Practically and Realistically Looking upon the Issue of New Energy "Surplus"

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***Abstract*- Financial crisis and global warming have spurred the development of new energy, but the issue of excess of new energy industry has not been fully reflected in Chinese official documents. Polysilicon and wind power are the main areas where the excessive capacity lies. The paper perceives new energy surplus as a potential hazard and analyzes the structural and institutional factors that would contribute to the surplus. Successful energy innovation is introduced to conceive the applicable strategies for China to develop its new energy industry.**

Keywords- New Energy; Capacity Surplus; Technical Upgrading

I. INTRODUCTION

Financial crisis and climate change have promoted the development of global new energy. On one hand, every economic crisis will give rise to new industries. On the other hand, because of global climate change and explicit requirements for reducing greenhouse gas emissions, it will also promote the new energy development [1].

By far all Chinese official documents have not yet put forward the excess of new energy industry. In September 2009, the State Council approved the "Notice", which mentioned that only the new energy industry, such as wind power equipment and polysilicon manufacturing, has had a tendency to duplicate construction in production processes. If the phenomenon of the new energy excess have really existed, then we should be familiar with the essence of this excess objectively and positively.

First, the new energy excess is a potential surplus, not a real surplus. The current all aspects have referred surplus to excessive capacity. Excessive capacity is the surplus production capacity formed by the actual output that is less than the capacity. However, China's wind power equipment and polysilicon manufacturing currently have a tendency to excess, but conclusions can't be drawn that surplus will certainly happened in the future development. Some clues can be discovered from Table Ⅰ which is from CEI net. According to the table, the average expected growth rate of new energy is too fast, which indicates the propensity of energy surplus. Moreover, there are many constraints to the reality production when the technology is still immature.

Second, the new energy industry is a structural surplus, not an overall surplus. The range of new energy is very wide [9]. New energy includes the above-mentioned wind and solar, as well as nuclear, geothermal, biomass. Even if some aspects of dividual sectors have given rise to some degree of excess, the whole new energy is not necessarily involved within excess. On the contrary, much of the new energy industry production is also in short supply.

TABLE I INSTALLED CAPACITY OF NEW ENERGY IN 2020

Power Type	Installed Capacity in 2008	Installed Capacity in 2020
Water and electricity	17152 million kilowatts	36000 million kilowatts
Wind Power	1217 million kilowatts	12000-15000 million kilowatts
Photovoltaic Power Generation	15 million kilowatts	2000 million kilowatts
Nuclear Power	910 million kilowatts	7000-8600 million kilowatts
Biomass Energy Power	315 million kilowatts	3000 million kilowatts

Finally, the new energy industry is a relative surplus, not an absolute surplus. In terms of wind energy source, after the wind power equipment construction is completed, there is a process of networking. In the period of wind farm commissioning, workers have to choose the rational position of decomposition switch and to make sure that the blower outlet voltage is within the specified range. The market of wind power would not expand rapidly due to the high technology requirements because it restricts the demand of the wind power market and thus the production capacity of wind power equipment is squeezed. But in the long term, when the technology reaches a certain level, the production of wind power equipment will be gradually released and the development of wind power will enter a large-scale stage [4].

II. THE REASONS OF NEW ENERGY "SURPLUS"

A. Blindness in Investment

Before the financial crisis in 2008, the highest price of polysilicon was close to $500 / kg [4]. Foreign polysilicon manufacturers pocketed the profits out of the core production technology they commanded. Because of the polysilicon profits, more and more domestic investors began to get involved in polysilicon processing industry during this period. Fig. 1 from EPIA demonstrates the rapid growth of photovoltaic. About 80 enterprises entered or prepared to enter the wind power machine manufacturing. But only 30 enterprises had prototype and the remaining 50 enterprises

did not form production capacity. According to the statistics, ten enterprises' annual output of wind power machine was more than 100, and only three enterprises' annual output was 1000 [5].

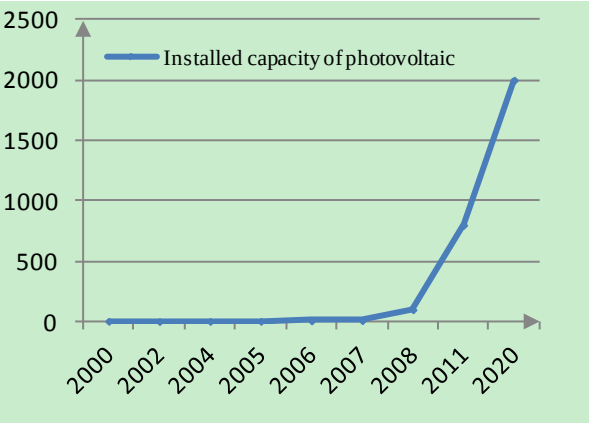

Fig. 1 The installed capacity of photovoltaic from 2000 (KW)

But at present, China's new energy market is relatively small. And the corresponding regulations and quality control systems are not complete and lack systematic technical regulation mainly because of some of the certification standards. Additionally, the high price of new energy undermines the competitiveness of some enterprises in the market, which will in return affect the market expansion. At the same time, the market potential cannot be uncovered without effective publicity and dissemination of information. Thus it must restrict the development of the market. Some of the energy is supported by the market, but there is no comprehensive policy to give aid to the development of the energy. To deal with the blind investments that have occurred to the energy market, the Chinese government should urge the enterprises to find a suitable energy to prudently invest on the basis of their economic strength and technical requirements. If we do not prevent the rush-style investment, enterprises may lead to the overall loss eventually [6].

Overall, the blind expansion is a conspicuous issue in the wind power equipment manufacturing, which is not only an essential process in the development of wind power market, but also the basic premise in the market competition. However, the current wind power equipment manufacturing is potentially surplus in the industrial development. It is clearly seen from the Fig. 2, which suggests that the installed capacity of wind power has increased rapidly since 2006.

When companies are considering the new energy as "meat and potatoes" and spend millions to build new energy facilities, the "surplus" of new energy is likely to occur.

B. Uncompleted Government policy

With respect to the development of new energy resources, China has many laws, regulations and policies, but these decrees and plans are often pompous [2]. In fact, many of the policies introduced by the government cannot solve practical problems appropriately. The power sector has not formally accepted the new power generation connected with net; the electricity price of wind power is more expensive than the average price; the wind power companies are receiving tax reliefs and other financial subsidies from the authorities but financial support for new energy is much smaller than other countries.

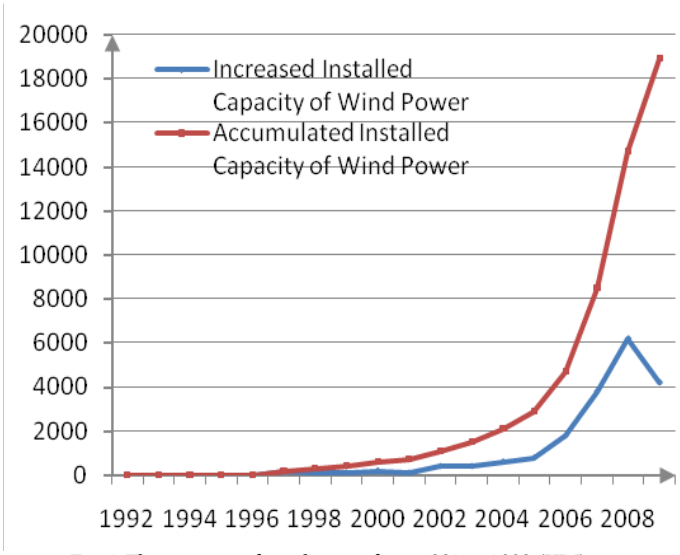

Fig. 2 The situation of wind power from 1992 to 2009 (KW)

For example, in the late 20th century, the Australian energy industry was at a crossroad where over-reliance on coal resources led Australia to be the world's largest per capita carbon dioxide emission, which accounted for 1.6% greenhouse gas emission of the world. In April 2001, Australia introduced a "mandatory renewable energy target" whose goal was to reach to 9500 gigawatt of renewable energy by 2010. In August 2009, Australia introduced a "renewable energy target" which guaranteed that by 2020 renewable energy power would account for 20% of the total electricity supply. Since 2006, Australian has launched government subsidies and tax rebates for those who purchase and renovate to LPG motor vehicles and has provided $1000/vehicle and $2000 vehicles tax subsidies respectively. Later in January 2002 and in September 2003, Australia respectively reduced 0.38143 AUD/L federal excise tax on ethanol and biodiesel; the Australian government has implemented renewable energy certificate system, which can not only track and verify obligations, but also help the quota bodies to complete the renewable energy quota obligation. In terms of energy innovation, Australia has established multilateral cooperation mechanism through forums and high-level bilateral dialogue mechanism [3].

It turns out that capital subsidies, tax breaks, tax credits and other fiscal incentives are an effective way to encourage the development and utilization of new energy resources. For instance, Australia supports new energy development through new energy plan, tax incentives, energy innovation, renewable energy certificates and a series of laws and policies. In Australia, the traditional energy patterns of oil, gas and nuclear has transferred into the use of new energy. Because of the similarity of energy law and structure between China and Australia, Chinese government can learn from the successful experience of Australia's initiative in developing new energy.

At present, Chinese government should play an active role in making plans for developing new energy industry in a long term and building a friendly environment that would bolster the industry. Besides, experts and the media should also participate in analyzing the current situation and preventing the new energy surplus from happening.

C. The Lack of Core Technology

Although technology seems to be slightly connected with new energy "surplus", it is actually actively involved in the "surplus" situation. Take wind energy as an example, the power rationing and the grid are the two problems that face the R&D center, new energy equipment and technology research.

The rapid expansion of wind power had an increasing influence on power grid, which had made wind power operation difficult. This problem lies in particular areas that have good wind energy resource. One problem is power rationing. Capacity installed by wind power of Mengxi has accounts for 20% of the maximum power load. During winter, the wind power output is constrained by the government because of the heat pressure and low electricity load restrain. Jilin and Gansu province often limit electricity. The other problem is grid. The main reasons behind the construction of power grids are that the grid supply does not match the demand of the wind farms and that wind power and power grid construction are different in the inherent characteristics. Other reasons are people's inconsistent cognitions, inadequate and inefficient policies, and the lack of incentives for grid construction. All the factors have obstructed the popularity of wind power, leading to a number of idle equipment and machinery.

In addition to the technology, access devises of new energy is another important factor that affects the new energy grid. On one hand, the gap in new energy technology between China and foreign countries is still very big [Table Ⅱ]. On the other hand, the international market of access equipment of new energy is still dominated by several large companies such as Siemens and ABB. Other manufactures such as GE, Vestas and Gamesa grasp core technology that distances new manufactures hard to compete with them. The situation in China is that the production of access equipment and components manufacturers are large and mixed [7].

At the same time, it is important to realize that network around the world is a difficult and general problem in the development of wind power. And a big step in international cooperation needs to be taken. It is imperative for China's government and new energy industries to increase investment, construct power grid, and expand resource allocation of the wind power.

TABLE II TECHNOLOGY GAP BOTH AT HOME AND ABROAD

Item Compared	Technological Gap
Direct combustion power generation	1. Introduced technology and equipment can't be assimilated and understood. 2. A huge gap between boiler characteristics and some aspects of feed and slag-off.
System integration	1. Raw material is unstable. 2. Inefficient transform. 3. The cost of production is very high.
Liquid fuel	1. Effort on studying katalyst characteristics, reducing the cost of effluent disposal and researching terminal productions. 2. Materials variance causes bottleneck in biodiesel enlargement. 3. Bio-oil technology only lays emphasis on output, not quality.
Geothermal energy utilization	Breakthrough in many key technology.

D. Financial Crisis

From the last year or this year, the global financial crisis triggered by U.S subprime mortgage crisis has been continually intensified, and it has had a serious impact on the substantial economy. The global economy is worsening trend and the economic growth slowed. The energy situation should also have some great changes, especially the price of oil. The maximum price of oil has been close to $150 a barrel in July this year, but now it drops to probably $50 [14].

Due to higher costs of the new energy, new energy industry has sprung up in Germany, Japan, the United States and other developed countries. The world's largest demand of photovoltaic products is Germany and Spain. The demand in Japan and the United States has increased soon in recent years. From the supply side, Japan and Germany respectively ranked the first and the second before the financial crisis. China ranked third. In 2008, China's photovoltaic capacity has exceeded Germany for the first time and been the highest in the world after the financial crisis (China's solar cell production has reached 1780 MW and accounted for 26% of the global total). The annual output of Suntech, the leading domestic solar cell plant, is about 500 MW in 2008, which has ranked third in the world. The output of Tianwei Yingli is 281.5 MW and the output of Trina Solar is approximately 200 MW [14].

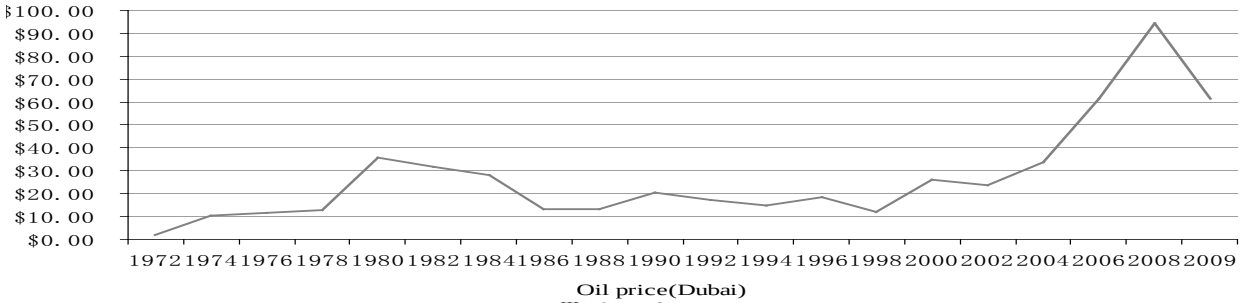

Fig.III Oil price from 1972 to 2009

Fig. 3 Oil Price from 1972 to 2009

The market of new energy products, especially photovoltaic products is in foreign countries. After the financial crisis, the government has tightened the credit, which made the new energy project difficult to finance. Many overseas photovoltaic projects were delayed and orders were canceled. Afterwards a number of countries have reduced the subsidy policies of new energy which increased the difficulty of province's photovoltaic enterprises exports. In 2009, France and Spain have put into effect to reduce the subsidy policy in photovoltaic solar energy market. As a result, the market demand of these two countries has shrunk dramatically, like the Spanish market demand fell from 1500 MW in 2009 to less than 500 MW in 2008. The German government which share of 50% on the total global market also has planned to reduce solar subsidies since April 1, 2010, which will cause the price and demand of photovoltaic cells to decline in 2010.

China's photovoltaic product has been at an annual rate of more than 30% annually since 10 years before the financial crisis (the high growth rate is up to more than 50% per annum). The main raw material of polysilicon rises in price continuously. The highest price reached to nearly $500/kg. After the financial crisis, the price of polysilicon also fell from $400-500/kg to $60-70/kg. The cost of domestic polysilicon was generally about 60 dollars per kilogram. The cost of individual closed loop company was up to $100 per kilogram [14]. This means that the profit of the polysilicon enterprise has been quite modest, and even these enterprises ran a deficit. And the new energy industries are infant industries. The cost of solar energy and wind power is far higher than the cost of thermal power generation. The price of oil, gas and other resource has fallen after the crisis. The cost disadvantage of new energy has been magnified. So it's difficult to have market competition with the traditional energy sector. Those large-scale and relatively low cost new energy companies are not much room for profit.

In summary, our country's economic development has been affected by the global crisis. The pace of economic development declines obviously. The energy supply has been a phenomenon of relative surplus. The financial distress has forced the entire industry to cut expenses and reduce costs. Foreign countries, especially in Europe reduced demand for photovoltaic because of the financial crisis. For various reasons the new energy market is not released. But in the long run, the current financial crisis will not affect the overall development trend of the new energy industry.

III. PROSPECTIVE ANALYSIS OF NEW ENERGY

Energy is the material basis for human survival and development. In recent years, the rapid development of the world economy has caused the global energy demand increasing rapidly. The supply of the oil, natural gas and other fossil energy supply is very tight. Energy price has been considerably on the rise. It is more prominent that fossil energy consumption has brought about environmental issues. Greenhouse gas emission and climate change should become an international social common understanding. Due to the pressures of global resources and environmental energy, it has become the world's common action to accelerate the development and utilization of new energy resources. No matter in developed countries or developing countries, the development and utilization of new energy will be the important fields and strategic focus in the energy development. In order to vigorously promote the development of new energy industry, governments make target for utilization and give aid to policy.

A. A Economic Environment Perspective

In general, any factors could not affect the development of new energy industry in the overall trend. This kind of judgment is mainly based on it that the restriction of resources and environment will not change in the economic and social development. As a large developing country, China should never stop quickening the development and utilization of renewable energy and solving the energy and environmental issues. The strategy won't be changed. Our economic and social development is very lopsided. The difference between city and countryside is still very big. Rural infrastructure is apparently laggard. Urban public facilities are insufficient. The expansion of domestic demand in the investment field is very wide. It is conditional that expanding domestic demand takes the place of the external demand. Although the situation of our economic development is serious, but compared with the other major economies in the world, the force of our country's measures for the slowdown in economic growth is the greatest, or it should be said that it is the fastest and the best. We are confident that our country will reverse this situation in order to rapidly promote the development of economy. Such a large environment is an important condition for our new energy industry development.

The financial crisis actually provides an adjustive opportunity for the development of new energy industry. The financial crisis triggered by the global economic crisis exposed the imbalance of the global economic development and the adjustment process in the financial and economic severe foaming. After the financial crisis, the global economy patterns will be deeply adjusted. The global economic recovery might go through a long, tortuous and complicated process. The international division of labor will be focused on the emerging industry and the industrial chain integration and be globally reshuffled. The innovation of science and technology will be more intense. Every country attaches great importance to cultivating high technology industries and emerging industries, such as the new energy, new materials, information technology and energy-saving of environmental protection. Innovation of science and technology application will make the international industrial competition into a new stage. In the circumstance that global economy last fall, trade protectionism, climate change, financial regulation, energy security, food security and other global issues will become the focus among the various countries to safeguard their state interests. In addition, they can maintain the space for economic development and the advantage of economic competitive. Therefore, with the

expansion of domestic demand and external demand, new energy will get more development in the period of the post-financial-crisis. New energy "surplus" will be also alleviated to some extent.

In fact, the imbalance and blindness always lurk behind the new energy industry in recent years. Many enterprises rush to the new energy industry with enthusiasm and profit. Most of them are also lack of in-depth and comprehensive feasibility study. They don't acquaint themselves with the reasonable judgment and expectation of their own economic and technical strength. They are anxious for success, and blind expansion began early. New energy is a skill-intensive and capital-intensive industry. Regardless of the technical ability, the capital strength, or the management level, all the requirements are very high. It's not easy to pick up technology, form the scale and guarantee sustainable development. In this respect, it should be said that our enterprises don't prepare adequately. In this sense, the financial crisis provides a good chance for us to calmly deliberate, objectively evaluate and reasonably position the new energy industry. From a long-term perspective, it can contribute to healthy development of the new energy industry.

B. A Climate Change Perspective

The fifteenth conference of the United Nations Framework Convention about climate change was hold in the Copenhagen, the capital of Danish, on December 7, 2009. Before November 25 State Council executive meeting decided to decrease carbon dioxide emissions per unit of GDP in 2020 than in 2005 by 40% ~ 45%.

Using conventional energy sources (primarily fossil fuels) is believed to have given rise to greenhouse gases emissions and to a resulting increase in global average temperatures since the mid-twentieth century. The fundamental conclusions of the most recent assessment report are that climate change is the result of human activity, that the ongoing rate of climate change will have devastating effects if left unchecked, and that the costs of action for mitigation and adaptation would be significantly lower than the costs of inaction. Along the same lines, the Stern Review on the Economics of Climate Change has estimated that the cost of climate change would amount to a loss of at least 5 percent of global GDP per annum, and could even reach 20 percent, while actions to counter the worst effects of climate change could cost about 1 percent of global GDP. It has also been debated that the effects of climate change could threaten the global peace and security if left unchecked [13].

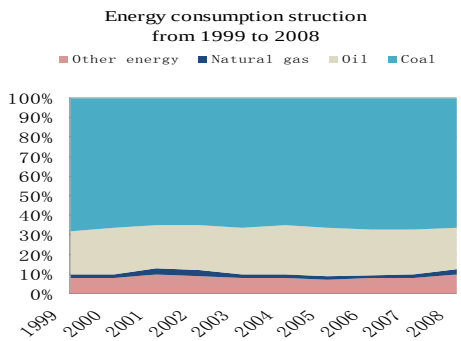

Fig. 4 Energy consumption struction (The most of the other energy is hydroelectric power.)

At present, coal occupies accounted for 70% of the primary energy consumption in our country [Fig. 4]. Thermal power accounted for more than 80% [Fig. 5]. Developing new energy sources is the most realistic and effective way to reduce carbon dioxide emissions. The generation installed capacity of nuclear power, wind power, photovoltaic power and biomass power in the total installed proportion will rise from 3% in 2008 to 15% by 2020, and the proportion of hydroelectric power will rise to the more than 37% [10].

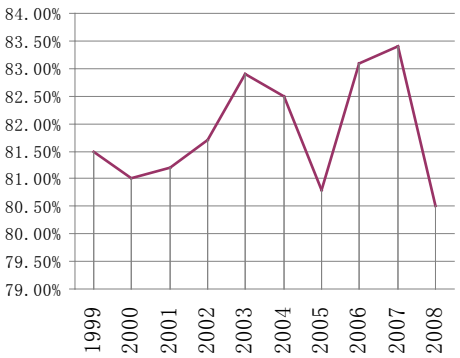

Fig. 5 The proportion of thermal power from 1999 to 2008

The contentious issue here is the perceived divide between the interests and obligations of developed and developing countries. The latter believe that developed countries should act first and bear most of the costs of reducing greenhouse gases emissions. The varying levels of historical responsibility of different countries for the climate change problem, as well as the extreme differences in the financial capacities of countries have also led to discussions at the global level on who should bear the major costs of climate change mitigation efforts. Additionally, mechanisms and incentives for greater private sector involvement–including technology transfer through the Clean Development Mechanism, carbon credits and tradable emission certificates–have all proven to be rough terrain in international negotiations.

Nevertheless, these debates have given an impetus to international discussions on new energy and how they could help to resolve the dual needs of reducing energy poverty and mitigating climate change. Several discussions on how to make relevant technologies and finances available for new energy have been taking place in the international debates on climate change. At the same time, the development of green businesses and the concept of the green economy have both emerged as possible effective responses for mitigating climate change [13].

IV. CONCLUSION

The rapid consumption of traditional energy resources makes the new energy to gradually catch international attention. Because many companies rush to this industry by their misunderstanding and an urge to make interests, they can seldom keep up with the demand of technological innovation and industrial upgrading, which result in the energy "surplus". The kind of the surplus is not about the

new energy but mainly about the polysilicon and wind energy equipment. Thus, the exploitation of the new energy has a long way to go and when the problems appear applicable strategies should come up that accord with China's present national conditions. The government in the choice of leading carrier of a new engine of economic growth cannot be blind but need to follow the future direction of industrial development [8]. New energy has become a key industry for national governments to deal with the energy crisis and future challenges of climate changes. Therefore, the problems of new energy cannot be avoided.

New energy problems should be analyzed and solved from a sustainable point of view. The current emergence of the so-called excess is only periodical excess. It does not mean that the future is always excessive. As the goal of China's new energy plan becomes clearer, demand of the market is expected to expand. Meanwhile, production capacity of polysilicon and wind power is gradually released. It takes time to turn into the actual output.

As a major energy consumer, China should fulfill its responsibility to optimize energy strategies in order to develop new energy market.

Not only does the legal system, but also the fiscal policy need to be established to support new energy sources. In the last, we rely on energy innovation to promote the "two-oriented society" [10].

In summary, developing new energy will yield more opportunities and more future needs for the society. To achieve this goal, enterprises should not only look to the future, but also give their attention to the current problems. It is important that they choose the right time to enter the new energy industry and then select the right part to develop among areas of new energy options. A critical point of view should be adopted to analyze the current situation and to confront underlying conflicts. Blindly following the trend will only come to nothing [11].

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