

Global Climate Change and the Responsibility of New Energy Industry in China

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ABSTRACT: From the perspectives of impact and essence of global climate change and the situation of emission reduction in China, the article introduces developing new energy is an effective way for China to fight climate change. In addition, it further discusses the issues existed in developing new energy and analyses the technical paths of developing new energy to fight global climate change in China, including Clean Development Mechanism (CDM), Voluntary Carbon Market (VCM), energy audits, and investment in potential emission reduction projects, etc. Finally, it gives some policy recommendations of developing new energy on fighting climate change.

Keywords: climate change, new energy, path, recommendation

1. THE GLOBAL CLIMATE CHANGE AND THE EMISSION REDUCTION PRESSURE IN CHINA

Ever since the industrialization of the major western countries in 19th century, the conventional energy, e.g. petroleum, coal and natural gas, has taken up the dominant position in the history of recent energy development and in the current energy market. The long-term use of fossil energy has resulted in pollutant emission and environmental deterioration, and especially the greenhouse gas emission has led to more and more severely global climate change.

The global climate change mainly refers to the global warming caused by the over accumulation of the greenhouse gas like CO₂. From 1970 to 2004, the concentration of

greenhouse gas (CO₂, CH₄, N₂O, HFCs, PFCs, SF₆) has increased by 70 % (from 28.7GtCO₂eq to 49GtCO₂eq); and the greenhouse effect has caused the average global temperature to increase by 0.74 °C (0.56 °C ~ 0.92 °C) in the recent 100 years (1906 ~ 2005). The Fourth Assessment Report on Climate Change by the Intergovernmental Panel of Climate Change (IPCC) clearly indicates that 90% of global warming is probably caused by human activities. In addition, the report also predicts that by 2100, the global temperature will be increased by 2 °C ~ 4.5 °C, even with a rise of 6 °C in some areas, which is about 3 ~ 8 times^[1] of the increase in 20th century, all of which shows that the global warming is becoming more and more severe.

The global warming has great influence on the ecological system, e.g. the glacier ablation, the rising of sea level, the desertification of farmland and the frequent occurrence of natural disasters. In the situation of global warming, agriculture is one of the most sensitive sectors in response to the climate change. Due to the large population in China, the development of agriculture concerns the destiny of the country and its people. If the global climate change cannot be effectively controlled, the production of main crops will be reduced by 37% in the second half of 21st century. In addition, by the year 2030, the capacity of agricultural production will generally be reduced by 5%~10% [2]. The climate change also imposes severe threat on many areas with fragile ecological system like the Tibetan Plateau. In recent decades, the ablation of glacier in Tibetan Plateau is accelerating. If the temperature continues to rise, the glacier on the Tibetan Plateau will be reduced from 500 thousand km² in 1995 to 100 thousand km² in 2030. Since the glacier on Tibetan Plateau is the headstream of several major Asian rivers, the reduction of river water caused by glacier ablation will inevitably affect the life of a population over 1 billion^[3]. Thus the global warming imposes great challenge on the future development of China.

China's CO₂ emission ranks second and the emission of CH₄ and N₂O also ranks top in the world. It is predicted that the total amount of CO₂ emission in China will probably exceed that in USA from 2025 to 2030 and China will become the largest emission country. In addition, the CO₂ emission per capita, which is currently below the world average level, will also climb up to the average level [4]. Though the CO₂ emission per capita is relatively low in China, the large amount of total emission brings China great pressure on fighting climate change. In the EU Spring Summit held in this March, the 27 EU members unanimously agreed to unilaterally reduce greenhouse gas

emission by 20% in 2020 compared with that in 1990, and if USA and China join in it, the reduction rate can increase to 30%. During the "Two Sessions" period in China, the dean of Earth Institute of Columbia University in USA, one of the leading specialists in global warming research, Jeffery Sax, believed that by the end of 2007, every country should negotiate on the post-2012 climate change system, and by the year 2009, the international society, including China and USA, two major emission countries, should be ready for signing one serious protocol, which should be concluded in 2010 and be duly approved to replace the Kyoto Protocol. Therefore, as the post-Kyoto era is approaching, China is facing more and more pressure on reducing greenhouse gas emission.

2. THE FEASIBILITY ANALYSIS ON DEVELOPING NEW ENERGY TO FIGHT GLOBAL WARMING IN CHINA

China is engaging in a rapid economic development. With its large population and low economic development level, the economic growth and the improvement of people's living standard are the most urgent tasks and thus the energy demand will still be increasing. China is one of the few countries, whose energy consumption heavily relies on coal. According to the statistics of BP 2007^[5], coal energy takes up 70.2% in primary energy consumption structure in China in 2006, compared with that of 28.4% in the world. To provide the same amount of heat, the emission amount of CO₂ by burning coal is 36% higher than that by burning petroleum and 61% higher than that by burning natural gas, and much higher than that by burning low-carbon or non-carbon renewable energy. The energy consumption structure in China, consisting primary coal, secondary petroleum and natural gas, and least limited renewable energy resource, has caused the CO₂

emission 30% higher than the average level in the world [6].

China must strive for a balance between climate safety and energy demand. Choosing the low-carbon or non-carbon new energy over the conventional high-carbon fossil energy for a better energy consumption structure will certainly be an effective way to ensure enough energy supply and reduce the greenhouse gas emission. The exploration of new energy on a large scale will provide a new solution to reduce the increasingly international pressure on emission reduction and ensure energy supply and climate safety.

In China, the new energy, often connected with renewable energy, refers to the solar energy, wind power energy, biomass energy, small-sized hydropower, tidal energy, geothermal energy, hydrogen energy, etc., not including conventional energy and large-scale hydropower. Therefore, there are abundant energy resources in China. According to relevant statistics^[7], among the new energy which can be commercially utilized in the near future, the energy provided by wind power and biomass power annually is equivalent to the energy provided by 1 billion tons of standard coal, which is approximately half of China's energy consumption in 2005 (2.1 billions tons)^[8]. The utilization of other forms of energy like solar photovoltaic generated electricity and tidal energy is in the beginning stage of commercialization, and more technology of using new energy is being developed. Consequently, after the maturation of mass production technology, the energy demand in China can be fully met.

The Medium-term and Long-term Development Planning for the Renewable Energy (hereinafter referred as Plan)^[9] examined and approved by the State Council in June 2007 has pointed out that by the year 2020, the total installed capacity of hydropower will reach 300 million kW, the total installed capacity of electricity generated by biomass energy will reach 30 million kW, the total installed capacity of electricity generated by wind power will

reach 30 million kW, and the total installed capacity of electricity generated by solar energy will reach 1.8 million kW. While in 2005, the installed capacities of hydropower, biomass energy, wind power, and solar energy were only 117 million kW, 2 million kW, 1 million kW, and 70 thousand kW respectively, which are much lower than China's development goal and thus there is great potential for China to develop new energy. Therefore, a sustainable development relying on new energy is totally feasible.

3. THE PRACTICAL PROBLEMS IN DEVELOPING NEW ENERGY IN CHINA

Though there is a great potential in developing new energy, the utilized energy amount is relatively small and only a part of new energy has been commercialized. The technology, scale, and speed of new energy utilization are far behind those in the developed countries. The problems of current retardation in new energy industry lie in the following aspects:

3.1. Incomplete, inconsistent and unstable policies in terms of supporting new energy development

There are no long-term mechanisms of supporting the sustainable development of renewable energy and no detailed rules of implementation with strong manoeuvrability. The Renewable Energy Law carried out in 2006 as a national-applicable law, has only listed the basic principles, but without concrete implementing conditions, which makes it less enforceable. Though the 12 relevant stipulations concerning the development of renewable energy, including the Stipulation of Hydropower Applicable to The Renewable Energy Law, the Research and Technology Standards for Renewable Energy, the Comprehensive Goal for Renewable Energy Development, are gradually being released and carried out, but compared with developed countries, the

relevant laws and regulations still need to be specified and revised in the aspects of authority and applicability^[10].

3.2. No enough encouraging policy

Under current technology condition and policy environment, the cost of small-scale hydropower, biomass power electricity, wind power electricity, solar photovoltaic electricity are 0.2 times higher, 0.7 times higher, 0.7 times higher, and 10 to 17 times higher than the cost of coal electricity respectively^[11]. All these figures show that the new energy is less competitive in the market. Due to the lack of relevant encouraging policies, the investors are less confident and thus are reluctant to invest in new energy projects. Taking the wind power as an example, in the Tentative Measures of Price and Apportion Management of Renewable Energy Generating Electricity issued in 2006, it is prescribed that the price of wind power electricity must be in accordance with government guided price, while the government guided price is determined by the public bidding. Ignoring the effect of franchised bidding, the government still adopts the public bidding which makes the franchised wind power projects suffer loss in profit.

3.3. The lack of compulsory market safeguard policy

Due to the lack of compulsory market safeguard policy, it is unable to form stable market demand and a continuous market drive for renewable energy.

3.4. Weak capability of technology development and weak industrial system

Except hydropower, solar energy, mash gas and crop ethanol fuel, the technology of other forms of new energy is still in its infancy and the equipments needed for new energy production rely on import. For example, the production of the wind power above the scale of megawatt mainly depends on technology transfer of production license or import; the key production equipment and

materials of photovoltaic cells rely on import, and the key technology for cellulose mass production has not been mastered, etc.

Therefore, in order to adjust the energy structure and achieve the goal of new energy development, the support of government policies, fund and technology support are needed. Only by solving the financial and technological problems encountered in new energy development from various aspects and adjusting public policies can China effectively foster the long-term development of new energy industry.

4. THE ANALYSIS ON TECHNICAL PATHS TO FITT GLOBAL CLIMATE CHANGE IN NEW ENERGY INDUSTRY IN CHINA

4.1. Utilizing Clean Development Mechanism (CDM) and attracting international fund and technology for new energy projects

In December, 1997, Meeting of Parties to the United Nations Framework Convention on Climate Change (UNFCCC) held in Tokyo has passed the Kyoto Protocol to restrain the greenhouse gas emission of developed countries, in order to fight global warming. Three market mechanisms are included in the Kyoto Protocol: the Emission Trading, the Joint Implementation (JI) and Clean Development Mechanism (CDM). The developed countries can offset their high cost emission by acquiring the low cost emission credits from developing countries through the Clean Development Mechanism.

Compared with conventional fossil energy, the new energy generates no greenhouse gas like CO₂, and has a potential to reduce greenhouse gas emission. China can get fund and technology support from CDM. According to the calculation of the Medium-term and Long-term Development Planning for the Renewable Energy, by 2010, the amount of new energy utilized in China will be equal to 300 million tons of standard

coal, which will reduce the emission of CO₂ by 600 million tons. And by 2020, this amount will be equal to 600 million tons of standard coal and the reduced amount of CO₂ emission will be 1.2 billion tons. Calculated by the Certified Emission Reductions (CERs) price of 10 dollars/tCO₂e, the income of carbon-industry will reach 12 billion US dollars.

4.2. Advancing the development of new energy industry by the Voluntary Carbon Market(VCM)

Different from CDM, the Voluntary Carbon Market (VCM) emphasises its “voluntary” character. In consideration of their prestigious images and social obligations, some world renowned companies originated the idea of VCM. They voluntarily commit themselves to compensating their greenhouse gas emissions by purchasing VER¹ from carbon emission reduction market to realize the goal of “Carbon-Neutral”². With the development of VCM and more fund supply, China’s new energy enterprises can benefit from finding alternative ways and gain additional fund supported by taking part in carbon-reduction trading. For example, the carbon-exchange platform offered by the Chicago Climate Exchange (CCX) can provide such trading choices for China’s emission reduction programs. CDM approves the registered reduction amount, while the CCX, acting as a complement to CDM, approves the occurred and proved reduction amount. Currently, five organizations in China have been approved to be the members of CCX.

4.3. Using energy audit to reduce energy consumption and increase energy efficiency

Energy audit means that audit units carry out supervision, check, analysis and evaluation on physical process and financial process of energy use of enterprises according to relevant national laws and regulations, technical standards, consumption rating, etc. Audit units search for energy conservation potential, put forward correction suggestions and measures, prepare programs and plans on energy conservation through inspection, test, diagnosis, consultation and evaluation of energy consumption, management level, consumption indices, financial process, integrated use, environmental effects to make enterprises reduce energy consumption and increase energy efficiency.

However, China has not worked out unified national standards for energy audit units and auditors. Energy audit work carried in each area can only abide by local standards or refers to foreign cases, which makes quality of audit report and energy audit work less effective.

4.4. Fostering the investment on new energy as potential emission reduction projects

To achieve the goal of developing renewable energy, besides making full use of external environment, China should also combine the national investment with diversified social investments to meet the large-scale fund demand.

The characteristic of new energy indicates that it is closely related to carbon-trading mechanism. The potential investment on carbon-asset projects can not only ensure the gain of program but also the extra gain on carbon-asset. For example, for a 1 MW wind power program, calculated by effective electricity generated time of 2000~2500 hours, 1MW wind power generator can generate 2000~2500MWh electricity every year. Calculated by 8 Euros /tCO₂e, the extra carbon-reduction income will be 16 thousand to 20 thousand Euros, with an increase of 5%~11% on the electricity price per unit. With the decrease on reservation and the increase on cost of fossil fuel, the renewable

¹ VER: Verified Emission Reduction, the verified reduction amount in voluntary Carbon Market

² Carbon Neutral: First calculating the total CO₂ emission amount of a person or a group, and then offsetting the calculated CO₂ emission amount by purchasing correspondent carbon emission reduction to protect the environment

energy with positive social and environmental effect will attract more investors to participate in the development of new energy industry.

5. THE SUGGESTIONS ON PUBLIC POLICY OF UTILIZING NEW ENERGY TO FIGHT GLOBAL CLIMATE CHANGE

5.1. Strengthening the Effectiveness of Government Support

Chinese government should issue and implement as soon as possible more applicable administrative regulations and technical standards on the basis of the Renewable Energy Law. For the new energy programs which are applying for the CDM program, the government should offer more support and simplify the application procedure to help accelerating the establishment of the programs. Besides the support and guide of policy, the government should provide motivation and assistance as well. Constrained by resources and technology, the cost of exploration and utilization of new energy is still high. The government should implement preferential fiscal and tax policy and compulsory market quota policy to encourage the production and consumption of renewable energy. For example, the government should make the price of new energy-generated electricity above the rate of social average profit to provide the investor with a stable, visible and higher reward. The government can also implement the compulsory market quota policy of new energy to make sure the new energy and renewable energy-generated electricity stay in a fix proportion for a sustainable development of new energy industry.

Additionally, China can use the international carbon-trading mechanism for reference, such as the operating mode of European greenhouse gas emission reduction plan to allocate the reduction quota to each company by using the emission license to ensure these companies' greenhouse gas

emission within the prescribed amount. By establishing China's emission quota system and the emission quota trading market, China can balance the need of traditional energy-consuming users and development of new energy programs for a broader developing scope of new energy industry.

5.2. Utilizing the financing advantages of the financial institutions

The government should help to establish a better new-energy investing and financing environment to ensure that the domestic financial institutions all actively involve in fostering the development of new energy industry. For the enterprises listed in national supporting domains and involved in CDM programs, the financial institutions should provide simplified loan procedure or cooperate with foreign financial institutions to form bi-directional credit guarantee to reduce trading risk and ensure profitability of emission reduction programs.

5.3. Improving the research and development ability of scientific institutions

Currently, most of the registered CDM programs aim at acquiring foreign fund support rather than introducing technological cooperation. However, in the long run, the introduction of foreign advanced technology for technological transfer is more important than fund support. The national energy research institutions should make use of the academic advantages to investigate the feasibility of technology transfer in CDM cooperation in different domains of new energy industry and come up with specific guidance in shifting the emphasis to technology transfer. For the undeveloped CDM program due to a lack of methodology, the research institutes should seize the opportunity to investigate the specific methodology and adjust the already established methodology to suit Chinese context to help more national new energy programs enter the scope of CDM. Since Voluntary Carbon Market(VCM) in China is

still in its infancy, the relevant research institution should keep in pace with the recent international trend to research the market standard for VCM and search for a suitable platform for new energy industry to be involved as soon as possible.

5.4. Emphasizing the advantages of professional consulting agencies

The cooperation mechanism under the carbon-trading system is very professional and it is difficult for the project owner to complete the whole application procedure alone. As the maturation of CDM field, a great number of professional consulting agencies appear. With their specialty in consultation, the delay of application due to ignorance can be avoided and owner's time and energy can be saved and they can help more enterprises to take part in the Voluntary Carbon Market and thus to foster effectively and professionally the development of new energy industry to the largest extend.

5.5. Treating the capital of different ownerships equally

China should lower the access threshold for new energy industry and promote the function of private capital. According to statistics by National Industry and Business Association, the private economy has taken up 65% of the GDP in 2005. The business scale, the technology, the equipments, the management and research ability all have been improved greatly. Compared with state-owned and other forms of economy, the private enterprises are more flexible and adaptable to market competition and industry structure adjustment. The new energy industry requires not only the participation of national economy but also that of private economy. The diversified investment structure can help the formation of industry chain and the attraction of outside fund and technology to build a mature and stable new energy market.

6. CONCLUSION

Nowadays, the climate change attracts more and more attention from all over the world. In addition, China as a major greenhouse gas emission country is under great pressure. Therefore, the development of new energy is an effective way for China to fight the climate change. The establishment of effective, long-term laws and regulations and motivation mechanism is the basis and the guarantee for developing new energy industry. The active involvement in CDM activities and VCM can help to solve the difficulties in fund and technology in new energy development and promote industrial competitiveness. And the strength of private economy should be emphasized and utilized to foster the new energy industry. At the same time, the government should face the problems and difficulties encountered in developing new energy industry and promote the advantages of financial institutions, scientific institutions and professional consulting agencies to make joint efforts to develop the new energy industry.

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