

**Asia-Pacific Environmental Innovation Strategies (APEIS)
Research on Innovative and Strategic Policy Options (RISPO)
Good Practices Inventory**

**Up-grading renewable electrical energy program for village levels in China
by use of government financing and bidding based on market regulation**

Summary of the Practice

Keywords: renewable energy, village power, bidding

Strategy: Innovative financing for renewable energy development

Environmental areas: Climate change

Critical instruments: Regulatory instruments

Country: P.R.China

Location: Seven provinces and autonomos regions in China, namely Inner Mongolia, Qinghai, Gansu, Xinjiang, Tibet, Shanxi and Sichuan

Participants: State Development Planning Commission

Duration: 2 years, from 2002 to 2003

Funding: total investment around 2 billion Chinese RMB Yuan from the central finance

Background:

Access to electrical power improves living standards, through better health (reduced indoor pollution caused by dependency upon traditional fuels), better health care delivery, improved education (better lighting to facilitate evening study at home), better training facilities, reduced drudgery and less time spent by women in un-productive tasks. Electrical power is also a tool, which can be harnessed for income generation and economic growth. In rural areas in particular, electricity has another important role as a vehicle for the flow of information, enabling a community to take part in affairs beyond its village confines, and promoting national political and social cohesion. Very importantly also, by facilitating electronic communications, electricity can create crucial links between otherwise isolated rural communities, between local markets and their national counterparts.

China is a developing country with a large territory of 9.6 million square kilometers and 1.28 billion people, among whom 0.8 billion live in rural areas. The Chinese government has committed itself to supplying electricity to remote areas by various technical means, including the extension of power grids and the establishment of local level systems. China has now achieved a remarkable 95 percent electrification rate. Even so, this challenge of rural electrification remains a high Government priority. Today, over 40 million people in China still lack access to modern energy services and their communities are typically located far from existing grids, mainly in the western regions.

At the same time, these regions enjoy the country's best wind and solar resource endowments. Recognizing this complementarity, the Chinese government in recent years has developed the concept of village level electrical power supply for remote areas using renewable energy resources, which include solar PV technology applications and hybrid power generation systems. The State Development Planning Commission (SDPC) is implementing a program called Electricity Facility Construction in Non-Electrified Townships for the western Provinces of China.

Objectives:

- To electrify 800 townships in remote areas of the seven provinces of Xinjiang, Qinghai, Gansu, Inner Mongolia, Shaanxi, Sichuan, and Tibet by using PV, Wind or PV/Wind hybrid systems;
- To promote the establishment and development of renewable energy service companies (RESCOs).

Description of the activity:

The program is to install 20 MW PV, wind or PV/wind hybrid systems for about 800 villages with a total budget of 2 billion RMB Yuan (the equivalent of U.S.\$0.24 billion). PV, Wind or PV/Wind/hydro hybrid systems will be used, including over half of them as PV power stations. At least 50 percent of the investment is from central government financing, while SDPC is in charge of implementation.

Target provinces are the seven western provinces of Xinjiang, Qinghai, Gansu, Inner Mongolia, Shaanxi, Sichuan, and Tibet. Out of these, Tibet will get nearly half of the grant and all of it will be for PV village power systems.

An open bidding procedure has been adopted for the program. Detailed plans are prepared by the seven local Province Planning Commissions. SDPC, as the implementing agency, is in charge of conducting the bidding procedures, selecting the tendering agency to control local bidding, the whole coordination, etc.. In November 2001, SDPC held a special conference in which responsibilities were assigned to each of the seven regional governments, and the tendering agency was appointed. From March to October of year 2002, detailed bids were taken. 569 sub-projects completed the bidding procedures, to supply power for 569 townships in seven provinces. The type of system to be installed is of the 15.5MW capacity, and the total investment has reached U.S.\$195 million. These systems are being installed by 10 or more companies at this time and it is expected that installation will be completed by the end of the year 2003.

Table 1: Information of Township Electrification Program.

Provinces	Number of Townships	Capacity to be installed (KW)	Investment (million US\$)
Xinjiang	48	1932.45	21.4
Qinghai	86	2600	32.2
Gansu	12	1230	13.7
Inner Mongolia	39	1362	8.23
Shanxi	10	70	0.97
Sichuan	51	1600	21.8
Tibet	350	6700	96.8
Total	569	15494.45	195

Critical Instruments

Overview

The Chinese government has budgeted a large investment of capital for hundreds of renewable energy systems for villages in remote areas with hopes this would help set up a market, adopt the open bidding method, and support the development of RESCOs.

Regulatory instruments

- An open bidding procedure is used in the selection of suppliers for village power systems. The advantages of this method are evident especially when compared with former methods. Initially, the central or local government invested the money to supply PV systems in remote areas, and the capital was provided directly to the owner. The owner would then select the system by himself (possibly selecting the components of the power system from separate manufacturers), and then select an engineering company to install the whole system. Although the procedure was sometimes conducted by bidding, the suppliers could not guarantee the quality of the whole system, because they did not supply all the individual components. It was the same for the manufacturers of the components. Ultimately nobody was in charge of quality control and the suppliers could not provide after-sale services. Many disputes arose between the owners, the manufacturers and the engineering companies, because the owners would be responsible for the operation of their own system..

In this program, the advantages of using an open bidding procedure and its effects are:

- Ensuring top quality and uniformity of products.
- Ensuring that before and after-sale services are provided by the suppliers.
- Reducing the price of the whole system

Impacts

Once the program is completed at the end of the year 2003, over 70 percent of the townships that previously had no access to a power grid will then be living with electricity. That will improve the living standards in these remote areas, as well as promote economic development.

There are also many other significant impacts in the region stemming from this program of renewable electrical power at the village level:

- (i) The village electrical power market is basically set up. Village power is still a new concept in China. In 1998, there were 39 integrated PV power stations, as well as several hybrid systems in the western regions. Most of these projects were supported by the government through various projects or programs. Generally speaking, there was no renewable electrical power market at the village level in China before the year 2001. Through the SDPC project, however, a huge market of renewable energy has been developed—800 systems, or twenty times the previous cumulative market. The concept is gradually being accepted by government, by manufacturers, by the engineering companies and by the end-users.
- (ii) Manufacturing and distribution companies/enterprises of village power systems have been developed. Prior to 2001, there were only three major companies with experience in providing village power systems, installation and after-sale services. After 2002, however, the large market of village power systems has attracted many other engineering companies who were once related to PV or wind energy. Dozens of engineering companies participated in the bidding.
- (iii) The quality of the systems as well as the after-sale service capability of the engineering companies has improved. Since the open bidding was adopted, the price of systems has been reduced by 30-50 percent, from a former price of about U.S.\$20/Wp to the current bidding price of about U.S.\$15/Wp.
- (iv) The PV industry has greatly improved. Because most of the systems in the program are PV power stations, and the others are PV/wing/hydro hybrid systems, the whole PV industry has been promoted. During the year 2001, the accumulated capacity of PV installations, including household and power stations, was only 15MW, and the annual sales capacity was less than 4MW. But this current program has been a big “cake” for the PV industry, making the annual PV sales reach four times more than before. That certainly promotes the development of PV manufacturing. At present, there are several big PV production lines being built, each with the capacity of 3-10MW, compared to the former total capacity of PV production lines of 4.4MW.
- (v) The program promotes the formulation of technical guidelines and standards for renewable village power systems. By March of 2003, the SDPC had gathered together national experts with rich experience and representatives from several big engineering companies to enunciate technical guidelines for the renewable village system, while the State Economy and Trade Commission also promotes the same level of performance by establishing technical standards. That will help quality control of the systems.

Lessons Learned

- (i) Open bidding procedures were used in the selection of engineering companies for village power systems. This means that the government and its consignors are the tenderee, and the engineering companies of village power systems are the tenders. Through the bidding, a “package” (including the components of the whole system, the installation and after-sale-services) is purchased for each sub-project. The engineering company who wins the sub-project is responsible for providing good quality components that meet the requirements, for installation, for debugging and other after-sale services. Under such conditions, the engineering companies try to select products of good quality and low price.
- (ii) One of the objectives of this program is to promote the establishment and development of renewable energy service companies. After hundreds of systems have been installed, there raises the question as to who will operate the systems. The government’s intention is to

encourage the development of renewable energy service companies. Through an open bidding procedure again, the government will select the renewable energy service companies that will be in charge of maintenance and operation for these village power systems. The cost of operation will come under a special fund to which the central government, local government and end-users will contribute.

- (iii) Because of the program, the PV market in China has increased several times during the year 2002, thus stimulating more and more manufacturers of PV module and engineering companies to develop. But once the program is over, a concern will be how to keep up the market at the same level that it was during the years 2002 and 2003. Future important aspects of a PV market should also be considered. If the market decreases greatly after the project is over, the newly built production lines and the new engineering companies will be in jeopardy.

Potential for Application

From the point of view of the whole program, this has been a big project financed by the government to resolve the supply of electricity in remote areas, to promote the development of the renewable village power sector, to set up a market and then reduce pricing to a certain degree etc.. On the whole, the positive impacts from this program are quite obvious. This method of setting up a market through governmental financial support can become a reference for other developing countries in Asia and Pacific regions that would wish to develop village power systems.

If the program is deemed successful in the end, although its great impacts have already been recognized, the Chinese government is considering a similar program to supply power to villages still without access to a power grid; they still numbered 122,000 in the year 1999. The number of villages without power is large, so such a program will need financial support from the government for at least 5-10 years. It is also possible that village power systems would be installed for a small number of villages. The new mechanism adopted in this program could also be continued for later programs. If a program of this nature is implemented, the PV market will at least keep the same status as in years 2002 and 2003 after the current program is over. This would mean that a continuing renewable village power market has been provided and guaranteed by the government.

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