Discussion of Problems in the Development of Building Energy Efficiency in China

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Abstract: In the context that Chinese energy shortage is beginning to emerge and China is constructing an economical society, much attention is paid to building energy consumption by the Chinese government and common people. Therefore, Building Energy Efficiency (BEE) is becoming one of the most fashionable terms in China in recent years. Although some specifications, standards and technologies have been developed, some problems worthy of note in BEE have appeared. Through introducing the current status of BEE in China, some serious problems existing in the development of Chinese BEE are pointed out in this paper. In this way, the author wishes Chinese leaders, researchers and designers in this field could think earnestly about the above problems in BEE. At the same time, the authors give some advice and reference solutions for the problems in the paper, and it is hoped that they are thoughtfully considered.

Key words: building energy consumption; Building Energy Efficiency (BEE)

1. INTRODUCTION

In recent year, there will be 2 billion m^2 new buildings in China each year with the existing buildings of 42 billion m^2 which mostly are these buildings with high energy consumption. The building energy consumption of China is 2～3 times to the developed countries in the similar climate zone that causes the damage of environment and resource and puts forward the critical point of energy and ecology. The building energy consumption will increase continuously with the development of urbanization, life level, building demand and living comfort. In 2000, building energy consumption in China is 0.35 billion ton standard coal. In 2001, the ratio between building energy consumption and total national energy consumption is 27.5%, and 1 percent more for each year. Assume the same speed for China, building energy consumption in China will reach 1.089 billion ton standard coal which is 3 times to 2000 year.

Fortunately, in recent year, Chinese government has paid much attention to the building energy consumption. The Construction Ministry which is the department responsible for building energy consumption takes many effective measures to reinforce BEE, for example, sets up related standard of BEE, develops many demonstration buildings, supervises the implement of related standard, enforces the management of high energy consumption building, renovates the system of heating etc. Assume that all the new buildings implement the energy efficiency standard and renovate the existing building step by step, there will be 420 billion KWh electricity, 0.26 billion ton standard coal and 0.846 billion ton CO_2 saved each year till 2020, which is good for energy saving and environment protection.

At the same time, we should be aware that there are many problems in the course of BEE in China.

2. PROBLEMS IN BEE OF CHINA

BEE is a complicated system which has relation with many departments. Government should make use of leading function to study and make out feasible policy, regulation, and technical standard etc. The work can only be finished through the efforts from all parts. From current situation, we are facing

many problems to be solved in BEE.

2.1 Government Confuses Its Function

In the course of BEE, the main function of government is to: organize related units and experts to make out policy, standard, regulation; enforce the study of BEE; put forward the technology of BEE; supply good policy service, legal system and technical service.

But some local governments confuse their function because of the economic interest. They do not supply good policy environment and promote the development of BEE technology. They monopolize the new technology and new product, which is hard to form the market mechanism and competition mechanism. The result prevents the development of new technology and new product in BEE. This is also the cause of bad BEE in some area.

2.2 Be Short of Technology of BEE

"In the course of BEE, the first step is to make out technical standard." The Chinese government has recognized the function of BEE standards and regulations. Many standards have been compiled or being compiled, such as《Design standard for energy efficiency of residential buildings》, 《Design Standard for Energy Efficiency of Residential Buildings in Hot Summer and Cold Winter Zone》, 《Design Standard for Energy Efficiency of Residential Buildings in Hot Summer and Warm Winter Zone》, 《Standard of climatic regionalization for architecture》, 《Thermal design code for civil building》, 《Design standard for energy efficiency of public buildings》, 《Code for acceptance of energy efficient building construction》etc. Many local governments also compile all kinds of local standards and regulations. Furthermore, China is compiling the 《Regulation of BEE management》, which will put forward the work of lawmaking.

One problem is that Chinese BEE standard lags behind foreign BEE standard. We all know that standard is the source of policy and technology to control BEE. And making standard is only a measure, the ultimate aim is to implement BEE standard. But there are many confusing technologies and unfeasible operation in existing standards and codes. For example, the existing standards mostly copy the matured technologies of foreign BEE, regardless of Chinese climate, construction condition and material etc. And some technical measures coming from lab are not fit for the real project. So it is hard to use these technologies.

In addition, the energy saving of 50% and 65% seems empty, because there is no deep study of new energy and new technology of application.

These problems are caused mainly by weak of BEE technology. There is no BEE theory, technical system and assessment system to adapt China. Furthermore, Chinese government has not paid much attention to the basic theory study of BEE and technology development of BEE. So the standards for BEE are short of technical support and prevent their applications in real projects.

2.3 Be Short of Government Financial Support and Private Investment

As mentioned before, there are 2 billion m^2 new buildings each year in China and 13 billion m^2 buildings with high energy consumption need to be renovated. This is a huge market and also economic challenge. Where is money coming? Chinese government can not invest so much money in BEE because of the restriction of revenue. And for other reasons, the market mechanism in China is not fully formed, so the private company dare not invest in the BEE. Both of these cause the short of money in BEE in China.

2.4 Be Lack of Technology of Clean and Renewable Energy

If we reach the goal of real BEE, clean and renewable energy will be an important part. But in current situation, there are the following obstacles:

Firstly, in the policy, renewable energy is lack of support of legal system and there is no related policy on application of renewable energy in buildings. Government does not make effort on renewable energy. If building uses renewable energy, the initial investment will increase; sometimes it will be much bigger. Government does not give favorable policies to attract building developers. The application of

renewable energy such as solar energy, ground heat etc is restricted.

Secondly, there are many obstacles in technology. The application technology of solar energy, ground heat is complicated; some technology is still in trial phase even in developed country. In China, the technology lags behind and the technology obstacle is obvious. Although there are many labs to make experiments, but for the application in large scale, there is lack of reference of design guide, standard and regulation. At the same time, there are few demonstration projects with little project experience. When using foreign experience, for different geographic and climatic conditions, the integrated technology for solar buildings and ground resource heat pump is lack of guide materials. Furthermore, the related products, construction technology and running management on solar buildings and ground resource heat pump are not mature. Technical obstacle is key obstacle in renewable energy in buildings which restricts the application of solar buildings and ground resource heat pump.

In addition, the economic obstacle is another problem. There is short of money in study and development of solar and ground resource technology used in the demonstration project; also in old building renovation. In order to strengthen the ability of staff, money should be used to training and information dissipation. Money has been the bottleneck of the application of clean and renewable energy.

2.5 Be Lack of Awareness of BEE

Although the central and local governments have made much effort to propagate BEE, BEE in China is still in baby phase. Common people including some technicians do not recognize the importance of BEE.

Energy saving buildings use many BEE measures, such as new energy saving materials, energy saving instruments etc. So the cost of the buildings increase. However, common people care the initial cost (building price) and do not care the building energy cost and running cost. In the competitive market, the developers must consider the BEE market, their advantage, money returning, running cost and how to make client buy energy saving building etc. These are the social factors which restrict the development of BEE.

3. MEASURES TO SOLVE THE PROBLEMS

BEE is a complicated social project, it needs government and the society to participate. The author gives the following advice for Chinese BEE according the current situation and his own experience.

（1）Government must be aware of its function, enforce the investment, strengthen basic theory study on BEE and advanced technology study.

Governments at all levels should organize related units and staffs to make BEE policies, standards, regulations and encouraging mechanism. Pay much attention to the study of basic theories, advanced technologies and new energy (clean and renewable energy); provide good service of policy support, legal system and technology support. At the same time, use all kinds of social investment to BEE, especially for the basic theory study and advanced technology study.

（2）Set up the encouraging mechanism to promote the BEE.

Governments at all levels should set up revenue and tax encouraging mechanism; set up the item in the budget for BEE used to develop, propagate, demonstrate, promote and supervise BEE; set up special item in the budget for old building renovation; decrease the tax for energy saving buildings; manage the energy consumption of big public buildings (such as government buildings) and supervise the energy consumption, promote the ladder energy price; reduce the estate tax for high level energy saving buildings.

（3）Enforce the propagation and promote the awareness of BEE

Firstly, enforce the examination and checkup of the BEE. The situation of implement of BEE will be the examination standard for construction units and design units. This will promote these units to recognize the importance of BEE.

At the same time, the BEE has the characteristic of social participation; the propagation and training should be enforced. Promote the management level and technical level of staff. And promote the energy label system of BEE. Rank the buildings according to their levels of energy consumption and make common people to joy the comfort and economic advantage of BEE.

4. CONCLUSION

Today with the shortage of energy the bottleneck effect from it is more obvious for the development of chinese economy. Chinese BEE has stepped into the critical phase. Chinese government should adopt all kinds of measurements to promote the level of BEE in China.

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