

# Resource Efficiency: Economics and Outlook for China



## 10 Resource efficiency policy in China

China is home to approximately one-fifth of the world's population. The nation is also experiencing a rapid process of urbanization. The urbanization rate reached 51 per cent in 2011 (CNSB 2012). By 2030, urban populations are expected to grow by more than 300 million, with nearly 60% of the population living in urban areas (Laquian, 2006). China's rapid economic growth in recent decades has been accompanied by substantial depletions of natural resources, degradation of major ecosystems and serious environmental pollution. Some of the more pressing environmental issues include water resource depletion and pollution, soil erosion, desertification, acid rain, sandstorms and forest depletion. A large share of the pollution originates from industrial production (Hicks and Dietmar, 2007).

### ***Five-Year Plans for Social and Economic Development***

Environmental objectives are integrated into several national policies and regulations, including the *Circular Economy Promotion Law and the Cleaner Production Promotion Law*. Sustainable consumption and production (SCP) principles are also integrated into China's Five-Year Plans for Social and Economic Development. The Five-Year Plans for Social and Economic Development (FYPs) form the basis for coordinating Chinese national public policy priorities. They are developed by the National Development and Reform Commission (NDRC) and approved by

the National People's Congress. SCP principles are integrated through quantified pollution emission targets as well as quantified resource efficiency targets.

The 11<sup>th</sup> FYP (2006-2010) marked a major shift from previous plans in terms of the objectives of economic policy. It had an increased focus on more balanced and sustainable growth, greater resource efficiency, better living standards and balanced rural-urban development. A key task and strategic priority of the plan is to 'build a resources-saving and environment-friendly society' (World Bank, 2008, page7). The most important SCP-related targets to be achieved over the five year period include:

- 20% reduction in energy intensity
- 10% reduction in annual SO<sub>2</sub> and COD emissions
- 30% reduction of water consumption per unit of industry value added
- Increasing the recycling rate for industrial solid wastes to 60%

By the end of 2010, China had basically realized the targets of energy conservation and emissions reduction set up in the 11<sup>th</sup> FYP, including reducing accumulated CO<sub>2</sub> by 1.46 billion tons, energy intensity by 19.1%, annual SO<sub>2</sub> by 14.29% and COD emissions by 12.45%.

The 12<sup>th</sup> FYP (2011-2015) is continuing the broad policy direction of the previous plan. Major themes

in the current plan are sustainable growth, economic restructuring, social equality and environmental protection. The Chinese government seeks to move the economy up the value chain to more service and high-tech oriented business. For the first time in a FYP, China has set a carbon-intensity reduction target of 17 per cent and intends to reduce energy intensity by a further 16 per cent by 2015. Other legally binding targets include (Lommen, 2011):

- Increase the proportion of non-fossil fuel by 3.1%
- Increase forest coverage by 1.3%
- Reduce annual SO<sub>2</sub> and COD emissions by 8%
- Reduce annual NO<sub>x</sub> and ammonia nitrogen emissions by 10%
- Reduce water consumption per unit of industry value added by 30%
- Eliminate the loss of arable land

Seven industries have been selected as priorities for development, consistent with the 12<sup>th</sup> FYP's goals of sustainable growth and moving up the value chain<sup>5</sup>. Their contribution to GDP is set to rise from 2% in 2010 to 8% in 2015 (KPMG, 2011a).

### ***Circular Economy Promotion Law***

China is one of the first countries to embrace the circular economy (CE) approach as a new paradigm for economic and industrial development. The CE concept seeks to change the economic growth model

by radically increasing material use efficiency and sharply reducing pollution discharges. The ultimate objective of the CE approach is to achieve decoupling of economic growth from natural resource depletion and environmental degradation (World Bank, 2009). The Chinese government has been promoting CE on a number of fronts, including legislation, policy reform, pilot projects, and monitoring and evaluation activities. The *Circular Economy Promotion Law* came into force in 2009. It is a comprehensive framework law which aims to improve resource efficiency, protect the environment and achieve sustainable development. The *CE Promotion Law* is very broad and far-reaching. Its enforcement therefore requires supporting regulations to be developed. The Chinese government is currently in the process of drafting the *CE Development Plan*, which will outline the major tasks and measures necessary for achieving more effective implementation. Several barriers have been identified that affect the successful implementation of the *CE Promotion Law*. These include the difficulty of changing current industrial structures, the lack of funding, advanced technologies and information support, the poor environmental awareness of the public and private sector, and the lack of effective enforcement mechanisms (Geng, 2009; Xue et al., 2010).

### ***Cleaner Production Promotion Law***

China began to implement cleaner production (CP) in the early 1990s as a way of confronting the country's serious environmental problems. A network of national and local CP policies incorporated CP

<sup>5</sup> The seven priority industries are New Energy (nuclear, wind and solar power), Clean Energy Vehicles, Energy Conservation and Environmental Protection, Biotechnology, New Materials (rare earths and high-end semiconductors), New IT (broadband networks, internet security infrastructure), and High-end Equipment Manufacturing (aerospace and telecom equipment)

activities such as demonstration projects, training and promotion centres and the creation of the National Cleaner Production Centre (CNCPC) (Hicks and Dietmar, 2007). Today, the *Cleaner Production Promotion Law* (2003) governs the implementation of all CP activities in the country. It seeks to promote cleaner production, increase resource efficiency, and reduce and avoid the generation of pollutants. This law not only encourages CP at the individual company level, but also supports broader CP efforts at inter-firm level and regional levels through eco-industrial development. Compulsory CP audits are carried out for key polluting enterprises. Enterprises are also encouraged to reach voluntary agreements with local governments to improve their energy and environmental performance beyond compliance with national and local standards (Andrews-Speed, 2009).

Despite China's relatively long experience with CP, several implementation challenges remain. Overall, it has proven difficult to encourage enterprises to undertake CP measures and to provide adequate resources to ensure CP adoption (Hicks and Dietmar, 2007). Lack of awareness, the absence of an adequate institutional framework and the difficulty of creating a market for CP services have also been recognized as common barriers to CP implementation (Geng *et al.*, 2010). For small- and medium-sized enterprises (SMEs) the most prominent barriers to CP adoption are the absence of economic incentive policies, lax environmental enforcement and high initial capital costs (Shi *et al.*, 2008).

### ***Policies relating to food and agriculture***

Since the mid-1990s, the Chinese government has been concerned with its ability to continue feeding a

growing population. More than 12% of cultivated land is believed to have been lost in the last decade due to urbanization and industrialization (OECD, 2010). These losses of cultivated land have largely been concentrated in the most productive farming areas of the country; the coastal and central provinces, which also have more fertile soils than the remainder of the country (Lichtenberg and Ding, 2008).

The central government places a high priority on the conservation of agricultural land, largely for food security reasons but also to protect farmers from being forced off their landholdings by local governments trying to convert collectively-owned land for industrial and residential purposes (Kamal-Chaoui *et al.*, 2009). The *Land Administration Law* was implemented in 1999 to protect environmentally sensitive and agricultural land, and to coordinate the planning and development of urban land. The law reinforces farmland preservation efforts by stipulating that the total amount of cultivated land within each administrative area needs to remain unreduced (Lichtenberg and Ding, 2008).

The *CE Promotion Law* contains provisions for developing ecological agriculture and for achieving greater overall efficiency in China's agricultural sector. For instance, agricultural producers are encouraged to adopt planting, breeding and irrigation technologies that reduce the use of water, fertilizers and pesticide. Agricultural departments are also advised to promote the use of energy-saving agricultural machinery.

The modernization of the agricultural sector is also one of the major priorities of the 12<sup>th</sup> FYP. Key agricultural targets include reaching an annual grain production capacity of no less than 540 million tonnes,

and ensuring the maintenance of farmland reserves at no less than 1.212 million square kilometres. The agricultural sector is to be modernized and made more efficient through various approaches including building logistical support structures, modernizing supply chains, standardizing production and quality control, increasing rural development funding and ensuring consumer safety (NZTE, 2011).

### ***Policies relating to buildings and construction***

China's rapid rate of economic development and urbanization presents a significant challenge to the building and construction sector in terms of energy supply and carbon emissions. China is the world's largest market for new construction projects with around 2 billion m<sup>2</sup> of floor space added annually, mostly in urban areas (Li and Colombier, 2009). While 60% of these new buildings are classified as residential, 30% are public buildings<sup>6</sup> and the remaining 10% are used for industrial purposes (Shui *et al.*, 2009). Buildings are a priority area for policy development by the Chinese government due to the large amount of energy wasted for their heating or cooling purposes. At present, the building sector accounts for nearly 30 per cent of China's total energy consumption, and this proportion is growing steadily (Li and Yao, 2009).

The 11<sup>th</sup> FYP established an energy-saving target for buildings of 100 Mtce in primary energy units (Levine *et al.*, 2010). Energy savings were meant to be achieved through better enforcement of building

energy efficiency codes and standards, retrofitting existing buildings and reforming heat supply systems, and improving energy management of government office buildings and large scale public buildings (Price *et al.*, 2011). The 12<sup>th</sup> FYP has also introduced ambitious energy saving targets for the building sector.<sup>7</sup> In addition, the CE Promotion Law contains provisions for the adoption of more efficient building and construction technologies and processes so that savings in energy, water, land and materials can be realized.

In recent years, China has adopted building codes for residential and public buildings, focusing on heating, ventilation and air conditioning, as well as lighting, hot water and power use. National energy design standards for residential and public buildings were developed in 2005. The Ministry of Housing, Urban and Rural Development (MOHURD) regulates the building industry in China and coordinates the country's building energy codes. Regulations, policies and programs issued by MOHURD to promote energy efficiency in buildings are listed in Table 7 below.

Implementation challenges in the building and construction sector still exist. For instance, the building codes compliance rate remains unclear for small cities and in rural areas. It is, however, considered accurate in larger cities, where compliance is enforced through regular and random inspections carried out by the local government (Zhou *et al.*, 2011).

<sup>6</sup> Public buildings in China refer to non-residential buildings including commercial, educational and governmental buildings

<sup>7</sup> The details of the 12<sup>th</sup> FYP for energy conservation of the building industry were not yet published at the time of writing.