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The Brightness and Township Electrification Program in China

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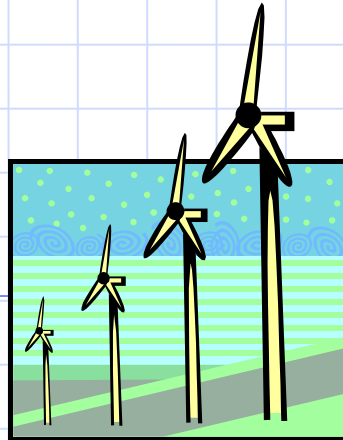
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Background

- ◆ China is a developing country with about 70% rural population;
- ◆ Rural infrastructure is poor, it needs be improved with a great efforts;
- ◆ In recent years, more than RMB 280 billion (EURO 28 billion) have been invested for rural grid improvement including extensions.
- ◆ However, by the end of 2003, there are still about 29,000 villages with about 7 million rural households (about 3.55% of the total population) which are not connected to the grid.

中华人民共和国地图



Renewable Energy Resources

- ◆ Hydropower: about 395 GW,
- ◆ Solar energy: about 2400 Bio. Tce /year,
- ◆ Wind power: about 1000 GW,
- ◆ Biomass: about 840 Mio. Tce /year

Efforts from 1970--2000

- ◆ small hydropower: 28 GW,
- ◆ small wind turbines: about 160,000 sets with a total capacity of 25 MW,
- ◆ Solar home systems: about 30,000 sets with a total capacity of 600 kWp have been disseminated,
- ◆ The installation was realized through many provincial projects with certain support from the state government.



Brightness Program

- ◆ **The “Brightness Program of China ” was drawn up under the leadership of former State Development Planning Commission during 1996 till 1999**
- ◆ **The plan is to speed up the activity of decentralized electrification of remote rural areas; it is also a positive response to the proposal of the world solar summit in Zimbabwe.**
- ◆ **It is planned that 23 million people in remote area shall be electrified by wind and PV technologies till 2010 with an average capacity of 100 W per capita. The total installed capacity will reach 2,300 MW then.**

Pilot Projects of the Brightness Program

Pilot Projects

- ◆ Under the leadership of SDPC, the pilot projects were launched in March 2000.
- ◆ Applied by provinces, Inner Mongolia, Gansu and Tibet were selected as pilot provinces
- ◆ SDPC allocated RMB 20 million grant for the projects and installed an executing system

Installations of the Pilot Projects

- ◆ About 5500 sets of Wind/PV hybrid home systems, 1 W/D/B village system were installed in Inner Mongolia by end of 2003
- ◆ About 10,000 solar home systems and 3 PV mini-grid village systems were installed in Gansu by end of 2002
- ◆ 6 PV village systems around 6 kW were installed in Tibet by end of 2001

Program in Ali Prefecture of Tibet

Supported by SDPC, MOST and SP, electrification project of Ali Prefecture, Tibet was implemented in 2001. 688 kW PV were installed. The total investment is about RMB 70 million.

- 11,000 sets of 40W PV home systems
- 30 sets of 5 kW PV village station
- 30 sets of PVP systems
- 10 sets of 400W PV TV antenna receiver

Song Dian Sao Xiang Program (1)

- ◆ It is the first step towards the large-scale dissemination of renewable energy technologies for decentralized rural electrification launched in 2002 by NDRC.
- ◆ The objective of the program is to supply power for the basic needs of the 1,065 not-connected township locations, which are distributed in 12 provinces, by use of small hydropower, PV and PV/wind hybrid systems under consideration of the actual resource-situation of the location.

Song Dian Dao Xiang (2)

- ◆ 688 PV or PV/wind hybrid mini-grid systems with a total capacity of 20 MW will be installed by the end of 2004, most of them have been in operation;
- ◆ 377 small hydropower mini-grid systems with a total capacity 264 MW will be installed by the end of 2005;
- ◆ The total investment was RMB 4.7 billion;
- ◆ All of the townships of China are supplied then;
- ◆ More than 1 million people benefits from the program

Map of the Main Project Provinces



A 300 kW PV Hybrid System in Gansu Province



A 145 kWp PV Plant in Xinjiang



A 46 kWp PV System in Tibet



Experiences

- ◆ It is feasible to electrify remote areas by RE technologies as the least cost option compared with grid extension and diesel generation.
- ◆ Government grant and support are necessary as the costs of RE technologies are still relatively high at present and difficult to be financed by the rural population
- ◆ The RE electrification significantly improves living conditions of the local people and provides better opportunity for the social and economical development, although the RE power may only satisfy a limited range of needs such as lighting, communication, and small-scale machinery and equipment.
- ◆ Capacity building, training and set-up of local service networks are fundamental conditions to guarantee a long term success and sustainable development of the program.

Challenges

- ◆ The operating costs of some RE technologies such as PV are still very high on this stage due to the limited lifetime of the batteries, a long term subsidy is actually needed even under the condition of the capital investment being granted. An appropriate cross subsidy scheme with grid power has therefore to be established;
- ◆ How to install a commercial approach of a long term O&M system based on necessary subsidy condition?
- ◆ How to optimize the function of the RE systems with their limited capacities to deal with increasing requirements of the mini-grid users to achieve good benefits?
- ◆ How to extend the lifetime of the battery bank to limit the running costs of PV systems?

Outlook

- ◆ “Renewable Energy Promotion Law” is already in the pipeline of the legislation system to establish the legal framework for the further development of renewable energies
- ◆ RE technologies will continue to play an important role for the electrification of the remaining 7 Mio. households in remote areas till 2010
- ◆ It is planned to install about 1 GWp PV during the 11th Five-year Plan (2006-2010)
- ◆ Large scale dissemination is expected.

Significances

- ◆ We hope that our experiences are useful for other developing countries to provide electricity to their un-electrified rural population who counts in total for more than 2 billion in the world;
- ◆ Our efforts will contribute to the renewable energy development, limitation of emission and sustainable development of human society;
- ◆ China offers a huge market for RE industry of the world.

It is really good to have a electrical light !



Thanks!

We would express our sincere appreciation to those nations and international organizations that supported us in the field. China welcomes all of you to join us in the next large scale programs!



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