

## China's Policy Design on Low-Carbon Economy

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### Abstract

It is universally acknowledged that every country must face up to low-carbon economy actively. However, how to develop low-carbon economy is still perplexed. This paper considers that low-carbon economy should be viewed as a complex adaptive system (CAS). Public policy and incentive system is indispensable in this CAS because it provides safeguard and impetus for low-carbon economy, especially in developing countries. According to China's current situation, there are many public policies and management regulations should be established and carried out as soon as possible. Furthermore, some public policies and management mechanisms should be remained priority, i.e. government must establishes a proper legal system, exerts market mechanism fully to provide force and support for low-carbon economy, and carries out admittance and quitting mechanism, monitoring and appraisal

mechanisms strictly, improves the political achievement appraisal system, and implements the accountability system of conserving energy and reducing emissions. Only by speeding up these steps consistently can energy conservation and emission reduction be successful.

**Key words:** Low-carbon Economy; Policy Design; Incentive Mechanism; Safeguard System

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### INTRODUCTION

Ecological environment and climate change are evolving into the central problems of the world. Industrialization has created huge material wealth, but also resulted in serious environment pollution and ecology threat.

On October 30th, 2006, The British government promulgated the assessment report "Stern Review: The Economics of Climate Change" by the chief economist of the world bank, it depicted the clear prospect of global warming: "if lose to take action timely in the next few years, economic and social crisis resulted from global warming will like than the world war and economic depression in the first half of 20th century. One fifth of global GDP may disappear completely".

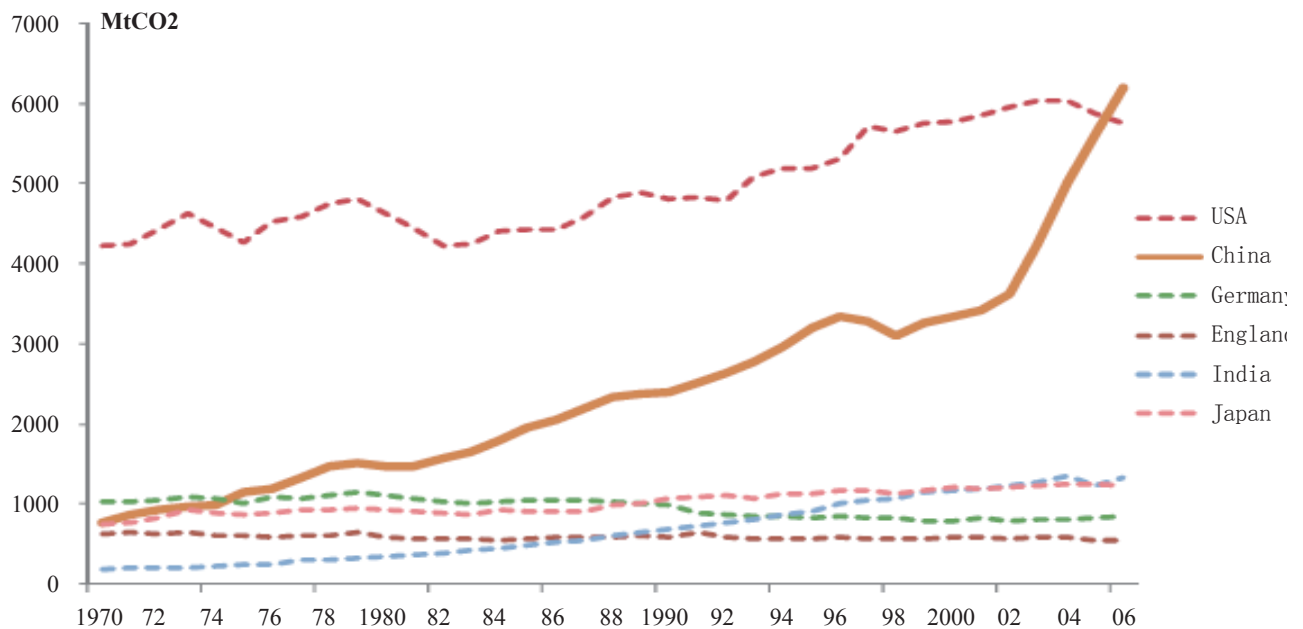
China is the world's biggest developing country with economy growing rapidly. However, there are many severe and escalating problems such as energy and resource shortage, water and air pollution, farmland and biological diversity loss (Ministry of Environmental Protection, 2009).

China's coal-based energy system has led to a number of challenges which could jeopardize future economy growth. 90% of SO<sub>2</sub> is caused by coal combustion, now

results in acid rain falling on more than 30% of China's total land. 16 Chinese cities are ranked among the most polluted 20 in the world, mostly due to the production and use of coal. The World Bank estimates around 400,000 people in China die each year from air pollution-related illnesses, mainly lung and heart diseases (Wang, Watson, 2010).

As the world's largest emitter of carbon dioxide (CO<sub>2</sub>) now, China's increment of CO<sub>2</sub> emission shows a significant increase in the global amount. As shown in Figure 1, China's total emission of greenhouse gases had increased more than 7 times from 1970 to 2007, and China's CO<sub>2</sub> emission exceeded the United States

obviously and ranked first in the world in 2007. However, the CO<sub>2</sub> emission of the U.S. was as high as 4,200 Mt in 1970 that was as much as about 4.5 times of China's CO<sub>2</sub> emission. In particular, China's CO<sub>2</sub> emission appeared sharply increase with the rapidly economic growth from 2002 to 2006. With the result that, as the Director of China Low Carbon Development Research Centre of Peking University, Wang Jianguo emphasized in July 2010, China's efficiency of energy utilization is only 1/4 that of Japan, that is to say, China's energy cost is four times that of Japan under the same output of \$100 (Wang, 2010).



**Figure 1**  
**The International Comparison of CO<sub>2</sub> Emission (1970-2006)**

## 1. DEVELOPING LOW-CARBON ECONOMY IS RAISED TO THE NATIONAL STRATEGY OF CHINA

In recent years, transforming economy growth pattern and promoting low-carbon economy have been becoming the national strategy and important precondition of sustainability. In 2007, President Hu Jintao pointed out that climate change can only be resolved by means of sustainable development (Hu, 2007).

In 2009, Hu Jintao addressed "Join Hands to Address Climate Challenge" at the opening plenary session of the United Nations Summit on Climate Change. He stated in clear terms on behalf of the Chinese government that China will continue to take strong measures to conserve energy, reduce emissions, develop renewable energies and nuclear energy, increase forest carbon sink and build green economy, and contribute its share to the international cooperation against climate change

(National Development and Reform Commission, 2007). At the same year, Premier Wen Jiabao held the state council standing committee meeting and determined that addressing climate change and developing low-carbon economy would serve as the important basis for formulating government medium and long-term development strategy.

Recently, China has been attaching great importance to scientific development, that is, comprehensive, balanced and sustainable development. The Seventeenth National Congress of the Communist Party of China set the building of conservation culture as a major strategic task and will adhere to the basic state policy of resources saving, environment protection and sustainable development. The Government of China formulates China's National Climate Change Program (CNCCP), outlining objectives, basic principles, key areas of actions, as well as policies and measures to address climate change for the period up to 2010 (National Development and Reform Commission, 2007). In the years ahead,

China will further integrate actions on climate change into its economic and social development plan, step up effort to develop green economy, low-carbon economy and circular economy (National Development and Reform Commission, 2007).

It is clear that low-carbon economy is the central part of China's sustainable development strategy. Chinese central government has indisputable resolution to develop low-carbon economy.

## **2. SAFEGUARD SYSTEM OF LOW-CARBON ECONOMY: POLICY DESIGN AND INCENTIVE MECHANISM**

Energy conservation and emission reduction is a typical of public good, thus, government must participate in it and play a leading role in the initial stage of low-carbon economy when carbon market is not founded really and investment mechanisms are still uncertain. So, the government's policies and incentive mechanisms are definitely important guarantee for low-carbon economy.

### **2.1 It Is Urgent to Strengthen Legislation and Establish a Proper Legal System for Low-Carbon Economy**

Developed countries such as England, America, Japan, Germany, Holland and Denmark have gone spearhead on low-carbon economy legislation and provided powerful legal guarantee for low-carbon economy.

On the one hand, Chinese laws of energy conservation and emission reduction strategy are incomplete at present, governments must improve related laws and policies to promote energy conservation, environment protection and speed up the formation of systems and mechanisms for sustainable development. These laws must be revised as soon as possible, such as Energy Law, Environmental Protection Law, Law for Assessment of Environmental Impacts, Air Pollution Prevention and Control Law, Mineral Resources Law, Coal Law, Electricity Law, Cleaner Production Promotion Law and Circular Economy Promotion Law, Low-carbon Economy Law, Oil and Natural Gas Law, Civil Nuclear Energy Law and Energy Public Utility Law. In the meantime, the supporting regulatory documents of Renewable Energy Law, Energy Conservation Law (have been revised) should be constituted soon. The Chinese Central Government can establish and integrate a policy system guided by the Energy Law and supported by the Coal Law, Electric law, Energy Conservation Law, Renewable Energy Law, etc., and assisted by regulations and policies issued by the State Council and local governments for providing policies of promoting energy conservation and emission reduction, developing renewable energy. So, low-carbon economy laws and regulations will lead China's low-carbon economy (Hu, 2009).

On the other hand, governments should establish the arbitration laws, strengthen the regulatory system and improve the penalty mechanism, realize whole process supervision of low carbon, enhance the laws' justice and persistence and propel low-carbon economy to success finally.

### **2.2 Governments Must Exert Market Mechanisms Fully to Provide Power and Support for Low-Carbon Economy**

Up till now, China hasn't formed government investment and market financing mechanisms steadily. Lacking of fund is constraining the low-carbon economy, under this circumstances, market mechanism must be exerted and developed as imperative assistance.

Firstly, it's urgently that governments should develop carbon finance, improve finance mechanism, expand finance scope, and realize diversity of investment subject, such as carbon trust, green stock, green bond, green insurance, green credit, carbon options and futures, and ecological compensation and so on.

Secondly, governments should establish some carbon markets with characteristic of perfect function gradually, speed up energy system and price reform so as to take advantage of price lever and policy effectively, build price system of reflecting the supply and demand relation, resource scarcity extent and regional carbon source diversity, and promote flow of the production factors and resource factors reasonably. It is an actual way for optimizing energy mix and propelling the balanced region development.

The last but not the least, carbon tax is viewed as an effective policy tool in developed countries for promoting energy conservation and emission reduction. Moreover, it can support and improve carbon trading system. In recent years, England, America, Japan, Germany, Norway and Sweden have imposed national carbon tax on fossil fuel. For example, those enterprises that signed agreements on climate change with government in England will be derated 80% of carbon tax if enterprises can achieve energy efficiency or emission reduction of agreement's specifications. At the same time, Governments can introduce taxes such as climate change levy, energy tax, and impose national carbon tax on high-carbon energy.

### **2.3 Governments Should Implement Admittance and Quitting Mechanism, Monitoring and Appraisal Mechanism Strictly**

Environmental protection and energy management departments should strengthen the whole process management and set up monitoring system, carry out admittance and quitting mechanism, monitoring and appraisal mechanism strictly.

First, It is time the related government departments concerned took proper steps to encourage the construction

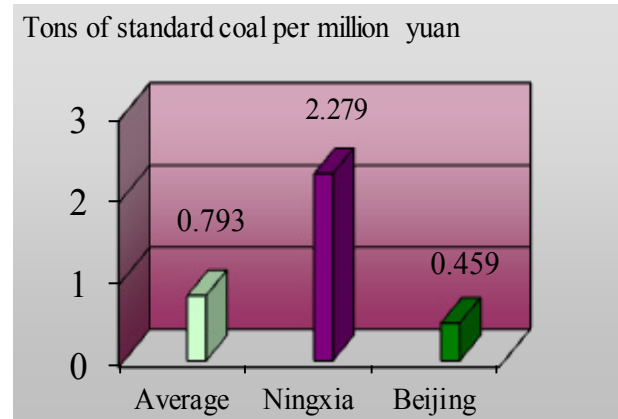
of large, more efficient, cleaner units, reply advanced key technologies to develop low-carbon economy, such as Carbon Capture and Storage (CCS), Flue Gas Desulphurization (FGD), Coal gasification, Integrated Gasification Combined cycle (IGCC) and Ultra-supercritical (USC), accelerate “close down, suspend operation, merge with others or shift to different line of production” of inefficient coal- and oil-fired power plants.

Second, it should be carried out scientific verification on energy efficiency and environmental protection strictly before set up new enterprises and increase new production projects so as to prevent expansion of high energy consumption, high pollution and high emission. There is no denying that complete monitoring and assessment system is very important and essential to improve the capability of addressing climate change because there are many problems in monitoring system, for example, It was reported that “up to 40% of those power generation units with FGD (Flue Gas Desulphurization) facility did not use it”(Liu, 2006). Therefore, the governmental policies should switch from mandating the installation of facility to focusing on enforcing units in operation through on-line monitoring and control. There are encouraging signs that the Chinese government is taking efforts towards this direction. For example, five coal-fired power plants were ordered to return the compensation to their desulphurization costs in proportion to the time of their FGD facilities not in operation and to make necessary adjustments in the specified period in 2008 (Zhang, 2009).

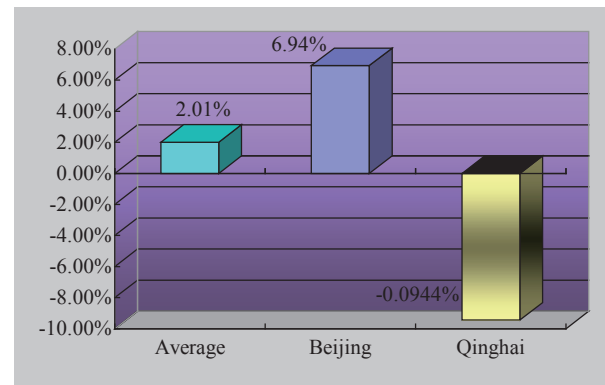
Last, reforming political achievement appraisal system still leaves much to be desired, that is to say, the performance of energy conservation and emission reduction should be included in appraisal system of government officials and entrepreneurs. It can be seen from the figure 2 and 3, there are still big variations in energy-saving performance among the 30 Chinese provinces. Average energy consumption per unit of GDP of the whole country is 0.793 tons of standard coal per million yuan in 2011. However, there were 20 provinces whose energy-saving performances were below the national average value, especially the western region. Energy consumption per unit of GDP of Ningxia was as high as 2.279 that was about 5 times as much as that of the lowest 0.459 of Beijing. In terms of energy intensity from 2010 to 2011, on the whole, China reduced energy intensity by 2.01%, Beijing took the lead, cutting its energy intensity by 6.94% that greatly exceeded the lowest -0.0944% of Qinghai (National Bureau of Statistics, National Development and Reform Commission, National Energy Administration, 2010; Zhang, 2010).

So, it must be changed that government officials pursue GDP growth simply at the expense of conservation culture and reform the political achievement appraisal system. Moreover, it is necessary to strengthen the institution building that environmental protection is becoming the hard constraint and embodied in hard means such as plan,

assessment and approval. In the meantime, governments should spare no effort to speed up institutionalization of the “regional restricted approval system” that was set up by depending on “One-vote Negation System” concerning environmental impact assessment, and make the proportion of environmental protection performance larger in officials political achievement appraisal system in the whole country (12th five-year plan research team of the Development Research Centre of the State Council, 2010).



**Figure 2**  
**Energy Consumption per Unit of GDP in China (2011)**



**Figure 3**  
**Energy Intensity Reduction in China (2011)**

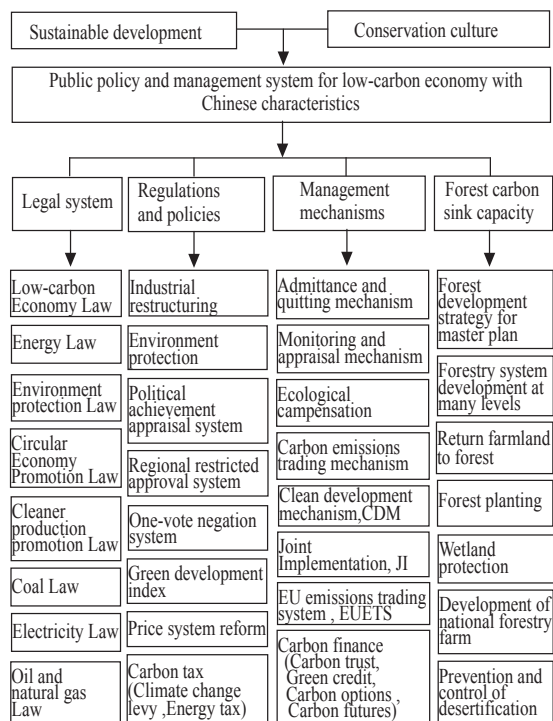
It was reported that many provinces still insisted on “GDP worship” in the 12th five-year plan under the circumstance of Chinese government weakening it, for example, Fujian, Heilongjiang, Guangxi and Guizhou proposed to double the per capita GDP. In contrast the more developed Guangdong and Shanghai proposed to achieve the annual average GDP growth rate of 8.0%, it was declined evidently compared with the 11th Five-year plan. Shanghai officials said that they would weaken the total amount index and strengthen the industrial restructuring, improvement of people’s livelihood and green development indices. In April 2008, Premier Wen Jiabao pointed out that China would implement the responsibility system for conserving energy and reducing emissions, it is helpful to realize China’s sustainable development strategy obviously.



Furthermore, there are many other imperative steps for conserving energy and reducing emissions, for example, governments can construct demonstration zones of low carbon economy and enhance the forest carbon sinks capacity, etc. In 2010, National Development and Reform Commission approved “Guangdong, Liaoning, Hubei, Shanxi, Yunnan” five provinces and “Chongqing, Tianjin, Shenzhen, Xiamen, Hangzhou, Nanchang, Guiyang, Baoding” eight city as the first pilot areas of low-carbon economy.

## CONCLUSION

On the whole, at present, nothing is more important than to promote low-carbon economy in China. Low-carbon economy system should be viewed as a Complex Adaptive System (CAS), exploration of its constitute elements and operation mechanisms should must be based on the perspective of systemic view so as to ensure low-carbon economy development smoothly, construct system framework and provide ideas and countermeasures for creating low-carbon economy path with Chinese characteristics. Taking into account all these factors, we may safely reach the conclusion that the policy design and incentive system for low-carbon economy is indispensable. Moreover, it is high time that governments put considerable emphasis on it and implement it as soon as possible.



**Figure 4**  
The Framework of the Public Policy and Management Mechanism

In conclusion, from what has been discussed above, we may construct the framework of the public policy and management system for low-carbon economy in China. As is shown by the Figure 4, there are many essential factors with different functions in the policy system are providing china's low-carbon economy with support and guarantee.

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