

TECHNICAL ASSISTANCE COMPLETION REPORT

Division: Energy Division, East Asia Department

TA No., Country and Name		Amount Approved: \$600,000.00 (\$450,000 [GOD]; \$150,000 [TASF])	
4309-PRC : Renewable Energy for Poverty Reduction		Revised Amount:	
Executing Agency: Gansu Provincial Finance Bureau	Source of Funding Government of Denmark (GOD)/Technical Assistance Special Fund (TASF)	Amount Undisbursed: \$9,515.53	Amount Utilized: \$590,484.47
TA Approval Date: 19 December 2003	TA Signing Date: 22 June 2004	Fielding of First Consultants: February 2005	<div>TA Completion Date</div> <div>Original: 31 May 2005</div> <div>Actual: 30 April 2007</div>
			<div>Account Closing Date</div> <div>Original: 30 April 2007</div> <div>Actual: 25 July 2007</div>

Description

Sustained economic growth in the People's Republic of China (PRC) is fueling demand for energy, in particular, electricity. Like many other provinces, Gansu province had achieved more than 9% average gross domestic product (GDP) growth in the first 3 years of the 10th five-year plan period (2001–2005); the electricity demand had grown by an average of 10% a year during the same period. The rapid growth was met mostly by addition of coal-fired power plants. Apart from the heavy dependence on coal, the energy intensity levels in Gansu are also higher than the national average. A combination of coal combustion and desertification causes poor air quality. Most of the Gansu's 14 cities did not meet acceptable air quality standards. In rural areas, the energy needs were primarily met by coal (50%) and, stalk and firewood combustion (40%) by households, which is environmentally polluting and inherently inefficient. Due to its geographic location and harsh climate, Gansu faced unique challenges in meeting the energy needs of its rural population. About one-third of the rural population lives in areas with significant energy shortages.

Some parts of the provincial electricity network, like the Zhangye grid, had consistently experienced power shortages due to lack of local generation capacity and the long distance to other generation sources. The deficit of electricity was resolved through load shedding and importing power from the neighboring Hexi corridor grid. The power situation in Zhangye and Hexi corridor were expected to worsen as demand continued to increase and only limited generation capacity is added. The rural and often poor consumers pay a much higher electricity tariff and are worst affected by the power shortages. New initiatives are required to deliver improved energy services in these rural areas, which are endowed with significant renewable energy (RE) sources and are often located closer to the rural communities. The least-cost generation expansion study undertaken in previous Asian Development Bank (ADB) technical assistance (TA) had identified hydropower development on Heihe river and other RE sources as the least-cost alternative to serve rural population in Zhangye. However, new approaches and technologies, together with innovative financing, needed to be piloted for demonstration effect, and commercial investment.

Expected Impact, Outcome and Outputs

The TA impact was to advance the sustainable development by expanding the use of energy efficiency and RE in small towns, villages and poor rural areas of Gansu province. The TA outcomes were to (i) examine potential for new energy service initiatives in small towns, villages, and rural areas; and (ii) develop candidate RE projects for commercial investment in poor and rural areas of Zhangye. TA outputs were (i) assessment of RE potential in rural areas, (ii) definition of enabling requirements for commercial RE investments using different organizational approaches, (iii) development of proposals for new RE and energy efficiency projects, (iv) design and implementation of pilot projects, (v) assessment of poverty reduction potential due to RE development, and (vi) dissemination and discussion of study findings.

Delivery of Inputs and Conduct of Activities

The TA consisted of the following activities: (i) reviewing the least-cost power expansion plan in Zhangye and Gansu and identify needs for new energy services for rural and poor customers, (ii) identifying barriers to energy efficiency and RE development, (iii) analyzing an appropriate financially sustainable model for energy efficiency and RE systems, (iv) developing pilot energy efficiency and RE services project, (v) identifying an appropriate institutional setup for RE system in rural area and develop its business plan, and (vi) developing a set of benchmark performance indicators to monitor and evaluate pilot projects and similar other projects.

An international consulting firm (the Consultant) from India (associated with national experts) was engaged in accordance with ADB's *Guidelines on the Use of Consultants* to carry out the TA. The consultants provided a total of 49 person-months input, 16 months higher than the expected 33 person-months in the TA design. The additional

input was mainly due to the increase (additional 13 person-months) in national consultants' input to accommodate (i) a much larger pilot project design and implementation (a \$200,000 pilot project was implemented using about \$105,000 of the TA resources); (ii) detailed pre-feasibility assessment of a cascade hydropower development scheme and a priority hydropower project; and (iii) strengthened dissemination activity and initial preparation of a knowledge product. The consulting input was provided in a timely and efficient manner to meet the TA implementation needs. A significantly increased consulting input, implementation of a larger pilot project and, development of a knowledge product within the TA design framework signifies the economy of the input and their productivity. The quality of consulting input was very good, especially, the consultant team leader's and some key members' performance were exceptional. The larger pilot project and a detailed pre-feasibility assessment of a cascade hydropower project scheme resulted in delays in TA implementation, which had to be extended by almost a year. Despite the delay, the Executing Agency (EA) and Zhangye city Government (ZCG) were satisfied with the implementation as it could readily accommodate their emerging needs.

ADB fielded regular review missions and showed flexibility in accommodating needs of the EA and ZCG that enhanced the TA ownership. The EA and ZCG provided full support and actively participated in TA implementation. ADB and EA performances were assessed as highly satisfactory.

Evaluation of Outputs and Achievement of Outcome

The TA achieved its outputs in an efficient and cost-effective manner. The Final Report was submitted on 31 May 2006; it was of good quality. The TA outputs were timely and relevant to an important rural development issue in Gansu Province. The quality of outputs was satisfactory.

The TA achieved its outcome satisfactorily. It field-tested one of the rural energy service model through a pilot biomass project, which was one of the first of its kind in Gansu and PRC. The pilot project included a biomass gasifier and a power generator; it uses agricultural waste to supply cooking fuel to rural households and recovers part of its cost from the electricity sold to the grid under the provisions of the new RE law. The EA and ZCG were fully satisfied with the TA outputs and followed through with the key recommendations. The TA led to renewed focus on rural energy within Gansu provincial government, which requested ADB for a follow on TA to develop provincial level rural clean energy program.

Overall Assessment and Rating

The TA was assessed as highly successful, which is reflected in the phased implementation of a cascade hydropower system on the Heihe river. The TA implementation took longer, which was primarily due to an expanded scope, which was accommodated on the request from the EA and key stakeholders. The expanded scope enhanced the attainment of TA objectives and ensured high ownership from the EA and ZCG. It was relevant in addressing the power shortages in a predominantly rural area of a poor province. The TA implementation was efficient; it was completed within the allocated budget and within a reasonable time. Due to strong support from the EA and ZCG, the TA is sustainable and immediately led to follow on ADB lending and an advisory TA.

Major Lessons

The pilot project that was technically completed properly, also brought out the hurdles related to realization of higher tariff for biomass power projects in Gansu and PRC, and issues during the operation and maintenance (O&M) phase of the pilot project. Although, the higher tariff was approved by the finance bureau, it was unclear how the difference will be paid for by the grid company. The initial failure to sell power led to cash flow problems and affected the O&M of the pilot project. To overcome this, a local power company was requested to operate and maintain the pilot project, which appears to be an optimal solution and matches with the recommendations of the TA. The pilot project implementation also highlighted the need for (i) more rigorous analysis of the institutional set up for rural energy services, (ii) careful consideration of O&M aspects of pilot project, and (iii) more participatory procurement approach in pilot projects to enhance ownership and ensure smooth O&M. A knowledge product—*Power of Self sufficiency: Rural Biomass Development in Gansu*—is being prepared incorporating lessons learned from the pilot project for dissemination to other provinces in PRC and, other developing member countries.

Recommendations and Follow-Up Actions

A follow on TA¹ is being implemented to follow up the key recommendations on rural energy services. ADB will continue to closely monitor O&M of the pilot project during the follow on TA implementation and incorporate the lessons learned in any future project implementation. The impact of the pilot project on the poverty incidence in Qidian village will also be monitored during the follow on TA implementation.

Prepared by: _____ Ashok Bhargava _____ Designation: _____ Senior Energy Specialist _____

¹ ADB. 2007. *Technical Assistance to the People's Republic of China for Gansu Rural Clean Energy Development Project*. Manila (TA 4935-PRC for \$800,000, approved on 1 June).