External Evaluator: Hiroshi Oita (OPMAC, Ltd.)

JBIC ODA Loan Project Mid-Term Review

Time of Mid-Term Review Field Survey: May 2006

Project Title: The People's Republic of China "Gansu Small-sized Hydropower Project" (L/A No. CXXII-P145)

[Loan Outline]

Loan Amount/Contract Approved Amount/Disbursed Amount: 6,543 million yen/4,633 million yen/4,638 million yen (as of end of May 2006)
Loan Agreement: March 2001
Final Disbursement Date: October 2007
Executing Agency: Financial Bureau of the Gansu Provincial People's Government
Implemented by Gansu Mingzhu South Hydropower Development Ltd., a subsidiary company of Gansu Mingzhu Hydropower Development Ltd. in the Gansu Electric Power Company Group

[Project Objective]

This project aims to increase the power supply capacity and improve the reliability of the electric power network by constructing small hydroelectric power plants in the Longnan and Zhangye districts of Gansu province. In so doing, the project will help to stimulate the regional economy by promoting investment and mitigating poverty in Longnan and Zhangye districts.

Consultants: (Beyond the scope of the yen loan) :
Gansu Water Conservancy and Hydropower Survey Design Institute and Guiyang Hydroelectric Investigation Design & Research Institute of State Power Corporation
Beijing Anneng Engineering Supervision Co., Ltd. (Supervision of the construction for the Longshou subproject) However, the Longshou subproject ended up being outside of the yen loan.
Northwest Investigation Design & Research Institute of State Power Corporation (Design of the Hanpingju subproject)

Contractors: China Water Resources (China) , China State Power (China)

Item	Results of ex-ante evaluation (September 2000)	Ex-post evaluation results as estimated at time of mid-term review
[Relevance] (1) National policy level	(1) The Chinese government's power reform directives set forth between 1998 and 1999 called for the expansion of clean power resources by taking such steps as the provision of small hydroelectric power generation in poor rural regions. This matter received significant support in China's 10th Five-Year Plan of 2001-2005.	(1) Of China's provinces, Gansu is one of the poorest. It was one of the regions targeted by the Great Western Development policy, a government directive set out in 1999 to diminish regional disparities. A directive to accelerate the construction of "new rural regions" blessed with infrastructure that could help fight poverty was a major focus of the 10th Five-Year Plan (2001-2005) as well as the 11th Five-Year Plan (2006-2010). China's overall demand has been rising, and coupled with the rising oil prices, energy development is receiving much attention. The facilities

		provided by the present project were constructed during the 10th Five-Year Plan. While helping to meet the urgent need to expand energy supply sources, it also coincides with a national policy to expand clean energy sources and mitigate poverty.
(2) Policy level	(2) The construction of small-scale hydroelectric power plants has been promoted to provide electricity to villages in the poor mid-western mountainous regions which are rich in water energy resources and to encourage economic development and help rid these rural regions of poverty. Among China's provinces Gansu lags far behind in economic development. The full provision of electric power infrastructure in rural regions and cities and towns is indispensable for their economic development. Small-scale hydroelectric power generation was a heavily emphasized undertaking under Gansu's Ninth Five-Year Plan.	(2) In its 10th Five-Year Plan, Gansu Province established a target of Hydroelectric project developments in Gansu's Baishui, Bailong, and Hei river basins while providing stable power supply in rural regions by improving the power transmission network. Longshou and Hanpingju subprojects were prominent Gansu construction projects in the 10th Five-Year Plan, and were given high priority. Through the present project, the power supply is expected to stabilize, the economy should develop, and as a result, poverty may be mitigated.
(3) Planning level	(3) The present project is included as part of the Chinese Farming Village Electrification Model Small Hydropower Project Experimentation County. In Gansu's Zhangye and Longnan districts, whereas power demand rose by more than 10% in 1999, supply did not follow suit, and so resolving the electricity shortage has become a pressing problem. Thus, as the present project involves the construction of small-scale hydroelectric power generation stations, it is a matter of high priority.	(3) The Longshou subproject was completed in June 2002, and the Hanpingju subproject was completed in September 2005. They were connected to the Zhangye and Longnan power grids, and have thus contributed to the stabilization of power throughout Gansu province. In Hanpingju, because winter is the dry season, power sometimes had to be drawn from the network, but in the rainy season that lasts for about eight months, a surplus of power was supplied to the network. Thanks to the provision of power facilities, including those provided through this project, since 2003 Gansu province has been able to export power to other provinces.

Gansu's Electric Power Balance (Unit: 100 Million kWh)

	2000	2003	2004
Amount consumed	295	398	452
Power generated	280	404	457
Hydroelectrically generated portion	114	108	122
Thermally generated portion	166	296	335
Imports from outside the province	47	44	56
Exports to outside the province	32	50	61

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<tr><td></td><td></td><td>Source: Gansu Province Statistical Yearbook</td></tr>
<tr><td>[Effectiveness]</td><td>(1) Operation and Effect indicators
1) Quantitative effects
(Longshou Subproject)<table><tr><td></td><td>Figures at time of ex-ante evaluation</td><td>Target values (target year not established at time of ex-ante evaluation)</td></tr><tr><td>Net electric energy production (sales amount) (GWh)</td><td>—</td><td>183.6</td></tr><tr><td>Revenue from electricity sales (million yuan)</td><td>—</td><td>66</td></tr><tr><td>Maximum output (MW)</td><td>—</td><td>52 (15MW×3, 7MW×1)</td></tr></table>(Beneficiaries: approx. 400,000 people)

(Hanpingju Subproject)<table><tr><td></td><td>Figures at time of ex-ante evaluation</td><td>Target values (target year not established at time of ex-ante evaluation)</td></tr><tr><td>Net electric energy production (sales amount) (GWh)</td><td>—</td><td>345</td></tr><tr><td>Revenue from electricity sales (million yuan)</td><td>—</td><td>104</td></tr><tr><td>Maximum output (MW)</td><td>—</td><td>60 (20 MW x 3)</td></tr></table>(Beneficiaries: approx. 2.64 million people)</td><td>(1) Operation and Effect indicators
1) Quantitative effects
(Longshou Subproject)
This subproject ended up being outside of scope of the yen loan (it was conducted using local Chinese funding, and was completed in June 2002).

(Hanpingju Subproject)<table><tr><td></td><td>Actual figures at the time of midterm review (May 2006)</td><td>Target values*</td></tr><tr><td>Net electric energy production (sales amount) (GWh)</td><td>350 (expected to be reached in 2006)</td><td>364 (design value)</td></tr><tr><td>Revenue from electricity sales (million yuan)</td><td>Undetermined</td><td>71 (yearly estimate)</td></tr><tr><td>Facilities usage rate (%)</td><td>Undetermined</td><td>5,051 hours/year (design value) (58%)</td></tr><tr><td>Unscheduled shutdowns (days/year)</td><td>Undetermined</td><td>No unscheduled shutdowns expected; six days per year (design value) slotted for repairs</td></tr><tr><td>Maximum output (MW)</td><td>72 (24 MW x 3)</td><td>72 (24 MW x 3)</td></tr></table>*Target figures for the Hanpingju subproject were not set out explicitly, but China has expressed the position that using design values as target figures would be adequate during the mid-term review. The project was completed in September 2005 (operations began in earnest in January 2006). As for the target year, the executing agency had not explicitly selected one. So long as sufficient water could be secured, the executing agency claims that the target can be reached within 2006.</td></tr>
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		・ Regarding the above target figures, there is a disparity between the dry winter season and the other rainier seasons, but it is estimated that they will be attainable within 2006. The demand for power during the dry season will be covered by power from other regions—as, for example, from the Bikou hydropower plant. ・ The original role of these small hydroelectric power plants was to contribute to the economic development of rural villages in the above regions. Recently, as part of a comprehensive energy policy, much attention has been given to how the efficient utilization of water power resources could strengthen the electric power grid over the entire region. ・ As for beneficiaries, the Longnan district has a population of approx. 2.7 million, and Wen county has a total population of 250,000 people. ・ The increase in maximum output from 60MW to 72MW can be attributed to changes to design details.
	2) Qualitative effects Stimulation of the regional economy, alleviation of poverty, and prevention of air pollution accompanied by an abatement in power supply shortages and an improvement in the electric power base.	2) Qualitative effects ・ Gansu has recently enacted investment promotion policies that encourage mergers and acquisitions, lure science and technology businesses, give preferential treatment to deals that address environmental issues, and provide exemptions and reductions for corporate and local taxes from 2001 to 2010. As stabilization of the power supply is a prerequisite for such investment, conditions are thought to be favorable given Gansu province's abundance of resources. ・ The project's target area (Longnan district in Wen county) constitutes a poor district in Gansu province, in which migrant labor is encouraged. Out of Wen county's population of 250,000, already some 10,000 are engaged in migrant labor. ・ At the time of the mid-term review, it was not possible to quantitatively confirm a poverty reduction effect, but in the future, stabilization of the power supply to the surrounding area and a stable tax revenue from power generation companies are expected from this project. A rising tax revenue should help foster infrastructure development and alleviate poverty in the target area. ・ It was not possible to quantitatively determine the impact that this

		project had on air pollution at the time of the mid-term review. At the time of the ex-post evaluation it will be necessary to recalculate the CO_2 reduction effects that the renewable energy can have. Regional GDP Trends (Unit: 100 million yuan) 2000 / 2001 / 2002 / 2003 Gansu province: 972 / 1,073 / 1,387 / 1,559 Longnan district: 40 / 43 / 56 / 63 Wen county: 3.6 / 3.8 / 4.6 / 5.3 Source: Gansu Province Statistical Yearbook
	(2) Factors which may influence the effectiveness and impact 1) Land acquisition and resident relocation Land acquisitions in Hanpingju come to approx. 90ha, and the number of residents to be relocated amounts to roughly 1,000 people (230 households).	(2) Factors which may influence the effectiveness and impact 1) Land acquisition and resident relocation ・ The number of residents relocated on account of land being submerged by dams came to 142 households or 750 people. Landslides resulting from dam construction led to the relocation of 95 households or 438 people. Moreover, because a portion of national highway 212 would be submerged by dams, a portion had to be rerouted, leading to the further relocation of 37 households or 138 people. The unexpected increase in the number of relocated residents stems from relocations due to landslides as well as the fact that need to divert a portion of national highway 212 was not initially anticipated. ・ At the time of the relocations, the provincial planning committee investigated a blueprint for relocating people created by the Northwest Investigation Design & Research Institute (NIDRI) (a consultant). After consideration of the benefit to residents, compensation has been given in accordance of the provisions of that plan. For the farmland, compensation was transferred directly into the bank accounts of land owners based on the cadastre (official register of landownership), taking into account the annual productivity of the farmland. According to the Wen County People Resettlement Bureau, this system is not limited to one-time payments, but rather allows for multiple payments of reparations. ・ Up to present, relocated residents have not expressed any

		dissatisfaction with the process, and the homes that they have been provided with are splendid.
	2) Environmental consideration Plans for water quality monitoring at dam sites: Longshou subproject: By Zhangye City Environmental Protection Bureau Hanpingju subproject: By Wen County Environmental Protection Bureau	2) Environmental consideration ・ During construction and afterwards, no adverse effects on health or the surrounding soil were detected in the vicinity of the dam. ・ The target of monitoring is water quality, but the conditions and manner of monitoring have yet to be arranged. The county's Environmental Protection Bureau is still coordinating things with the Longnan City Environmental Protection Bureau. In principle, water quality will be investigated by taking samples at three different times—once each during the dry season and wet season, and once again when the water level is normal.
	(3) Factors which may influence the sustainability 1) Privatization In the midst of the reform of China's electric power structure, there is a need to follow up on management conditions among those actually executing projects and to heed the trend towards privatization.	(3) Factors which may influence the sustainability 1) Present status of the executing agency's structure (privatization, etc.) ・ The actual executing agency, Gansu Electric Power Company Group is essentially a holding company. Gansu Mingzhu Hydropower Development Ltd., which was financed by the group, has been conducting operation and management of the Hanpingju power plant through Mingzhu South Hydropower Development Ltd. Creating institutions with independent accounting systems in this way can make costs and the scope of responsibilities more transparent, and it is hoped that this will make it possible to achieve efficient management and operations. ・ Because Gansu province is now able to supply electricity to other provinces, it will be able to use the tax revenue from electricity sales towards the development of target regions.
	2) Electricity Sales Contracts There is a need to establish appropriate electricity fees. The contents of the electricity sales contract (including the establishment of the electricity fees) that is expected to be settled by the time the power plant begins operation also need to be determined.	2) Electricity Sales Contracts ・ An agreement on electricity sales was signed between Gansu Electric Power Company, the primary power network administrator for the entire province, and Gansu Mingzhu South Hydropower Development Ltd, which operates and manages the Hanpingju power plant. The contract is renewed annually upon mutual agreement between the companies. ・ General electricity fees in Gansu province are currently as shown below. It is felt that this fee structure gives due consideration to the poor in rural regions.

		Up to 100KWh 0.49 (yuan/kWh) 100 kWh-200 kWh 0.44 200 kWh-300 kWh 0.375 Greater than 300 kWh 0.32 Small-scale hydropower in rural regions For daily life: 0.20 - 0.30 (yuan/kWh) For production (irrigation etc.) : 0.06 ・ The electricity rates for power sent from the Hanpingju hydroelectric power station to the power grid is set by the National Development and Reform Commission, and currently is 0.227 yuan/kWh. ・ The two power companies report that they are making profits, but there is a need to assess the detail to confirm their financial conditions.
Information for reference		
[Efficiency] (1) Outputs (2) Project period	(1) Outputs 【Longshou subproject】 ・ Power generators: three 15-MW units, one 7-MW unit ・ Transformers and associated machinery ・ Transformer substation machinery ・ Steel structures ・ Building materials 【Hanpingju subproject】 ・ Power generation machinery (generators, transformers, etc.) three 20-MW units ・ Dam construction ・ Power plant and auxiliary facilities (including transmission lines, etc.) ・ Tunnel construction (including steel structures) ・ Building materials (Consulting services) Outside the scope of the yen loan (2) Project period March 2001-March 2004 (35 months)	(1) Outputs 【Longshou subproject】 Given the rapid increase in demand for electricity, the subproject has been viewed as a matter of the utmost importance, and the Chinese began work on it even before the yen loan had been awarded. JBIC also studied ways to assist the subproject, but in the end, financing came in the form of China's own domestic currency (project completed). 【Hanpingju subproject】 ・ Power generation machinery (generators, transformers, etc.): three 24-MW units ・ Dam construction (volume of water stored: 51 million m^3) ・ Power plant and auxiliary facilities (including transmission lines, etc.) ・ Tunnel construction (including steel structures) ・ Building materials (Consulting services) Outside the scope of the yen loan (2) Project period March 2001-September 2005 (55 months) (Hanpingju subproject only)

	・Longshou subproject: completion expected March 2003 ・Hanpingju subproject: completion expected March 2004	・Trial runs were begun July 2005 starting with machine No. 3 and concluded in September 2005. Full-scale operations are now under way.
Lessons Learned and Recommendations	(Lessons learned) The Longshou subproject was initially expected to be funded by a yen loan, but because increased power demand made the project so necessary and urgent, it was carried out using domestic funding. In the future, it will be necessary to accurately judge demand estimates and project implementation schedules when providing yen loans for similar kinds of projects. (Recommendations) ・ Among impact and effect indicators, a reduction in poverty in poor and rural regions through small hydroelectric power generation together with clean energy measures were confirmed qualitatively. At the time of the mid-term review, however, it was difficult to perform quantitative evaluations. Related information should be gathered continuously, and the project effect should be confirmed. ・ Indicators that were yet to be confirmed at the time of the mid-term review should be confirmed in the ex-post evaluation.	
Indicators set for use at time of ex-post evaluation	N/A	・ Power at transmission terminal (sales amount) (GWh) ・ Revenue from electricity sales (million yuan) ・ Facilities usage rate (%) ・ Unscheduled shutdowns (days/year) ・ Maximum output (MW)