate Social Responsibility* in 2008. The Shanghai Stock Exchange requires companies to report on promoting sustainable development in social, environmental, and economic matters. It also requires companies to measure performance in terms of "social contribution per share", which provides an ESG perspective for listed companies to evaluate their value to society (Shanghai Stock Exchange, 2008; Siddy, 2009).

In 2007, SASAC issued the *Guidelines to the State-owned Enterprises Directly under the Central Government on Fulfilling Corporate Social Responsibilities*. These Guidelines are intended to implement the spirit of the 17th CPC National

Congress and the Scientific Outlook on Development, and mandates state-owned enterprises (SOEs) directly under the central government to fulfill ESG duties, in order to realize coordinated and sustainable development of enterprises, society and environment.

The SASAC guidelines were further elaborated in 2010 in the Enterprise Internal Control Supplemental Guidelines issued jointly by the Ministry of Finance together with the China Securities Regulatory Commission, the National Audit Office, the China Banking Regulatory Commission and the China Insurance Regulatory Commission. The 2010 guidelines are designed to improve internal assessment and external auditing for improved governance of state enterprises and cover 18 specific aspects of enterprise operation.

Other laws requiring environmental and energy use disclosure further support China's ESG efforts. For example, in 2010, SASAC issued guidance on pollution to state-owned enterprises in the *Interim Regulations on Supervision and Management of Energy Conservation and Emissions Reduction of State-owned Enterprises Directly under the Central Government*. This interim regulation outlines basic working requirements, monitoring and reporting systems, inspection rules, and rewards and punishments for firms for energy conservation and emissions reduction performance. As described in greater detail in Chapter 2, China is implementing reporting requirements towards the development of a national cap and trade system that will further support ESG monitoring of Chinese enterprises.

Socially Responsible Investing Comes to China

Socially responsible investment (SRI) is a sustainable investment strategy that focuses on ESG as an indicator of future financial performance. SRI takes social, environmental, and ethical or governance issues into consideration in investment decisions. Socially responsible investing is based on the premise that superior company performance in the environmental, social, and governance areas leads to superior financial performance.

SRI is one of the most rapidly growing investment areas in Europe and North America. Socially responsible investing has grown to an estimated US \$3.7 trillion investment market by 2012, and is one of the fastest growing segments of financial markets (US SIF Foundation, 2013). Most of this demand is from large institutional investors, such as pension funds, universities, corporations, hospitals, foundations, insurance companies, nonprofit organizations, and religious institutions. With socially responsible investing representing a large and growing segment of the institutional market, companies cannot ignore their social and environmental performance.

Socially responsible investment is still at an initial stage in China. There is evidence that Chinese listed companies are already paying attention to SRI, however China's capital market does not yet depend on SRI to the extent of western markets (Duan, 2010). Eighteen investment funds operating in China invest along SRI principles (China SIF, 2014). As of December 31, 2014, these funds have an estimated RMB 23.5 billion or US \$3.9 billion under management, a portion of which may be allocated to investments in China (China SIF, 2014; Howbuy Database, 2015). The table below lists firms investing based on SRI principles in China.

Funds investing based on SRI principles in China

Fund Name	Fund Company	Fund Type	Fund Size (RMB 100 million)	Inception Year
Bank of China Growth	Bank of China Investment Management	Stock	66.33	2006
Penghua Good Governance (LOF)	Penghua Fund	Stock	32.57	2007
Aegon-Industrial Fund	Aegon-Industrial Fund Management	Stock	42.25	2008
Invesco Great Wall Corporate Governance	Invesco Great Wall	Stock	1.17	2008
Yinhua Harmony	Yinhua Fund Management	Mixed	7.66	2009
HSBC Jintrust Low Carbon Pioneer	HSBC Jintrust	Stock	6.37	2010
Zhonghai Fund New Env Energy	Zhonghai Fund	Mixed	1.91	2010
China Universal Social Responsibility	China Universal Asset Management	Stock	6.79	2011
Aegon-Industrial Green Investment (LOF)	Aegon-Industrial Fund Management	Stock	33.2	2011
Fullgoal Low Carbon Env	Fullgoal Fund	Stock	3.8	2011
CCB Principal Social Responsibility	CCB Principal Asset Management	Stock	0.86	2012
Tianhong Good Retirement	Tianhong Asset Management	Mixed	8.65	2012
Caitong Sustainability	Caitong Fund	Stock	4.93	2013
Bank of China Beautiful China	Bank of China Investment Management	Stock	0.98	2013
Hua An Ecology First	Hua An Funds	Stock	1.12	2013
Bank of China Healthy Life	Bank of China Investment Management	Stock	1.62	2014
Fortune SG Ecology	Fortune SG Fund Management	Stock	1.52	2014
Changsheng Ecological Environment	Changsheng Fund Management	Mixed	13.26	2014

Source: China SIF, 2014 (as of December 31, 2014).

In comparison to China's 1,800 publicly traded funds that are cumulatively worth 4.5 trillion RMB, China's 18 SRI funds manage assets representing only 0.52 percent of all Chinese public funds (China Fund, 2015). In contrast, investment funds incorporating ESG factors in the United States in 2012 were worth US \$1.013 trillion (US SIF Foundation, 2013), 260 times larger than that of China. Moreover, as noted above, total sustainable and responsible investing in the United States is worth US \$3.7 trillion (US SIF Foundation, 2013), over 80 percent of the value of all of China's public funds. Yet, the presence of SRI funds in China is significant for the example they set, especially if they produce superior returns through greater emphasis on risk reduction, as ESG theory predicts.

Recent surveys of investment funds show that SRI is making progress among Chinese mutual funds in three aspects: awareness, strategy and practices. The Asset Management Association of China's annual survey of mutual funds shows that awareness of SRI and concern with SRI issues among mutual funds have been gradually increasing since 2008 when the survey commenced. The table below presents the results of the annual surveys from 2008 to 2012. By the end of 2012 China had four SRI funds, eight funds that incorporated SRI elements, two SRI indexes, and four SRI finance products with about 600 million RMB invested. The 2012 survey shows that concern over SRI has increased among mutual funds from 34.2 percent in 2008 to 62.9 percent in 2012 (AMAC, 2013). Although we do not know the composition of investors accounting for this growth, it signals growing acceptance of SRI in China's capital markets.

Asset Management Association of China Survey Results, 2008-2012

Year	2008	2009	2010	2011	2012
Sample	41	57	59	68	70
Feedback	17	57	59	68	70
Feedback Rate	41.5%	100%	100%	100%	100%
Concern SRI	14	28	41	43	44
Concern Rate	34.2%	49.1%	69.5%	63.2%	62.9%

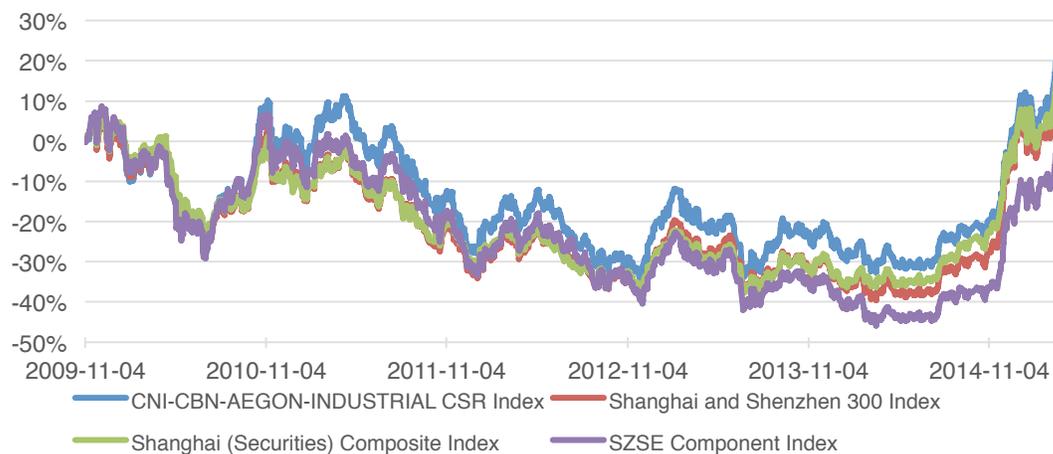
Source: AMAC, 2013.

The Socially Responsible Investment Survey of Chinese Funds 2014 released in November 2014 by China SIF reveals that of 54 mutual funds surveyed, 89 percent of fund manager reported that they pay attention to ESG performance in managing their funds. Corporate governance, product safety, and corruption were the three most important non-financial risk factors recognized by mutual funds, followed by supply chain, employee right and benefits, ESG information disclosure, air pollution control, and issues related to climate change. In particular, in light of China's severe air pollution, two thirds of fund managers expect increases in investment in the environmental protection area. Chemicals, extractive industries, and steel were perceived to be the sectors most exposed to ESG risks (China SIF, 2014).

ESG Performance and Financial Performance - Evidence From China

The ultimate test of ESG is whether it enhances profits. This crucial issue has been the subject of much research and debate in China. In the graph below, we present the performance of the CNI-CBN-AEGON CSR Index compared to leading market composite indexes for China, which show that the ESG index has outperformed the broader market. The CNI-CBN-AEGON-INDUSTRIAL CSR Index is comprised of 100 A-shares listed on the Shanghai Stock Exchange or Shenzhen Stock Exchange selected for superior CSR performance.

Performance of CNI-CBN-AEGON-INDUSTRIAL CSR Index compared with Composite Indexes



Source: Wind Database, 2015.

A number of studies have been conducted testing available data using various approaches such as valuation, financial performance and social capital. Most of the recent studies show a positive link between ESG and financial performance, albeit not uniformly. The results reveal a much richer set of relationships between ESG and corporate performance, suggesting that the proposition that corporate performance can be reduced to a single measure of profitability is too simplistic. Perhaps the questions should be how the various different aspects of ESG relate to overall performance and how best to measure performance. The richness of the results also suggests there are opportunities for enterprises to enhance their understanding of corporate performance and measurement by using ESG concepts, a theme we return to in the next section. In this section, we review selected results from some of the leading recent research in China.

Long (2013) examines CSR literature in order to explore the reasons for research results showing a divergence between corporate social performance (CSP) and corporate financial performance (CFP). Long postulates that social performance measures do not match financial performance measures, leading to different financial measures producing different results, specifically market-based financial

measures being indeterminate and accounting-based financial measures showing a consistently positive relation with social performance (CSP). Long uses two models to explain the divergence. Model 1 uses CSR indexes to measure CSP, and cumulative abnormal returns (a market-based financial performance measure) to predict CFP. Model 2 uses sub-category CSR expenditures to measure CSP, and gross revenue (an accounting-based financial measure) to measure CFP. By using a data set of 162 publicly listed manufacturing companies, which issued CSR reports in the first half of 2009, Long finds that CSP and CFP are significantly correlated and verifies market-based measures cannot give definitive results while accounting-based measures show a positive relation with CSP. Model 1 shows that a non-linear, "horizontal S-type" relationship may exist between CSR index and market-based CFP measures. Model 2 shows that total CSR expenditures significantly positively correlate with accounting-based CFP measures, but the direction and magnitude of the impact of different categories of CSR expenditure on accounting-based CFP measure may vary.

Wei and Tang (2013) used annual report data of listed companies in various sectors including mining, building and IT from 2007 to 2010, and using an adapted Solow model conclude that social responsible investment has a positive relationship with enterprise value creation. Because the influence of ESG on corporate financial performance is not directly measured, a variable Corporate Social Capital based on financial data was used as an indicator of enterprise competitiveness.

Ying (2014) studied how CSR influences corporate social capital. Ying analyzed data from 72 listed companies, defining "corporate social capital" based on seven factors: employee relations, supplier relations, consumer relations, creditor relations, partner relations, government relations, and community relations. Yin found the corporate social responsibility index significantly positively correlates to employee, customer, creditor, government, community, and to overall corporate social capital at the 99 percent confidence interval level. Only supplier and partner relations were not significant.

Yang (2013) evaluated data from 73 listed medical companies from 2009 to 2011, from two perspectives. First, Yang studied the impact of individual CSR aspects on firm competitiveness. CSR is divided into seven aspects based on stakeholder theory: shareholders, creditors, employees, consumers, suppliers, government and social welfare. Competitiveness was measured using Jin (2011)'s Monitoring System of Enterprise's Competitive Power, and data was collected from corporate annual reports and semiannual reports. Yang concluded that fulfilling responsibilities to stockholders, suppliers, creditors and government will enhance enterprise competitiveness, while fulfilling a firm's responsibility to the general public barely influences its competitiveness, and fulfilling its responsibility to its employees and consumers weakens its competitiveness.

Yang explained the counter-intuitive conclusions concerning employees as influenced by employee surplus in the pharmaceuticals industry, and in the case of consumers by the perception that pharmaceuticals earn above normal profits. We note that circumstances prevailing in the pharmaceuticals industry and consumer perceptions may have influenced the conclusion for employees and consumers. Nevertheless, the results are instructive from both a measurement and consumer education perspective. Second, Yang studied the relationship between overall social responsibility combining all seven aspects and firm competitiveness. Yang concludes that the more social responsibility efforts a firm undertakes, the stronger its competitive position will be. In the table below, we set out examples of indicative data for each of the stakeholder groups analyzed by Yang (2013).

Yang (2013)'s Corporate Social Responsibility Indicators

CSR Stakeholder	Examples of Indicative Financial Data
Shareholders	Earnings per share
Creditors	Total assets/total debts
Employees	Cash payment to workers/total assets
Consumers	Main business cost/main business income
Suppliers	Turnover ratio of account payable
Government	Tax payments
Social Welfare	Donations

Source: Yang, 2013.

Xu and Yang (2009) conducted a series of CSR surveys from 2007 to 2010 using data from the World Bank and China's National Bureau of Statistics surveying a total of 1,268 industrial enterprises in 12 Chinese cities. They evaluated CSR in terms of financial performance indicators, and also attempted to evaluate firms' social responsibility efforts in relation to social capital. Xu and Yang defined corporate social responsibility in terms of five dimensions and corporate social capital in terms of four dimensions in the context of China. Based on regression modeling, they concluded that when businesses are willing to promote social responsibility, social capital would increase accordingly.

Xu and Yang (2009) CSR Dimensions

CSR Dimension	Questionnaire (answered by yes or no)
Charity	Donate to charity and public welfare activities
	Hold or jointly organize charity and public welfare activities
	Encourage employees to participate in such activities
	Join in public welfare organization or association
Customer orientation	Do not do falsify advertising and public information
	Provide clear and accurate product information and labels
	ISO 9001 compliant
	Practice continuous improvement for customer satisfaction
Employment	Focus on employee training and investment
	Enterprise labor union
	Employees have three insurance (pension, medical, injury)
	Never default on employee wages
Economic	Contribute to national and local economic development
	Clearly advance goal of social wealth
	Efficiently provide quality products and services
	Promote local employment related policy
Environment	Establish special environmental protection department
	Achieve ISO 14000 certification
	Issue environmental performance and sustainability report
	Additional investment to achieve environmental standards

Source: Xu and Yang, 2009.

Xu and Yang (2009) Corporate Social Capital (CSC) Dimensions

CSC Dimension	Questionnaire (answered by yes or no)
Government relations	Whether enterprise general manager serves as adviser to government agencies
	Whether the firm discusses problems with local government
	Enterprise general managers have worked in government
	Government supervision conducive to developing business
Partnership relations	Firm owners worked in companies in different industries
	Borrowing between firms
	Active communication and information sharing in industry
	Maintain long-term good relations with customers, suppliers
Trust	Suppliers provide credit period of deferred payment
	Provide customers credit period of deferred payment
	Local government is transparent and credible
	Partner enterprise is worthy of trust
Social Networking	Participated in industry or business association
	Loans from banks or other financial institutions
	Borrowing from friends and relatives
	Loans from informal financial market

Source: Xu and Yang, 2009.

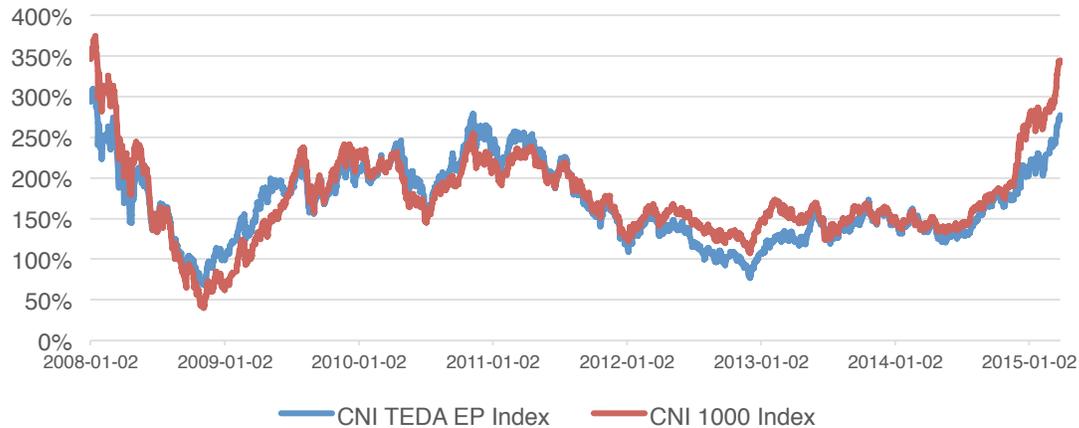
Hao (2014) evaluated how corporate social responsibility impacts corporate financing based on data from listed chemical companies from 2008 to 2009. Hao found that the requirements of raising capital exert pressure on companies to engage in social responsibility efforts and disclose CSR-type information.

Wang et al. (2013) evaluated the influence of CSR on institutional investor preferences by using panel data to model the relationship between the percentage of Chinese company shares held by financial institutions and those companies' CSR practices. Based on empirical analysis of 918 companies listed on the Shanghai and Shenzhen exchanges from 2006 to 2010, they found that institutional investor ownership is positively related to CSR centering on government and community aspects. They further found that different types of institutional investors have different preferences for certain CSR themes, with funds having a unique preference for CSR based on government.

Sun and Zhang (2012) found that SRI investors influence controlling shareholders or business management through a variety of shareholder activities. They argue that where the interests of stakeholders are fully considered and promote corporate social responsibility, SRI and controlling investors share certain business risks through their common investment driven by their concern about the survival and development of the companies they invest in. Thus, CSR in response to SRI can reduce financing cost and business risks.

Qiao and Long (2010) measure China's capital market's response to SRI principles with the aid of the China TEDA Environmental Protection Index, and conclude that China's capital market positively responds to SRI information disclosures by listed companies.

In the graph below we compare the performance of the China TEDA Environmental Protection Index (index code 399358), an index of 40 A-shares related to environmental protection listed on the Shanghai Stock Exchange or Shenzhen Stock Exchange, with the CNI 1000 INDEX (index code 399311), which includes the top 1000 stocks in the Shanghai Stock Exchange or Shenzhen Stock Exchange. The China TEDA Environmental Protection Index appears to closely track the broader market.

CNI TEDA EP Index compared with CNI 1000 Index

Source: Wind Database, 2015.

Kong and Zhang (2012) reviewed 2010 annual CSR reports and annual report of 16 listed banks. Regression analysis of the rate of CSR information disclosure and financial performance showed a modest positive correlation.

Zhu et al. (2012) used the Shenzhen Social Responsibility Index and the Shanghai Social Responsibility Index to test social responsibility investment performance in the Shenzhen and Shanghai stock markets from August 2009 to December 2011. They evaluated the yields of social responsibility indexes and market indexes, and found the mean yields of social responsibility indexes are superior to the mean market index both in Shenzhen and Shanghai during the test period.

Zhu et al. (2012) Shenzhen Index Comparison

	Sample	Mean	SD	T-value	P-value
Shenzhen Social Responsibility Index	583	-0.0305	0.0434	15.996	0.0000
Shenzhen Market Index	583	-0.0714	0.0434		

Zhu et al. (2012) Shanghai Index Comparison

	Sample	Mean	SD	T-value	P-value
Shanghai Social Responsibility Index	606	-0.0721	0.0434	-1.002	0.317
Shanghai Market Index	606	-0.0666	0.0434		

Source: Zhu et al., 2012.

As noted above, not all studies have uniformly concluded that CSR has a salutary effect on corporate performance. Xu and Xiao (2013) tracked five main social responsibility indexes in China's stock market from August 2009 to December 2011, and found that, compared with their benchmark *Hu Shen 300 index*, results were mixed. Overall, they concluded that the performance of social responsibility investment is not worse than traditional investment, and does not have obvious disadvantages.

Hu et al. (2013) evaluated CSR disclosure measured by the number of pages of corporate CSR reporting in annual reports against stock prices for 222 A-share private companies listed on the Shanghai Stock Exchange (SSE) before 2009. The result shows a strong negative correlation between environmental social governance disclosure and stock market price. This study is one of the outlier results and we note that the number of pages of social responsibility reporting as a means to evaluate CSR may not be a meaningful measurement of the quality or materiality of information reported or actual CSR performance.

Chen and Ma (2006) evaluated market reaction to CSR reporting using 907 listed companies' stock price data and their CSR accounting information status. They concluded market reaction to CSR information is relatively weak based on their chosen set of indicators. We note that this study predates the entry of the first SRI fund in China by at least several years, and almost a decade before socially responsible investing and CSR would emerge as an issue of concern for most Chinese mutual funds and the investment community generally.

ESG Performance and Reporting - Room for Improvement and Opportunity

ESG performance and reporting among Chinese companies is widely understood to fall short of that of their western counterparts. The motivation to improve performance as a result of reporting remains difficult to prove for China² but we believe the link is intuitively strong and unambiguous - reporting provides a compelling incentive to improve performance. A great deal of attention has been paid to this topic in industry and academic circles in China and here we review the issues identified with reporting by Chinese companies. Given the state of ESG performance and reporting, we see room for improvement as well as an opportunity for those firms that elect to claim a leadership position in ESG reporting.

² Research demonstrating the relationship in China is scarce but encouraging. See, e.g., Kong and Zhang (2011) who reviewed 2010 annual CSR reports and annual report of 16 listed banks. Regression analysis of the rate of CSR information disclosure and financial performance indicators showed a modest positive correlation.

Several scholars have evaluated the effectiveness and standardization of existing ESG reports and environmental information disclosure reports, identifying inadequacies in reporting. Peng and Zhang (2013) evaluated the reporting of 117 listed companies and concluded that current CSR accounting information is inadequate. Hou (2013) evaluated CSR accounting information disclosure for 100 listed energy companies and concluded that only 13 percent prepared good quality disclosures, whereas reporting of 38 percent or three times that number was deficient. Tao and Zheng (2013) analyzed CSR reports from China's top 100 enterprises, evaluating their environmental disclosures. Their conclusions confirm the findings of other scholars and provide insights into current practices:

- ESG reporting for these enterprises reached a common but relatively low level. The overall level of environmental information disclosure is relatively poor. Significant gaps between China and developed countries exist.
- Overall, environmental information disclosure by industries related to the environment (energy-intensive industries and highly-polluting industries) is higher than other industries, and private enterprises exhibit slightly better environmental information disclosure than state-owned enterprises.
- The poor performance by industry in terms of quantitative disclosure is a common failing among study companies, reflecting huge potential to improve domestic corporate environmental management.
- Under China's domestic institutional system, government regulation of corporate management can significantly impact enterprise behavior.
- Mobilization of social pressure presently would be the most important means to advance China's environmental conditions.

Several scholars have attempted to explain the reasons for poor performance in ESG among Chinese companies. Su and Li (2011) argue that the lack of adequate environmental legislation, fragmented environmental policy, and poor environmental awareness among corporations are the main barriers to implementation of corporate environmental responsibility. Based on a study of two serious pollution accidents in China, Xu and Xiao (2013) concluded that poor safety regulation, a culture of secrecy, and weak penalties are the main reasons for poor awareness of environmental social responsibility among enterprises. Peng et al. (2012) evaluated annual reports and CSR reports of 60 listed enterprises in the agricultural sector in the midst of the food safety scandal, and found that only two companies in 2007 published CSR reports, and 16 companies submitted CSR reports in 2008 and 2009, attributing the low reporting rates to poor awareness of ESG information disclosure, mainly due to China's institutional environment and market structure. Yang (2012) argues that China's

ESG development remains in an early stage, and although some progress has been achieved, the overall status of ESG implementation is unsatisfactory, citing problems such as fake and inferior products, false or unreliable advertising, failure to adequately protect employees, lack of public trust, lack of environmental protection awareness and general apathy towards social goals.

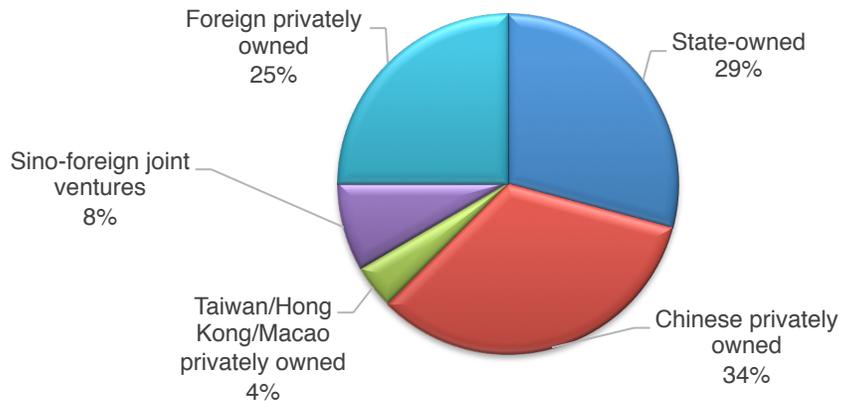
Significantly, the SRI community is developing in China, and research conducted in the private sector and academia is aimed at improving ESG performance and reporting and screening tools. For example, several Chinese academics have attempted to improve ESG systems by suggesting new designs. Guo (2013) proposed an environmental awareness system for Guizhou province. Zhang and Zhang (2011) advocate SRI screening systems be employed in China from the financial, environmental and social perspectives. Similarly, Cai (2012) describes how western insurance companies invest using SRI principle and suggest that Chinese insurance companies can use the same methods of positive and negative screening, shareholder advocacy, and community investing to achieve superior results.

3.4 Enterprise Responses to ESG Drivers: Evidence from our Corporate Survey

As part of this report, we conducted a survey of domestic and foreign enterprises operating in China, as well as additional surveys of experts drawn from academia and NGOs knowledgeable about practices of corporations and government agencies in relation to environmental compliance in China. We surveyed 72 enterprises and 16 experts during the November 2014 through February 2015 period. Representatives of enterprises were interviewed on a confidential basis. Some survey respondents did not answer all survey questions so the number of responses varies by question as indicated in our summary.

Of our 72 corporate survey participants, 20 enterprises or 28 percent are publicly traded. The most common types of ownership represented in the survey were Chinese mainland privately owned enterprises (24 enterprises), followed by state-owned (21), and foreign privately owned enterprises (18), then Sino-foreign joint ventures (6) and Taiwan/Hong Kong/Macao privately owned firms (3). These companies were almost evenly distributed by size, ranging from largest (15 enterprises), top 10 (21), medium (18) and small (18).

Enterprise Survey Participants by Ownership

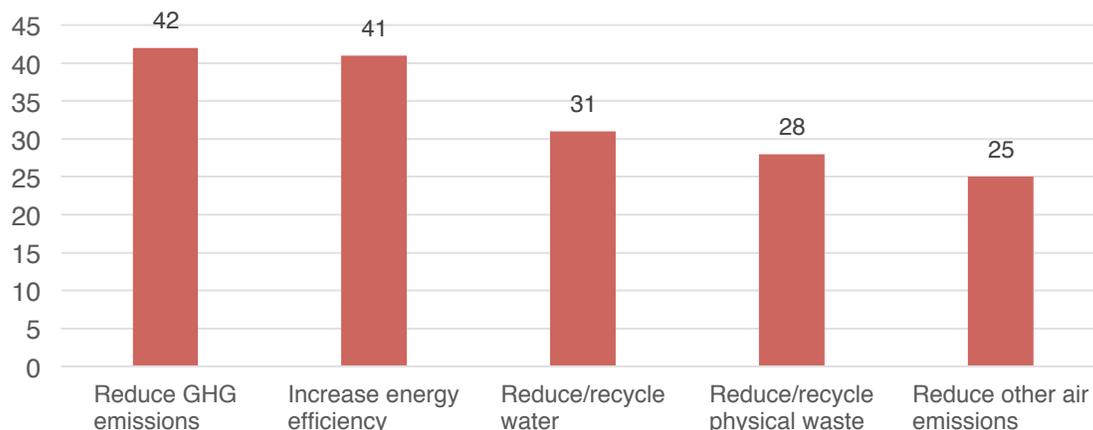


Source: Authors.

Survey respondents were similarly diverse with 11 industry categories represented. Three segments accounted for 56 percent of respondents. These were financials represented by 19 firms, energy industry by 11 enterprises, and manufacturing by 10 firms. Other industry segments included food/drugs (7 firms), transportation (7), electronics (6), chemicals (4), service industries (4), IT (2), buildings/appliances (1) and household/personal products (1).

Corporate survey participants were asked to report the types of initiatives they have launched to mitigate their environmental impacts. Of the 72 companies, 42 companies (58 percent) have initiated programs to reduce GHG emissions and 41 companies or 57 percent are seeking to increase energy efficiency. We note that for many companies efforts to reduce GHG emissions and increase energy efficiency are the same programs. Significantly, of the 54 Chinese domestic companies surveyed including Sino-foreign joint ventures, 28 companies (52 percent) reported having initiated GHG or energy efficiency programs.

Enterprise Environmental Initiatives



Source: Authors.

We asked survey participants to identify and rank the drivers motivating their environmental initiative based on the strength of the driver - 1 for none, 2 for weak, 3 for medium, 4 for strong, 5 for very strong. Of the drivers identified, six exert relatively greater influence: long-term competitiveness considerations, concerns about current or future Chinese law or regulation, media opinion, international standards, and investor sentiment. The table below reports the average rankings and number of participants identifying each driver.

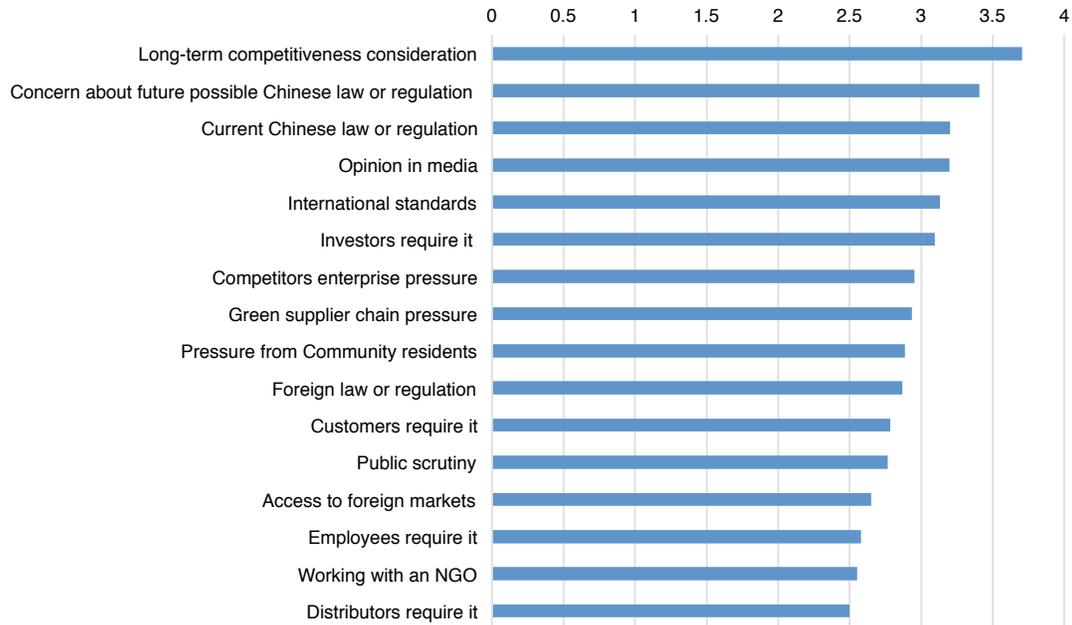
Drivers Motivating Enterprise Environmental Initiatives

Driver	Strength of Driver	Participants Identifying Driver
Long-term competitiveness	3.73	61
Concern about future Chinese regulation	3.41	59
Current Chinese law or regulation	3.20	60
Media opinion	3.20	61
International standards	3.13	61
Investor requirements	3.10	63
Competitors	2.95	60
Supply chain requirements	2.93	59
Pressure from local community	2.88	60
Foreign law or regulation	2.87	61
Customer requirements	2.78	60
Public opinion	2.77	60
Access to foreign markets	2.65	60
Employees	2.58	59
Partnership with an NGO	2.55	58
Distributor requirements	2.50	58

Source: Authors.

Long-term competitiveness was the most important reason motivating companies to take environmental initiatives, taking into account both the number of companies citing it and the strength of the driver. We think this reflects management's recognition that the public perception of superior environmental performance can provide a competitive advantage to the firm. Our conclusion is further supported by the prominence of concerns over media opinion. Concern over current and future Chinese law or regulations were also prominent, as well as international standards, suggesting that firms are responding to government efforts to tighten environmental regulation. Investor requirements were also among the top reasons cited for launching these initiatives.

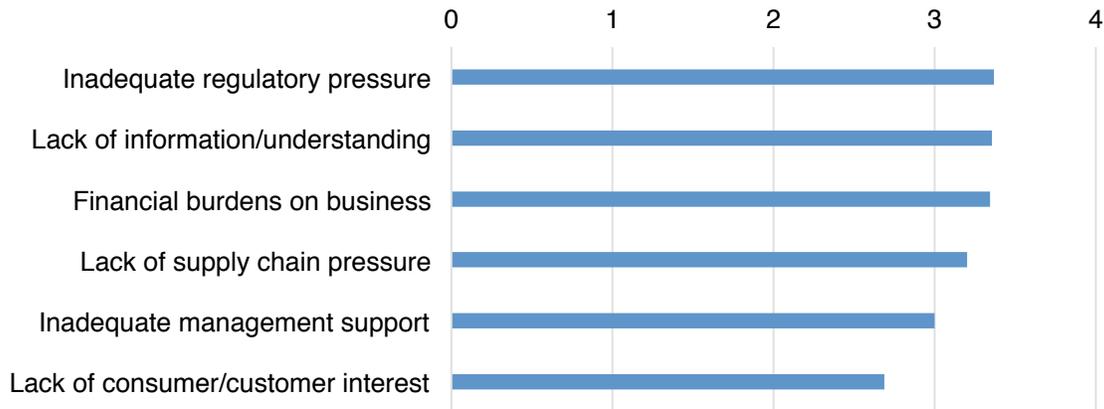
Drivers of Enterprise Environmental Initiatives by Impact



Source: Authors.

Companies were also asked to identify the barriers they face in undertaking initiatives to reduce their environmental impacts. Companies were asked to evaluate barriers in terms of degree of influence using the following criteria: (1) none, (2) weak, (3) medium, (4) strong, and (5) very strong. The survey revealed that certain barriers exerted significant influence, in particular inadequate regulatory pressure, lack of information, and financial burden. Moreover, experts we interviewed consistently identified lack of regulatory pressure in particular as a barrier.

Barriers to Enterprise Environmental Initiatives by Impact



Source: Authors.

Importantly, lack of consumer or customer interest was a comparatively weaker barrier, just as it had been as a driver. The neutrality of customer opinion confirms that customers are not yet playing a significant role in driving company agendas. However, we also see an evolving marketplace shaped by increasingly stringent regulations and consumers who are growing in awareness. And, as suggested by our consumer survey and others like it, consumer sentiment represents a potential opportunity for firms positioned to shape and exploit consumer preferences for environmental goods.

4. Green Consumers in China

The concept of the "consumer" as we know it today has existed in China for little more than a decade. The Chinese consumer has experienced a rapid evolution in terms of rising income levels, transition from rural to urban lifestyle, and greater access to global goods and services. Importantly, the birth of the modern Chinese consumer also means a transition from purchasing goods and services out of necessity to purchasing out of desire. At the same time, Chinese consumers have also become consumers of vast amounts of information available through social media via the internet and cell phone, making them far more aware and educated.

We believe the Chinese consumer remains in a transition phase. We believe that the information revolution and the need for the individual to exercise control over his or her environment and express himself or herself through action is, and will increasingly be, expressed through the medium of consumerism. Thus, consumer perception shaped by both the conventional and electronic and social media can trigger changes in consumer sentiment rapidly. Companies must now pay close attention to the views 1.35 billion Chinese consumers, over half of which are already urbanized, a proportion that steadily continues to rise.

We believe that consumers will exert influence on issues of concern to them, including the areas of environment, health and safety. Consumers and information have already played a vital role in solving environmental problems, sometimes with dramatic consequences for the companies involved. Consumer awareness has driven demand for disclosure of environmental information about products and the companies that make them and, in turn shifted markets. As described in detail in Chapter 1, the 2008 milk scandal case, in which the industrial chemical melamine was intentionally added to milk, illustrates the power of consumers to drive change in response to environmental, health and safety concerns.

In this Chapter, we focus on the Chinese consumer. The consumer represents the endpoint or objective of the value chain. Understanding the consumer is essential to developing a successful strategy to build and maintain competitive advantage. We discuss the following topics centering on the consumer in the larger context of shaping strategies to enhance competitive advantage and environmental performance:

- Mainstreaming green consumption in China
- Strategies to shape consumer preferences for green products; and
- Eco-labels and ESG as ways for companies to seize the initiative in communicating their brand with consumers.

4.1 Mainstreaming Green Consumption

The concept of “green consumption”, the idea that consumers can use their spending power to advance environmental protection and minimize the adverse affects of their consumption, originated in 1963 when the International Organization of Consumer Unions proposed that consumers have a duty to protect the environment. In 1992, the United Nations Conference on Environment and Development formally proposed the concept of sustainable consumption and advocated that countries adopt it in practice. The idea gained acceptance in Europe and the United States in the late 1990s and has since become mainstream in a number of markets ranging from organic foods to consumer choice among renewable and other cleaner energy sources for home electricity. More recently, the concept of green consumption combined with life cycle analysis are used to justify extended producer responsibility policies imposing duties on manufacturers to take responsibility for post-consumption waste generated by their products (See, e.g., OECD, 2001).

Green consumption can only be effective if consumers show strong preferences for green products and exhibit a credible willingness to accept the associated costs for those products, thereby enabling corporations to scale up green production. Thus, green consumption poses the same fundamental challenges presented by traditional corporate strategy and product marketing - how to educate the consumer about the superiority of a product and persuade the public to pay more for premium products while establishing the brand's identity firmly in the minds of consumers. For firms that position themselves as providers of high-value goods and services, the green consumption movement can support their corporate and marketing strategies.

As we discussed in Chapter 1, one of the major challenges for China is historically low levels of disposable income. However, as China urbanizes and income levels rise, a new class of Chinese consumers has emerged that has the potential to make choices based on quality and environmental impact. We believe that the future of China's business practices and green consumerism is tied directly to these emergent consumers.

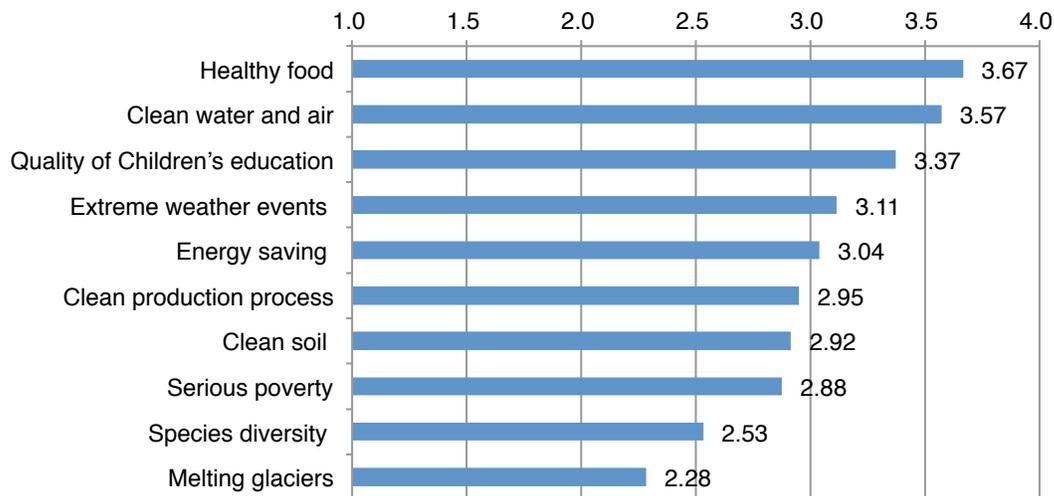
Research of the Chinese market strongly suggests that Chinese consumers will respond to green consumer and environmental appeals as described further below in this chapter in greater detail. One survey of 3,000 Chinese consumers in the cities of Beijing, Shanghai, Wuhan and Shenzhen carried out from 2009 to 2013 by the China Chain Store & Franchise Association and Renmin University of China reveals that almost 84 percent of consumers surveyed were willing to pay some premium for green products, citing environmental protection concerns. Over 12 percent were willing to pay a premium of 10-30 percent or were

indifferent to price. Another 25 percent were willing to pay a 5-10 percent premium for green products (Li et al., 2014).

At the same time, consistent with the challenge of low levels of disposable income among a large segment of the Chinese population, producers must remain concerned about the cost of products. According to the study, while those willing to pay a substantial premium represent a sizeable market segment at over 37 percent, 45 percent of those surveyed would only pay a premium of less than 5 percent. Significantly, the research also showed that almost 54 percent of consumers were motivated by expectations of cost savings, suggesting that notwithstanding consumer willingness to pay a premium for a product or service, retailers must remain conscious of the need to deliver some tangible economic benefit over the product's life (Li et al., 2014).

Our own survey of consumers conducted for this study confirms the findings of other surveys that show Chinese citizens are concerned with deteriorating environmental conditions. During January to February 2015, we surveyed 201 individuals in person and on-line, primarily from Beijing, Shanghai, Hubei, Jiangsu, Guangzhou and Gansu provinces. Our results show that Chinese consumers are most concerned about healthy food, clean water and air quality. The graph below shows the survey participants average degree of concern for specific environmental issues based on a ranking of 1 (do not agree it is a concern) to 6 (completely agree it is a concern).

Respondents' Degree of Concern for Specific Issues

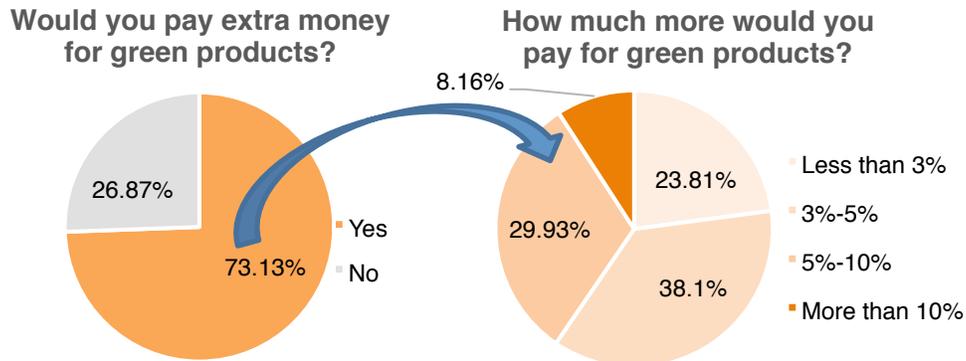


Source: Authors.

As in other studies described in this report, Chinese consumers also demonstrated a general willingness to pay for green products. In our survey, 73 percent of respondents said they would pay extra money for green products, and

76 percent of those would accept a 3 to 10 percent price increase. Significantly, 6 percent of all consumers surveyed would accept an increase in price of 10 percent or more. These numbers suggest potential market growth for green products is substantial.

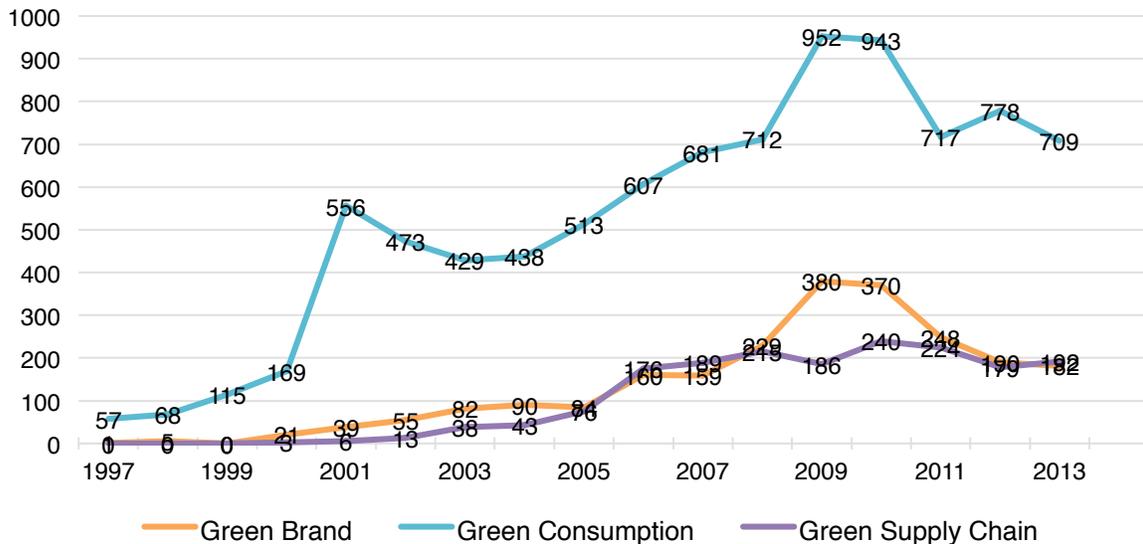
Respondents' Willingness to Pay



Source: Authors.

Green Consumption in China

Green consumption has attracted considerable attention in policy and academic circles in China, and is of increasing interest to the business community. Research on green consumption in China encompasses several themes: identifying decisive factors influencing green consumption behavior, surveying public environmental awareness, exploring potential barriers to green consumption and green production, willingness to pay studies, and the formation of green markets. The figure below illustrates the growth of interest in green consumption, showing the number of articles published by Chinese researchers in domestic journals based on a key word search of three core topics from 1997 to 2013: "green brand", "green consumption" and "green supply chain". Most interest in green consumption has occurred since the 2000s, spiking around the food safety scandal in the late 2000's, and remaining steady since.

Key Word Search of CNKI Database, 1997-2014

Source: Authors, CNKI Database.

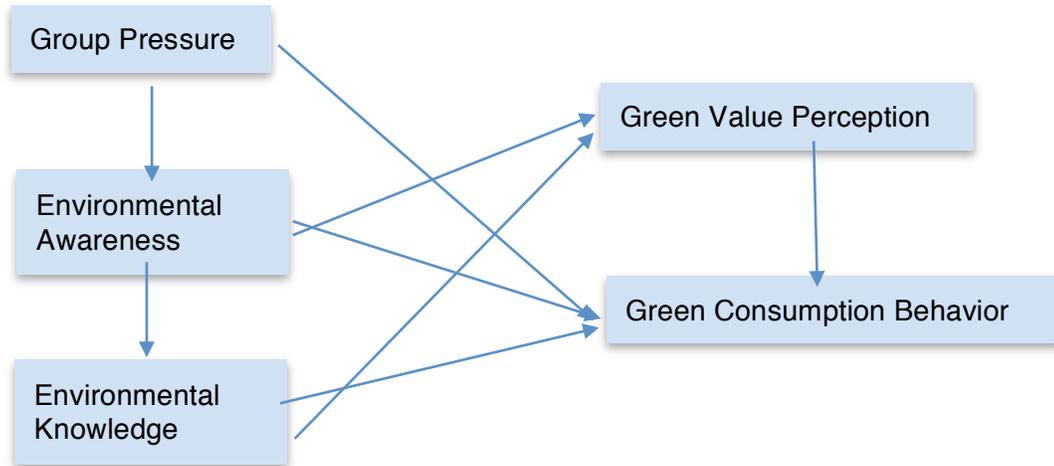
The potential for a new strategy to drive consumer demand in a market the size of China creates truly significant opportunities for Chinese industry. As we saw from the food scandal of the late 2000s, shifting consumer sentiment along green consumption lines can significantly impact markets, creating both winners and losers.

Green Consumption Models

Numerous models seek to explain individual consumer behavior, and several of these models have been adapted to green consumption research. Here we briefly review three models of green consumption behavior in China that are based on the Theory of Planned Behavior or the Value-Belief-Norm Theory. These models provide a framework to evaluate consumer decision-making and to organize the growing body of survey research identifying specific factors driving green consumer behavior in China, a topic to which we turn in the next section.

The Theory of Planned Behavior model suggests that the greater the degree of external pressure an individual feels, the more likely the individual will engage in certain behaviors. Yu (2009) proposed a green consumption behavior formation mechanism based on the theory that operates through the mechanisms of group pressure and environmental cognition. Yu Wei's green consumption mechanism is presented in the diagram below. In the diagram, arrows indicate one-way causal relationships.

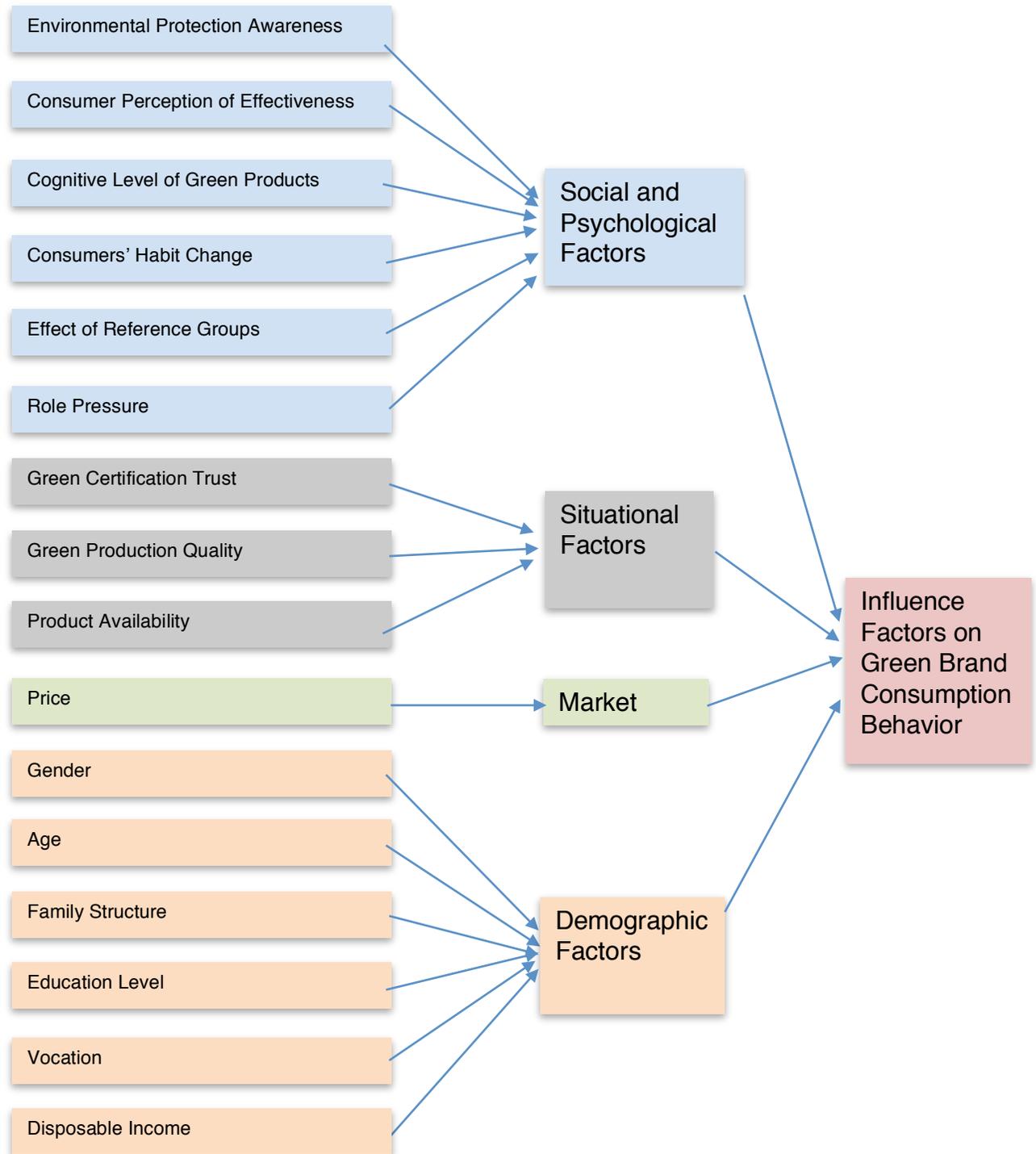
Green Consumption Behavior Formation Mechanism



Source: Yu, 2009.

Qiu (2012) developed the "Green Brand Consumption Influence Factor Model", which seeks to explain the motivations and influences of consumers who purchase green products in China. Based on international research, Qiu separates Chinese consumers into five different categories - green actor, green thinker, green consumption foundation, green follower, non-green group, and then identifies the preconditions in green products selection. This model incorporates social and psychological, situational, market and demographic factors.

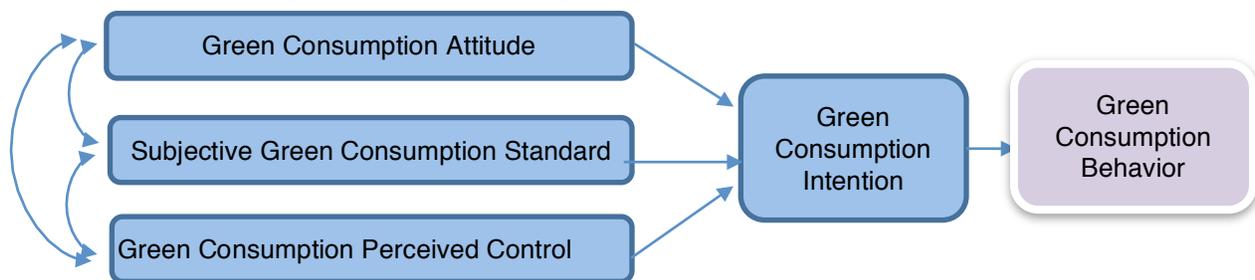
Influence Factors Model of Green Brand Consumption Behavior



Source: Qiu, 2012.

Lao and Wu (2013) build on the Theory of Planned Behavior in advancing their "Green Consumption Behavior Impact Mechanism Model." In this model, three factors - consumers' green consumption attitudes, their subjective green consumption standard and their green consumption perceived control - influence consumers' green consumption intentions, and ultimately decide consumers' green consumption behavior. In this mechanism, *green consumption attitude* refers to the degree that consumers like or dislike green consumption behavior. *Subjective green consumption standard* is the social pressure exerted by others and experienced by the consumer during his or her decision-making process concerning green products. *Green consumption perceived control* relates to the consumers' perception of the feasibility and difficulty level of implementing green consumption. It is consumers' perception of factors facilitating or blocking green consumption. These factors shape green consumption intention, which is consumers' willingness to embrace green consumption, and ultimately forms green consumption behavior reflected in overall purchasing decisions.

Green Consumption Behavior Impact Mechanism Model



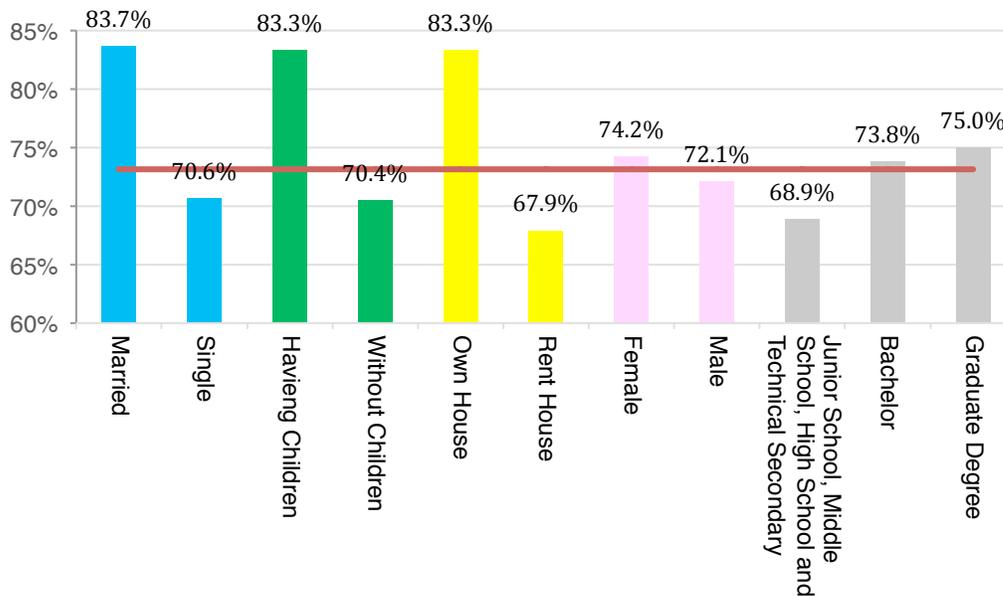
Source: Lao and Wu, 2013.

These and other models like them attempt to explain the formation mechanism of green consumption behavior based on analysis of human behavior from different perspectives, including basic demographic characteristics, internal factors such as subjective attitude, perception, knowledge, and external factors such as group pressure, market information, and product availability. Although factors vary considerably in terms of causality and emphasis, model construction in all three examples depends on, or refers to, similar basic theories that explain human behavior, such as the Theory of Planned Behavior and the Value-Belief-Norm Theory. These models also share several points in common. They seek to identify incentive factors (both internal and external) for green consumption, and can be tested using surveys to evaluate whether these factors significantly impact green consumer behavior. We now turn to the survey-based research that identifies specific factors that drive green consumer behavior in China.

4.2 Factors Shaping Green Consumer Preferences

Based on these formation mechanism models, research based on consumer surveys has sought to identify those factors that motivate green consumption behavior. Our own survey conducted for this study confirmed that certain demographic characteristics have strong effects on consumer green purchasing preferences and their willingness to pay for green products. Based on 201 Chinese consumers surveyed during the January to February 2015 period, our results show that marital status, the presence of children, economic status (as reflected by home ownership), age and education level are strongly predictive of the propensity for green consumption. Generally, these factors indicate a higher willingness to pay for green products, and women exhibit slightly higher willingness to pay for green products than men. Our results are consistent with other domestic surveys, as shown by the graph below. In the sections that follow, we review and evaluate the results of third party surveys concerning specific demographic factors influencing Chinese consumers.

Willingness to Pay More for Green Products by Demographic Factors



Source: Authors.

Demographic Characteristics

● **Gender**

International studies show gender is a relatively significant explanatory variable in environmental awareness and activities related to green consumption. However, domestic research shows mixed conclusions with respect to the influence of gender. Some domestic studies show women have higher levels of participation in environmental issues, while others show less participation or no significant relationship exists.

- Bai and Wan (2012) conducted a survey in Jiangsu province that shows *women have higher levels* of green consumption cognition and behavior.
- Wang (2008) concluded the women have better performance in personal environmental habits, but the difference is insignificant in public environmental behavior.
- Qiu (2012) surveyed 368 subjects, and concluded that gender has no significant influence on green consumption.
- Qiu (2012) verified Thompson (1998)'s conclusion that marital status combined with gender might be very important to identify green consumers, but not gender itself.
- Wang (2003) surveyed five western provinces and concluded men exhibited higher environmental awareness than women.

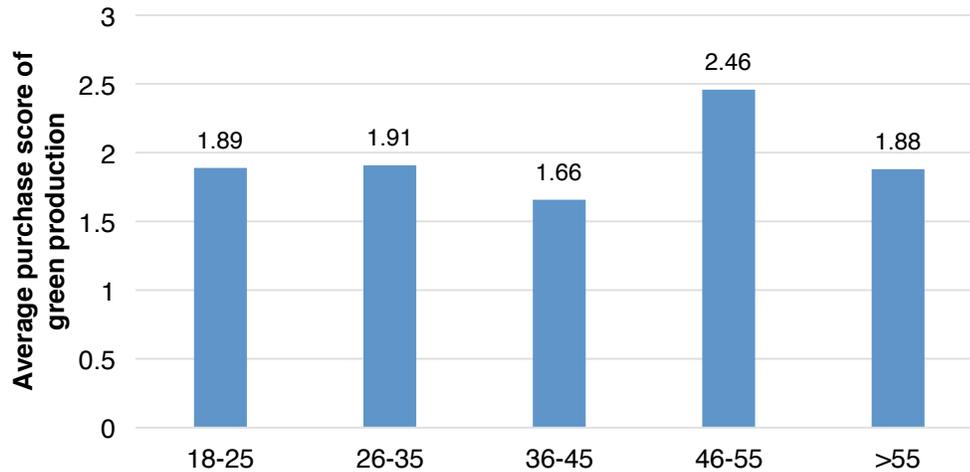
We believe that the results of surveys seeking to isolate the effects of gender on green consumption may be confounded with other gender-influenced variables such as the degree to which women participate in the workforce, political activities and educational levels. These other variables may vary by location, degree of urbanization and economic development, and local cultural characteristics. We think this is an area where further research is warranted. As in many other countries, women do the majority of household purchasing in China (Chen and An, 2000) and are a driving force behind the growth of Chinese consumerism (Ye, 2010). A better understanding of the effects of gender on green consumerism is therefore essential to any strategy seeking to exploit the environmental benefits of products.

- **Age**

Most domestic studies show younger generations are more environmentally aware and possess greater environmental knowledge. At the same time, some studies suggest older consumers appear more likely to engage in green consumption. Yet others conclude no significant relationship exists between age and consumption behavior.

- The China General Public Environmental Survey (2007) conducted in 20 provinces concluded that younger consumers have higher environmental awareness than older consumers (Sociology Research Institute of Chinese Academy of Social Sciences, 2008).
- The National Public Environmental Awareness Survey (1998) shows the young pay more attention to environmental protection than adults. According to this survey, 70.3 percent of teenagers receive environmental knowledge from schools (State Environmental Protection Administration and Ministry of Education, 1998).
- Bai and Wan (2012) conclude older individuals know more about green consumption.
- Wang (2008) argues age has no significant influence on environmental behavior.
- Qiu (2012) analyzed survey results collected by Scheffe and found people between ages 46 to 55 spend significantly more on average for green brands and products. Qiu concluded that older consumers pay more attention to environmental and personal health. The figure below shows Qiu's survey results for average spending on green products by age group. The y-axis refers to green consumption score based on a range from 1 to 3: 1 indicates never purchases green goods, 2 indicates occasional purchases, and 3 refers to regular green goods consumption.

Consumers' Average Spending on Green Brands by Age Group



Source: Qiu, 2012.

We believe that the relationship between age and green consumption is complex, involving up and coming generations being more environmentally aware, but older more established generations having higher levels of discretionary income to spend on green consumption. Younger generations are likely being socialized positively toward green consumption and this creates opportunities in the intermediate future for firms to develop products targeting this rising consumer group, as well as older generations with greater disposable income that may pay closer attention to health as they age. We also believe that marketing research must be conducted at the brand and product level to ascertain how these dynamics will shape the market for any particular product.

● **Marital Status and Children**

Most domestic studies show marital status alone is not predictive of green consumption behavior, but marital status combined with children exhibits a significant positive relationship with green consumption.

- Bai and Wan (2012) shows marital status could only significantly influence green consumption behavior but not green consumption attitude or cognition. They found that married people who have children show stronger green consumption behavior.
- Qiu (2012) verified Thompson (1998)'s conclusion that marital status combined with gender might be very important to identify green consumers, but not gender itself.
- Qiu (2012) concluded families with children spent significantly more on green consumption on average than those without children.

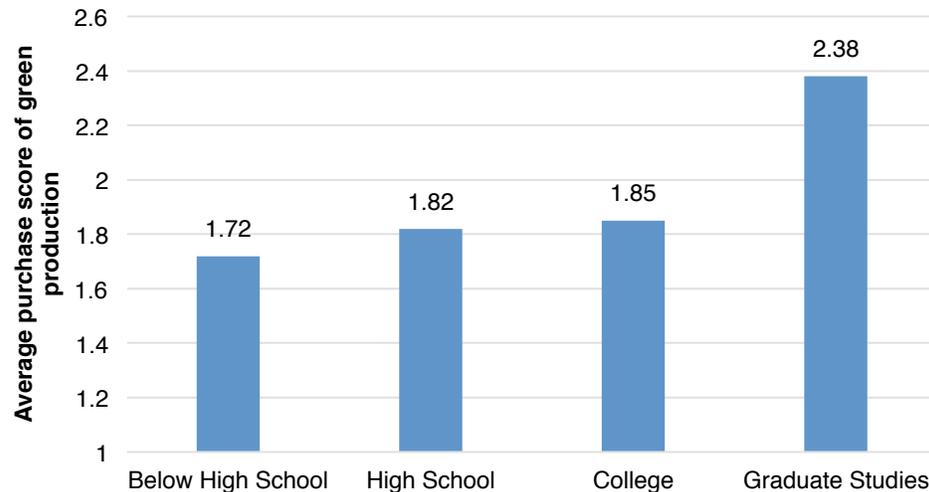
We believe that the findings that the presence of children as a driver for green consumption is possibly one of the most important research findings for China. Parents striving to provide a safe environment for their children is a universal value, not unique to China. However, in China, the theme of parents devoted to providing the best possible future for their children reaches near fanatical levels. In turn, this has driven growth in industries essential to the development of children, such as in the education field. We believe that the themes of providing safety and the best possible future for children, and concerns about environmental factors such as air quality and food safety, are among the most promising strategies that firms can employ to market goods and services that promote a clean environment.

- **Education Level**

Almost all domestic studies show a positive and significant relationship between education level and environmental awareness and/or green consumption.

- Bai and Wan (2012) show people with higher education levels are more supportive of spending on green consumption based on a survey of 364 consumers in Jiangsu Province. Survey participants were interviewed at super markets, fast-food restaurants, bus stops and other public places.
- Based on a survey of 347 participants in Xian province, Wang (2008) concluded education level has a significant positive influence on environmental behavior, and the higher the education level of a person, the more probable he or she will be to adopt behaviors that protect the environment.
- The China General Public Environmental Survey (2007) concluded that higher education levels correlate to stronger environmental awareness and environmental behaviors based on analysis of a sample comprising 3,001 survey responses. (Sociology Research Institute of Chinese Academy of Social Sciences, 2008)
- Qiu (2012) concluded that consumers with higher education levels hold firmer views with respect to purchasing green products based on analysis of 368 survey returns. The diagram below shows consumers' average consumption habits based on this research. The y-axis refers to green consumption scored ranging from 1 to 3: 1 indicates never purchases green goods, 2 indicates occasional purchases, and 3 refers to regular green goods consumption.

Consumers' Average Consumption Score for Green Products by Education Level



Source: Qiu, 2012.

Education, or environmental knowledge, is common to all the models seeking to predict green consumption. We believe environmental awareness is a precondition for willingness to support green consumption. As the evidence suggests this issue is settled, we believe future research should focus on the means and content of environmental education. Further research concerning which sources are most persuasive in delivering credible educational content, messaging approaches, and specific content should, in our opinion, define the future research agenda. Public or private institutions may conduct this research, however we see a role for the private sector to address these questions in the context of specific target audiences.

● Environmental Knowledge

Similar to education level, level of environmental knowledge shows a strong relationship to environmental behavior and viewpoints.

- The China General Public Environmental Survey (2007) shows that the public is comprised of a high awareness group and low awareness group in terms of environmental knowledge (Sociology Research Institute of Chinese Academy of Social Sciences, 2008).
- Wang (2008) argues environmental knowledge is the most important factor that leads to public environmental behavior.
- Wang and Yin (2010) confirm Wang (2008)'s conclusion and further argue environmental knowledge has significant influence on both public "shallow" and "deep" environmental behaviors.

- Yu (2009) concluded consumers' environmental knowledge significantly influences environmental awareness and values.

Environmental knowledge correlates closely with other factors such as education level, but we also believe it could operate independently of this factor. If correct, this delinks environmental awareness from other demographic characteristics, potentially expanding the target group of green consumers. Applied research in this area should, in our opinion, focus on targeted messaging for groups with general education levels as well as product pricing and market differentiation for lower income groups.

● **Vocation**

Domestic studies typically show students, public servants, researchers, teachers and doctors are more environmentally aware and willing to support green consumption. In contrast, soldiers typically show relatively lower levels of environmental awareness. Other studies reach different conclusions about specific vocations, making it difficult to form general conclusions concerning certain vocations or the role of vocation generally in green consumption.

- Wang and Yin (2010) concluded vocation has a strong relationship with public "shallow" environmental behavior. Students are more active than government functionaries, professionals, clerical staff, self-employed individuals, farmers, soldiers, police and employees of NGOs.
- The China General Public Environmental Survey (2007) found national public servants, corporate managers, students, police, soldiers, and professionals show relatively high environmental awareness, while farmers, self-employed, unemployed people, and retired people possess relatively lower environmental awareness (Sociology Research Institute of Chinese Academy of Social Sciences, 2008).
- Qiu (2012) found doctors, teachers and researchers spend the most on green consumption, followed by public servants, while soldiers spend the least on green consumption.

We believe vocation is the least important variable for firms to consider in targeting green consumers. The increasing diversity of the Chinese workforce and the fact that few if any products are marketed exclusively to a particular vocation suggests that this variable has little practical relevance in most contexts. Also, we believe that vocation correlates with the highly

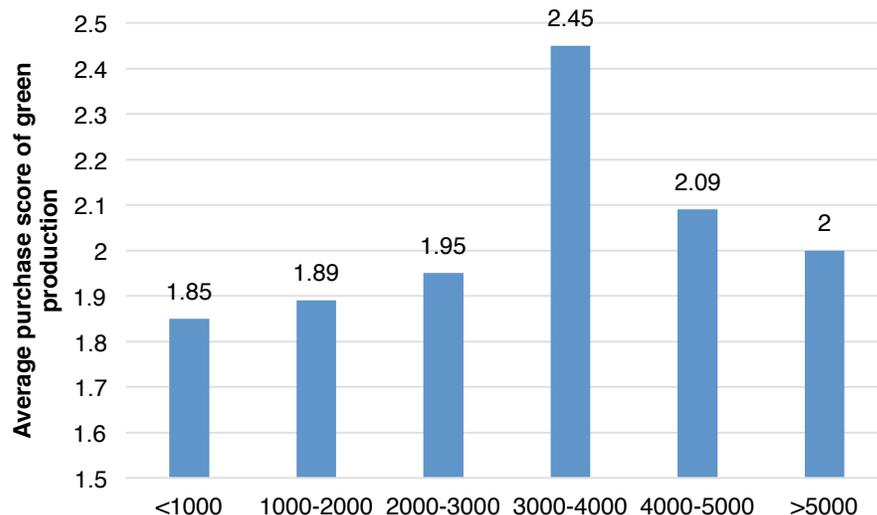
relevant variables of education and disposable income, which we believe are more reliable. Combined with other variables such as education and disposable income, however, we do believe that vocation might be relevant for specific companies in narrow contexts such as targeted product advertising placement or development of product marketing channels through organizations aimed at specific vocations or social media having the desired educational and income characteristics.

- **Disposable Income**

Higher levels of disposable income appear to have a positive influence on green consumption or environmental behavior. However, some studies show no significant relationship between disposable income and environmental behavior.

- Based on a survey of 368 subjects, Qiu (2012) found that consumers whose disposable income is between 3,000-4,000 RMB per month spend significantly more on green consumption than those whose disposable income is below 1,000 RMB per month. The y-axis refers to green consumption score based on a range from 1 to 3: 1 indicates never purchases green goods, 2 indicates occasional purchases, and 3 refers to regular green goods consumption.

Green Consumption based on Disposable Income



Source: Qiu, 2012.

- Based on a 2006 survey of 386 subjects and a 2009 survey of 400 subjects, completed independently of each other, Wang and Yin (2010) concluded that income has no significant influence on "shallow" environmental activity but has a strong and lasting impact on "deep" environmental activity.

- Based on a survey of 347 participants, Wang (2008) concluded that although disposal income shows a significant positive relationship with environmental cognition and knowledge, disposal income has no significant influence on environmental behavior since there is no significant relationship between environmental cognition and environmental behavior. We note that Wang (2008) is the same researcher who co-authored Wang and Yin (2010) described immediately above, which subsequently found a relationship between disposable income and deep environmental activity.

Green products are typically more expensive than ordinary products to produce. Accordingly, we believe higher levels of disposable income are important, if not essential, to most corporate strategies to produce and market these products to consumers. Albeit limited, the weight of research in China supports the general proposition that higher levels of disposable income promotes green consumption. We believe that this variable, combined with other variables such as education and awareness, is critical to the development of integrating green consumption strategies into corporate strategy.

- **Rural versus Urban Residence**

One study comparing environmental practices among urban and rural residents shows that urban residents are more likely to be environmentally aware and likely to engage in activities to protect the environment.

- The China General Public Environmental Survey (2007) concluded that urban citizens are stronger than rural residents in terms of environmental cognition, environmental protection awareness, and environmental protection activity (Sociology Research Institute of Chinese Academy of Social Sciences, 2008).

We believe that urbanization is creating both the conditions and a market for green goods. Although not explicitly identified as such in the other surveys, the study of consumerism in China is centered to a great degree on urban residents. We believe that residency correlates to disposable income and education variables, which we have identified as central factors in corporate strategies based on green branding and products. Importantly, urbanization also relates to lifestyles, values and identity, all of which factor greatly in modern product positioning, to which we now turn.

4.3 From theory to Practice: Shaping Consumer Demand for Green Products

Lifestyles and Values and Consumer Identity in Green Consumption

The new generation of Chinese consumers is unlike previous generations in a fundamental way. Older generations of Chinese purchased a narrow range of essential products out of necessity. Younger generations of consumers, in contrast, purchase a virtually unlimited range of goods and services for pleasure, personal fulfillment and self-expression. This transformation has occurred in less than two decades, and we believe, there is much room for further evolution.

That the new Chinese consumer purchases goods and services to satisfy largely non-essential needs presents opportunities for the providers of green products to develop strategies to position their products and brands beyond mere utility. Chinese consumers are urban, "wired" (immersed in an information rich environment), often better educated, have rising levels of disposable income, and, as a result of living in increasingly crowded and polluted cities, concerned about environmental issues that have a direct impact on their wellbeing. These consumers are important economically, yet, due to China's system of government, have few means to influence their general conditions. This magnifies the importance of their decision-making power as consumers as a means both of self-expression through product choices, as well as to attempt to influence or control one's environment.

Corporate branding and product positioning that targets urban, well-informed and relatively wealthy consumers and offers this group a means of shielding themselves from environmental harms that are of immediate concern to them is only an initial step in the transformation of the new Chinese consumer to a green consumer. Green product manufacturers and brands, through consumer education and advertising, can raise the awareness of consumers, and thereby shape their viewpoints. Green brands thus can transition from responding to emerging consumer needs, to helping shape those very needs. This is done through the formation of values.

There is good reason to expect that the new Chinese consumer will further evolve and that this evolution will take place as a result of changing values, in particular those relating to the environment. Chinese citizens are simultaneously experiencing rapid increases in both income levels and pollution levels in urban areas, the center of consumer culture. According to the Environmental Kuznets curve, as countries develop, citizens' experience increasing income levels and tolerate a decline in the quality of their environment in exchange for development. At some point, changes in values occur when residents demand an improved quality of environment and, through regulation or otherwise, are willing to pay or

forego additional income for that benefit. The Environmental Kuznets curve has been studied extensively in China, and research to date suggests that China has not yet reached the point at which citizens are willing to trade income for a higher quality of environment. Wang and Fan (2005) adapted an econometric model to test whether the Kuznets curve explains citizen preferences in China based on 20 years of data, and concluded that China had not yet reached the Kuznets curve turning point. Based on data from 1978 to 2012, Yang (2014) analyzed the increasing income gap between rural and urban citizens and similarly concluded that China has not yet reached the "turning point" in the Kuznets curve and remains on the left side of the "inverted U".

We note that the Kuznets curve measures citizens' preferences on an aggregated, national scale. Research typically does not distinguish among income groups or urban and rural residents. As long as China's cities - the centers of consumerism - are increasingly polluted, China's wealthiest consumers should remain strongly motivated to use their purchasing power to improve their lives, protect their health, and perhaps send a message to those who can address pollution problems to do so. Thus, we see the rising urban middle and upper income levels driving demand for green consumption even more strongly in the face of the overall national drive to develop.

Along with rising income levels, China has developed a modern urban lifestyle that emphasizes personal appearance and healthy living. Chinese culture has long been focused on health and the role of nature, rooted both in Chinese herbal medicine and ancient philosophy. The modern version emphasizes youthful appearance, activities such as yoga and running, and healthy living such as organic food and products designed to ensure clean air and water in the household, and use of modern conveniences for busy professionals seeking to maintain balance in between work and other pursuits. Lifestyle marketing has long been practiced in the west and is now clearly established in China.

Consumer Innovativeness

The success of new products and services depends to some extent on the willingness of consumers to accept change or innovation in products, a concept known as "consumer innovativeness" (Rogers, 1983).

Scholars have explored the factors that influence consumer innovativeness and sought to understand its impact on consumption behavior in western countries. Venkatraman (1991) and Goldsmith (1995) show consumer innovativeness is related to age, gender, income and social status. Usually the young and people with relatively high social status exhibit higher levels of consumer innovativeness. Steenkamp (1999) argues that consumer innovativeness significantly impacts consumers' purchasing decisions concerning new products.

Chinese research on consumer innovation confirms these trends apply to China. Chen (2011) finds that consumer innovativeness significantly influences consumers' purchasing decisions concerning new products. Chang and Zhu (2007) concluded that consumer innovativeness significantly influences acceptance of online shopping and e-banking, just as Lassar et al. (2005) had found for western countries. Liu and Su (2011) explored the impact of consumer innovativeness to corporate brand extension in China and found that consumer innovation can support corporate brand extension, through which companies could achieve greater market share.

Lao and Wu (2013) first introduced the concept of consumer innovativeness into green consumption, and attempted to ascertain its influence on green consumption in the context of China. Based on a survey of 909 subjects, they reached the following conclusions:

- Men, the young, the more highly educated, and higher income groups show relatively high consumer innovativeness.
- Green consumption attitude has insignificant influence on green consumption intention, while subjective green consumption norms and green consumption perceived control (access and barriers to products) have significant influence on green consumption.

We believe the Chinese consumer has demonstrated a remarkable willingness to accept market innovation. Consumers' ready embrace of new products, both foreign and domestic, the expansion of western advertising methods, the ubiquity of malls, and the rapid growth of online retailing, all within the period of two decades are strong evidence of consumer innovativeness.

In the green consumption area, the findings concerning consumer innovativeness are consistent with current research on demographic indicators for China. We believe the provision of information can play a critical role in raising awareness of green products and can help secure market position for superior products that address environmental issues that affect Chinese consumers in their daily lives.

Group Pressure

Group pressure refers to the psychological pressure faced by an individual when they conflict with a group norm (Yu, 2009). According to group pressure theory, the group to which an individual belongs is an important factor influencing his or her consumption decisions. At the same time, group pressure in a market economy also impacts corporate production decisions. Significantly, enterprises

regularly seek to influence group norms through products and advertising targeted at certain categories of consumers and consumer society at large. Given the importance of group pressure theory to product positioning, industry, their advisors and academics want to understand the specific relationships at play in order to offer both theoretical and practical insight into this important field. Group pressure studies are inherently culture-specific and accordingly we focus on studies of the Chinese mainland population.

Yu (2009) surveyed 243 subjects in Jinan and Qingdao in a study that shows group pressure significantly influences individual environmental awareness, but has no direct influence on individual green consumption. Yu suggests green pressure requires an intermediate link of “enhancing environmental awareness” to influence actual consumption patterns.

Based on a survey of 285 subjects, Yu (2012) verified group pressure can significantly influence green consumption attitudes in his study of the relationship between environmental awareness and green consumption behavior. According to this study, if consumers live in an atmosphere infused with green consumption themes, they are more likely to adopt green consumption habits.

Qiu (2012) concluded green consumption is influenced strongly by various social factors such as reference group, family, and social role.

Domestic research focusing on the role of group pressure concerning environmental issues and green consumption is at a relatively early stage in China, and we believe it is a highly promising area for future applied research. We think this should be a focal point for industry as well as academic research, and application of this research can be instrumental in shaping both corporate strategy and consumer preferences.

4.4 Seizing the Initiative - Product Labels and ESG

Brands that seize the initiative by speaking directly to their target consumers are most likely to successfully define their position in the marketplace and in the minds of consumers. For a green branding strategy to succeed, building consumer awareness of the environmental aspects of a product and its advantages is essential. When coupled with a broader effort to position a brand, consumer education initiatives can establish a market position for a firm and its entire range of products.

In this section, we discuss product labeling and ESG and methods to educate consumers and establish product, brand and enterprise identity in the minds of the consumer. These strategies are designed not only to educate consumer, but also to empower them to make informed decisions, thereby meeting a fundamental need for individuals to make decisions about their lives and

environment. The eco-label movement is an example of how the provision of product information can empower consumers to drive change. At the enterprise level, ESG information provides information about an enterprise's operations aimed at a broad group of stakeholders. We consider both of these strategies in turn as a means to build product, brand and enterprise identity and capture market share in the process.

Green product identification

Companies that provide information to consumers about the environmental impacts of their products, whether in response to mandatory environmental product-labeling requirements or voluntarily, provide information that can shape consumer attitudes towards their products and brands. Eco-labels are simplified representations of highly complex information concerning a product's impact from cradle to grave. The origin of eco-labeling can be traced to energy efficiency standards and labeling, however eco-labeling today covers a broad range of environmental impacts based on the full life cycle of products, including greenhouse gas emissions, water, chemicals, and other metrics.

In China, the Chinese government has published 46 national energy efficiency standards, encompassing household appliances and industrial facilities (China's Preparatory Committee for the United Nations Conference on Sustainable Development, 2012). Based on these standards, China has begun to implement energy-saving and environmental product identification and energy efficiency marking systems, which can enhance consumer's willingness to select and use energy-saving products. The government estimates that 230 billion kilowatt-hours of power has been saved by these actions, leading to cost savings of more than RMB 100 billion (China's Preparatory Committee for the United Nations Conference on Sustainable Development, 2012). As of 2012, more than 1,800 companies and 40 thousand products in 2012 possess the China Environmental Labeling Certification. Sales of products bearing this environmental label have surpassed RMB 200 billion per year (China's Preparatory Committee for the United Nations Conference on Sustainable Development, 2012).

Achieving compliance with these standards not only helps meet environmental requirements, but they also help sell products. The Chinese government's procurement laws specify that only products that meet green purchasing criteria will be eligible for government purchase (Qiao and Wang, 2011). Thus, compliance opens a large market for compliant products. Companies that can show their products meet or exceed standards can establish a reputation for superior performance and quality.

Scholars have sought to verify the effectiveness of green product labeling in promoting green consumption in China. Qiu (2012) concluded that green product

identification significantly influences consumers' decisions, however he also found that consumers' attitudes toward green products still varies greatly. Based on a survey of 470 consumers, Yang and Hu (2008) found that green certification can enhance consumers' trust in brands, and such trust can strengthen consumers' attitude towards and willingness to purchase those brands. Liu (2010) found that third-party certification could help establish consumers' trust and play an important role in product purchasing decisions based on a survey of 385 consumers in Shandong Province. Liu identifies a causal relationship of "cognition-trust-identify-purchase" observed during the green purchase process.

Chinese Consumers Awareness of and Response to ESG

The environmental, social and governance field has developed rapidly in China during the past decade. Since environmental information disclosure is an important part of ESG, the relationship between ESG and consumer purchasing decisions potentially influences green consumption. Research on Chinese consumers' response to ESG and its influence on consumer buying decisions confirm this relationship for China.

The Tsinghua-Ruder Finn CSR Program publishes the annual CSR Index Report for the fast moving consumer goods (FMCG) and automobile industries in China. The report is a consumer-oriented CSR evaluation based on a survey of consumers across China. Survey results from the CSR Index Reports during the 2009 to 2012 period reveal the following trends among Chinese consumers:

- Consumer attention to CSR has increased each successive year.
- Consumers are more aware of an individual's influence on nature, and expect less waste during consumption.
- Consumers are looking at more areas of corporate CSR performance, and are beginning to express their views on issues in relation to business operations and social development such as energy security, environmental protection, employee rights and interests, and supply chain management through various channels, including social media.
- The public does not hold a high opinion of CSR performance of Chinese FMCG enterprises.
- CSR's influence on customer purchasing behavior is increasing.

Consumer awareness of CSR has increased significantly. In the 2011 survey, 79 percent of the respondents said they would give priority to buying products from companies with "outstanding CSR performance", and 69.6 percent said they

would "recommend others to purchase products of a company with good CSR performance". In the FMCG sector, a total of 84.3 percent of those surveyed, well above the prior year's 54.7 percent, stated they were 'very concerned' and 'concerned' about CSR performance.

According to the Tsinghua-Ruder Finn's study, more consumers now directly communicate with enterprises through social media and their opinions are having a more direct influence on the reputation of enterprises. Consumer perceptions, attitudes and behaviors directly influence an enterprise's business performance. As we have seen in the food scandal of the late 2000s, Chinese consumers are "wired" and their ability to spread negative information about companies and products through information technology can devastate a company or industry. Chinese scholars are increasingly identifying CSR as a key factor influencing the views of consumers and their purchasing decisions.

Xie and Zhou (2009) conducted an empirical study on the relationship between CSR and consumers' purchasing preferences in China. Their survey of 351 individuals confirmed that:

- CSR could exert a direct effect on consumers' identification with enterprises and corporate reputation.
- CSR exerts both direct and indirect positive effects on consumers' willing to purchase goods and services. Indirect positive effects are mainly generated by company reputation and consumer identification with a brand.

Ma (2011) explored the impact of CSR on consumer purchasing decisions through a survey of 253 participants, finding:

- CSR is one factor that can significantly influence consumers' purchasing decisions, and the extent of influence depends on the consumers' profile.
- Consumer response to CSR is linked to benefits and value identification.

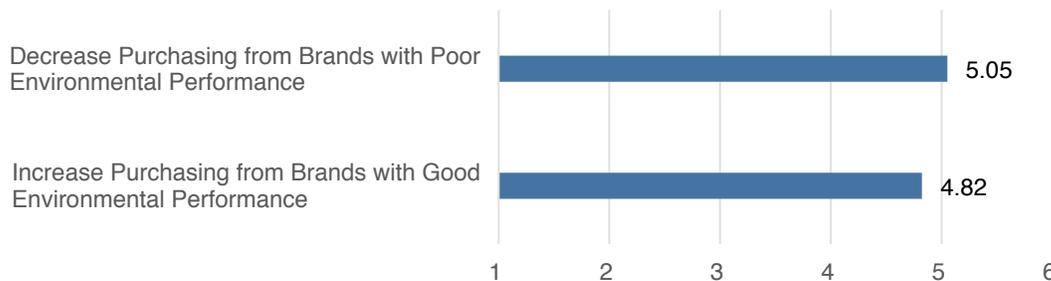
Wang and Cui (2014) explored consumers' response to CSR performance in a survey of 419 individuals. The conclusions are as follows:

- Chinese consumers willingness to purchase goods and services increases with superior CSR performance in the fields of consumer responsibility, employee, environment, and charity.
- Corporate responsibility towards consumers, employees and the environment are more important CSR performance indicators than charitable activities. This result is similar to the Tsinghua-Ruder Finn CSR Survey.

- The impact of CSR performance on consumer purchasing decisions is most effective when consumers also perceive the company's product quality to be superior.

Our own consumer survey of 201 individuals completed during January to February 2015 suggests that Chinese consumers will make decisions in response to information concerning corporate environmental performance, especially negative environmental information. Consumers indicated strong willingness to decrease their purchases of goods and services from brands with poor environmental performance (reflected by a score of 5.07 out of 6), and slightly less willingness to increase their purchases from brands with good environmental performance (4.87 out of 6).

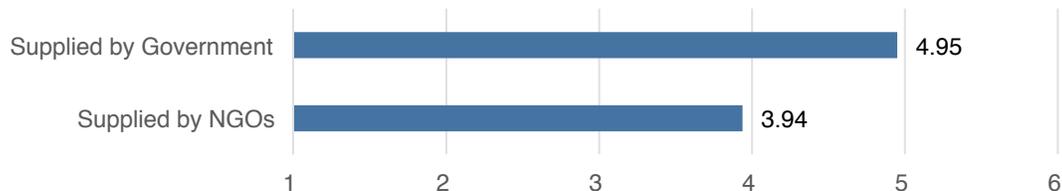
Environmental Performance in Purchasing Decisions



Source: Authors.

Significantly, our survey shows that government plays an important role in disseminating information about the environmental performance of companies. According to our survey, respondents ranked government first, ahead of NGOs, in reliance on information concerning environmental performance.

Persuasiveness of Sources of Environmental Information



Source: Authors.

We believe ESG reporting is rapidly becoming a key factor shaping corporate reputation in China. In turn, corporate reputation based on ESG factors is becoming an important tool for shaping consumer opinion towards an enterprise's brands and products.

5. Key Trends and Themes

This report has explored the role of environmental performance in shaping corporate strategy in order to enhance competitive advantage. We think it is critically important that China's leading enterprises raise their environmental standards in order to better serve China and its citizens.

As we argued in Chapter 1, while there are significant challenges to improving environmental performance, among them the challenge posed by income inequality among Chinese consumers, significant physical and institutional drivers for change are emerging. Chinese industry will be forced to adapt to the changing business environment and will require new corporate strategies to do so.

We believe that transforming corporate strategy to embrace higher environmental standards requires managers to "make a business case" for change. Thus a profit-focused, credible analysis from the enterprise perspective is essential to transition China to green production.

Our exploration of corporate strategy has identified the following trends and themes that we believe enterprises should observe in adapting their corporate strategy in light of the changing business environment in China.

China's War on Pollution is Intensifying Environmental Enforcement

China's "War on Pollution" and the current anti-corruption campaign signal that more stringent enforcement of environmental regulation is certain. Decades of failure to enforce environmental laws, resulting in the gradual but tangible degradation of the environment and the quality of life experienced by ordinary Chinese have combined to trigger a crisis of public confidence in the Party and the government. China's leadership is now responding to the environmental crisis as a national priority and there is mounting evidence that enterprises and officials conspiring to violate pollution laws will be prosecuted under both environmental and criminal laws.

The Chinese government is backing these campaigns with a law reform that will be more fully implemented starting in 2015 to combat all forms of pollution. Under the new Environmental Law, polluters face hefty fines, shutdown of factories, and even criminal penalties. Together with the issuance of more rigorous industry-specific standards for pollution emissions, sanctions and other measures in the new Environmental Law all signal a new era in environmental enforcement.

China's Anti-Corruption Campaign Bolsters the War on Pollution

Corruption and pollution are interrelated in China. Bribery of government officials to obtain business licenses, to gain access to land or raw materials, to ignore violations of health and safety regulations, to fail to investigate or prosecute companies that produce products that harm the public or the environment, or to misreport pollution emissions of industrial facilities, are examples of the ways in which corruption has undermined the enforcement of China's laws and regulation intended to protect the public and the environment. China's Anti-Corruption Campaign will strengthen its broader efforts to redress environmental violations and to promote a cleaner environment under China's broad War on Pollution by holding liable the individuals responsible for violation of environmental laws where graft or corruption is involved.

Leading Companies Care about Reputation

China's leading companies - those that are responding to the government's call to become global leading brands - care about their reputation. Our own survey of Chinese and foreign corporations operating in China confirmed that companies that have fostered a public image in China's domestic marketplace are seeking to build and protect their brand.

Beyond the obvious desire to drive profits, we think there are good reasons for the emphasis on corporate and brand reputation that are rooted distinctly in China's institutional framework. The leadership of these companies is closely connected to the Chinese government, and many individual corporate leaders may also hold positions in either the Party or the government. Thus, the performance and reputation of their companies reflects directly on their own professional reputations within the Chinese system of promotion that applies to government officials and managers of state-owned enterprises. The ESG approaches outlined in this study reflect best practices that are designed to enhance company profitability and reputation. For these reasons, we believe reputational concerns will drive greater adherence to ESG principles among Chinese companies in the future, including state-owned enterprises.

A Change in Thinking Among Consumers is Underway

The new generation of Chinese consumers is unlike previous generations in a fundamental way. Older generations of Chinese purchased a narrow range of essential products out of necessity. Younger generations of consumers, in contrast, purchase a virtually unlimited range of goods and services for pleasure, personal fulfillment and self-expression. That the new Chinese consumer

purchases goods and services to satisfy largely non-essential needs presents opportunities for the providers of green products to develop strategies to position their products and brands beyond mere utility.

Chinese consumers are urban, "wired", typically well educated, enjoy rising levels of disposable income, and, as a result of living in increasingly crowded and polluted cities, concerned about environmental issues that have a direct impact on their wellbeing. This group is important economically and yet due to China's system of government has few means to influence their general conditions. This magnifies the importance of their decision-making power as consumers as a means both of self-expression through product choices, as well as to attempt to influence or control one's environment.

Consumers empowered with information can play a vital role in solving environmental problems, sometimes with dramatic consequences for the companies involved. Consumer awareness has driven demand for disclosure of environmental information about products and the companies that make them. The 2008 milk scandal case described in Chapter 1, in which the industrial chemical melamine was intentionally added to milk, illustrates the power of educated consumers to drive change in response to environmental, health and safety concerns.

A Change in Thinking Among Investors will Follow

Socially responsible investment is still at an initial stage in China, however there is evidence that Chinese public companies are increasingly paying attention to SRI. As China's domestic capital market matures, and Chinese companies increasingly list their shares overseas, we expect to see the trend towards SRI investing to further take root in China. As we've noted in Chapter 3 of this report, the Asset Management Association of China's annual survey shows that concern over SRI has increased among mutual funds from 34.2 percent in 2008 to 62.9 percent in 2012 (AMAC, 2013). Based on the *Socially Responsible Investment Survey of Chinese Funds 2014*, 89 percent of Chinese mutual fund managers surveyed pay attention to ESG performance in managing their funds (China SIF, 2014). We believe that increasing participation of Chinese companies in international capital markets and concern about environmental issues among Chinese consumers will only serve to intensify the focus of investors on these same themes.

ESG and Green Consumption Gaining Recognition in China

Our understanding of Chinese consumers and their preferences has increased markedly in the recent several years. During this period, Chinese scholars have sought to identify key factors that influence consumers' green consumption behavior. Studies of demographic factors such as age, education level, disposable income, marital status and children show relatively consistent conclusions across studies.

Against this backdrop, researchers and enterprises are better positioned to understand how factors such as environmental knowledge and green product identification impact green consumption. Drawing on the fields of product marketing and psychology, approaches such as group pressure and consumer innovativeness concepts can be employed in China to shape the views and behavior of consumers.

Evolving Role for NGOs and the Media in China

While our own survey suggested that non-government organizations (NGOs) are less influential than the government in the eyes of Chinese consumers, it is equally clear that NGOs are gaining in stature and increasingly important. NGOs already play an important role in environmental protection and advocating green consumption.

A leading example of the emerging role of NGOs and media is the Institute of Public & Environmental Affairs' (IPE) *Green Supply Chain Program*, an NGO founded by journalists that disseminates corporate environmental information through a database that the public can check against corporate pollution records. The IPE *Pollutant Map* enables the public to monitor the environmental performance of individual factories in their area based on public data, and has resulted in citizen groups demanding change from industry on emissions release and from government on enforcement. This platform has forced global brands, including Apple, to improve their supplier environmental performance.

We see NGOs and the media playing an increasingly important role in environmental supervision and green consumption advocacy in China. NGOs and media that disseminate information about companies, supply chains and products, and possess credibility in the public's view can play an especially important role in influencing consumer preferences related to green products.

Our corporate survey revealed that Chinese companies that are taking a leadership position in ESG initiatives have formed cooperative relationships with NGOs.

These alliances provide the private sector firm with enhanced resources for understanding environmental issues as they pertain to their brand. We think partnerships along these lines, when implemented to take account of legitimate concerns for confidentiality, can be a valuable tool for corporations in developing their approach to ESG and green consumption and their broader corporate strategy.

Competition for Foreign Markets as Drivers of Domestic Policies

China's leading companies are vying not only for domestic market share, but also for leadership in the international marketplace. Regulatory standards in major markets such as the European Union and the US typically drive standards in other markets and across industry supply chains. We believe that market access requires that companies be prepared to meet the highest standards, and that enterprises that consistently apply these across their production lines stand the greatest chance of succeeding in key global markets. Under appropriate conditions, firms that produce a product that meets the requirements of the most stringent regulator can exploit this as a competitive advantage especially if the superiority of the product is perceptible to the consumer.

Overcoming Income Disparities Among Consumers

Corporate strategy based on higher quality products that are more sustainable for the environment and healthier for the consumer will require firms to persuade consumers to accept the associated costs for those products, thereby enabling corporations to scale up green production. Wealthy, urban consumers represent a starting point for corporate strategy, however for firms to reach full economies of scale they will need to market their products to a broader segment of Chinese consumers. This will require a multi-prong product marketing strategy, including educating the consumer about the superiority of a product, demonstrating the long-term cost or other benefits justifying paying a premium, as well as achieving greater efficiencies and superior environmental results along the entire supply chain. Firms that scale up production will enjoy lower production costs through learning and other scale effects. Successful firms will ultimately be in a position to use regulation - and their relative advantage in complying with stricter regulation - as a competitive advantage in marketplace.

How Leading Companies will Shape their Fortunes and China's Future

How Chinese and international companies operating and serving China respond to China's environmental challenges and domestic and foreign regulations designed to strengthen environmental compliance will affect their relations with China's government and their positioning in the minds of increasingly environmentally-conscious Chinese consumers. Inevitably, how these companies respond will ultimately affect their balance sheets.

For China, a country committed to deepening the marketization of its economy and expanding its reach in the global economy, how its commercial enterprises conduct business both within and outside China increasingly furnish the means by which China will achieve its goals for future development.

We see the relationship between the government, firms and consumers as increasingly dynamic and interdependent, each influencing the other. Leading companies should seek to provide solutions to the environmental problems the government seeks to overcome, and to encourage stringent regulatory policy, thereby enhancing their competitive advantage. With respect to consumers, leading companies should seek both to serve the needs of consumers and to shape their preferences towards environmentally superior good and services.

In the interplay between the government, firms and consumers, we believe that leading companies must adopt a pro-active corporate strategy aimed at responding to China's environmental and related business challenges to maintain their own competitiveness and to ensure China's future.

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Chinese names are presented in customary manner as surname first followed by given name without punctuation. Western names are presented as surname first followed by given name separated by a comma.

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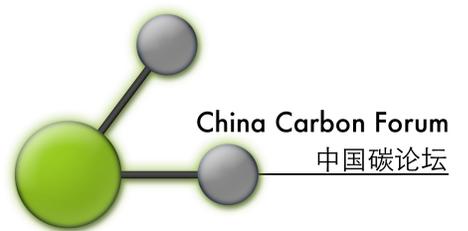
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