

China " Tenth Five-year " Plan On the Renewable Energy Research and Development

Shi Dinghuan

Department of High and New Technology and Industrialization,
Ministry of Science and Technology of China

Introduction

Ladies and gentleman, respected chairman:

I am very happy to see you here and have an opportunity for talking about China " Tenth Five-year " Plan on the Renewable Energy Research and Development.

As well known, human have to face two problems, serious environment pressure and energy resources shortage, should be resolved in the near future. In one hand, applications of mineral energy resources, such as oil, coal and natural gas, have been greatly promoting the development of the society and improving up the level of people ' s living condition. However, mineral energy resources are limited, that is, the energy resources have being used up day by day in the near future. In other hand, an immoderate use of mineral energy resources existed in the whole world has been causing serious environment problems and some natural calamities with each passing day. In view of a long-term development strategy of energy resources, human must seek a way of developing new energy resources to make a persistent economy growth in the world. The renewable energy resources no or little environment pollution caused from their consumption must be very important for us in the future.

The government of China has been paying more attentions on development and use of the renewable energy. Just after the United Nations Conference on the Global Environment and Development held in 1992, the Council of China made out 10 clauses of policies and measures on its environment and development in the country. In this document, it is clearly shown that China will develop and popularize clean energy resources, such as solar energy, wind energy, geothermal energy, tidal energy and biomass energy to suit measures to local conditions. In fact, China was the first country of completing the report of " Century Agenda of China 21 " in 1996. And the government has been supporting works on research, development, popularization and demonstration of renewable energy technologies and projects for 20 years.

Up to now, China has made a great progress on the field of using the renewable energy through a lot of works on research development and demonstration and popularization of the technology. First of all, the technical level has been improved greatly, the market has been expanded continuously, and the

industrial system already has begun to take shape. According to a rough statistics, we can see some information as following.

- There are about 6.88 million sets of household biogas digesters built in rural areas and about 748 sets of biogas systems in large or medium scales operated for treating organic waste waters from industries. The capacity of biogas electricity generation is up 770 kW and the annual electricity generation has been up to 1.3 million kWh. In addition, there are about 200 sets of stalk gasification systems for supplying gas fuels centrally to 30 thousands families in villages.
- The capacity installed of mini-hydroelectric stations is up to 17 GW and the annual electricity generation can be about 420 millions of kWh.
- There are about 15 million square meters of solar water heater and about 13 MW of PV cells have been used in the country. And 7 stations of PV cells have been built in no-electricity counties of Tibet, the capacity installed up to 420 kW.
- The capacity installed of wind power generation have reached 226 MW, in which, there are 21 wind farms have been built and 155 thousands sets of mini wind power generators have been used in pastoral areas and mountain areas.
- In the whole country, the capacity installed of geothermal power generation has been up to 35 MW and the area of house warmed with terrestrial heat is over 8 million square meters.

Now, China government is going to draw the Tenth Five-year Plan, 2001-2005, for developing the renewable energy. I believe that a greater achievement on the renewable energy will be made and a new energy industry will be set up quickly in the next 5 years.

Target of Developing the Renewable Energy in the Period of Tenth five-year

- In the period of five years, from 2001 to 2005, China will pay more attention on developing the renewable energy, especially on improving its conversion efficiency, cutting down its production cost and increasing its share in the national energy construction. In this period, we will do our best to make most of renewable energy technologies up to or near by the most advanced level in the world and promote it going to industrialization and commercialization. Especially, China will carry out a strategy plan, named as the Strategy Plan of Developing the West Area of China. Combined this plan, we will treat the renewable energy as an important role on resolving the energy problem in agricultural and pastoral areas of the West Area. By 2005, the target amount of the renewable energy developed in the whole

country are shown as following.

- Wind energy, the capacity installed of wind generation will be over 1.5 million kW.
- Solar energy, the PV capacity installed will be up to 80 MW and the area installed of solar heaters will be over 60 million square meters.
- Biomass energy, the capacity installed of biomass gasification and generation will be over 80 MW and the energy from stalk gasification and biogas production will up to 2 million tons of Mtce.
- Geothermal energy, the amount of geothermal energy used, including generation and heat use, will reach 1 million tons of Mtce.
- Ocean energy, the ability of exploitation of tidal energy and wave energy will be up to 2 MW of capacity installed yearly.
- Hydrogen energy, some hydrogen energy application technologies, like hydrogen production, hydrogen stored-up, hydrogen energy conversion and application, a practical system will be built up in the period for demonstrations.

The " Tenth Five-year " Plan on Research and Development of the Renewable Energy

The " Tenth Five-year " Plan on Research and Development of the Renewable Energy is drawn up by the Ministry of Science and Technology of China, in which, the main frame is to research and develop a series of key technologies and to set up their demonstration projects. At the meantime, we will pay a greater attention on the industrialization and commercialization of these technologies.

1. Biomass Energy

- To develop a high efficient anaerobic fermentation technology and set up a demonstration project of biogas power generation in MW level.
- To set up a demonstration project of biomass gasification and generation technology, the capacity installed will be up to 5 MW.
- To develop the technology of liquid fuel from biomass and set up a demonstration project, 50-100 tones of liquid fuel production yearly.

2. Solar Energy – PV Technology

- To develop the technology for manufacturing efficient crystal silicon PV cells at low cost in an industrial scale, its capacity of production will be 5 MW yearly.
- To develop the technology of producing thin film PV cells and set up a tested production line in 0.5 MW scale.

- To develop technology for merging the electricity generated from PV power generation systems into the national power net and to set up 5 systems of house-roofs and 2 power stations in large scales.

3. Solar energy – solar thermal technology

- To develop the technology of power generation from solar heat and build a demonstration system for this technology
- To set up a demonstration system of the solar energy air condition.

4. Wind Energy

- To develop the technology of designing and manufacturing 600 kW wind power generation systems commercially.
- To research and manufacture large wind generators in MW levels and new types of wind generators.
- To develop the design optimized and operation technology for wind power generation fields in large scales.

5. Geothermal Energy

- To set up a demonstration project of power generation in a 10 MW level by using terrestrial heat with high temperature.
- To develop the technology of the heat pump and its application in the geothermal energy and make the technology into the industrialization.

6. Ocean Energy

- To set up a demonstration project of the power generation station from the tidal energy in a 10 MW level.
- To develop a wave power generator and its demonstration project in a large capacity.

7. Hydrogen Energy

- To develop the technology for the production and storage of hydrogen energy.
- To develop and industrialize the application technology of fuel cells systems and fuel cell cars.

Necessary Sustaining Condition

In order to ensure that this plan will be carried out successfully, the Ministry of Science and Technology of China has worked together with other governmental departments concerned to the subject and will take some efficient measures as a necessary sustaining condition to support the plan.

1. Lay down development plan and seek financial sources

The center government and local governments at different levels have treated the renewable energy as an important issue in the new and high technology field and brought it into the overall plan of the national economic development and the national fiscal budget. Departments of the center government, local governments and enterprises should positively raise funds to support the development of the renewable energy.

2. Providing supports on policy and finance

The government should provide necessary supports on policy and finance for developing the renewable energy in order to promote its development process.

3. Supporting works on the localization of manufacturing equipment and speeding up the industrialization process

For constructions of demonstration projects of the renewable energy, local governments and enterprises should give their supports and aids actively in order to promote the localization of manufacturing renewable energy equipment and raise the proportion of in-country equipment in these projects step by step. We will set up a healthful industry of renewable energy on the base of introduction, digestion and absorption of technologies and equipment imported from the abroad.

4. Establishing a perfect system of scientific research and services

For the development of the renewable energy, it is very important to promote the translation from scientific results to productions, take up the standardization of products, set up the monitor system of product quality, consummate the system of technical services and provide the good customer services.

5. Enhancing international cooperation and introducing advanced technologies and financial aids

We will do more works on the academic exchanges and technical cooperation with the international society widely, especially on introduction of vanguard technologies, new processes and key equipment from developed countries into China. This will be beneficial to quickening the development process and raising the overall level of the renewable energy technology developed in our country.

Epilogue

Ladies and gentlemen:

China is one of developing countries in the world. Its economic growth and technical level is not so high that it needs more financial aids and technical supports provided by international organizations, financial institutions, social

consortiums and foreign governments, especially needs technologies and equipment from developed countries for developing its renewable energy resources. We welcome American friends, especially, you, any participant in this meeting, go to China for developing the renewable energy at the principle of mutual benefits. Of course, there are several ways available to you for your entry; you can take one or more ways as you please. It is certainly that Chinese people will remember you and appreciate your works, your distributions and your everything you done for the development of the renewable energy in China. Finally, I like to say thank you for your attention, thank you everyone. Thank you chairman.