



Validation Report

Reference Number: PCV: PRC 2008–09
Project Number: 30386
Loan Number: 1901
September 2007

People's Republic of China: Shen-Da Power Transmission and Grid Rehabilitation Project

Operations Evaluation Department
Asian Development Bank

ABBREVIATIONS

| | | |
|------|---|----------------------------------|
| ADB | – | Asian Development Bank |
| PCR | – | project completion report |
| EA | – | executing agency |
| LEPC | – | Liaoning Electric Power Company |
| MOF | – | Ministry of Finance |
| OCR | – | ordinary capital resources |
| OED | – | Operations Evaluation Department |
| PRC | – | People's Republic of China |

Key Words

asian development bank, China, energy, distribution, generation, performance evaluation, power, project completion report, rural electrification, shen-da, transmission, validation.

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OED PCR Validation

| 1. Basic Project Data | | PCR Review Date Posted: | | |
|---|--|---|---------------------------|-------------------------|
| Project Number: | Project No. 30386; Loan No. 1901 | Appraisal | Actual | |
| Project Name: | Shen-Da Power Transmission and Grid Rehabilitation Project | Total Project Costs (\$M): | 475.00 411.81 | |
| Country: | People's Republic of China | Loan/Credit (\$M): | 100.00 63.00 | |
| Sector(s): | | Cofinancing (\$M): | 375.00 348.81 | |
| Financing (\$M): | ADF: | Borrower Contribution (\$M): | | |
| | OCR: | Board Approval Date: | | |
| Cofinanciers: | | Closing Date: | 29 November 2006 | |
| Project Officers: Appraisal/ Implementation PCR | Name: Edu Hassing | Designation: Principal Energy Specialist (retired since last year) | From (month/yr) | To (month/yr) |
| | Ashok Bhargava | Senior Energy Specialist | | |
| Evaluator: | Thomas F. Jones | Director: | Ramesh B. Adhikari | |
| Quality Control Reviewer | Robert Schenck | | | |

2. Project Description (as stated in RRP)

a. Rationale and Expected Impacts:

The northeast power region of the People's Republic of China (PRC) comprises the provinces of Jilin, Heilongjiang, Liaoning and the Inner Mongolia Autonomous Region. Mine-mouth coal-fired power generating plants are located in the sparsely populated, northern Inner Mongolia Autonomous Region, while the energy-consuming areas are mainly in the industrial south of Liaoning Province. Hence, considerable benefit can be realized by interconnecting the north and the south. The first part of such interconnection from Heilongjiang Province to Shenyang in Liaoning Province was completed in June 2001 under an Asian Development Bank (ADB) loan. This Project was designed to complete the interconnection by extending the transmission line further south thereby increasing the capacity and efficiency of electricity transmission from Shenyang to Dalian in Liaoning Province, thereby increasing the availability and reliability of electricity supply in the province through putting in place an integrated regional grid that facilitates establishment of a regional competitive power market as envisaged by the Government.

b. Objectives or Expected Outcomes:

The principle objective of the Project was to increase the capacity and efficiency of electricity transmission from the northeastern part of the PRC to the southern part of Liaoning Province, thereby increasing the availability of electricity and the reliability of electricity transmission and distribution systems in Liaoning Province and avoiding harmful emissions associated with new power generation in the densely populated southern part of Liaoning Province. Other objectives were to complete the upgrading and expansion of rural electrification in the relatively poor rural areas of Liaoning Province and to develop an integrated regional grid that will enable restructuring of the power sector in Liaoning Province.

c. Outputs:

At appraisal, the specific outputs were expected to be:

- (i) electricity transmission
 - (a) construction of a single-circuit, 500 kV transmission line of 502 km from Shenyang to Dalian.
 - (b) extension of four 500 kV substations at Shaling, Xujia, Wangshi, and Nanguanling and construction of a 500 kV substation at Shendong
 - (c) installation of communication systems and environmental monitoring equipment
- (ii) electricity transmission expansion and upgrading
 - (a) upgrading and expansion of the Shenyang electricity network, including the upgrading of 220kV substations at Taiyuan and Suncheng
 - (b) upgrading and expansion of the Dalian electricity network
 - (c) upgrading and expansion of the Nanguanlin-Yanshu electricity network, including the construction of a 220kV substation at Yanshui
- (iii) rural electrification upgrading and expansion in the poverty counties of Kangpin, Xiuyan, and Xinbin and the poverty city of Zhuanghe
 - (a) construction of 66 kV transmission lines
 - (b) installation of 66 kV transformers and rehabilitation of existing 66 kV transformers
 - (c) upgrading of 10 kV distribution lines
 - (d) upgrading and replacement of low voltage transformers and installation of new capacitors
 - (e) training of staff in rural electricity supply companies in operation and maintenance of low voltage networks
 - (f) provision of energy efficient lighting
- (iv) upgrading of urban distribution in Shenyang and Dalian
- (v) competitive power market development - (a) study on transmission and distribution tariff distribution, restructuring of LEPC, and network management improvement; and (b) domestic training of Liaoning Electric Power Company (LEPC) staff
- (vi) consulting services for project implementation
- (vii) international training of LEPC staff in management of a power grid company in a competitive market
- (viii) closure of 10 coal-fired power generation units (with a total capacity of 437 MW) in Liaoning Province.

3. Evaluation of Design and Implementation (Evaluator assessment of actual vs. envisioned)**a. Relevance of design and formulation:**

The design and formulation of the project was rated as relevant. It was in line with the Government's main objective of increasing the supply of power to support the country's economic growth. Providing support to achieve economic growth in an efficient, equitable, and sustainable manner was the central theme of ADB's operational strategy for the PRC. More specifically, ADB focused on three strategic objectives: (i) efficiency improvements, (ii) environmental protection, and (iii) growth promotion in less developed provinces. Finally, the project was a logical extension of ADB's support to strengthen the provincial and regional transmission network to optimize utilization of existing power sources in the northeast power grid.

b. Outputs (or conditions in the case of program loans) and Costs as envisioned during appraisal as compared to actual costs and achievement of outputs; reasons for any deviation:

| COMPARISON OF PROJECT COST AT APPRAISAL AND COMPLETION | | | | | | |
|--|--------------------|--------|--------|---------|--------|-------------------|
| (\$million) | | | | | | |
| Item | Appraisal Estimate | | | Actual | | |
| | Foreign | Local | Total | Foreign | Local | Total |
| A. Project Cost | | | | | | |
| 1. Transmission Construction | | | | | | |
| a. Construction of 500kV Transmission Line | 16.54 | 92.21 | 108.75 | 16.90 | 103.98 | 120.88 |
| b. Extension of 500 kV substations | 28.68 | 31.00 | 59.68 | 22.46 | 54.26 | 76.72 |
| c. Installation of Communications Systems and Environmental Monitoring Equipment | 5.10 | 4.59 | 9.69 | 2.56 | 5.97 | 8.53 |
| 2. Transmission, Upgrading and Expansion | | | | | | |
| a. Shenyang Electricity Network | 15.10 | 40.10 | 55.20 | 10.23 | 34.62 | 44.85 |
| b. Dalian Electricity Network | 0.43 | 2.55 | 2.98 | 0.00 | 18.85 | 18.85 |
| c. Nanguanling-Yangsu Electricity Network | 11.44 | 40.47 | 51.91 | 2.65 | 15.87 | 18.52 |
| 3. Upgrading Urban Distribution in Shenyang and Dalian | 0.00 | 5.00 | 5.00 | 0.00 | 8.90 | 8.90 |
| 4. Rural Electrification Upgrading and Expansion | 0.00 | 101.33 | 101.33 | 0.00 | 86.00 | 85.00 |
| 5. Competitive Power Market Development | | | | | | |
| a. Consulting Services for Study | 0.42 | 0.16 | 0.58 | 0.84 | 0.00 | 0.84 ^a |
| b. Domestic Training | 0.10 | 0.07 | 0.17 | 0.00 | 0.00 | 0.00 |
| 6. Consulting Services for Project Implementation | 0.79 | 0.40 | 1.19 | 0.79 | 0.00 | 0.79 |
| 7. International Training | 0.50 | 0.10 | 0.60 | 0.00 | 0.00 | 0.00 |
| 8. Closure of Coal-Fired Power Plants | 0.00 | 0.87 | 0.87 | 0.00 | 0.00 | 0.00 |
| 9. Land Acquisition and Resettlement | 0.00 | 4.16 | 4.16 | 0.00 | 11.20 | 11.20 |
| Total Base Cost | 79.10 | 323.01 | 402.11 | 56.43 | 338.65 | 395.08 |
| 10. Contingencies | | | | | | |
| a. Physical | 7.91 | 17.58 | 25.49 | 0.00 | 0.00 | 0.00 |
| b. Price | 7.88 | 21.02 | 28.90 | 0.00 | 0.00 | 0.00 |
| Total Before IDC | 15.79 | 38.60 | 54.39 | 0.00 | 0.00 | 0.00 |
| 11. IDC and Front-End-Fee | 5.11 | 13.39 | 18.50 | 6.57 | 10.16 | 16.73 |
| Total Project Cost | 100.00 | 375.00 | 475.00 | 63.00 | 348.81 | 411.81 |
| IDC = interest during construction | | | | | | |
| ^a Includes international training | | | | | | |
| Source: Liaoning Electric Power Company | | | | | | |

Overall, the cost of the project was less than envisaged at appraisal. This was mainly attributed to very competitive bidding and design refinements during detailed design. The appraisal estimate was based on preliminary designs and costs. Major differences in the cost of individual items included (appraisal versus actual) several items but most notably the Dalian Electricity Network which increased by over 5 times. No explanation is given for this in the PCR. Land acquisition also cost about 1.7 times the appraisal estimate. Some cost items were considerably below appraisal estimates but these were small items including contingencies, which were not needed. Domestic training costs were apparently absorbed by LEPC and not quantified. The only significant, although small financially, deviation was not meeting a poverty reduction component involving the provision of 100,000 compact florescent light bulbs to the poorest households in three poverty counties and one poverty city.

c. Project Cost, Disbursements, Borrower Contribution, and Conformance to Schedule (as relevant to project performance):

Project costs were generally within estimates. There were no delays in the provision of counterpart funds. Following the delayed effectiveness of the loan, the disbursement was revised. Initial disbursements were slow but caught up in the last three years of implementation. Adjusting for the 10 month delay in loan effectiveness, the implementation schedule was generally followed except for part of the Rural Electrification Upgrading, which delayed project completion by about four months.

d. Implementation Arrangements, Conditions and Covenants, and related Technical Assistance:

LEPC was the executing agency and remained as such following a major restructuring of the power sector by the Government. The restructuring did not affect project implementation except for the rural component involving the installation of 100,000 energy efficient florescent light bulbs in poverty areas, which was not undertaken.

The loan covenants were designed to cover sector reforms, tariff and enterprise reforms and governance, environmental and social impact, financial performance of the EA, and implementation issues. The loan covenants were generally complied with. The covenant involving tariff reform was not fully met as it is a sector issue but progress was made on tariff unification. The PCR stated that "...significant progress has been achieved in the PRC..." in this regard. The covenants on environment and social impacts were complied with. Concerning the financial covenants, LEPC's return on assets was low compared with appraisal estimates, mainly because it lost many of its better-performing generating assets. Appraisal estimates of transmission tariffs were high resulting in a lower return on assets.

The related TA was provided to help LEPC prepare the project to meet ADB requirements, particularly in the areas of environmental impact assessment, resettlement, procurement, project implementation, and economic and financial analyses.

e. Performance of the Borrower and Executing Agency:

The performance of the Ministry of Finance (MOF), representing the Government as the borrower, was considered satisfactory. MOF helped to facilitate completion of the requirements for the loan to become effective. Loan effectiveness was delayed by 10 months and coincided with submission of the first loan withdrawal application. This simply represents good fiscal management on the part of MOF and suggests that loan approval dates should be more realistic especially given approval of advance action and retroactive financing, which does not place any pressure on ministries of finance.

LEPC as the executing agency was considered to have performed in a generally satisfactory manner. The project was implemented within budget and within the schedule except for some works and completion of a revised rural poverty component, issues beyond the control of LEPC.

f. Performance of the Asian Development Bank:

ADB's performance in monitoring the project was considered generally satisfactory. Most issues were resolved quickly and loan savings cancelled in a timely manner. Two issues arose concerning ADB's requirements. One involved the standard of insulation to be used. ADB rightly insisted on international standards to ensure that the international bidding would be competitive. The other involved the installation of 100,000 efficient light bulbs in poor households. With sector reform, LEPC had been turned into a transmission company with its distribution mandate assigned to another company. Thus, LEPC considered that it could not distribute and install light bulbs. LEPC suggested an alternative subcomponent too help the poor, which was accepted by ADB. This alternative involved: (i) road construction and upgrading, (ii) renovation and upgrading of school buildings and facilities, (iii) construction of a bridge, and (iv) construction of school boarding facilities. If installing light bulbs is outside the mandate of LEPC, then it is difficult to understand how building roads, bridges, and school facilities are within its mandate. This is not explained in the PCR.

4. Evaluation of Performance (Evaluator assessment):

a. Relevance

The project was “highly relevant”. See 3. a. above.

b. Effectiveness in Achieving Outcome

The project was “effective”.

c. Efficiency in Achieving Outcome and Outputs

The project was “highly efficient” and is reportedly running at or near capacity.

d. Preliminary Assessment of Sustainability

Sustainability is “likely”. The transmission tariffs have been set to allow for maintenance, operations and debt payment. The financial assessment at appraisal uses a depreciation rate of 4.36 percent while the PCR uses a depreciation rate of 6.0 percent. The effect of this cannot be evaluated as the presentation in the appendix of the PCR is a summary. This change was not explained in the PCR; its possible effects on sustainability need to be evaluated. The depreciation rates used appear to be on higher side – (i) Transmission has a 50 year span, hence 2% is appropriate. Larger Transformers would be around 25 years, for which a higher rate say 4%. The sustainability analysis should have examined the company finances to determine long term viability.

e. Impact (both intended and unintended)

No serious unintended impacts were identified. The intended impact of the installation of 100,000 energy efficient light bulbs and accompanying savings to poor families was not realized. No evaluation was undertaken of the impacts of the substitute works for the rural poor were assessed.

5. Overall Assessment, Lessons, and Recommendations (Evaluator assessment):

a. Overall Assessment

Overall the project was successful. It was completed within LEPC's budget and reasonably close to the original schedule taking into account the delay in making the loan effective. The only component that was not undertaken was the installation of 100,000 light bulbs but this was replaced with works designed to improve the conditions of the rural poor in selected locations.

b. Lessons

- (i) Responsible ministries of finance are not going to meet the requirements of loan effectiveness until they are ready to utilize the loan. The effect of this needs to be evaluated.
- (ii) Projects based on preliminary design will experience design and cost changes and, in some cases, unintended environmental and social effects.
- (iii) This project was prepared knowing that a major restructuring of the power sector was imminent. The scope of the project and related covenants might have been improved if it had been prepared after restructuring had been implemented.
- (iv) Sector policy changes require considerable time especially in large countries where many issues and possible positive and negative effects must be evaluated. Adequate time for such issues to be resolved should be allowed.

c. Recommendations

Recommendations follow the lessons learned above:

- (i) always evaluate the effect of delayed loan effectiveness on ADB and country considerations and project implementation

- (ii) evaluate the effect of basing projects on preliminary design
- (iii) understanding the effects of sector restructuring would help improve project design
- (iv) implementation and disbursement schedules should take past experience into account
- (v) recognize that significant policy decisions may require considerable time to prepare and implement
- (vi) the financial evaluation assumptions in the PCR should be the same as those used at appraisal. If not, an explanation should be provided. Company finances should be looked in to while assessing long term viability.

6. M&E Design, Implementation, & Utilization (Evaluator assessment):

The design of the project involved mainly civil works and some training. Results are easily confirmed as such projects generally have very good records. There are no significant issues to be brought out here.

7. Other (Safeguards, including governance and anticorruption; Fiduciary aspects):

Safeguards were complied with including environmental and resettlement concerns were handled well. Fiduciary aspects appear to have been well handled.

| 8. Ratings: | PCR | OED Review | Reason for Disagreement/Comments |
|---|-------------------------|-------------------------|---|
| Relevance: | Highly relevant | Highly relevant | |
| Effectiveness in Achieving Outcome: | Effective | Effective | |
| Efficiency in Achieving Outcome and Outputs: | Highly efficient | Highly efficient | |
| Preliminary Assessment of Sustainability: | Likely | Likely | |
| Borrower and EA: | Satisfactory | Satisfactory | |
| Performance of ADB: | Satisfactory | Satisfactory | |
| Impact: | Positive | Positive | |
| Overall Assessment: | Successful | Successful | |
| Quality of PCR: | | Satisfactory | |

9. Comments on PCR Quality:

Based on:

- Quality and completeness of evidence and analysis to substantiate claimed ratings
- Consistency with PCR Guidelines (PAI 6.07)
- PCR Candor and internal consistency; consistency of narrative/ratings with monitoring indicators, other data
- Candid, accurate consideration of exogenous factors (positive and negative) and attribution of results
- Extent to which lessons and recommendations are based on evidence and analysis

The PCR is generally satisfactory but it raises a few matters that should have been adjusted.

- The cancelled loan amount of \$37.0 million is not included in the basic data
- The basis for changing the depreciation rate from that used at appraisal is not explained, company finance not analyzed.
- The change in the rural component seems to be an after thought. The substituted rural components and their impact on poverty is not explained nor is how these components come under the purview of LEPC.

REGIONAL DEPARTMENT'S RESPONSE TO THE PROJECT COMPLETION REPORT VALIDATION REPORT

On 22 September 2007, Director, OED2 received the following comments from Energy Division of East Asia Regional Department.

We have reviewed the Project Completion Report (PCR) Validation report and found it generally satisfactory. We have following clarifications on the comments stated in the PCR Section 9. Comments on PCR Quality.

1. The reason why the PCR used a higher depreciation rate of 6% compared to the 4.36% used at appraisal is to align it with the grid company practices established in the People's Republic of China. Please note that the PCR for the Yunnan Dachaoshan Transmission Line Project (L 1644-PRC) circulated in 2005, a comparable transmission line project, also adopted a 6% depreciation rate. The accelerated depreciation rate adopted in the PCR has resulted in a more conservative financial projection of the project company while not affecting its viability.
2. Regarding the change in rural electrification component (100,000 energy efficient fittings in poorest households of 4 poverty counties), we have noted the comment made in the PCR. Due to limited page numbers a detailed explanation could not be included in the PCR. However, please note that Liaoning Electric Power Company did not implement these alternative projects on its own, but provided the funds (comparable to the cost of original component) for the relevant county governments' specific priority rural development projects.