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The Revelation of Foreign Carbon Emission Policies for Developing China Low-Carbon Economy[1]

LA REVELATION DES POLITIQUES DE L'EMISSION DE CARBONE ETRANGERES POUR LE DEVELOPPEMENT DE L'ECONOMIE BAS-CARBONE EN CHINE

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Abstract: In present, developing the low-carbon economy is common recognized by the world. In order to achieve the aim of low-carbon economy, to reduce the carbon dioxide emissions is one of the most important measures. Nowadays, because of the large population, high energy intensity and the unreasonable energy structure based on fossil fuel, our country has faced an enormous pressure during the reducing carbon emissions process. Based on the current international applying carbon emission reduction proposals, we discussed the developed countries carbon emission reduction policies in detailed which includes the United States, Britain and Japan and etc. and in the meantime. Based on the above overseas developed countries experiences, the paper analyses our country's present situation of carbon emission reduction, finds the existing problems and put forward relevant recommendations. In brief, the research will provide some reference to build a low-carbon economy society of our country.
Keywords: low-carbon economy; CO2 emission; home and abroad carbon emission reduction policy; questions and measures

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Résumé: A l'heure actuelle, le développement de l'économie à bas-carbone est généralement reconnu par le monde. Afin d'atteindre l'objectif de l'économie à bas-carbone, la réduction des émissions de dioxyde de carbone est l'une des mesures les plus importantes. De nos jours, en raison d'une population nombreuse, d'une intensité énergétique élevée et d'une structure énergétique déraisonnable basée sur les combustibles fossiles, notre pays a fait face à une pression énorme au cours du processus de réduction des émissions de carbone. Sur la base des propositions internationales de la réduction de l'émission de carbone actuellement appliquées, nous avons étudié les politiques de réduction des émissions de carboneles des pays développés en détail, qui comprend les États-Unis, la Grande-Bretagne, le Japon etc, et en même temps, basé sur les expériences de ces pays développés ci-dessus, le document analyse la situation actuelle de notre pays en matière de la réduction des émissions de carbone, trouve des problèmes existants et propose des recommandations pertinentes. En bref, cette recherche fournira des références à la construction d'une société de l'économie bas-carbone dans notre pays.

Mots-Clés: économie à bas-carbone; émissions de CO2; politiques de la réduction de l'émission de carbone domestiques et étrangères; problèmes et mesures

1. INTRODUCTION

In the background of global climate change, "low-carbon economy" has become an increasing concern around the world. "Low-carbon economy" is a style based on the “low power consumption, low-pollution, low-emission”. It is an economic form which the human development and carbon productivity (the economic output per unit of carbon emissions) has reached a certain level in the meantime, which aims to realize the common global vision controlling greenhouse gas emissions. The performance of low-carbon economy is to achieve higher energy efficiency, energy structure optimization and rational consumer behavior, and to reduce greenhouse gas emissions or reduce greenhouse gas emissions growth is an important element.

1.1 Internationally

First, the IPCC (Intergovernmental Panel on Climate Change, the United Nations Intergovernmental Panel on Climate Change)’s Fourth Assessment report, global greenhouse gas emissions in the coming decades will continue to grow. By 2030, emissions will increase 45% -110% due to the energy use of carbon dioxide, as shown in Table 1, in which increments of 2 / 3 to 3 / 4 will be from developing countries (IPCC, 2007).

Table 1: 1990-2030 carbon dioxide emissions in some Countries and Regions

(BAU scenario) Unit: million tons

	History		Forecast		
	1990 year	2005 year	2010 year	2020 year	2030 year
U.S	4989	5982	6011	6384	6851
Canada	465	628	669	727	784
E U	4101	4383	4512	4760	4834
Japan	1009	1242	1196	1195	1170
China	2241	5323	6898	9475	12007
India	565	1164	1938	2614	3237
World	21226	28051	31100	37035	42325

Source: EIA(2008)

In April 2008, the former World Bank chief economist Nicholas Stern re-released the report of "Climate change's key elements of the global agreements" based on the "Stern Report" in 2006, which puts forward the long-term control goal of Greenhouse Gas's steady thickness is 450-500ppm,except adhering the global temperature rise limit controlled in 2 degrees, which also presents that the per capita emissions should reach 2 tons global convergence level by 2050, require the developing countries undertake the binding force emissions targets by 2020(Stern Nicolas, 2008).

1.2 Domestically

Secondly, in China, the resources and environment have become serious constraints for future development with China's rapid economic growth. In order to achieve the low carbon economy, China has taken a series of measures. The Chinese Academy of Sciences issued the report "2009 China's Sustainable Development Strategy, which puts forward the development objectives of low carbon economy in China by 2020:the unit GDP energy consumption should be decreased by 40% to 60% than the consumption in 2005,the carbon dioxide emissions unit GDP is by 50% or so.

According to Kaya identity relation, a national (or regional) carbon dioxide emissions growth main depends on the following four factors contribution: population, per capita GDP, energy intensity (unit GDP energy consumption) and the energy structure (ZHUANG Gui-yang, 2009).

China is a country with a population of 1.3 billion, and the population factor is a major contributor to carbon emissions. China's energy intensity is much higher than the world average, according to estimates, to create one U.S. dollar per GDP energy consumption, China is 3.8 times of the world average, 4.3 times of the United States's, 11.5 times of Japan's. Meanwhile, China's coal and other fossil fuel-based energy structure will not be changed a lot for a long period (Figure 1).

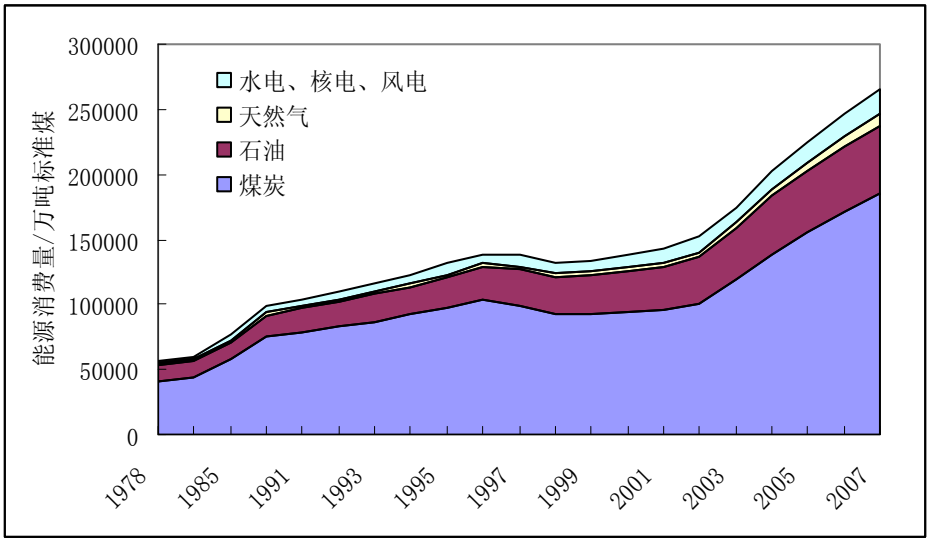

Figure 1: 1978-2007 China's energy consumption structure

With the rapid economic growth, China's energy consumption is still the major driving force for the growth of greenhouse gas emissions at least by 2030.

Therefore, based on theoretical analysis and national conditions, China's low-carbon economy realization is mainly in two ways: First, adjust the energy structure and reduce carbon dioxide emissions intensity; Second, improve energy efficiency and reduce energy intensity.

2. THE PRESENT MAJOR CARBON EMISSIONS PROGRAM AT HOME AND ABROAD

At present, the international carbon emissions contain mainly three options: First, use of energy saving and improve energy efficiency; Second, to adjust energy structure, develop low-carbon energy; third, CCS, which is the Carbon Capture and Storage.

2.1 Energy efficiency

Improving the energy efficiency, reducing fossil energy consumption is an important way to reduce emissions of carbon dioxide. China's current per unit energy consumption output is obviously higher than the advanced international level, thermal power's coal consumption supply reaches to 22.5%, Energy utilization rate is only 26.9% of the U.S, 11.5% of Japan,. If we can reduce energy consumption per unit output value to the current level of Japan, China may realize the goal of carbon dioxide emissions about 40 or 50 years earlier, Therefore, improving the energy efficiency is an effective way to achieve.

2.2 Adjust the energy structure

China's coal-dominated energy structure has led to the production and use of energy has been a major source of environmental pollution. In 2007, the coal consumption of primary energy consumption accounted for 69.5%.Growing energy consumption and over-reliance on fossil fuels, result in greenhouse gas emissions increase rapidly. By 2010, coal in energy production and consumption still more than 60%, By the year of 2050, the ratio of it will not be less than 50% the coal-dominated energy structure will rapidly increase greatly greenhouse gas emissions.

U.S., EU and Japan are actively taking oil alternative strategy. President Bush proposed the "Advanced Energy Initiative aims to increase wind and solar power generation use and development, to strive to replace 75% of 2025 oil imports from the Middle East. The European Union in 2005 launched a four-year sustainable energy movement, energetically encouraging bio-ethanol and biodiesel to replace petroleum as a transportation fuel. Japan focuses on developing fuel cells, nuclear power and biofuels, thereby reducing demand for oil. In the long term, the development of low-carbon fuels is the ultimate way to reduce emissions of carbon dioxide, but due to many technical and cost limitations, which can't achieve good short-term emission reduction effect (CHEN Xiao-jin, 2006).

2.3 CCS

CCS can be taken mainly from onshore fields, coal, coal bed methane and other geological conditions. By 2020, a conservative estimate of the implementation of our land may provide the major source for ccs space about 140 billion t, the cost is not more than 396 yuan / t.

3. CO_2 EMISSION REDUCTION POLICIES IN MAJOR DEVELOPED COUNTRIES

3.1 United States

The U.S. government invested considerable funds and resources for scientific research on greenhouse gas emissions reduction and technology development. The main purpose is to utilize the resources

efficiently with keeping the pursuit of domestic economic growth, In 2008,Obama announced that he will be about to make some measures to reduce greenhouse gas emissions' level as 1990's levels by 2020, to realize the target 80 % cut of greenhouse gases by 2050. The following is the major implement projects of the United States (RU Ming, 2006).

3.1.1 Climate Change Technology Plan

The program's goal is to accelerate the development of key technologies to achieve substantial greenhouse gas emission reduction task.

3.1.2 Climate Change Science Program

The plan is made for the federal government's tans-departmental program designed to in-depth study the natural changes in Earth's environmental systems and human change, through observation and prediction of global climate change, to provide the scientific basis for decision-making bodies of the United States and the international community.

3.1.3 International cooperation

To promote international multilateral and bilateral cooperation projects, realize the outcome of climate change related work. In multilateral cooperation, the United States continue to be the most important providers for UNFCCC finance. In the bilateral cooperation, the United States and Australia and other countries have established bilateral partnerships, to carry out the cooperation research for the climate change science, energy and other fields.

3.1.4 Climate Partners

Feb.2003, U.S. President declare 12 major industrial sectors and the Business Roundtable members committed to work with U.S. Environmental Protection Agency, Department of Energy, Ministry of Communications and the Ministry of Agriculture, launched a ten-year emissions reduction plan. The 12 industries sectors include electricity, oil refining, natural gas, automobile manufacturing, steel, chemicals, magnesium metal production, forestry, paper making, railway transportation, cement production, mining, aluminum smelting, lime manufacturing and semiconductor production etc..

3.1.5 Voluntary report plan of greenhouse gas

The plan announced in February 2002, by the Department of Energy, Ministry of Commerce, Ministry of Agriculture and EPA to jointly promote the President's greenhouse gas emission reductions plan.

3.1.6 Renewable energy, the oil and electric hybrid and fuel cell vehicles

As of 2009 the government announced to provide 41 billion dollars in tax incentives to encourage the use of renewable energy and efficient energy technologies such as hybrid vehicles and fuel cell vehicles, solar water heating systems, gas power, wind power, biomass and gas cogeneration system.

3.1.7 Federal energy and carbon sequestration program

Through the international cooperation, the United States will provide financial support for demonstration projects within a decade, the total number amounting to 1 billion U.S. dollars, to subsidize funded Freedom CAR Partnership 1.7 billions for five-year program, to develop hydrogen fuel cells,

hydrogen infrastructure and zero emissions of greenhouse gases of automotive technology.

3.2 England

The United Kingdom is the world's active advocate and forerunner of climate change, The "Kyoto Protocol"'s goal promised by EU is to keep the greenhouse gas emissions 8% level of 1990's based criterion by 2012, while UK are willing to bear more responsibility to reduce emissions by 12.5% in EU's "emissions reductions sharing agreement". Moreover, the British Government further stated that they seek to reduce the major greenhouse gas CO_2 20% in 2010, by 60% in 2050.The promotion measures of carbon reduction in UK are as following (PAN Jia-hua,CHEN Ying, ZHUANG Gui-yang, 2006).

3.2.1 Climate change levy

In order to achieve the "Kyoto Protocol" emission reduction targets, the British Government puts forward a substantive policy, namely, climate change levy. Its essence is a kind of "energy tax", and the tax basis is the quantity of using coal, natural gas and electricity, using petroleum products, cogeneration and renewable energy can reduce or remit taxes, The main purpose of the tax levy is to increase energy efficiency and promote energy-saving investment..

The UK tax has very distinct characteristics. The first is to use price leverage, improving energy efficiency, promote energy structure adjustment (different energy's tax rates is not same, cogeneration, renewable energy can be tax-free). Secondly, in principle, for the fiscal neutral tax, there is no increase on enterprise overall tax burden. Thirdly, to make the emission reduction targets clear for the large energy consumption company, and to relieve the tax properly, in order to maintain the competitiveness of enterprises. Fourth, to have good effect for business and public sector (not for households), the political risk is low, a small direct impact on citizens. Fifth, to form the public opinion, to raise public awareness. Therefore, the United Kingdom's climate change levy is a positive and effective policy tool with little negative impact.

3.2.2 Carbon Fund

Carbon Fund is an independent company invested by the government and its operating style is enterprises, established in 2000. The company's goal is to help business and public sector reduce carbon dioxide emissions to grasp business opportunities for carbon capture technology, then aims to help the UK realizes the low carbon economy; their work main focuses on reducing carbon emissions, in the short and medium term focus on improving energy efficiency and carbon management, long-term focus on investment in low carbon technology.

The main source of carbon fund is the UK's climate change levy, about 0.66 billion pounds each year. There are three major areas of fund use, one is for research and development; the second is to accelerate technology commercialization; Third, to invest in incubators. In the aspect of low-carbon technologies choice, carbon fund pays more attention on the science of technology assessment. In order to reduce market risks, and its main selection criteria is carbon emission reduction potential and technological maturity, which also focuses on cost efficiency. In the aspect of the enterprise choice, the Energy Carbon Fund focuses mainly on large enterprises, their energy cost is more than 300-400 million pounds a year because large enterprises emit high energy consumption and carbon reduction.

3.2.3 Greenhouse gas emissions trading scheme

The program launched in 2002, it is the British government's partial strategies controlling climate change, its main purpose is to gain the experience for GGS emission trading and to ensure the UK's

competitive advantage before the EU and international GGS emissions trading start.

There are three main ways to participate in this program. One is enterprises directly involve, voluntarily make the emissions caps. Taking into account the risks of this commitment, the Government has come up with 215 million pounds five years as an incentive fund (043 million pounds per year), to encourage enterprises to join emissions trading. Second, to participate with an agreement, to sign "climate change agreement", then will get 80% tax cut. If agreement goals can not be got ,the enterprises will pay up all the climate change levy. Third, project participants, this mechanism is to encourage those who aren't belong to above two kinds enterprises to proceed pollution reduction, including electric power, transportation and end-users (such as contract energy management company, EMC) and so on.

3.3 Japan

According to Japan's "environment, recycling-oriented society White Paper" published figures, we can get that Japan's total amount of its greenhouse gas emissions reach 13.4 million tons by 2006, and in excess 6.2 % of the based criterion year (1990) of "Kyoto Protocol" specified, among in that, the carbon dioxide emissions amount is 1.274 billion tons. The main carbon emissions reduction measures proposed by Japan are as following:

3.3.1 Implementation of environmental taxes

Japanese government has amended the environmental tax program many times from 2004,and formed the final scheme in 2005. The expected environmental tax levy will amount to 370 billion yen, per household average annual burden of 2,100 yen, Program about tax relief provisions in the new environment mainly includes: the first, high emissions Users can cut the tax about 50% to 60%; second, taking into account the steal manufacturing has no other suitable alternative sources of energy，to implement tax-free to them; third, 50% reduction in kerosene tax. Through the implementation of environmental taxes, which is expected to cut about 43 million tons of carbon emissions, equal to about 3.5% in 1990's level(WANG Tong, 2007).

3.3.2 Develop and implement their own plan of action

Japan's own plan of action is a self-restraint action plan to achieve the "Kyoto Protocol" target. In 2007, the comprehensive survey from 39 industries shows that there are four kinds of industries have developed a new plan of own action ,22 trades revised emission reduction targets.

3.3.3 Promote national autonomy to participate in carbon emissions trading system.

Since 2005, Japan began to implement the "autonomous participation of domestic carbon emissions trading system." This is an important measure using market means to promote enterprises GGS emissions. From the first implementation of results among the 31 companies participants, up to Sep.2007, CO_2 emissions decreased by 29%. Moreover, with the world's carbon emissions trading market expansion, the Japanese domestic carbon emissions trading system has been more perfect, enterprises further increase to 150 enterprises in 2008.

3.3.4 Implement "the Government first planned"

According to "Measures to promote climate change law" and "Kyoto Protocol" requirement, from April 2005, the Japanese government decided to implement "the first planned", which states: Government agencies and their subordinate institutions will achieve the 2006's goal cutting down 7% than 2001, In

2006 the Japan government developed a new program, provided : the annual GGS emissions reduction of Japan government and their subordinate institutions should cut down 8% of 2001's by 2010-2012(YANG Shu-chen, 2009).

4. REVELATION OF THE FOREIGN CARBON REDUCTION EXPERIENCE

China has already been the world's second largest carbon emission country, if we don't take appropriate measures, we will likely turn to be the world's largest one replacing U.S, which will affect China's international image, and will also challenge our sustainable energy developing and will cause tremendous pressure on the environment. So, referring to the above discoursed foreign experience, we can get the following revelation:

4.1 Optimizing fiscal policies to guide investment and consumption upgrading

At present, China can't hold perfect conditions to implement the carbon emissions environmental tax, but with the environmental situation become more seriously, the international's reducing carbon dioxide emissions rising costs and other factors will have a major impact on our economy. China can not rely exclusively on the developed countries' huge financial and technical assistance, we should formulate fiscal and taxation policies to guide consumption and investment structure upgrading, to change the basic conditions of high emissions from energy structure and consumption amount.

4.2 Change the energy structure, improving energy efficiency

The energy production and its consumption are the main reasons of Chinese GGS emissions, we must vigorously develop renewable energy, strictly control the construction of coal-fired power plant, shutting down small thermal power, transformation of high-pollution power plant; to promote clean fuel for power generation, promote the science and technology innovation, and accelerate the application of new technologies as low-cost carbon sequestration technology for power generation, efficient cooling heating and power, distributed power supply terminal and etc..

4.3 Formulate relevant policies for long-term mechanism of carbon emission reduction

We can add some relevant regulations in the revision processes of the law "Addressing Climate Change", and gradually establish a legal system with the improvement of the response level to climate change. We can also strengthen the regulatory policies, such as access restriction to energy-intensive industry, standard of energy-usage limitation, high-energy-equipment standards, and energy consumption standards for cars and so on.

4.4 Strengthen energy environmental protection, encourage and guide enterprises to participate in CDM cooperation projects

CDM is one of the mechanisms under the framework in "Kyoto Protocol". The coal-based energy consumption model of China leads to the rapid growth of greenhouse gas emissions. Therefore we should greatly develop CDM cooperation projects to promote energy efficiency, to develop and utilize the renewable energy, and to recycle methane and coal bed methane, which will help us to import

advanced resource utilization and environment protection technologies, and to provide a good way for environmental, economic and social sustainable development.

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