

Study on Social Responsibility Reporting System in the Transition of Low Carbon Buildings

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Abstract. The development of low carbon constructions plays an important role for realizing the transformation of low carbon economy. However, there is externality for the development of low carbon constructions. The crucial point is how to more effectively internalize the externality within acceptable total transaction cost. When there is transaction cost, the property right of carbon emission cannot be completely defined and executed. It is a feasible approach to promote the development of low carbon constructions through establishing a Low Carbon Constructions social responsibility report system.

Keywords: Low Carbon Economy; Externality; Social Responsibility Report; Low Carbon Constructions; Carbon Emission; Emission Reduction.

1. Introduction

In November 2009, China proposed the target of reducing 40%-50% carbon emission per unit GDP I 2020 compared to that of the year 2005. This target definitely has huge impact to the growth of national economy. According to the research of Yuan Fuhua (2011), since the Opening up of China, the potential average economic growth of China is 9.5%, of which about 1.3 percentage point growth is at the cost of environment. After the year 2000, the consumption of environment drives economic growth for 2 percentage point on average. Considering the conditions of low carbon development and population transformation, the potential economic growth for China will be gradually below 8% in the next 10 years. The present production mode cannot counter the impact of emission reduction. In order to maintain the continuous and steady development of economy, the improvement of technology and the transformation of structure is vital.

In addition, according to measurement, the total energy consumption of China's buildings takes up 20.7% of the social energy consumption (Jiang Yi, 2006). About 50% of the greenhouse gas is from the building related energy consumption around the world. One third of the non-recyclable energy is used for buildings and their maintenance globally. In China, only 14% of the population apply heating, however the energy used for heating each year reached 130 million tons of standard coal, which take up 15% of the total energy production of the country (China Construction Material Research Institute, 2003).

The key technology of energy saving for buildings includes the improvement of building envelope, heating and cooling system, lightening and home electrical system, as well as the utilization of recyclable energy and energy saving design for newly built constructions. According to the research report of McKinsey consultation company and the estimation of experts, in the year 2020, only the improvement of building envelope could potentially reduce carbon emission for 40%-60%. The total relative emission reduction potential by comprehensive application of advanced energy saving technology is about 160 million tons to 200 million tons of CO₂. The relative emission reduction potential of applying energy saving heating system is 20%-35%. Thus the total emission reduction potential is about 100 million tons to 140 million tons of CO₂ (Zhuang Guiyang, Chen Ying, Zhang Lei, 2010).

Obviously, development of Low Carbon Constructions has higher emission reduction potential. Meanwhile, it has significant impact to the total social energy consumption. Therefore, it is very important to promote the development of low carbon constructions. The author is trying to research

the approaches for the development of low carbon constructions, and concludes that the social responsibility report is a practical approach to promote the development of low carbon constructions.

The essay consists of five sections. Section one is introduction. Section two discusses the externality issue during the process of low carbon economic transformation. Section three analyses the comparative advantage of promoting the development of low carbon constructions by social responsibility report. Section four illustrates the life cycle social responsibility report for low carbon constructions. Section five concludes the essay.

2. Externality during the Process of Low Carbon Economy Transformation

Generally speaking, low carbon economy could be realized through structure adjustment, technology reform, policy tools, and low carbon lifestyle. These approaches involve concept, system, technology, and behavior. Assuming the concept is constant, system is constrained by certain technology and behavior, while the set system is decisive to technology and behavior to large extent. Regarding to the practical situation, as the technology and behavior factor could not have major breakthrough within a short period of time, it is better to promote low carbon economy by way of system.

It is difficult to realize low carbon economy because it is hard to balance development and low carbon. Accordingly, it is difficult to design low carbon economy transformation system as it has to not only include diversified bodies with distinct preferences, but also guarantee the goal of climate change control. During the process of low carbon economy transformation, the attitude of different interest groups could be seen as dots in a two dimensional chart with data on economic development and emission reduction. Due to the inalienability of climate, the long term benefits of climate change mitigation are public goods. If there is transaction cost, there is externality unavoidably when different interest groups are trying to balance their economic benefit and climate change mitigation measures. Take China as an example, some areas have developed small scale high-energy consuming and heavy-polluting industries for a long time. Some areas only focus on economic development but neglected the problem of environment pollution. While some local governments try to ration electricity, the enterprises prepare electric generating set by themselves. This demonstrates the externality of micro economic agencies' behavior during the process of implementing low carbon economy. For consumers, as illustrated by the research and survey of Zheng Yonghong and Liang Xing (2009), 82% of the respondents support enterprises to promote low carbon economy. However, if the products' price increases due to the implementation of the enterprises, 61% of the respondents reported that they would not buy the product any more.

It is not a problem that people have different opinions or they have conflict interests. It will only be a big problem if we could not internalize the externalities under the constraint of affordable total transaction cost. Therefore we have to make a set of practical system to make the stakeholders balance their conflict interests through effective transactions, and ultimately coordinate the conflict interests via trade-offs.

In the construction market, the individual cost and social cost, and individual benefit and social benefit of the suppliers and buyers are different due to externalities. This leads to the loss of social benefits. As the buyers do not have to pay additional price for the emission reduction cost of constructions, the nominal demand curve will move up. Meanwhile, as the suppliers do not have to pay for the emission reduction cost of constructions, the nominal supply curve will move down. This results in excessive supply and consumption of high carbon constructions.

For the construction industry, under the condition of fixed preference of the demanders, the loss of social benefits are caused by both the excessive development of high carbon constructions and insufficient development of low carbon constructions. If the low carbon construction suppliers could not get price compensation equal to social benefits, or the high carbon suppliers do not have to undertake the extra social cost result in high carbon, the construction enterprises will face the problem of incentives distortion brought about by externality. For the construction enterprises which design and develop high carbon constructions, as the cost they assume is lower than the social cost, so when

the demand curve is fixed, the equilibrium supply of high carbon constructions will be larger than the optimal social equilibrium supply. While for the construction enterprises which design and develop low carbon constructions, as the price compensation they get is lower than social benefits, the supply of low carbon constructions will be smaller than the optimal social equilibrium supply.

Therefore, to promote the development of low carbon constructions, it is vitally important to effectively internalize the externalities during the process of economic transformation

3. Using the Social Responsibility Report to Promote the Internalization of the External Features of the Development of Low-carbon Buildings

In economic field, the traditional approaches to external problems are control and “Pigouvian Taxes.” However, according to the study conclusion drawn by new institutional economics, these approaches are the results of the overlooking of trading expenses. The adoption of an institution other than others depends on the fact that it entails the minimum trading expenses when the income is fixed.

In Yuan Fuhua’s opinion (2011), China has a relatively weak feedback mechanism reflecting pollution’s impact on the changes of economic growth, an indication that environmental issues here are still “external” ones. This means China now has neither an effective system for protecting environmental resources property right nor a market trading mechanism, which are needed for the clear definition of the negative external effect of pollution. He also holds that the establishment of a system for clearly defining environmental resources property right and a market trading mechanism is the key. But from the point of view of cost efficiency, when there is no unified and relatively rigorous property right definition, it is relatively costly to build a new integrated carbon emission trading market. Nor is it feasible in a short period of time. Besides control, the most favorable plan is to merge the low-carbon economy preferences of all areas and units into some existing market. It is like to include the cost of dog barking in the price of a residential quarter and include the quality of the public order in the house rentals of different quarters. This requires the relevant information sources. Under current conditions, the social responsibility report is a feasible option. Therefore, when total privatization is impossible, the social responsibility report is a feasible approach to effectively promote the transition towards low-carbon economy.

Through study, Richardson (2009) points out that the social responsibility report plays a very important role in the transition towards low-carbon economy. In fact, some Chinese empirical study literatures also show that the social responsibility report has indeed been taken seriously by the relevant stakeholders. Gao Jie (2009) carried out a case study against the samples of some Chinese public companies that voluntarily issued their social responsibility reports in 2008. The result showed that their cumulative excess reward rate was notably higher than that of the public companies that did not issue the report. In addition, the cumulative excess reward rate of the companies that voluntarily issued the report had an obvious and continuous rise within three days after the issue of the report, though only by a small margin. Relying on the enterprise reputation theory, Shen Hongtao, Wang Liyan, and Wan Tuo (2011) carried out a study by taking the non-ST public companies in Shanghai and Shenzhen stock exchanges from 2008 to 2009 as samples. They find that the corporate social responsibility report can effectively convey the information about social responsibility behavior and enhance the positive relations between social responsibility behavior and enterprise reputation.

In actual international institution arrangement, the Copenhagen Accord has three key contents (Zhuang Guiyang, 2009). First, it maintains the previous long-term action objective: keeping global temperature rise within 2°C above that in the pre-industrialization period. Secondly, it requires that the developed countries supplement and perfect their emission reduction goals by January 31, 2010, that the developing countries present their national circulars on greenhouse gas emission once every two years, and that the emission reduction projects receiving fund and technical aids and their emission reduction amounts should abide by the relevant provisions such as MRV. Thirdly, with meaningful reduction efforts and on a transparent basis, the developed countries should jointly raise 100 billion USD per year by 2020 to meet the developing countries’ needs in emission reduction and adaptation. They should also offer 30 billion USD per year from 2010 to 2012 as the rapid startup

fund. Of these, the demand for the biennial national greenhouse emission circulars from the developing countries apparently have the basic intention of using the social responsibility report to promote the countries' transition towards low-carbon economy. The fund supply by the developed countries undoubtedly represents "trading" consideration in nature.

4. Full-life-cycle Social Responsibility Report System of the Low-carbon Buildings

So, how can the social responsibility report system of the low-carbon buildings be built? Answer to this question depends on the consideration of four aspects: full life cycle of the low-carbon building, subject of its social responsibility report, calculation of the carbon emission in the social responsibility report, and establishment of the supervision and control mechanism and database based on the social responsibility report.

4.1 Full Life Cycle of the Low-Carbon Building and Subject of its Social Responsibility Report

In a full life cycle of the low-carbon building, different phases involve different enterprises, which form different subjects of the social responsibility report. These subjects make public the amounts of the carbon emission or emission reduction by their own projects in their own social responsibility reports.

The existing literatures do not have unified division of the phases in a full life cycle of the low-carbon building. According to Zhang Shilian and Zhang Liling (2010), a full life cycle of the low-carbon building can be divided into five phases: early-stage decision making, planning design, construction, operation maintenance, and demolition & scrapping. He Fuchun and Fu Xiangzhao (2010) hold that there are four phases: design, construction, operation & use, and demolition & recovery. According to Zhang Taoxin, Zhou Yueyun, and Lu Peng (2011), there are six phases: material preparation, construction, use, demolition, handling, and recovery. It is obvious that the full life cycles of the low-carbon building determined by the aforesaid two literatures have certain differences. That in the literature by Zhang Shilian (2010) covers a longer period of time than that in the literature by Zhang Taoxin (2011). In fact, early-stage decision making is a general operation management activity of the enterprise. It does not necessarily target a certain low-carbon building or those in a certain series. However, it is very difficult to strictly distinguish among demolition, handling, and recovery. Therefore, a full life cycle of the low-carbon building normally should include the period from planning design to demolition and scrapping. The phase division within the period is based on the need for carbon emission calculation. As for the social responsibility report, the key is to know what phases are completed by different subjects.

Now, in China, the subject of the social responsibility report at the project planning design phase is usually the project planning design unit or real estate enterprise. The subject at the construction phase is usually the constructing enterprise. The subject at the operation maintenance phase is usually the property management company. The subject at the demolition, handling, and recovery phase is the demolition unit.

4.2 Calculation and Release of Carbon Emission in the Social Responsibility Report

For low-carbon buildings, a series of carbon emission or emission reduction calculating models have been developed both at home and abroad. China Real Estate Chamber of Commerce and China Elite Real Estate Academy took the lead to issue the Framework on Carbon-reduction Technical Assessment for China's Green Low-carbon Residential Communities on November 28, 2009. The framework calculates the amounts of carbon emission and emission reduction in four dimensions: energy conservation, greening, water saving, and traffic within the community. In addition, when Fu Jiafeng and Huang Jiangli (2010) were studying low-carbon development potentials of the buildings in frigid areas, they developed a method package for calculating energy consumption in a full life cycle. Zhang Taoxin and some others (2011) have also built up a mathematical model for measuring

and calculating carbon emission in a full life cycle of the building. Although, from the point of view of information presentation, these models can all serve as the methods for calculating carbon emission in the social responsibility report and only the comparability between the projects and between the periods should be guaranteed, industry standards such as the Framework on Carbon-reduction Technical Assessment for China's Green Low-carbon Residential Communities should normally be adopted as far as the implementation validity of the social responsibility report system is concerned.

As for information release, a subject may in practice be involved simultaneously in certain phases of several low-carbon building projects. Therefore, in its social responsibility report, the information about the amounts of carbon emission or emission reduction of different low-carbon buildings should be presented separately. In addition, the report subject at the project planning design phase should make public the amounts of carbon emission and emission reduction in the designed full life cycle of the project. This is to facilitate its comparison with the actual amounts of carbon emission and emission reduction in the full life cycle of the low-carbon building project.

4.3 A Supervision and Control Mechanism based on the Social Responsibility Report

To use the social responsibility report to effectively promote the development of low-carbon buildings, supervision and control based on the social responsibility report should be implemented. Such supervision and control have two meanings. First, the information in the social responsibility report should be examined and verified so as to reasonably guarantee its credibility. Secondly, the relevant subject should be kept under supervision to make sure that it has actually fulfilled emission reduction.

As for the examination and verification of the social responsibility report, some international standards that can be used for reference have been established. Of them, the ones used most widely and with the biggest influence include ISAE3000 issued by International Auditing and Assurance Standard Board (IAASB) and AA1000 (Yang Haiyan, Xu Jialin, 2009) issued by ISEA. However, these standards cover a rather wide scope. For low-carbon buildings, as the examination and verification of the calculation of the carbon emission and emission reduction amounts are involved, industry standards will prove to be very important.

As for supervising the actual fulfillment of emission reduction by the relevant subjects, since there are certain positive and negative effects (Zhang Shilian and some others, 2010) among different phases in the full life cycle of the low-carbon building, there will be supervision and control to certain extent between different subjects of a same project under the social responsibility report system. Moreover, through the release of the information such as the designed and actual amounts of carbon emission and emission reduction in the social responsibility report and by relying on the accumulation of the relevant data and experience, all phases in the full life cycle of the low-carbon building will be further improved.

5. Conclusion

Building industry has an apparent impact on the total social energy consumption. Meanwhile, it has relatively high potentials in emission reduction. It is therefore very important to promote the development of low-carbon buildings. Through study, this paper holds that using the social responsibility report to promote the development of low-carbon buildings is a more feasible approach than other means such as the establishment of a clear environmental resources property right definition system and a market trading mechanism. In the social responsibility report system of low-carbon buildings, the subjects separately adopt industry standards to calculate the amounts of carbon emission or emission reduction in their social responsibility reports, release the information item by item, and carry out examination and verification in accordance with the industry standards. Relying on the internal supervision and control power of different subjects and their accumulation of data and experience, the system can be further improved during implementation and can be expected to promote the development of low-carbon buildings in a more efficient way.

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