Annual Review of Low-Carbon Development in China (2011-2012)

Executive Summary

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About CPI

Climate Policy Initiative (CPI) is a policy effectiveness analysis and advisory organization whose mission is to assess, diagnose, and support the efforts of key governments around the world to achieve low-carbon growth.

CPI is headquartered in San Francisco and has offices around the world, which are affiliated with distinguished research institutions. Offices include: CPI at Tsinghua, affiliated with the School of Public Policy and Management at Tsinghua University; CPI Berlin, affiliated with the Department for Energy, Transportation, and the Environment at DIW Berlin; CPI Rio, affiliated with Pontifical Catholic University of Rio (PUC-Rio); and CPI Venice, affiliated with Fondazione Eni Enrico Mattei (FEEM). CPI is an independent, not-for-profit organization that receives long-term funding from George Soros.

Executive Summary

For the 11th Five-Year Plan (FYP) period, China set a target of reducing its energy intensity (energy consumption per unit of GDP) by 20 percent compared to the 2005 baseline, and it achieved a 19.06 percent reduction. This is equivalent to a 630 Mtce reduction in energy against the baseline[1] and corresponds to avoided carbon dioxide emissions of 1550 Mt CO_2. Despite this avoided CO_2 emissions, China's total emissions grew by 33.6 percent, resulting in the country's emergence as the world's largest greenhouse gas emitter.

This review explores China's low-carbon development efforts under the 11th FYP period. What drove the decline in energy intensity? How did government actions contribute to this decline? What are the implications of China's experience for the 12th FYP?

The review is organized into four sections:

1. China's overall low-carbon development performance, as well as its technological development and related structural adjustment;

2. Key policies, new implementation mechanisms, and financial support strategies that China employed to facilitate low-carbon development;

3. The role of local governments, enterprises, and the public in China's low-carbon development;

4. An outlook for low-carbon development under the 12th FYP period.

Our key findings are as follows:

1. Technological development and changes in the country's economic structure had the largest impact on China's low-carbon performance during the 11th FYP period.

    - The adoption of cleaner technologies accounted for about 69 percent of the 630 Mtce reduction in energy against the baseline. China focused on the following technology areas to improve carbon and energy efficiency: higher-efficiency coal-fired power plants; energy efficiency improvement in the industrial and building sectors; wind and solar energy; and carbon capture, utilization, and storage. Energy efficiency in the industrial and building sectors improved through the deployment of economically efficient low-carbon technologies, but there is still opportunity for improvement. In addition, domestic manufacturing capacity for low-carbon equipment grew. Through the country's increased efforts, the low-carbon technology gap between China and developed countries has narrowed.

1 This Review reports changes in the energy and emission intensity of China's economy relative to a 2005 baseline. Absolute energy savings and emissions reductions are calculated using a rolling year baseline: 2005 energy and emission intensity provides the baseline for 2006 improvements; 2006 actuals provide baseline for 2007, and so on.

- Structural changes in China's economy accounted for 23 percent (or 143 Mtce) of the 630 Mtce reduction in energy use against the baseline. Of this amount, changes in the mix of industries contributed 77 Mtce, and a shift to higher value-added products reduced energy use by another 117 Mtce against the baseline. However, the extremely rapid growth of the industrial sector expanded that sector's share of the national economy and increased its energy consumption by 51Mtce. Energy-intensive industries also moved from eastern China to western and northeastern China, locking in a high-emissions economic structure in the latter regions.

2. To meet its energy intensity targets, China employed a diverse set of low-carbon policies, new implementation mechanisms, and significant financial support and incentives.

    - Administrative instruments reduced CO_2 emissions by 473 Mt relative to the baseline; incentive instruments resulted in a reduction of 777 Mt; and market instruments reduced emissions by 15 Mt.

    - New implementation mechanisms include the energy conservation target accountability system, new market-based instruments such as energy performance contracting, and more effective systems for supporting renewable energy development.

    - A cumulative investment of 2.59 trillion yuan (398.8 billion USD) in clean energy and energy efficiency improvements during the 11th FYP period has made China the largest investor in the world in these areas since 2009.

3. Local governments at various levels executed central government policies by enforcing the target accountability system, enhancing energy conservation monitoring and enforcement, establishing funds designated for energy conservation, and promoting the concept of energy conservation to the public. In addition, some local governments promoted the development of the renewable energy industry and low-carbon cities. This forward motion was often counterbalanced, however, by the pressure of intensive regional economic competition, which often drove local authorities to prioritize GDP growth over low-carbon development.

4. Large enterprises undertook significant technological upgrades and used internal financing, green credits, and the national fund for energy-saving technological upgrades to reduce energy intensity. The target accountability system, industrial development policies, the reform of the energy management system, and increased in energy prices all fostered energy-saving awareness among enterprises and facilitated energy-saving action. In contrast, small- and medium-sized enterprises received less government support, thus limiting their ability to reduce energy consumption and emissions.

5. Direct carbon emissions from building operation and transport accounted for approximately

30 percent of China's total carbon emissions in 2010, an increase of over 41 percent from 2005. This increase was more rapid than the growth in total emissions during the same period (34 percent).

6. Meeting the targets set for the current 12th FYP (a 16 percent reduction in energy intensity and a 17 percent reduction in carbon intensity) will be challenging for the following reasons:

    - Since much of the "low-hanging fruit" in energy intensity reduction has already been picked, the marginal costs of energy conservation and carbon reduction will continue to rise.

    - China is undergoing rapid industrialization and urbanization, which will continue to drive the growth of total energy consumption.

    - Local authorities may prioritize GDP growth over low-carbon development.

    - The sheer size and speed of the growth in national energy demand will make it difficult to increase the share of low-carbon energy sources in the nation's total energy structure.

To make the transformation to a low-carbon economy and ultimately reverse its trend of increasing emissions, China will need to take strategic action. The country should encourage further technology penetration, explore additional market-based policy instruments, and extend support to small and medium-sized enterprises. The key challenges in coming years include containing the growth of energy-intensive industries, particularly in the West and Northeast, accelerating growth through low-carbon development, and redirecting increasing energy-intensive consumer behaviour.