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PROJECT PERFORMANCE ASSESSMENT REPORT

PEOPLE'S REPUBLIC OF CHINA

**ERTAN HYDROELECTRIC PROJECT I & II
(LOANS 3387 & 3933)**

**SICHUAN POWER TRANSMISSION PROJECT
(LOAN 3848)**

**ZHEJIANG POWER DEVELOPMENT PROJECT
(LOAN 3846)**

June 27, 2005

*Sector, Thematic, and Global Evaluation Group
Operations Evaluation Department*

Currency Equivalents (annual averages)

Currency Unit = Yuan (Y), 100 fen = 1Yuan

| | | |
|------|----------|-------|
| 1991 | US\$1.00 | Y5.36 |
| 1995 | US\$1.00 | Y8.35 |
| 2000 | US\$1.00 | Y8.27 |
| 2003 | US\$1.00 | Y8.28 |

Abbreviations and Acronyms

| | |
|----------|---|
| AAA | Analytical and advisory services |
| CEPC | Chongqing Electric Power Company |
| EHDC | Ertan Hydropower Development Company |
| Gencos | Generation Companies |
| GoC | Government of China |
| HV | High Voltage |
| IBRD | International Bank for Reconstruction and Development |
| ICR | Implementation Completion Report |
| MOEP | Ministry of Electric Power |
| MoF | Ministry of Finance |
| NDRC | National Development and Reform Commission |
| OED | Operations Evaluation Department |
| PPA | Power Purchase Agreement |
| PPAR | Project Performance Assessment Report |
| RAP | Resettlement Action Plan |
| SAR | Staff Appraisal Report |
| SEPA | Sichuan Electric Power Administration |
| SEPC | Sichuan Electric Power Corporation |
| SERC | State Electricity Regulatory Commission |
| SPC | State Power Corporation |
| SOE | State-Owned Enterprise |
| T & D | Transmission and distribution |
| Transcos | Transmission Companies |
| VAT | Value Added Tax |
| ZPEPC | Zhejiang Provincial Electric Power Company |
| GWh | gigawatt-hour (1 million kWh) |
| TWh | terawatt-hour (1 billion kWh) |
| kV | kilo volt (1000 volts) |
| MW | megawatt (1000 kilowatts) |

Fiscal Year

Government: January 1 – December 31

| | | |
|---|---|----------------------|
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OED Mission: Enhancing development effectiveness through excellence and independence in evaluation.

About this Report

The Operations Evaluation Department assesses the programs and activities of the World Bank for two purposes: first, to ensure the integrity of the Bank's self-evaluation process and to verify that the Bank's work is producing the expected results, and second, to help develop improved directions, policies, and procedures through the dissemination of lessons drawn from experience. As part of this work, OED annually assesses about 25 percent of the Bank's lending operations. In selecting operations for assessment, preference is given to those that are innovative, large, or complex; those that are relevant to upcoming studies or country evaluations; those for which Executive Directors or Bank management have requested assessments; and those that are likely to generate important lessons. The projects, topics, and analytical approaches selected for assessment support larger evaluation studies.

A Project Performance Assessment Report (PPPAR) is based on a review of the Implementation Completion Report (a self-evaluation by the responsible Bank department) and fieldwork conducted by OED. To prepare PPARs, OED staff examine project files and other documents, interview operational staff, and in most cases visit the borrowing country for onsite discussions with project staff and beneficiaries. The PPAR thereby seeks to validate and augment the information provided in the ICR, as well as examine issues of special interest to broader OED studies.

Each PPAR is subject to a peer review process and OED management approval. Once cleared internally, the PPAR is reviewed by the responsible Bank department and amended as necessary. The completed PPAR is then sent to the borrower for review; the borrowers' comments are attached to the document that is sent to the Bank's Board of Executive Directors. After an assessment report has been sent to the Board, it is disclosed to the public.

About the OED Rating System

The time-tested evaluation methods used by OED are suited to the broad range of the World Bank's work. The methods offer both rigor and a necessary level of flexibility to adapt to lending instrument, project design, or sectoral approach. OED evaluators all apply the same basic method to arrive at their project ratings. Following is the definition and rating scale used for each evaluation criterion (more information is available on the OED website: <http://worldbank.org/oed/eta-mainpage.html>).

Relevance of Objectives: The extent to which the project's objectives are consistent with the country's current development priorities and with current Bank country and sectoral assistance strategies and corporate goals (expressed in Poverty Reduction Strategy Papers, Country Assistance Strategies, Sector Strategy Papers, Operational Policies). *Possible ratings:* High, Substantial, Modest, Negligible.

Efficacy: The extent to which the project's objectives were achieved, or expected to be achieved, taking into account their relative importance. *Possible ratings:* High, Substantial, Modest, Negligible.

Efficiency: The extent to which the project achieved, or is expected to achieve, a return higher than the opportunity cost of capital and benefits at least cost compared to alternatives. *Possible ratings:* High, Substantial, Modest, Negligible. This rating is not generally applied to adjustment operations.

Sustainability: The resilience to risk of net benefits flows over time. *Possible ratings:* Highly Likely, Likely, Unlikely, Highly Unlikely, Not Evaluable.

Institutional Development Impact: The extent to which a project improves the ability of a country or region to make more efficient, equitable and sustainable use of its human, financial, and natural resources through: (a) better definition, stability, transparency, enforceability, and predictability of institutional arrangements and/or (b) better alignment of the mission and capacity of an organization with its mandate, which derives from these institutional arrangements. Institutional Development Impact includes both intended and unintended effects of a project. *Possible ratings:* High, Substantial, Modest, Negligible.

Outcome: The extent to which the project's major relevant objectives were achieved, or are expected to be achieved, efficiently. *Possible ratings:* Highly Satisfactory, Satisfactory, Moderately Satisfactory, Moderately Unsatisfactory, Unsatisfactory, Highly Unsatisfactory.

Bank Performance: The extent to which services provided by the Bank ensured quality at entry and supported implementation through appropriate supervision (including ensuring adequate transition arrangements for regular operation of the project). *Possible ratings:* Highly Satisfactory, Satisfactory, Unsatisfactory, Highly Unsatisfactory.

Borrower Performance: The extent to which the borrower assumed ownership and responsibility to ensure quality of preparation and implementation, and complied with covenants and agreements, towards the achievement of development objectives and sustainability. *Possible ratings:* Highly Satisfactory, Satisfactory, Unsatisfactory, Highly Unsatisfactory.

Contents

| | |
|--|------------|
| Principal Ratings..... | v |
| Key Staff Responsible | vi |
| Preface..... | vii |
| Summary..... | ix |
| Background to the Projects..... | 1 |
| Ertan Hydroelectric Project..... | 2 |
| <i>Project Description.....</i> | <i>2</i> |
| <i>Project Objectives.....</i> | <i>2</i> |
| <i>Appraisal, Quality at Entry, and Implementation.....</i> | <i>3</i> |
| <i>Issues.....</i> | <i>4</i> |
| <i>Performance Ratings</i> | <i>8</i> |
| Sichuan Power Transmission Project | 11 |
| <i>Project Objectives.....</i> | <i>11</i> |
| <i>Project Description.....</i> | <i>11</i> |
| <i>Appraisal and Quality at Entry.....</i> | <i>11</i> |
| <i>Institutional Development Issues</i> | <i>13</i> |
| <i>Performance Ratings</i> | <i>16</i> |
| Zhejiang Power Development Project | 18 |
| <i>Project Objectives.....</i> | <i>18</i> |
| <i>Project Description.....</i> | <i>19</i> |
| <i>Appraisal and Quality at Entry.....</i> | <i>19</i> |
| <i>Implementation</i> | <i>20</i> |
| <i>Institutional Restructuring Issues</i> | <i>21</i> |
| <i>Finances.....</i> | <i>23</i> |
| <i>Performance Ratings</i> | <i>24</i> |
| Power Sector Overview: present problems and future directions | 27 |
| Lessons Learned..... | 32 |
| Annex A. Basic Data Sheet..... | 33 |

| | |
|---|-----------|
| Annex B. Structure of the Chinese Electric Power Industry | 42 |
| Annex C. World Bank Studies of Reforms in the Chinese Electric Power Sector..... | 43 |
| Annex D. Borrower's Comments..... | 45 |

This report was prepared by Sunil Mathrani who assessed the project in February 2005. The report was edited by William Hurlbut, and Helen Phillip provided administrative support.

Principal Ratings

| | <i>ICR*</i> | <i>ICR Review*</i> | <i>PPAR</i> |
|---|---------------------|-------------------------|--------------|
| Ertan I Hydroelectric Project (Loan 3387) | | | |
| Outcome | Highly Satisfactory | n.a. | Satisfactory |
| Sustainability | Likely | n.a. | Likely |
| Institutional Development Impact | n.a. | n.a. | High |
| Bank Performance | Satisfactory | n.a. | Satisfactory |
| Borrower Performance | Satisfactory | n.a. | Satisfactory |
| Ertan II Hydroelectric Project (Loan 3933) | | | |
| Outcome | Satisfactory | Moderately Satisfactory | Satisfactory |
| Sustainability | Likely | Likely | Likely |
| Institutional Development Impact | Substantial | Substantial | High |
| Bank Performance | Satisfactory | Satisfactory | Satisfactory |
| Borrower Performance | Satisfactory | Unsatisfactory | Satisfactory |
| Sichuan Power Transmission Project (Loan 3848) | | | |
| Outcome | Satisfactory | Satisfactory | Satisfactory |
| Sustainability | Likely | Likely | Likely |
| Institutional Development Impact | Substantial | Substantial | High |
| Bank Performance | Satisfactory | Satisfactory | Satisfactory |
| Borrower Performance | Satisfactory | Satisfactory | Satisfactory |
| Zhejiang Power Development Project (Loan 3846) | | | |
| Outcome | Highly Satisfactory | Satisfactory | Satisfactory |
| Sustainability | Highly Likely | Highly Likely | Likely |
| Institutional Development Impact | High | High | High |
| Bank Performance | Highly Satisfactory | Highly Satisfactory | Satisfactory |
| Borrower Performance | Highly Satisfactory | Satisfactory | Satisfactory |

* The Implementation Completion Report (ICR) is a self-evaluation by the responsible operational division of the Bank. The ICR Review is an intermediate Operations Evaluation Department (OED) product that seeks to independently verify the findings of the ICR. The ICR review had not been introduced at the time of the Ertan I loan closure.

Key Staff Responsible

| <i>Project</i> | <i>Task Manager/Leader</i> | <i>Division Chief/ Sector Director</i> | <i>Country Director</i> |
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| Appraisal | Vukota Mastilovic | Richard Stern | Shahid Burki |
| Completion | Noureddine Berrah | Mohammad Farhandi | Yukon Huang |
| Sichuan Power Transmission Project (LOAN 3848) | | | |
| Appraisal | Vukota Mastilovic | Richard Newfarmer | Nicholas Hope |
| Completion | Jianping Zhao | Junhui Wu | Yukon Huang |
| Zhejiang Power Development Project (LOAN 3846) | | | |
| Appraisal | Barry Trembath | Richard Newfarmer | Nicholas Hope |
| Completion | Barry Trembath | Junhui Wu | Yukon Huang |

Preface

This is the Project Performance Assessment Report (PPAR) for three electric power projects in China (Ertan Hydroelectric, Sichuan Transmission, and Zhejiang Power Development) that were implemented during the period 1991-2003. They were supported by four IBRD loans and two commercial syndicated loans with partial Credit Guarantees from IBRD.

The purpose of this assessment is to review progress in the Chinese power sector since the OED evaluation of Bank assistance to China's energy sector that was undertaken in 1999. The report comprises three self-contained performance assessments of each of the projects followed by a brief overview of the present situation and problems in the Chinese power sector and a comparison with the position six years ago. Given the high quality and comprehensive coverage of physical implementation of the projects in the ICRs, this performance assessment is selective in its coverage and predominantly concentrates on policy issues, especially institutional reforms. Lessons from the projects have been consolidated in the report's final chapter.

The Ertan Hydroelectric project was undertaken in two consecutive phases, each one the object of a separate loan, one for US\$380 million (Ln. 3387), approved in July 1991 and closed on schedule in December 1996, and the second of US\$400 million equivalent (Ln. 3933), approved in August 1995 and closed on schedule in December 2001.

A loan of US\$270 million equivalent (Ln. 3848), approved in February 1995 and closed two years late in December 2003, supported the Sichuan Power Transmission Project. The Zhejiang Power Development Project was supported by a loan (Ln. 3846) of US\$400 million, approved in February 1995 and closed one year late in December 2003.

This report is based on the Implementation Completion Reports (Report no. 16583 of May 15, 1997; Report no. 24342 dated June 21, 2002; Report no. 25612 dated June 16, 2004; and Report no.29194, of April 23, 2004) prepared by the East Asia and Pacific Region the appraisal documents (Report no. 8470, June 11, 1991; Report no. 14072, July 7, 1995; Report no. 13468, January 20,1995; and Report no. 13498, January 31, 1995), loan documents, project files, and discussions with Bank staff.

An Operations Evaluation Department (OED) mission visited China in February/March 2005 to discuss the effectiveness of the Bank's assistance with the government and the project implementing agencies. The collaboration and assistance of all their officials are gratefully acknowledged.

Following standard OED procedures, the draft of this PPAR was sent to the borrower and implementing agencies for comments before finalization. Comments from the borrower have been attached as Annex D.

Summary

The projects examined by this PAR – Ertan Hydroelectric I & II, Sichuan Transmission, and Zhejiang Power Development – cover a 12-year period from 1991 to 2003. They had a number of common objectives, most particularly the alleviation of power shortages and institutional development (including wide-ranging utility and sector-level reforms), as can be seen from the table below:

| Achievement of main project objectives | | | |
|---|----------------------------|-----------------------------|-----------------------------|
| Project Objective | Ertan Hydroelectric | Sichuan Transmission | Zhejiang Power Devt. |
| Increase power supply | Y | Y | Y |
| Transfer technology | Y | Y | -- |
| Capacity building | Y | Y | Y |
| Tariff reforms | N | Y | Y |
| Sector reforms | -- | Y | Y |
| <i>Of which:</i> | | | |
| - Commercialization | -- | Y | Y |
| - Corporatization | -- | Y | Y |
| - Introduce competition | N | -- | Y |
| Reduce T & D losses | -- | -- | Y |

Key: Y = achieved; N = not achieved; -- = not applicable.

The overall outcome of the Ertan Hydroelectric Project (Phases I and II combined) was satisfactory. Highly relevant objectives were achieved and project resources were effectively utilized. The 3300 megawatt power plant will produce a large amount (15 terawatt-hours) of clean electricity for several decades to come. It is already yielding major economic and financial benefits for Sichuan which are highly robust. Sustainability is assessed as likely. The project's institutional development impact was high. Bank and borrower performance were both satisfactory.

The Sichuan Power Transmission Project was an indispensable complement to the Ertan project since it connected the Ertan power plant to the major cities of Chengdu and Chongqing by means of a high-voltage transmission network. The project also addressed important reforms of the provincial power utility's organization, management, and financial practices. The overall outcome of the project was satisfactory. Its institutional development impact was high and sustainability is likely. Bank and borrower performance were both satisfactory.

The physical components of the Zhejiang Power Development Project were completed satisfactorily and have produced the expected outcomes in terms of increased output of electricity and reduced technical losses. Institutional capacity building, though important, was not as crucial in the Zhejiang Power Development Project because it was a utility which was already somewhat ahead of most of its provincial peers and was also a long-

standing borrower from the Bank. On the other hand, the objective of promoting power sector reforms carried much more weight in this project, as Zhejiang served as a pilot for numerous reforms that were later introduced nationally. Many useful lessons were obtained from the three-year experience with a competitive generation market that was set up in Zhejiang province under the project. The experience increased awareness of the benefits of competition beyond Zhejiang to the Chinese power industry at large. The overall ID impact of this project was high and sustainability is likely. Bank and borrower performance were both satisfactory. The overall outcome of the project was satisfactory.

The Chinese power sector has been in a state of considerable flux since 2002, in the wake of the government's decision to separate generation from transmission. Booming economic growth combined with insufficient investment planning have led to the reemergence of significant power shortages nationwide, which has complicated the process of institutional reforms. This assessment found that the Chinese electricity sector is presently experiencing considerable transitional difficulties in implementing the 2002 sector reforms. The benefits from unbundling and competition have yet to manifest themselves and will take several more years to do so. The biggest obstacle to greater efficiency and lower costs has been the supply-demand imbalance, which prevents any form of competition among bulk suppliers, and the absence of effective regulation. There remains a large agenda of unfinished business to tackle in the areas of sector regulation, tariff setting, power markets, and investment planning.

The experience gained under the three projects reviewed in this report, as well as from the pursuit of concurrent power sector reforms at the national level in China, offers the following lessons of general applicability:

- Power shortages are a barrier to the pursuit of market reforms aimed at increasing competition.
- Effective regulatory arrangements should be in place at the same time (if not sooner) as power supply entities are unbundled, in order to reduce abuses of market power.
- Indicative power system planning at the national level is essential in order to avoid boom-bust investment cycles such as the one currently building up in the Chinese power sector.

Ajay Chhibber
Acting Director-General
Operations Evaluation

Background to the Projects

1. Two of the projects that are the subject of this performance assessment (Ertan Hydroelectric and Sichuan Transmission projects) are located in Sichuan province of southwest China, which has a population of about 90 million. The third is in Zhejiang, one of China's most economically advanced provinces, located on the east coast, south of Shanghai.

2. Sichuan has a very large hydroelectric potential, only a fraction of which had been developed prior to the Ertan Hydroelectric Project. About 40 percent of installed generation capacity in Sichuan at that time was hydroelectric, mostly small run-of-river plants. In 2004, total power generation capacity in Sichuan province was about 20,000 MW¹, of which two-thirds was hydroelectric. Sichuan is a net exporter of electricity to other provinces, while Zhejiang has been an importer of electricity for about a decade.

3. The Yalong river, one of the major tributaries of the Yangtze, flows through Sichuan. The Yalong is 1,500 kilometers long and has its source in mountains west of the Sichuan plateau above 4000 meters, dropping to about 1000 meters in altitude, where it joins the Yangtze. The river has the potential to provide about 25,000 MW of power generating capacity when all the 20 sites along its length are fully developed.

4. Acute power shortages prevailed in Sichuan province² in the late 1980s and mid-1990s. Power demand was growing robustly at 7 to 8 percent annually. The power sector in general at that time suffered from a scarcity of skilled manpower, had outdated methods of utility management and lacked modern technology, particularly for power generation. The Sichuan Electric Power Administration (SEPA), the main power utility in the province, had been responsible for preparatory activities for Ertan, prior to the Government's (GoC) decision to set up the Ertan Hydroelectric Development Company (EHDC) in 1988 with the specific purpose of developing the hydropower resources of the Yalong River. However, as the then sole client of EHDC, SEPA was responsible for constructing the high-voltage transmission system to bring the electricity produced at Ertan to the two major cities of Chengdu and Chongqing. The latter project, which was supported by a separate IBRD loan approved in 1995, is part of this performance assessment.

5. By the time the Ertan hydro project was approved in 1991, the Bank already had built up a portfolio of seven power projects in China, including three other hydroelectric plants, but this was its first project in Sichuan, which at that time was China's most populous province. In terms of design and content, the Ertan hydro project is part of the cohort of 'first generation' power projects in China, with a strong emphasis on technology transfer and capacity building, but with minimal policy content. From 1994 onwards, (when the Bank and GoC undertook the first reviews of sector reform options),

1. The sixth largest in China.

2. This was also true of Zhejiang province at that time.

the Bank's power projects nearly always addressed institutional reform issues as part of the design of new lending operations. The Sichuan Transmission and Zhejiang Power Development projects thus belong to the subsequent 'generation' of Bank-funded power projects in China.

6. The Bank had already made two loans to the Zhejiang power utility to build the Phase I of the Beilungang coal-fired power plant³, so it was a utility that was already well known to Bank staff by the time power reforms came to prominence in the Bank-GoC sector dialog in the mid-1990s. Its role as a pioneer or 'testing ground' for sector reforms during the second half of the 1990s was therefore a logical progression. The Bank still has an ongoing relationship⁴ with the Zhejiang utility. However, there have been no subsequent Bank-funded projects with the two power companies in Sichuan, principally due to macro-economic and GoC borrowing policy decisions rather than sectoral factors.

Ertan Hydroelectric Project I & II⁵

PROJECT DESCRIPTION

7. The Ertan Hydroelectric project was the first step in the long-term development of the hydroelectric potential of the Yalong River. The 240-meter-high curved arch Ertan dam is at 1,200 meters above sea level, with a long, narrow reservoir that extends 145 kilometers upstream. The underground powerhouse contains six 550 MW generating units that can produce an annual average total of about 17 terawatt hours (TWh) of electricity. Until the Three Gorges Project, Ertan was the largest hydroelectric plant in China. The plant is connected to the cities of Chengdu and Chongqing by 500kV transmission lines that were constructed in a parallel Bank-supported project.

8. Given the large size and long gestation period of the project, it was clear from the start that two IBRD loans would be required. The first for \$380 million was approved in 1991, and the second for \$400 million followed in 1995, accompanied by a Guarantee operation for commercial financing of \$150 million. Transmitting the power from Ertan to the main urban centers of Sichuan (Chengdu and Chongqing) required the construction of a 500kV system, which was partly financed by another Bank loan of \$270 million to the Sichuan Electric Power Company, also approved in 1995 and reviewed in this report.

PROJECT OBJECTIVES

9. The main objectives of the Ertan I hydroelectric project were to:

3. The subject of PPAR # 19510 issued in 1999.

4. Tongbai Pumped Storage Project.

⁵ There were two consecutive phases of the Ertan hydroelectric project, each one the subject of a separate loan. Within the Bank, Ertan Phase I and Ertan Phase II were appraised at different times and treated as separate 'projects' with their own identification code.

(a) provide additional generating capacity to the power system in Sichuan Province in order to alleviate acute electricity shortages; (b) assist in the transfer of modern technology and in the introduction of efficient construction methods in order to reduce the cost and prevailing long gestation periods of large hydroelectric projects in China; (c) contribute to further improvements in the analysis of environmental and ecological impacts of hydroelectric resource development and in the design of related mitigation measures; (d) enhance the institutional development of EHDC by strengthening its organization through a modern management training program and introducing of economic efficiency and pricing principles; and (e) provide technical assistance in project design and implementation, and for the promotion of optimal operation of the power system, prudent financial management, and manpower development.

10. Objectives (c), (d), and (e) can be considered as one objective, since they are in practice facets of the same overall goal of institutional development of the project entity, rather than distinct objectives in their own right.

11. It was entirely appropriate that the same three overall objectives were carried over to the Ertan II project when it was appraised five years later. However, at that stage two new objectives were added, namely:

- the promotion of competition through the development of market-oriented commercial arrangements for the sale of power generated under the Project; and
- the diversification of financing strategies for power development.

APPRAISAL, QUALITY AT ENTRY, AND IMPLEMENTATION

12. The project was technically well prepared at appraisal. Good arrangements were in place for engineering and construction management, including the use of international engineering consultants to assist with a very large and technically difficult project. Ertan was the first time that international contracting practices were used in a Chinese hydro project. The ICR's coverage of implementation is comprehensive and need not be repeated here.

13. The environmental impact assessment and resettlement program were prepared to the prevailing standards at that time. The latter proved to be inadequate and a full-blown Resettlement Action Plan was prepared for the appraisal of the second loan, but this too turned out to have important shortcomings (para 17). Environmental mitigation measures also had to be reinforced following the second loan, in order to comply with more stringent World Bank and GoC norms that had come into effect since the first loan was appraised.

14. Institutional and capacity building aspects were also dealt with appropriately in the project design. No safeguards or mitigating measures could have been incorporated at appraisal to have prevented the project from suffering the financial difficulties it encountered in its first five years of operations (paras 25-26).

15. The project was appraised in late 1989 but the Bank was unable to negotiate the loan with GoC due to the political climate following the events that year in Tiananmen Square, with the result that major civil works contracts could not be signed, with loss of a construction season. Formal negotiations were eventually concluded in March 1991. Bridge financing had to be arranged by EHDC/GoC to avoid losing a second construction season because Board approval took place only in July 1991.

16. Site preparation began in 1987, the first generating unit went into service in 1998, and the project was fully completed in early 2000, at a cost of US\$2.2 billion⁶, about six months ahead of schedule. Despite initial difficulties and delays and the demanding implementation schedule, all six units of the power plant were in service by end-1999. From a technical standpoint they have been operating normally since then, although production in the initial years had to be held back because of financial and demand-related factors exogenous to the project (paras 25-26). The plant has been operating at close to full capacity in 2003-04 and objectives (a) and (b) above can be said to have been fully achieved.

ISSUES

Resettlement

17. As described in the ICR, at the time of project appraisal 29,000 people were expected to need relocation since their homes would be submerged by the reservoir. This estimate rose to 35,000 by the time the second loan was appraised in 1995. However, the latter figure did not include families affected only by the loss of land⁷, nor did it take account of population growth during the 1990s among the affected families, which then raised the total to 46,000 covered in the Resettlement Action Plan (RAP). Thereafter about 4,000 people had to be shifted a *second* time since the locations selected for their new settlements were too prone to landslide damage or because the initial per capita land allocations made to them were insufficient to ensure income recovery to their former levels. There are still about 900 people awaiting secondary resettlement, which has proved to be much slower than anticipated, mainly due to the scarcity of arable land. The assessment mission was informed that adequate funds are available to complete the program, but that it is likely to take until end-2006 to do so. This is an inordinately long period, given that all other aspects of the project had been fully completed by late-2000.

18. The financial costs of resettlement were seriously underestimated. These rose from \$104 million at the initial appraisal, to \$176 million when the second loan was appraised and finally to over \$290 million at project “completion”⁸, or about \$6,300 per person. As indicated in the ICR, the unit costs as well as the “headcount” for resettlement were poorly estimated, even at the time of the second appraisal and RAP.

6. Excluding the high-voltage transmission lines, which cost a further US\$1 billion.

7. Some families homes were above the waterline and were therefore excluded, even though their land holdings were submerged.

8. Including the unfinished secondary resettlement of about 900 people.

19. The Hongge resettlement village visited by the assessment mission appeared to be in good physical condition, about 7 to 8 years after it was set up. Household electrification is 100 percent, much higher than in the original villages. Higher-value agricultural activities, such as fruit crops and livestock that were started since the villages were established, seem to be contributing to raising household incomes beyond pre-project levels.⁹ However, statistical data on household income levels is no longer collected, following the non-renewal of an economic monitoring contract, so it is impossible to quantify the degree of progress, or the extent of the income shortfall of those resettled elsewhere for a second time. The people still awaiting secondary resettlement have been left even further behind in terms of income restoration in comparison with those now living in Hongge.

20. A ten-year post-project rehabilitation levy of about 0.3 fen/kWh on EHDC's electricity sales provides funds for both environmental protection around the reservoir as well as for infrastructure maintenance and improvements and income-boosting activities for the resettlement villages. This is a useful instrument to help ensure project sustainability since it eliminates uncertainty about funding from budgetary sources.

21. Despite the unfinished secondary resettlement, the Ertan resettlement program appears to have been successful overall and has given satisfactory results in terms of restoration or improvement of living standards and better access to infrastructure and other services for the bulk of the affected population. Nevertheless, the precarity of the 900 people still to benefit from secondary resettlement is unsatisfactory and GoC cannot be said to have fully met all its resettlement obligations under the project.

22. The experience gained from the Ertan resettlement program is likely to be useful in the design and implementation of the subsequent EHDC hydro projects. The use of an international environmental and resettlement panel for the first time in China proved its worth. Anecdotal evidence suggests that the resettlement policies of the Sichuan government have been positively influenced through exposure to Bank practices under the Ertan project, particularly as regards monitoring and evaluation.

Finances

23. The SAR states that project sought to promote 'prudent financial management' and to 'introduce economic efficiency and pricing principles'. This section examines what was achieved in this regard.

Electricity production and sales

24. Electricity production by EHDC in 2004 was 15.6 terawatt-hours (TWh), two thirds of which was purchased by SEPC. Chongqing Electric Power Company (CEPC) accounts for about a quarter of purchases and a few large state-owned industries in Sichuan take the remaining 6 to 7 percent.

9. Many of the farmers grew lower-value cereals prior to resettlement, which are not only more land- and water-intensive to cultivate, but also offer lower prospects for income enhancement.

EHDC- Electricity sales

| Year | Sales in TWh |
|-------------|---------------------|
| 1998 | 0.75 |
| 1999 | 5.0 |
| 2000 | 8.2 |
| 2001 | 12.5 |
| 2002 | 13.3 |
| 2003 | 14.3 |
| 2004 | 15.6 |

25. The low level of sales in the years 2000-01 after full commissioning of all six units was mainly due to the failure of Chongqing Municipality to use its agreed quota¹⁰ of power from EHDC, in violation of the contractual agreement. It preferred to buy power from new plants under its jurisdiction, to which it had provided fiscal incentives, rather than buy from Ertan. The slowdown in demand growth in Sichuan following the Asian financial crisis also contributed to the problem. SEPC preferred to dispatch its own plants in preference to Ertan. This led to the perverse outcome of EHDC being forced to spill water while older, coal-burning power plants operated instead.

26. EHDC was unable to enforce the terms of the PPAs due to the monopsonistic power of its two customers and the absence of a strong regulatory authority to arbitrate in the matter. The company suffered serious financial losses in terms of forgone revenues at a time when its debt service burden was very high. There were also substantial economic losses to both Sichuan and Chongqing from their suboptimal generation plant dispatching policy. The adverse publicity (including the attention drawn to it by the Bank in its communications with the central government) about the inability of EHDC to find outlets for its power production, probably contributed to GoC's subsequent decision in 2002 to separate generation from transmission, in order to avoid future misuse of market power¹¹. The problem of suboptimal use and dispatch of energy from Ertan proved to be short-lived and was resolved once the demand for electricity rose sharply from 2003 onwards.

Tariffs

27. EHDC's sale prices differ according to the buyer. SEPC now pays an average of Y0.26/kWh while the tariff for Chongqing is Y0.24/kWh (including VAT). The industrial clients of EHDC¹² pay less than half (only about Y0.1 to 0.15/kWh) the price charged to the utilities. EHDC is incurring an annual financial loss of at least Y0.1/kWh on the 1.2TWh that it supplies to the state-owned enterprises, or more than Y120 million

10. Following the separation of Chongqing, GoC decided that SEPC would take 68.5 percent of the power from Ertan and the remainder would go to CEPC, but these shares were later modified to reduce CEPC's share to 27 percent of an 'optimal' output of 14.6 TWh.

11. The State Council Power Sector Reform Plan (Document No. 5, 2002) explicitly refers to the problems of "unfair dispatch" and "provincialism" as barriers to the optimal allocation of energy.

12. These are energy-intensive SOEs that were encouraged to set up plants in the late 1990s to absorb the "glut" in hydropower from Ertan and were offered promotional power tariffs as incentives.

(US\$15 million). During the recent power scarcity, such preferential contracts had a very high opportunity cost because other consumers would have readily paid much more for the power, but the Sichuan provincial government is unlikely to eliminate these subsidies in the foreseeable future.

28. Different prices are charged to SEPC in the flood and dry seasons and there is also a daily peak/off-peak price. However, only a single flat price is used for sales to CEPC at all times. There is no clear logic for this preferential treatment. Nor has the principle of a separate capacity and energy charge in the tariff been introduced, even though it was agreed with the Bank at the time of loan negotiations and explicitly covenanted in the Project Agreement for the second Bank loan. A two-part tariff with a lower energy charge would probably also have helped EHDC to find outlets for more of its production in the early surplus years, when its flat tariff was higher than the cost of electricity from SEPC's old coal-fired plants.

29. Sales volumes above the contracted amount are apparently also to be priced at the same level as the contract price, which has to be approved by the Pricing Bureau of NDRC. Clearly EHDC has little scope to orient its prices and sales to reflect scarcity or glut in the power markets. The present situation is very far from the declared project objective of "market oriented commercial arrangements for the sale of power."

30. In addition, the current tariffs to SEPC and CEPC are still substantially below the GoC approved bulk tariff of Y0.34/kWh (including VAT) that was supposed to be reached progressively by 2006. The agreed target price has now been revised down by NDRC to Y0.278/kWh, to reflect the improved debt profile of EHDC. However, average revenue per unit of sales in 2004 was only Y0.207/kWh¹³, which about the same as the average revenue in the first three years of operation.

31. It seems unlikely that the large gap (over 50 percent) between actual and the "recommended/agreed" tariff will be closed in under two years. The looming generation surplus in 2007-08 (para 130) will also make it hard for EHDC to obtain significantly higher prices in the coming years. Lack of progress in raising tariffs has been a cause for concern ever since production started in 1998. The Bank repeatedly brought the matter to the attention of the authorities at both the provincial and national level, but without success. In conclusion, it appears that the project failed to meet the objective of introducing economic pricing principles in tariff setting.

Debt management

32. In late 2003, the outstanding \$396 million equivalent of IBRD currency pool loans were prepaid by EHDC using a new single currency U.S. dollar loan that it obtained from the Bank of China at LIBOR plus 0.6 percent. This has reduced EHDC's outstanding debt to IBRD to about \$208 million at end-2004. The operation reduced the debt service outflows and also reduced the risks arising from the currency pool. Currency fluctuation between the U.S. dollar and Yuan is minimal and current international opinion

13. Including 17 percent VAT, half of which EHDC is allowed by GoC to retain as a temporary arrangement and consider as an increase in equity capital.

suggests that future changes would lead to a revaluation of the parity in favor of the Yuan, thereby reducing EHDC's debt service burden even further. Foreign commercial cofinancing in Euros accompanied the second IBRD loan to EHDC, in pursuit of the objective of diversifying EHDC's financing sources and exposing it to international capital markets. However, the commercial cofinancing has also been fully repaid and the associated IBRD Partial Credit Guarantee canceled. In addition, EHDC was able to refinance some of its local debt at lower interest rates and extend maturities to 25 years. These adjustments to EHDC foreign debt illustrate its financial management capabilities and are evidence of the project's contribution to financial capacity building in EHDC.

Profitability

33. EHDC recorded its first profits in 2003 and was estimated to have earned Y486 million on sales of Y2,756 million in 2004. This is a major turnaround from a loss of about Y1 billion in 2000. Given the higher sales volumes and lower interest charges following its debt restructuring, EHDC's finances appear to be slowly reaching a sustainable footing, although its debt-equity ratio (92/8) is still unsatisfactory and will limit its future borrowing capacity. Agreement in principle has been reached for an increase in shareholders' equity¹⁴ of about Y300 to 400 million, which will help EHDC to increase its borrowing capability for a new hydro project at Jinping.

34. Lower than agreed tariffs mean that EHDC is still substantially below the Bank-covenanted rate of return (RoR) on assets (6 percent versus 15 percent). There were some concerns that the RoR covenant may have been too stringent and if applied would have led to unreasonably high tariffs and the accumulation of large surpluses by EHDC. However, the outcome has been the opposite, with the non-application of the tariff recommended by GoC itself.

35. There is little reason to expect a breakthrough on tariffs in the near-term. Yet EHDC's financing needs for the Jinping hydro project are very large and a reasonable level of internal cash generation is important to mobilize lenders to provide funds for this major project. Future earnings need to be reinvested in developing the hydropower potential of the Yalong, in line with EHDC's mandate and mission statement, but current GoC policy towards EHDC does not appear to be supportive of this goal.

PERFORMANCE RATINGS (PHASES I AND II COMBINED)

Outcome

36. The Ertan hydro project will produce a large amount (averaging 15TWh annually) of clean electricity for several decades to come, eliminating the need to burn over six million tons of coal per year. As such it yields major economic and financial benefits for Sichuan which are highly robust. EHDC, its suppliers and contractor acquired the technology and project management skills for the design and implementation of very

14. The shareholders have yet to pay in the full 20 percent of the initial project investment as equity in EHDC.

large, world-class hydroelectric schemes. The Bank's capacity building objective for EHDC under the project appears to have been largely accomplished (paras 42-44) and it is now well-placed to pursue new hydroelectric development schemes on the Yalong. For these reasons, the project outcome is rated **satisfactory**. Had there been better financial results (para 34) and full completion of the secondary resettlement (para 17), the project would have merited a highly satisfactory rating.

Relevance

37. The three main objectives (alleviation of power shortages, transfer of technology, and institutional development) of the project were highly relevant to the circumstances prevailing at the time (late 1980s) in the Sichuan power sector. The creation of a new entity, EHDC, to build and operate the project meant that the institutional development objective had considerably greater relevance than would otherwise have been the case.

38. With hindsight, promoting competition as an objective of the second loan seems to have been both unrealistic and premature in the prevailing context. Its inclusion probably reflects internal World Bank pressures rather than an objective assessment of relevance and feasibility. On the other hand, seeking new financing approaches was certainly relevant and appropriate for a new entity with little exposure to international capital markets.

39. The overall relevance of the project objectives is assessed as **high**. The inclusion of one inappropriate objective in the second loan does not detract from the high relevance of the others.

Efficacy

40. The project's efficacy is rated as **high**. Three broad project objectives (increasing power supply, transferring technology and developing EHDC as an institution) were largely achieved. The promotion of competition was not particularly relevant to the prevailing circumstances at that time and was not achieved.

Efficiency

41. According to the ICR, the project has an EIRR, of at least 11 percent at prevailing tariffs and considerably higher – 16 percent when an estimate for the willingness to pay is included¹⁵. Efficiency of resource use is assessed to be **substantial**.

Institutional Development Impact

42. EHDC was converted into a limited liability company with a Board of Directors in 1995, a step that the Bank attached considerable importance to as part of the approval process for the second loan. Today EHDC's share capital is divided between the State Development Investment Company and the Sichuan Provincial Investment Group with 48

15. Not recalculated by the evaluator.

percent each, while the remaining 4 percent is held by the China Huadian Corporation¹⁶. Following GoC's decision to separate generation from transmission, SEPC, the main off taker of EHDC's production no longer has a stake in it. EHDC has a staff of about 300, about half of whom are directly involved in Ertan power plant operations. A new department has been set up to handle preparatory work for the construction of the Jinping hydro project¹⁷, upstream of Ertan.

43. EHDC benefited from a wide range of training, advisory services and technical assistance during the decade-long project implementation period. They covered technical, organizational managerial, financial, tariff, resettlement, and environmental matters and have been well described in the two ICRs. This PPAR considers their impact to have been highly beneficial in building up the new institution.

44. The project has undoubtedly helped EHDC become a mature entity that is now organizationally well placed and has the capabilities to undertake further major hydroelectric developments on the Yalong River such as the much larger Jinping hydro project. The project's ID impact is therefore rated as **high**.

Sustainability

45. Technical sustainability is **highly likely**, given EHDC's demonstrated engineering and operational strengths over the past five years since project completion. The Ertan hydroelectric project will produce large positive cash flows for EHDC for the next several decades, but financial concerns relating to the non-observance of the approved tariff cannot be overlooked. Nevertheless, overall sustainability is considered to be **likely**.

Bank Performance

46. Preparation and appraisal by the Bank were rigorous. High-quality supervision was undertaken very regularly and repeated efforts were made to protect EHDC's interests on tariff and dispatching issues. Bank staff exhibited great diligence in supervision, even after loan closing. Overall performance is rated **satisfactory**.

Borrower Performance

47. This challenging project was successfully implemented by EHDC and is producing major economic benefits for Sichuan. EHDC's performance was **highly satisfactory**. However, there were shortcomings in the quality of the initial resettlement plan, GoC pricing policies, poor government decisions on competing investments and sub-optimal dispatch policies in the early years of operation, as well as inordinate delays in completing the secondary resettlement program. Nevertheless a **satisfactory** overall performance rating is justified because of the successful implementation of this large and difficult project.

16. One of the five major state-owned generation companies set up in 2003.

17. At about 1,900 meters altitude, Jinping I & II would be plants of 3600MW and 4400MW respectively.

Sichuan Power Transmission Project

PROJECT OBJECTIVES

48. The objectives of the project were to: (a) alleviate an acute shortage of electricity in Sichuan province; (b) assist in designing and implementing power subsector reforms in Sichuan; (c) support the implementation of further power tariff rationalization; (d) promote the transfer of contemporary technologies for extra high voltage power transmission networks; (e) strengthen institutional capabilities for environmental management and resettlement planning; and (f) upgrade management and operation capabilities through staff training.

49. The above six objectives can be distilled into three: increase electricity supply, transfer technology, and promote institutional development (including wide-ranging utility and sector-level reforms). Capacity building and technology transfer were common objectives shared with the Ertan hydroelectric project. But unlike Ertan, which was solely a generation company, SEPC was an integrated power utility, thereby presenting the Bank with an opportunity to engage it in broader power sector reforms and start the provincial-level implementation of reform principles that had been broadly agreed at the national policy-making levels of GoC.

PROJECT DESCRIPTION

50. The physical aspects of the project consisted of the construction of over 2,000 kilometers of 500kV transmission lines and associated substations to connect the Ertan hydroelectric project to the Sichuan power grid. Construction of the first of these transmission lines was technically challenging due to the high altitudes (as much as 3,500 meters), severe cold, rugged and remote terrain that had to be crossed during construction. The rest of the project consisted of diverse advisory services, training, and technical assistance to improve SEPC's organization, accounting and financial capabilities, and management information systems.

APPRAISAL AND QUALITY AT ENTRY

51. Bank assistance for the transmission system necessary to bring the electricity produced at Ertan to the major load centers in Sichuan was perfectly logical – neither project could produce any returns without the other. Given the Bank's involvement in the Ertan project since the late 1980s, it was essential to ensure that these crucial transmission lines were built in close coordination with progress on Ertan.

52. Sichuan Electric Power Company was a new borrower for the Bank that until this project had been largely untouched by sector reforms that had begun in other provinces. The Bank's strategy at that time¹⁸ explicitly entailed addressing the problems in the

18. SAR para 1.26.

provincial utilities and also proposed doing so in the inland provinces where there had been no previous Bank involvement with the local utility.

53. The reform agenda was ambitious but appeared feasible. According to the SAR¹⁹, it included: (a) commercialization of power companies, including provision of greater autonomy; (b) rationalization of power tariffs; (c) realignment of the regulatory and legal framework for the sector, including the promulgation of a National Electricity Law; and (d) strong encouragement for further diversification in financing for power development, including private sector participation. The reform agenda had the necessary political support and buy-in from decision-makers, who were required to translate GoC's new national policies²⁰ for the economy – the transition to a socialist market economy – as well as SOE reform, into actions to improve the performance of the electric power sector.

54. The policy content of the project was broadly in line with the Bank's 1993 policy paper for power lending, which gave considerable weight to corporatization and commercialization. However, transparent regulation, which was another major plank of the 1993 policy, did not feature in the design of the Sichuan reforms, but was expected to be addressed by a new national electricity law²¹ that was under preparation at the time of project appraisal. Nor was the unbundling and privatization of integrated power utilities envisaged on the “menu” of reform options being considered in China at that juncture.

Reform Action Plan

55. At the time of project appraisal in 1994, SEPC had only just begun to separate itself from the Sichuan Electric Power Administration (SEPA), an oversight body of the provincial government. It had not yet become a limited liability company with a board of directors. Its operations and management were still intertwined with SEPA. As with most provincial utilities in China at that time, SEPC was involved in a wide array of activities and services far removed from its core business. Electricity prices at that time were among the lowest in China and the tariffs were extremely complex. Much needed to be done to introduce modern management techniques and financial practices. The project included a substantial package of foreign technical assistance for capacity building across a broad range of disciplines.

56. These reforms, which were a prominent Part of the project, were distilled into an action plan for the commercialization and corporatization of SEPC. The action plan was approved by GoC and annexed to the agreed minutes of negotiations. Implementation of the action plan was also included as a covenant in the project agreement between SEPC and the Bank.

19. para 2.15.

20. The “Regulations on Transforming the Management Mechanism of State-Owned Enterprises” (July 1992), the “Regulations on adoption of New Accounting System” (July 1993), and the “Company Law” (December 1993), launched the process of enterprise reform.

21. Adopted by the NPC in late 1995 and effective from April 1996. It is still in force in its original form, despite having been superseded by subsequent changes in many important areas, but revisions are being discussed.

Physical Implementation

57. The first circuit of the transmission line from Ertan to Chengdu was ready in time for the commissioning of the first unit of the Ertan hydro plant and the PPA with EHDC was also signed at about the same time. However, there were some delays in completing the other transmission lines in 1999-2000. These were bottlenecks that contributed to the low production from Ertan in its first two years. The final cost of the project was US\$965 million and the transmission lines have been operating satisfactorily during the past five years. They are now the vital centerpiece of the entire high-voltage network in Sichuan.

58. The 500kV system from Ertan had to be reconfigured to take account of the reduction in power flows to Chongqing, which was originally supposed to receive two-thirds of the power from Ertan, but which chose to take only a third. Hence, the transmission system needed to be upgraded to deliver more power to the Chengdu area. This obliged SEPC to construct an additional 500kV line and substation that had not been part of the original design. SEPC also took steps to strengthen the transmission links with the rest of the Central China Power Grid to enable greater “exports” of power from Sichuan to other provinces²², particularly in the wet season. SEPC undertook these investments without recourse to additional World Bank financial assistance. In addition, the initial design capacity of the transmission lines²³ was insufficient to evacuate Ertan’s maximum power production during the rainy season. Reinforcement is now underway to eliminate this power transfer bottleneck.

59. About 3600 households were relocated as a result of the project. As in the case of the Ertan project, the quality of the initial resettlement action plan was poor, although prepared in accordance with the Bank’s requirements of the time. The RAP’s deficiencies were remedied during the early phase of implementation and independent monitoring and evaluation arrangements were put in place to oversee the resettlement program, which was completed satisfactorily at a cost of US\$64 million, five times greater than estimated at appraisal.

INSTITUTIONAL DEVELOPMENT ISSUES

60. The SAR states that project sought to “assist in designing and implementing power sector reforms”. This section discusses the results achieved in pursuit of the project’s reform goals.

Implementation of Reforms

61. As stated in the SAR, “the objective of the reform package is to develop SEPC into a limited liability company in full conformity with the Company Law, separated from the government, financially autonomous and self-sufficient, with clearly defined ownership structures and rights, and operated according to modern commercial

22. Net exports from Sichuan to other provinces in 2004 were about 7,650 GWh, or about 12 percent of electricity sales within Sichuan.

23. 2,900 MW versus the 3,300MW maximum capacity of Ertan.

management principles and procedures. SEPC's Action Plan includes an integrated, step-by-step program of measures to achieve this objective by 1998." Although sector reforms proceeded somewhat differently than envisaged at appraisal, the above goals have been largely achieved, but took several years longer than expected. On the other hand, in some fields reforms have proceeded much further than anticipated a decade ago, largely as a result of the landmark 2002 State Council power sector reform plan (paras 123-124).

62. Accounting separation²⁴ of 10 generation plants and 15 power supply bureaus was achieved in 1999. The final transfer of governmental functions (policymaking and sector regulation) from SEPC to the Sichuan Economic Commission²⁵ was not achieved until mid-2000. This in turn delayed SEPC's own internal reorganization. SEPC was eventually registered as a limited liability shareholding company in 2000.

63. In 1997, during project implementation, the boundaries of Sichuan province were changed and Chongqing and its surrounding areas were carved out of Sichuan and granted the administrative status of a separate municipality (with a population of about 30 million) under direct control of the central government. Numerous complications arose from the creation of Chongqing municipality, including the transfer of some SEPC assets and staff. Also major sections of the transmission lines from Ertan and two substations fell within the boundaries of the new Chongqing Municipality. However, it was agreed that SEPC should retain sole responsibility for project implementation. The asset and staff split also delayed moves to change SEPC's legal status.

64. As a consequence of the 2002 State Council decision to separate generation from transmission (para 123), SEPC's power plants were fully transferred to the new generation companies in mid-2004, with the exception of one hydroelectric peaking plant that it has been allowed to retain.

65. Transferring non-core activities such as staff medical and educational facilities to the provincial government is proving much harder. These had been separated from SEPC in accounting terms during the SEPC reorganization in 2000, but remain part of its overall responsibilities. The Sichuan government is reluctant to take on the financial and staff burden, while the concerned staff are also unhappy as their service conditions would be inferior to their current ones. Due to these difficulties, the transfer is unlikely to take place in 2005. Spinning off SEPC's 16 subsidiary companies that are involved in more commercial business activities may be less difficult, but also remains to be done. There are no ongoing plans for a further hiving off of the 28 "branch" companies under SEPC that essentially deal with power distribution.

66. The project did not address the issue of sector regulation, which was being handled mainly at the state level (para 128) through the now-defunct Ministry of Electric Power²⁶ and its successor body. Provincial-level regulation was entrusted to the Sichuan Provincial Commission on Economic Relations and Trade once the SEA was wound up

24. The unbundling of SEPC had not been envisaged at that point.

25. SEPA was wound up.

26. Abolished in 1998, when operational and commercial functions were transferred to a new State Power Corporation, and governmental functions to the State Economic and Trade Commission.

in 2000. In the coming years, Sichuan province will apply regulatory principles and pricing policies that have still to be defined by the concerned GoC bodies, SERC and NDRC.

67. Transmission pricing was not tackled under the project, since it was assumed that all the power from Ertan would be consumed within Sichuan and therefore the PPA between SEPC and Ertan would be adequate. Growing volumes of power exchanges across provincial and regional lines now mean that it is urgent to reach country-wide agreement on the pricing principles to be used for power transmission.

SEPC Finances

68. Rationalization of the power tariff structure was an explicit project objective. The process began in the early years of project implementation, with the elimination of differentiated regional prices for the same consumer categories, as well as a steady increase in the price of electricity. Time of day and seasonal pricing is used for commercial and industrial consumers, in line with Bank recommendations. SEPC's financial performance improved until 2000, but then declined thereafter. A big increase in capital expenditure and short-term borrowing²⁷ coincided with slight falls in energy demand and average power prices. These were the main factors behind its declining profitability during 2001-03, that meant it was unable to comply with World Bank loan covenants on financial performance. Accounts receivable also mushroomed, due to poor-performing state-owned enterprises with payment difficulties. The problems were exacerbated by new tariff distortions arising from the provincial government's decision to offer incentives to certain consumer categories (like energy-intensive industries and new enterprises) in the form of discounts to *stimulate* electricity consumption. These incentives were short-sighted and stimulated the wasteful use of power at a time when surpluses were fast disappearing. Such preferential pricing was a major factor contributing to SEPC's weak finances in 2001-02. These measures were finally abolished in 2004, due to the power shortages that hit Sichuan in 2003-04. Overall, the project can be said to have met its goal of improving tariff structures, although the recent experience in Zhejiang province (para 105) shows that there is still much to be done in Sichuan with regard to residential electricity pricing.

69. SEPC's financial performance in 2004, with pre-tax profits of about Y870 million, was probably its best ever despite the loss of income arising from the transfer of generation plants. This was the result of higher energy sales, higher sale prices, and the abolition in mid-2004 of preferential tariffs. SEPC was also able to reduce its outstanding long-term debt to its lowest level since 1997. Its debt/equity and self-financing ratios as well as debt-service coverage are now much healthier. However, future profitability will depend in part upon SERC/State Grid decisions on transmission pricing. At present, the respective shares of the retail tariff going to generation transmission and distribution appears to be skewed in favor of generation (para 133), which will need to be addressed

27. GoC's anti-recessionary measures following the 1998 Asian crisis included a big push for rural electrification and capital investment for network upgrading that provincial power companies had to fund largely from their own or borrowed resources.

by GoC if the other two branches of the electricity supply industry are not to be deprived of adequate funds for investment.

Creation of a Generation Market

70. In 1999, SEPC set up an internal generation market for its 10 plants that accounted for about half of all capacity in the province. This was the first step toward the creation of a bulk power market in the province and had not been envisaged at the time of project design. The initiative for it appears to have come from SEPC, not the Bank. Nor was it part of the initial reform action plan agreed at the time of loan negotiations. By mid-2000 (when there was a capacity surplus in Sichuan), the generation market had been expanded to include non-SEPC controlled plants (IPPs and Ertan) and generators accounting for about 9,000MW of capacity²⁸ were participating in daily bidding for 96 quarter-hour “slabs” of generation. A Parallel “swap” market was also set up to permit thermal plants to sell their generation “quotas” to hydro plants, particularly in the wet season. This proved successful and led to significant cost savings. However, in the current environment of electricity shortages in Sichuan, the bulk supply market has little relevance. All generators receive the “cap” or ceiling price of Y289/MWh.

There were many distortions in this initial experiment due to SEPC’s role as market operator and the attendant conflict of interest arising from its direct control over more than half of all generation capacity being dispatched. International consultants (Mercatos Energeticos) were hired under the project to improve market design and to draft operating rules. The brief experience with competition at the bulk level came to an end when the spare generation capacity was absorbed and shortages began in 2003. But lessons from it may prove to be useful in 2007 and beyond, when spare generation capacity is widely expected to be available. At that point, a bigger market – on a regional rather than provincial basis – is likely to prove a more efficient arrangement, particularly as inter-provincial high-voltage transmission links are now much more developed than they were five years ago.

PERFORMANCE RATINGS

Outcome

71. The overall project outcome is assessed as **satisfactory**, given that as a result of the project, (i) electricity from the Ertan hydro plant reaches its main markets in Chengdu and Chongqing, thereby contributing to alleviating power shortages; (ii) SEPC is a stronger utility and has acquired the skills to undertake high voltage transmission projects unassisted; and (iii) sector reforms continue to progress. These were the three broad objectives that the project sought to achieve.

28. About half of which was hydroelectric.

Relevance

72. The project objectives were highly relevant to the prevailing circumstances in Sichuan in the mid-1990s: a pressing shortage of electricity, the unreformed power supply sector and the knowledge gap in technology, utility management, and finances. They were also fully consistent with Bank's strategy to support GoC's efforts to bring about a transition from communism to a socialist market economy through the reform of state-owned enterprises. Today, a decade later, sector reforms retain their topicality and would feature prominently if there was to be a new Bank lending operation. The relevance of the project objectives is therefore rated as **high**.

Efficacy

73. The project's efficacy is rated as **high**, since all the six project objectives listed in para were achieved without significant shortcomings. There is still a considerable amount of unfinished sectoral reform business to complete, but that was not envisaged under the project. Nor was it expected that everything could be accomplished during a single project with a life of less than a decade. The underlying problem of power shortages (which were eased as a result of the project) has recurred, but for reasons unconnected with SEPC or the project (para 125).

Efficiency

74. The project's EIRR as estimated by the ICR is in the 12 to 14 percent range, (depending upon tariff and willingness to pay assumptions), which is satisfactory. The estimates do not take account of the additional economic benefits arising from the fact that the project facilitated power exports to other provinces. These exports to power-short provinces had a much higher economic value to the buyers than the tariff paid by them to SEPC during the power shortages of the last two years. Hence, the EIRR is probably higher²⁹ than estimated in the ICR. Efficiency is therefore assessed as **substantial**.

Institutional Development Impact

75. As described in para 61-65, the project made a major contribution to the institutional reforms in SEPC. The extensive³⁰ Bank-funded training program in key areas such as the design, construction, and operation of high-voltage networks, utility finance, corporate planning, and environmental management also had a positive impact on SEPC's capabilities. Consulting services provided under the project endowed SEPC with a modern financial management information system. Overall it is a much stronger, commercially-minded company with a better trained staff than a decade ago. The project's ID impact was **high**.

29. Not recalculated by this PAR.

30. Over 800 staff-months.

Sustainability

76. Project sustainability is rated **likely**, despite the uncertainty arising from the incomplete sector reorganization. Following the unbundling of generation and transmission, the 500kV network is one of SEPC's prime assets. It is well maintained and highly likely to receive adequate operating and maintenance funding, given its importance to SEPC's role as a transmission company. For the moment, the "loss" of its generation assets to the new generation companies does not appear to have hurt SEPC's financial performance unduly. Greater financial autonomy and "independence" from the provincial government depends upon the quality of sector regulation, which has yet to be tested, given the newness of the regulator SERC, and the lack of clarity about its real authority to set tariffs.

Bank Performance

77. The project was an astute blend of high-priority physical investments that complemented the Ertan hydro project, and utility reforms in a less-developed inland province. Project design and appraisal were good, while supervision was regular and comprehensive, even if staff efforts to counteract the adverse effects of poor decisions on tariffs and dispatching were ineffective. The Bank, lacking leverage (para 116), could only exhort and attempt to persuade GoC of the need to take a particular course of action. Ideally, there should have been a follow-on project to continue supporting the sectoral reforms, in the manner of the Bank's work with the provincial utility in Zhejiang, ZPEPC. Overall Bank performance is considered **satisfactory**.

Borrower Performance

78. Overall borrower performance is rated **satisfactory** because of successful implementation of the project and real progress achieved in sector reforms and institutional development. These outweigh the shortcomings in the pricing policies of the Sichuan government, suboptimal investment by Chongqing Municipality in new thermal plants, and the underusage of Ertan's hydroelectricity in its early years resulting from SEPC's favoritism of its own plants.

Zhejiang Power Development Project

PROJECT OBJECTIVES

79. The SAR lists the objectives of this project as: (a) help meet rapidly expanding electricity demand in Zhejiang province in a least cost manner; (b) promote power sector reform including commercialization and corporatization of the provincial power enterprise; (c) upgrade management capabilities and systems to enable the enterprise to operate efficiently in a commercial environment; (d) promote competition at the generation level through establishment of market-oriented commercial arrangements between power generation and marketing entities; (e) encourage alternative financing

strategies for power development; (f) improve supply-side efficiency through reduction of transmission and distribution losses; and (g) reduce environmental impacts of new generation.

80. The multiplicity of objectives listed above is striking for their number, diversity, and breadth. Only a strong and experienced implementing agency used to working with the Bank (which was the case) could have been expected to tackle them all. They were undoubtedly all relevant, but had varying degrees of importance. Unlike EHDC or SEPC, capacity building, though important, was not as crucial in a utility which was already somewhat ahead of most of its provincial peers. On the other hand, the objective of promoting power sector reforms carried much more weight in this project than in either of the other two projects reviewed in this PAR and this topic is therefore the main focus of the performance assessment that follows.

PROJECT DESCRIPTION

81. In order to increase electricity supply in the province, the project comprised (1) the construction of Beilungang Phase II power plant (3 coal-fired units of 600 MW each) (2) transmission network expansion and reinforcement; and (3) distribution network upgrading in Hangzhou and Ningbo Municipalities.

82. The remainder of the project consisted of a carrying out an agreed program of power sector reforms and technical assistance and training for capacity building and reform implementation.

APPRAISAL AND QUALITY AT ENTRY

83. The Bank had been closely involved in the debates and design of the Chinese power sector reforms in 1993-94, prior to appraisal of this project. Following the mid-1993 GoC-World Bank workshop³¹, it was agreed that Zhejiang would be one of two pilot provinces for the development of sector reforms nationwide. Hence, the policy content of the project was given prominence right from the design stage.

84. Prior to appraisal, the Vice-Minister of the then Ministry of Electric Power wrote to the Bank's Country Director³² to spell out the broad principles of power sector reform that GoC intended to pursue, essentially (i) the separation of government from enterprises, (ii) the corporatization and commercialization of the latter, (iii) an improved legal framework, (iv) expanding the use of foreign financing, and (v) tariff reform. These areas became the main planks of the reform plan for the power industry in Zhejiang and thereafter in most other provinces as well.

31. The report "China Power Sector Reform: Towards Competition and Improved Performance" Report No. 12929 (1994) had been preceded in 1993 by an IDF-funded workshop, study tour and report on reform options prepared by a GoC task force ("Strategic options for power sector reform in China," ESMAP Report No. 156/93).

32. Letter dated 15 December 1993.

85. The content of the Reform Plan reflected the judgment of the ZPEPC taskforce and had a high degree of client ownership. Implementation of the Reform Action Plan over four years to end-1997, with dated milestones was included as a loan covenant, even though ZPEPC recorded its concern³³ that its ability to do so in accordance with the timetable depended upon decisions to be taken by others outside its control. This was a judicious caveat, given the likelihood of delays at the national level in finalizing the electricity law and the fallout from the decision to wind up the Ministry of Electric Power. With hindsight, given the path-breaking nature of the reforms, it appears that the timetable was rather unrealistic, even for those activities that were predominantly under provincial or ZPEPC control.

IMPLEMENTATION

86. As described in the ICR, the physical components of the project were completed satisfactorily and have produced the expected outcomes in terms of increased output and reduced technical losses. The new units of the Beilungang II power plant were commissioned ahead of schedule and have shown good technical and environmental performance since then.

87. The project was largely completed by 2002, but the closing date was extended by a year to end-2003 in order to continue financing further work on the financial management information system. The final cost of the project amounted to US\$1,494 million, two-thirds of which was for the Beilungang II plant.

88. A total of 2156 people were relocated as a result of the project, substantially less than estimated at appraisal. According to the ICR, better, larger housing was provided to the affected households. An independent survey of the resettled families³⁴ revealed that per capita income had generally risen significantly after relocation.

89. The ICR states that emissions from Beilungang II are 20 percent less than comparable plants in China, although no comparative data is provided. Since the wording of the project objective relating to environmental issues is poor³⁵, it is not possible to draw any meaningful conclusion from the rather imprecise statement in the ICR. In any event, data on emissions³⁶ shows that the plant comfortably meets SEPA standards for waste water quality, flue gases and dust emissions.

90. ZPEPC's total transmission losses were reduced from 5.8% in 1995 to 4.3 percent in 2001, in part due to the project-funded 500kV system reinforcement. These have been reduced further to 3.3 percent in 2003, although this cannot be attributed to the project. The distribution investments in Hangzhou and Ningbo helped to meet demand that doubled in four years, while keeping energy losses in those areas down to 3 percent.

33. Para 30, SAR Annex 3.4.

³⁴ by the East China Investigation & Design Institute

35. The SAR states that the project's environmental objective is: "reducing the environmental impacts of new generation", without stating what the comparator or benchmark is.

³⁶ ICR p. 26 and Annex 10.

91. In order to better assess the impact of ZPEPC's power plants on ambient air quality, the project provided the hardware, software, and training for an environmental monitoring system. Data was collected in 1997-98, prior to the commissioning of Beilungang II to provide a baseline, and for two subsequent years. The assessment mission was told that analysis did not reveal any significant difference in air quality which could be attributed to Phase II.

92. Unfortunately, the monitoring system has fallen into disrepair³⁷ and since the transfer of ZPEPC's power plants to the new generation companies (Gencos), no steps have been taken to revive it. There is no mandatory requirement for the Gencos to carry out air quality monitoring outside the plant perimeter³⁸ and they are unlikely to do so in future, believing that this is for the State Environmental Protection Agency to deal with.

INSTITUTIONAL RESTRUCTURING ISSUES

93. From 1998 onwards, reform issues intermingled with those addressed under the follow-on Tongbai Pumped Storage Project, particularly as regards power markets. The two projects were supervised together and a single aide-memoire was issued, with a consolidated section dealing with all reform issues for the two projects. In addition, given that it was the same set of people on both sides dealing with reforms under both projects, it is virtually impossible to attribute certain results to one or the other.

94. A revised reform plan (without milestones) was agreed for the Tongbai project in 1999. Although almost five years had elapsed since the reform plan agreed for the Power Development Project, a considerable amount of the content of the new plan was a carryover of unfinished business from the earlier project. However, the latter also addressed new reform areas such as the creation of a generation pool and single buyer and the conversion of power supply bureaus into limited liability distribution companies.

95. Beilungang I power plant³⁹ was established as a limited liability company in 1997, but the conversion of ZPEPC into a limited liability company, one of the key steps of the reform plan agreed with the Bank was heavily delayed, in part because of the creation of SPC at the national level and lack of clarity about asset ownership between it and the provincial power companies. After the 2002 separation of generation, ZPEPC retains two hydro plants with a capacity of about 300MW that it manages on behalf of the East China Gridco. It has 10 prefecture-level power supply bureaus that deal with distribution and still has a substantial number of non-core subsidiary companies that are involved in design, construction, research, and testing. While these now have a distinct legal status, they are in no way independent or commercially run businesses since they rely overwhelmingly on their parent company for work assignments. Financial flows between them and ZPEPC are also far from transparent. Commercialization of the ZPEPC group

37. The equipment was expected to last 5-6 years, which it did. Major upgrading is now needed.

38. The four Bank-funded monitoring stations were located 3-5km away from the plants. On-site and stack emissions continue to be measured and recorded.

39. Built in the late 1980s with financing from the first two IBRD loans to ZPEPC.

of companies still has some way to go before it can be said to have been fully achieved.

96. The need for a study of distribution restructuring was identified in 2001, but put aside as premature. The arrangements for rural power supply are rather complex, with assets owned in part by ZPEPC⁴⁰, the provincial government and the county government. The staff is employed by the county, but since 2003 all the operations are managed by ZPEPC. Future separation of distribution into subsidiary companies will also require asset valuations and agreements on the respective ownership shares.

97. Work on provincial-level regulation was held up by a lack of state-level guidelines and uncertainty as to where to fit it into the provincial administration. The GoC announcement in 2002 of its intention to create a state-level regulator appears to have led to the issue being shelved under the project, though the follow-on project included some technical assistance to help design a regulatory system for Zhejiang. With hindsight, it seems that inadequate attention was given to the need for progress in regulation at the state level to at least accompany (if not precede) the other sector reforms. In practice it has lagged behind, with adverse consequences nationwide, as discussed in the final section of this report (paras 127-9).

Competitive Generation Market

98. This was a notable feature of the project and the actual outcome went beyond the original reform plan, which envisaged an internal market for power purchases from ZPEPC plants. In 1998-99, when China was experiencing surplus power generating capacity, conditions were propitious for a pilot provincial generation market.

99. With the encouragement of SPC and SETC at the national level and with Bank-funded technical assistance under the project, ZPEPC thoroughly designed and prepared a bulk trading system after an extensive review of international experience. With help from consultants funded under the project, a state-of-the-art trading system and related technical facilities began operating on January 1, 2000. By the time the market was suspended in mid-2003 due to shortages and load shedding, 70 percent of the province's installed thermal capacity⁴¹ was participating in it.

100. Enabling generators to participate in the market first necessitated the clarification of asset ownership and clear financial separation of power plants, thus laying the foundation for the subsequent transfer of assets to the new Gencos in 2003. The market resulted in greater transparency of generation costs and prices and led to a reduction of 1.5 percent in overall power purchase costs for ZPEPC. Gencos were given clear incentives to reduce their own costs, increase productivity, and thus enhance their ability to compete. It was also an extremely useful learning experience for over 600 staff of ZPEPC as well as the generators, so there was a big institutional development impact.

40. Prior to 1998 all rural distribution assets belonged to the counties, but subsequent network upgrading by ZPEPC has led to it acquiring the new/improved assets.

41. Nuclear and hydro power plants were excluded.

Finally, the experience increased awareness of the benefits of competition beyond Zhejiang to the Chinese power industry at large. The success of the “experiment” was very likely to have been a factor in the State Council’s decision to include the creation of regional bulk power markets with bidding for dispatch in the 2002 sector reform package.

101. Unsurprisingly, the market suffered from some imperfections due to its small size and the excessive market power of three generators, who controlled nearly 70 percent of the capacity. Transmission constraints prevented some plants from maximizing production at particular times to take advantage of opportunities. As the single buyer, ZPEPC had to support the risk of generation cost increases without the ability to alter its own selling prices. Nevertheless, the project can be said to have achieved the objective of promoting competition at the generation level. Many useful lessons were obtained from the three-year experience, which will improve the workings of any future generation markets to be set up in China when there is once again an adequate reserve margin.

FINANCES

102. After several uninterrupted years of fully satisfactory financial performance until 2002, ZPEPC was unable to meet the covenanted⁴² self-financing ratio of 30 percent in 2003 and 2004, due to the size of its large annual (Y9-10 billion) investment program,⁴³ the higher cost of power purchases from other provinces, and the reduced margin left to it as a T&D company after the separation of the Gencos. The position did not improve in 2004, when it made net profits of only Y0.5 billion on sales of Y56 billion, despite a 22 percent increase in its sales volume. Higher profitability in the future will depend upon an industry-wide tariff restructuring to redress the unbalanced share of tariffs granted to the T&D companies in the wake of the 2002 separation of generation (para 133).

103. In the same manner as for the Bank’s Ertan loan, the IBRD currency pool portion of the loan for this project was prepaid by ZPEPC in 2003. However, unlike EHDC it was able to do so from its own resources and did not need to refinance the loan in the local capital market. The Japanese Yen portion⁴⁴ of the commercial cofinancing was also prepaid.

Tariff Reforms

104. The initial focus of the Bank was on achieving unification of retail tariffs in the province. According to the action plan, this was due by January 1, 1996, but was finally introduced from 2001, five years later than covenanted.

42. Financial covenants under the subsequent Tongbai pumped storage project have not yet been revised to take account of the loss of generation assets and the reduced share of retail tariffs that ZPEPC is allowed to retain.

43. Largely funded by commercial borrowings.

44. 5 billion Yen, or about US\$50m. The balance of the cofinancing (US\$100m) was in US dollars and has not been prepaid, so the IBRD partial credit guarantee remains in force.

105. Tariff improvements were given a boost by the power shortages in order to better manage demand. In 2003, for industrial users six time periods and three rates were brought in to flatten the demand curve. In mid-2004, ZPEPC introduced peak and off-peak pricing⁴⁵ for residential consumers, as well a progressively rising block rate to dampen consumption. They are the first provincial utility in China to do so. The energy savings from the residential sector can be sold at a higher tariff to industrial and commercial users, who pay more.

106. Although there has been real progress on tariff issues, other tariff anomalies continue to persist. For example, the Provincial Pricing Bureau imposes⁴⁶ different wholesale prices to different counties within Zhejiang province, to take account of differing economic conditions at the local level.

107. At the bulk supply level, ZPEPC pays different prices to the big Gencos (who account for 60 percent of its requirements), to prefectural and municipal plants and to other suppliers outside the province, who represent about 30 percent of the total. The price of power from the latter is negotiated bilaterally, while NDRC sets the bulk price to the Gencos. The latter varies according to the age of the coal-fired plant and the number of hours of utilization. The Bank has expressed its reservations about this kind of pricing over many years to no avail. Between 2000-03, ZPEPC's bulk prices were partly market determined (para 100), when it operated a competitive generation market, but that no longer operates.

PERFORMANCE RATINGS

Outcome

108. As can be seen from the table below, the project did meet its stated objectives and achieved tangible progress in many areas, but several of the accomplishments were quickly undone – power shortages came back, competition was suspended, and ZPEPC finances are declining. These were partly due to exogenous factors, partly to GoC.

45. Y0.56/kWh from 0800 to 2200h and half that rate during night hours, versus a flat tariff of Y0.53/kWh at all times. So far, over a million consumers have switched to the new system, out of nearly 15 million residential consumers in total.

46. Ultimately the decision is endorsed by the NDRC pricing bureau in Beijing.

| Project Objective | Status |
|---|--|
| Help meet electricity demand | Met, but power shortages recurred. |
| Pursue sector reform including commercialization and corporatization of ZPEPC | Largely met |
| Upgrade ZPEPC management capabilities and systems | Met |
| Promote competition at the generation level | Achieved, but suspended |
| Encourage alternative financing strategies for power development; | Achieved via commercial cofinancing and WB guarantee |
| Reduce transmission and distribution losses | Achieved |
| Reduce environmental impacts of new generation | Unmeasurable |

109. The overall outcome of the project is assessed as **satisfactory**. The truncated nature of the achievements of the project prevent it from meriting a higher rating.

Relevance

110. As was the case in the Sichuan Transmission project, expanding the power supply and implementing sector reforms were the two dominant goals of this project. The relevance of these project objectives is rated as **high**.

Efficacy

111. The project objectives were achieved, although to varying degrees and for varying lengths of time. Hence the project's efficacy is assessed as **high**. The subsequent reversals that have occurred have been ignored in arriving at this rating.

Efficiency

112. According to the ICR, the Beilungang II plant, which accounts for over 60 percent of total project expenditures, has an EIRR of about 20 percent at prevailing bulk tariffs⁴⁷, compared to the SAR estimate of about 18 percent. The efficiency of resource use is therefore assessed to be **substantial**.

47. Not recalculated by the PAR.

Institutional Development Impact

113. The Bank has had a long and unbroken working relationship with ZPEPC stretching back about 20 years, and which continues today. Determining the ID impact of a specific project in a continuum is necessarily arbitrary. During this period, the entity has been transformed. Working with the Bank helped ZPEPC to upgrade the skill levels of its staff, and expose them to new ideas and working methods. ZPEPC exhibited openness and receptivity to outside help and was able to extract the best of what was on offer. The Bank had considerable positive influence on ZPEPC's corporate culture as well as on sector policies. Overall ID impact of this project is therefore assessed as **high**.

114. The process of change is not yet complete and ZPEPC's senior management recognizes that it has to face new challenges and meet higher standards of service quality and reliability if it is to join the ranks of the world's top power utilities, as it aspires to do. Nevertheless, ZPEPC no longer needs the Bank's financial assistance and its own skill levels are now high enough for it to enter the international utility consulting business.⁴⁸ Although ZPEPC would like to prolong its working relationship with the Bank, seeing it as a "bridge" both to GoC as well as to the outside world, the case for new lending to ZPEPC is weak, for both financial and capacity building reasons.

Sustainability

115. Setbacks in the sector, such as the reappearance of power shortages, the suspension of the competitive generation market and the declining financial performance of ZPEPC although not directly attributable to the project, prevent the project's sustainability from being rated as highly likely. Nevertheless, there are good reasons to believe that these problems will be reversed in the next 2 to 3 years. Power shortages are likely to be eliminated within the next 12-18 months, which should permit the reintroduction of competition for generation dispatch. Tariff discrimination against the T&D companies is also likely to be progressively reduced. Longer-term sustainability is considered to be **likely**.

Bank Performance

116. The good preparation and bold reform features of the project, and subsequent high quality supervision all deserve recognition. Possibly the Bank could have done more to highlight to GoC the risks of not having a satisfactory regulatory framework in place at the time of sector unbundling, but as stated in the 2004 CAE as well as in OED's Evaluation of Assistance to China's energy sector (2000), the Bank's leverage was minimal and its influence has always depended upon "persuasion and demonstration."

117. Bank performance is therefore assessed as **satisfactory**.

48. It is going to provide assistance in planning, marketing and management to a utility in Vietnam.

Borrower Performance

118. As is well described in the ICR, ZPEPC deserves a highly satisfactory rating for its performance in implementing the project. The performance of Zhejiang Province was also satisfactory.

119. On the other hand, GoC's performance was unsatisfactory. As described in the subsequent section of this report, the sector is in difficulty today in large part due to GoC decisions taken during the project period – sector planning was neglected, the moratorium on building new plants was too long, regulation was delayed and ineffective and tariffs are distorted. While it is true that GoC did implement the 2002 “big bang” reforms, and is belatedly trying to get a grip on matters in the sector, the positive effects are still to come (para 139).

120. In distilling the above three varying performances into a single rating, this PAR concluded that overall borrower performance can be considered as **satisfactory**.

Power Sector Overview: present problems and future directions

121. The Chinese electric power sector has been in a state of flux during the past three years, following the “big bang” reforms of April 2002, when the unbundling of generation from transmission and distribution began.

122. The start of unbundling was a major milestone in a sector reform process that had been long in the making, and in which the World Bank had participated extensively through project lending activities, dialog with the Chinese authorities, and the provision of free-standing external advisory services stretching back almost a decade to 1993. Annex D lists important studies commissioned or supported by the Bank that contributed to the process of designing the sector reforms.

123. The State Council-approved reform plan of 2002 sought to “break monopoly, introduce competition, improve efficiency, reduce cost, develop more reasonable pricing mechanism, optimize resource allocation, promote power development, accelerate the integration of a national grid, and promote the development of a fair, orderly, healthy power market system under appropriate government regulation”⁴⁹. The reforms were expected to be essentially completed by end-2005. However, the above objectives are far from being achieved and the process will take at least another five to ten years to complete, with the likelihood of encountering unforeseen problems en route.

124. The first step was the dissolution of the State Power Corporation (SPC) and the creation of five new generation companies each with about 20 percent of the generation assets of the former SPC. They are all entirely state-owned⁵⁰ and there are many instances

49. State Council Document No.5, 2002.

50. Although their core subsidiaries are partially listed on the stock exchange, some internationally.

of cross/mixed ownership of power plants among them. Two transmission grid companies (see Annex C for a description of the sector) were also set up at the same time. A national regulatory agency, State Electricity Regulatory Commission (SERC), was established in 2003⁵¹.

125. Meanwhile, the country was hit by power shortages,⁵² which led to power cuts in 2003 and 2004, and which are expected to continue well into 2006. This is the consequence of very rapid economic growth, which exceeded all forecasts, combined with insufficient new capacity being brought on line. The latter was due in large part to a two-year GoC moratorium on issuing permits for the construction of new generation plants out of concern that the generation overcapacity in 2000-01 would make it difficult to absorb the energy becoming available from the Three Gorges project.

126. The current shortages have led to a massive increase in the purchase and use of oil-fired standby generators. It is estimated that about 20 percent of China's incremental oil demand in 2003-04 was due to captive power generators. The power crisis has also meant that plans for power trading and competitive dispatch, also part of the sector reform plan, have had to be deferred.

127. The lack of a high-level policymaking body such as a ministry for energy at the national level is a handicap in the current fluid and transitional phase of sector reforms. Fragmentation in the sector has led to a loss of control by GoC and a considerable diffusion of responsibility. It plays into the hands of the electricity supply enterprises, which to a large extent are able to pursue their own expansion plans with minimal oversight.⁵³ The absence of an effective sector regulator exacerbates this tendency.

128. Two years after its creation, SERC is still struggling to establish its authority⁵⁴ in the face of fuzzy "ground rules" set by the State Council and the countervailing authority of long-established and more powerful bodies such as the National Development and Reform Commission (NDRC), which still has the final word on electricity tariffs nationwide. Lines of responsibility between SERC and NDRC are not yet clearly demarcated, with the latter seemingly reluctant to surrender any of its regulatory powers over the sector, even though it is over-stretched. SERC has little autonomy and still depends upon a budgetary allocation from the Ministry of Finance (MoF) to cover its operating costs.

129. While the Chinese energy sector abandoned prescriptive central planning long ago, it did not replace it with strategic or indicative planning. Today, sector planning is virtually impossible given the decentralized and fragmented context and no single body has a complete picture of ongoing trends and activities. This is illustrated by the near-

51. "Power Sector Regulation in a Socialist Market Economy," 1997 [WB Discussion Paper No. 361] was an influential study that contributed to the setting up of a state regulatory agency.

52. Estimated by SERC to have been 30,000MW in 2004 (Source: China Daily, 26 February 2005)

53. However, they too are suffering from the negative effects on their overall profitability of the lack of GoC control over coal prices.

54. Described in the local press as a "toothless tiger" (China Daily, 26 February 2005).

spontaneous nationwide boom in power plant construction triggered by the power shortages. Many of these plants are being built without the usual governmental clearances and until recently the central government was unaware of the massive scale of new investment in generation capacity.

130. A recent NDRC investigation has revealed that about 300,000MW of new capacity is presently under construction, which is a massive amount⁵⁵, even by Chinese standards, given that total installed generation capacity (excluding captive generators) in China in 2004 was about 400,000MW. About 50,000MW of new capacity was brought online in 2004 and at least as much is likely this year. Even though the demand for electricity is still rising at above 10 percent annually, a significant portion of this new capacity is therefore likely to be surplus⁵⁶ to requirements in 2007-08, even if rapid economic growth continues.

131. The expected glut will have a considerable impact on the power sector. Normally, major new generation investments would be accompanied by commensurate expansion of transmission and distribution, but it is far from clear if the provincial power companies are undertaking these complementary investments. Financial constraints on them, and a less bullish perception of demand is probably restraining transmission and distribution (T&D) investments. Hence there is a likelihood of new power plants being unable to get their potential output to consumers due to T&D bottlenecks. In addition, the surplus capacity could also have serious implications for the Chinese banking system. If power supply outstrips demand as expected, many of these projects may run at low levels of capacity utilization and their promoters may have difficulty in generating sufficient cash flows to service their loans⁵⁷.

132. Conscious of the lack of firm direction for energy policy, the government recently decided to set up an energy policy task force under NDRC, but this will not have the powers of a ministry or be able to compensate for ineffective sector regulation and the lack of investment planning. Nor will it be able to prevent a generation supply glut in 2006-07 and the attendant financial costs. Given the substantial amount of preparatory work done⁵⁸ on sector regulation in the five years preceding the 2002 “big bang,” it is surprising that more was not done earlier by GoC to ensure that regulation did not lag the institutional changes.

133. At the time the generation companies (Gencos) were created in 2003, the somewhat *ad hoc* split of retail tariffs appears to have given an overly generous share to

55. About 50,000MW of new capacity was added to the system in 2004.

56. Older, less efficient plants could be mothballed, but the experience with Ertan hydro (paras 25-26) in its early years suggests that this is unlikely, unless tariff policies (that discriminate against new plants) are changed and genuine competition develops in the generation market.

57. Since the major portion of the loans are from state-owned banks to state-owned generation companies, formal defaults are unlikely, but loan rescheduling on a large-scale would be needed to avoid adding to the stock of the banks' non-performing assets.

58. With considerable Bank support, partly under the Zhejiang Power Development Project and partly as self-standing AAA such as the joint MOEP-WB study (discussion paper 361, 1997) “Power sector regulation in a socialist market economy.”

the Gencos, which today receive about 70 percent of the total tariff, while the T&D companies have to cover all their costs with the remaining 30 percent. Furthermore, generation tariffs do not distinguish between capacity and energy charges, distorting plant dispatch and handicapping new, more efficient plants. The principles to be used to determine transmission pricing have not yet been finalized by SERC/NDRC, over two years after the creation of the Gencos. Meanwhile, the T&D companies have to bear the brunt of these regulatory and tariff shortcomings. They feel that they have suffered financially as a result of the unbundling of generation and that they are underfunded, while the Gencos are able to pursue an “oversized” investment program. While examining the profitability of the Gencos was beyond the scope of this PPAR, it is true that transmission has historically been neglected in the Chinese power sector, and there are very substantial “catch-up” needs to be met before the country has an integrated national high-voltage grid. So there is a *prima facie* case that the share of the tariffs going to the transmission companies (Transcos) is inadequate. Since there is no sectoral mechanism to transfer surpluses from Gencos to Transcos, it is clear that future tariff increases will have to be heavily skewed in favor of the Transcos. This process has already begun, in that the Gencos were only allowed to pass on 70 percent of the increase in coal prices to the Transcos at the time of the last tariff adjustment in mid-2004.

134. Although OED undertook a Country Assistance Evaluation⁵⁹ for China in 2003-04, the latter was largely based on the detailed OED review of the Bank’s energy sector assistance to China completed in late 1999⁶⁰. It is instructive to compare how the situation has evolved in the five years since then. That report (para 3.25) found that:

“...a number of serious issues remain to be addressed for the sector to sustain its rapid growth, as highlighted in recent Bank reports and elaborated upon in various parts of this report: gaps in the legal and regulatory framework for private participation; suboptimal system planning, which led to a relative neglect of transmission and distribution investments and gas-fired generation, and the unbridled growth of small and inefficient locally-financed power plants; persisting distortions in wholesale and retail tariffs; apparent inefficiencies in local distribution systems; persisting lack of clarity in power assets ownership and insufficient reliability of utilities’ financial data; and uneven monitoring and enforcement of environmental regulations. The reforms promoted by the Bank under its recent projects aim at addressing most of these issues.”

135. Taking each of the above issues in turn, this PPAR finds that today, the legal framework has weaknesses for public enterprises involved in the power sector. For example, Ertan Hydropower Development Company has had difficulties in getting the terms of its Power Purchase Agreements (PPA) observed. In addition, there have been continuing shortcomings for private players.⁶¹ The 1996 Electricity Law has been overtaken by subsequent institutional changes and is no longer an adequate basis for the sector’s future development. The regulatory framework has hardly progressed, despite the creation of SERC.

59. Report No. 29734, (OED, July 2004).

60. “The Bank’s Assistance to China’s Energy Sector,” Report No. 21891 (OED, 2001)

61. This was probably also the case five years ago, even though it was not highlighted by the OED report.

136. The near-absence of system planning is still a serious shortcoming, contributing to a misallocation of sectoral investments (such as the current over-building of new generation plants and insufficient investment in regional high voltage interconnections)⁶². In fact the present situation as regards planning may be worse than that identified five years ago, because of the large number entities that became involved in the sector following the 2002 unbundling and because of the further dispersal of spending authority. The recommendation by OED in its 1999 review that the Bank should help promote comprehensive energy planning does not appear to have been followed up.

137. The performance of distribution systems has probably improved as a result of the substantial investments made in network upgrading in recent years, although there is no consolidated data to confirm this. Asset ownership is certainly clearer, following the corporatization of many power enterprises and the setting up of limited liability companies. However, the spinning-off of non-core businesses by the provincial power companies is far from complete and likely to take several more years.

138. Old tariff distortions have been substantially reduced but not eliminated⁶³, while new ones have been created (para 133) that are contributing to resource misallocations. Most power companies now probably have better financial information and accounting systems than in the late 1990s and follow better environmental practices, although this view is largely conjectural since it is not based on a survey.

139. In conclusion, this PPAR finds that the Chinese electricity sector is presently experiencing considerable transitional difficulties⁶⁴ in implementing the 2002 sector reforms. The benefits from unbundling and competition have yet to manifest themselves and will take several more years to do so. The biggest obstacle to greater efficiency and lower costs has been the supply-demand imbalance, which prevents any form of competition⁶⁵ among bulk suppliers, and the absence of effective regulation. There remains a large agenda of unfinished business to tackle in the areas of sector regulation, tariff setting, power markets, and investment planning⁶⁶.

⁶² . The Bank's E. Asia Region project staff argued that "as far as power system planning is concerned, there has been a lot of progress in the planning of transmission networks and distribution grids, particularly in the area of regional and inter-regional transmission networks".

⁶³. For example, the persistence of preferential tariffs in Sichuan and the use of a flat tariff for the energy from the Ertan hydro plant.

⁶⁴ The Bank's E. Asia Region project staff commented that "The sector is not experiencing more difficulties than the rest of the Chinese economy, and is actually performing better than other similar industries."

⁶⁵. It also remains to be seen how much real competition will occur between the five Gencos, so long as they continue to have joint shareholdings in plants and all remain fully state-owned.

⁶⁶ The Bank's E. Asia Region project staff commented that "this is a normal stage in all reforms and that the Chinese authorities are working out the process slowly but efficiently". They added that "China has made most impressive progress in reforming its power sector in less than three decades".

Lessons Learned

140. The experience gained under the three projects reviewed in this report, as well as from the pursuit of concurrent power sector reforms at the national level, offers the following lessons of general applicability:

- As amply illustrated in the ICR for the Ertan hydroelectric project, good institutions for resettlement are key⁶⁷. China has three institutional features that facilitate successful resettlement and can be replicated elsewhere: (i) enlightened policies by central and provincial governments that establish the principles and incentives for resettlement as a development opportunity; (ii) planning and execution based on sound guidelines, managed by dedicated local authorities and open to a fair and Participatory process; and (iii) funding of post-resettlement activities by a levy from project-generated income.
- Power shortages are a barrier to the pursuit of market reforms aimed at increasing competition. This emerges clearly from the short-lived experience with competition for generation dispatch in both Sichuan and Zhejiang provinces⁶⁸.
- Effective regulatory arrangements should be in place at the same time (if not sooner) as power supply entities are unbundled, in order to reduce abuses of market power such as that which occurred in Sichuan following the commissioning of the Ertan hydroelectric plant⁶⁹.
- Indicative power system planning at the national level is essential in order to avoid boom-bust investment cycles such as the one currently building up in the Chinese power sector. The absence of national-level oversight and planning, combined with imperfections in the flow of information to investors as well as to the authorities and inadequate controls on lending (due diligence) by the Chinese financial system, have contributed to over-investment in generation and under-investment in transmission⁷⁰.

67. This lesson is reproduced verbatim from the ICR of Ertan II since it is both clear and succinct.

68 The Bank's E. Asia Region project staff commented that "It is the interference of government in case of tight supply that created the problems not the market. Reform could be implemented in tight supply conditions and if markets are well designed they will ration power in the most optimum way".

69 The Bank's E. Asia Region project staff commented that "The real lesson is that it would be a long process to change from command-and-control type of operation to market operation based on contracts and rules, and from old style government control to modern light-handed regulation. The reform process should be designed to recognize this".

70 The Bank's E. Asia Region project staff commented that "No doubt China needs better energy planning in general and power system planning in particular. But this is not the root of the current over-investment. This seems to be more of the issue of state owned company governance (bank governance as well) rather than the issue of sector planning and regulation".

Annex A. Basic Data Sheet

ERTAN I HYDROELECTRIC PROJECT (LOAN 3387)

Key Project Data (amounts in US\$ million)

| | <i>Appraisal estimate</i> | <i>Actual or current estimate</i> |
|---------------------|---------------------------|-----------------------------------|
| Total project costs | 2200 | 2601 |

Cumulative Estimated and Actual Disbursements

| | <i>FY92</i> | <i>FY93</i> | <i>FY94</i> | <i>FY95</i> | <i>FY96</i> | <i>FY97</i> |
|---|-------------|-------------|-------------|-------------|-------------|-------------|
| Appraisal estimate (US\$M) | 110.0 | 213.0 | 286.0 | 380.0 | | |
| Actual (US\$M) | 139.1 | 243.5 | 294.4 | 371.1 | 377.0 | 380.0 |
| Actual as % of appraisal | 126.5 | 114.5 | 102.9 | 97.7 | | |
| Date of final disbursement: December 17, 1996 | | | | | | |

Project Dates

| | <i>Original</i> | <i>Actual</i> |
|----------------------------|-----------------|---------------|
| Identification/Preparation | | 07/03/87 |
| Appraisal | 12/89 | 11/26/89 |
| Negotiations | | 03/25/91 |
| Board presentation | 07/91 | 07/02/91 |
| Signing | 07/91 | 07/11/91 |
| Effectiveness | 09/91 | 09/06/91 |
| Project completion | 12/31/96 | 12/31/2000 |
| Loan closing | 12/31/96 | 12/31/96 |

Staff Inputs (staff weeks)

| | <i>Weeks</i> | <i>\$'000</i> |
|-------------------------------------|--------------|---------------|
| Preparation to appraisal | 141.5 | 397.9 |
| Appraisal | 32.5 | 98.2 |
| Negotiations through Board approval | 39.5 | 125.4 |
| Supervision | 46.1 | 121.0 |
| Completion | 4.3 | 11.1 |
| Total | 263.9 | 753.6 |

Mission Data

| | <i>Date (month/year)</i> | <i>No. of persons</i> | <i>Staff days in field</i> | <i>Specializations represented</i> | <i>Performance rating</i> | | <i>Types of problems</i> |
|-------------------|---------------------------------------|---------------------------|------------------------------------|--|----------------------------------|------------------------------|--------------------------------------|
| | | | | | <i>Implementation status</i> | <i>Devel. objectives</i> | |
| Through appraisal | 02/91 | 5 | 5 | Engineer, Financial Analyst (2), Resettlement Specialist, Environmental Consultant | | | |
| Supervision 1 | 08/92 | 2 | 3 | Engineer (2) | | | |
| 2 | 07/93 | 1 | 4 | Engineer | | | |
| 3 | 04/94 | 2 | 4 | Economist (2) | | | Tariff study delayed. |
| 4 | 07/94 | 1 | 13 | Engineer | 1 | | |
| 5 | 10/95 | 4 | 11 | Engineer, Environmental Consultant (2), Resettlement Specialist | 1 | | |
| 6 | 06/96 | 3 | 4 | Engineer, Environmental Consultant, Resettlement Specialist | 1 | | Resettlement budget approval delayed |
| 7 | 11/96 | 4 | 5 | Engineer (2), Resettlement Specialist, Economist | 1 | | |
| Completion | Combined with 7th supervision mission | | | | | | |

Other Project Data

| <i>FOLLOW-ON OPERATIONS</i> | | | |
|--------------------------------|-----------------|----------------------------------|-------------------|
| <i>Operation</i> | <i>Loan no.</i> | <i>Amount (US\$ million)</i> | <i>Board date</i> |
| Ertan II Hydroelectric Project | 3933 | 400 | 08/22/1995 |

ERTAN II HYDROELECTRIC PROJECT (LOAN 3933)**Key Project Data** (*amounts in US\$ million*)

| | Appraisal Estimate | Actual or current estimate | Actual as % of appraisal estimate |
|---------------------|---------------------------|-----------------------------------|--|
| Total project costs | 2200 | 2601 | 118.0 |

Project Dates

| | Original | Actual |
|----------------|-----------------|---------------|
| Appraisal | | 02/17/1995 |
| Board approval | | 08/22/1995 |
| Effectiveness | 01/17/1996 | 1/17/1996 |
| Closing date | 12/31/2001 | 12/31/2001 |

Staff Inputs (staff weeks)

| | Weeks | \$'000 |
|----------------------------|--------------|---------------|
| Identification/Preparation | 89.9 | 356.00 |
| Appraisal/Negotiation | 36.2 | 187.50 |
| Supervision | 97.1 | 585.25 |
| Completion | 12.4 | 45.20 |
| Total | 234.7 | 1173.95 |

Mission Data

| | <i>Date (month/year)</i> | <i>No. of persons</i> | <i>Specializations represented</i> | <i>Performance rating</i> | |
|----------------------------|------------------------------|--|--|------------------------------------|-----------------------------------|
| | | | | <i>Implementation progress</i> | <i>Development objectives</i> |
| Identification/Preparation | 10/94 Environmental | 9 | Energy Specialist, Economist, Environmental Specialist, Financial Specialist, Resettlement Specialists (2), Engineers (3) | | |
| | 04/94 Preappraisal | 10 | Financial Specialists (3), Energy Specialist, Resettlement Specialist, Economists (2), Engineers (3) | | |
| Appraisal/Negotiation | 03/1995 | 8 | Economist, Environmental Specialist, Financial Specialists (2), Resettlement Specialist (1), Engineers (3) | | |
| Supervision | 06/96 | 6 | Manager, Energy Specialist, Economist, Environmental Specialist, Resettlement Specialist, Engineer | HS | HS |
| | 11/96 | 4 | Financial Specialist, Resettlement Specialist, Engineer, Economist | HS | HS |
| | 06/97 | 3 | Environmental Specialist, Resettlement Specialist, Engineer | HS | HS |
| | 03/98 | 4 | Environmental Specialist, Resettlement Specialist, Engineers (2) | HS | S |
| | 07/98 | 3 | Environmental Specialist, Resettlement Specialist, Engineer | HS | S |
| | 12/98 | 4 | Economist, Energy Specialist, Resettlement Specialist, Engineer | HS | S |
| | 05/99 | 2 | Energy Specialist, Environmental Specialist | HS | S |
| | 11/99 | 4 | Energy Specialist, Economist, Environmental Specialist, Resettlement Specialist | HS | S |
| | 05/00 | 7 | Energy Specialist, Economist, Environmental Specialist, Financial Specialist, Resettlement Specialists, Engineers, IT Specialist | S | S |
| | 11/00 | 7 | Energy Specialist, Economist, Financial Specialist, Resettlement Specialists (3), Engineer | S | S |
| | 05/01 | 10 | Energy Specialist, Economist, Environmental Specialists (2), Financial Specialist, Resettlement Specialists (2), Engineers, Agricultural Development Specialist, Micro Credit Specialist | S | S |
| 11/01 | 5 | Economist, Financial Specialist, Resettlement Specialists, Engineers (2) | S | S | |
| Completion | 04/02 | 5 | Economists (2), Resettlement Specialists (2), Engineer | S | S |

SICHUAN POWER TRANSMISSION PROJECT (LOAN 3848)

Key Project Data *(amounts in US\$ million)*

| | Appraisal Estimate | Actual or current estimate | Actual as % of appraisal estimate |
|---------------------|-------------------------------|---------------------------------------|--|
| Total project costs | 874 | 852 | 97 |

Project Dates

| | Original | Actual |
|----------------|-----------------|---------------|
| Appraisal | | 06/25/1994 |
| Board approval | | 02/28/1995 |
| Effectiveness | 11/20/1995 | 11/20/1995 |
| Closing date | 12/31/2002 | 12/31/2003 |

Staff Inputs *(staff weeks)*

| | Weeks | \$'000 |
|----------------------------|--------------|---------------|
| Identification/Preparation | 2.2 | 5.4 |
| Appraisal/Negotiation | 42.7 | 294.8 |
| Supervision | 96.4 | 401.2 |
| Completion | 7.1 | 33.8 |
| Total | 148.4 | 735.1 |

Mission Data

| | <i>Date (month/year)</i> | <i>No. of persons</i> | <i>Specializations represented</i> | <i>Performance rating</i> | |
|----------------------------|------------------------------|---------------------------|--|--|-----------------------------------|
| | | | | <i>Implementation progress</i> | <i>Development objectives</i> |
| Identification/Preparation | 02/93 | 4 | Economist, Financial Analyst, Engineers (2) | | |
| | 08/93 | 7 | Engineers (3), Economist, Financial Analyst, Resettlement Specialist, Environmental Specialist | | |
| Appraisal/Negotiation | 06/94 | 8 | Power Engineers (4), Economists (2), Financial Analyst, Resettlement Specialist | | |
| Supervision | 03/96 | 4 | Power Engineer, Economist, Financial Analyst, Operations Officer | S | S |
| | 04/97 | 4 | Power Engineer, Economist, Financial Analyst, Resettlement Specialist | U | U |
| | 12/97 | 2 | Operations Officer, Resettlement Specialist | S | S |
| | 11/98 | 4 | Operations Officer, Economist, Financial Analyst, Resettlement Specialist | S | S |
| | 05/99 | 3 | Operations Officer, Energy Specialist, Resettlement Specialist | S | S |
| | 11/99 | 3 | Energy Specialists (2), Resettlement Specialist | S | S |
| | 5/00 | 6 | Energy Specialist, Energy Economist, Power Engineer, Financial Analyst, Financial Management Specialist, Resettlement Specialist | S | S |
| | 12/00 | 4 | Energy Specialist, Energy Economist, Financial Analyst, Environmental Specialist | S | S |
| | 06/01 | 5 | Energy Specialists (2), Financial Analyst, Resettlement Specialists (2) | S | S |
| | 11/01 | 4 | Energy Specialists (2), Financial Analyst, Financial Specialists | | S |
| | 04/02 | 2 | Operations Officer, Resettlement Specialist | S | S |
| | 09/02 | 4 | Energy Specialist, Energy Economist, Financial Specialist, Resettlement Specialist | S | S |
| | Completion | 11/02 | 2 | Energy Engineer, Operations Officer | S |

ZHEJIANG POWER DEVELOPMENT PROJECT (LOAN 3846)

Key Project Data *(amounts in US\$ million)*

| | Appraisal estimate | Actual or current estimate | Actual as % of appraisal estimate |
|---------------------|---------------------------|-----------------------------------|--|
| Total project costs | 1574 | 1494 | 95 |

Project Dates

| | Original | Actual |
|----------------|-----------------|---------------|
| Appraisal | | 3/24/1994 |
| Board approval | | 2/28/1995 |
| Effectiveness | 08/23/1995 | |
| Closing date | 12/31/2003 | 12/31/2003 |

Staff Inputs *(staff weeks)*

| | Weeks | \$'000 |
|----------------------------|--------------|---------------|
| Identification/Preparation | 80.8 | 347.3 |
| Appraisal/Negotiation | 65.0 | 285.6 |
| Supervision | 77.6 | 400.0 |
| Completion | 7.6 | 61.5 |
| Total | 231.0 | 1094.4 |

Mission Data

| | <i>Date (month/year)</i> | <i>No. of persons</i> | <i>Specializations represented</i> | <i>Performance rating</i> | |
|----------------------------|---|---|--|------------------------------------|-----------------------------------|
| | | | | <i>Implementation progress</i> | <i>Development objectives</i> |
| Identification/Preparation | Identification 07/93 | 7 | Power Engineers (2), Energy Economist, Financial Analysts (2), Thermal Plant Specialist, Environmental Specialist | | |
| | Preappraisal 10/93 | 7 | Power Engineers (2), Energy Economist, Financial Analyst, Thermal Plant Specialist, Environmental Specialist, Resettlement Specialist | | |
| Appraisal/Negotiation | Appraisal 04/94 | 14 | Power Engineers (4), Energy Economist, Financial Analysts (4), Thermal Plant Specialist, Environmental Specialist (2), Resettlement Specialist, Lawyer | | |
| | Roadshow for Guarantee 11/94 | 3 | Division Chief, Financial Analyst, Lawyer | | |
| Supervision | Resettlement Supervision Mission 10/95 | 2 | Power Engineer, Resettlement Specialist | HS | HS |
| | 04/96 | 3 | Sr. Power Engineer, Financial Analyst, Consultant-Resettlement | S | HS |
| | 12/96 | 3 | Financial Analyst, Sr. Power Engineer, Consultant-Resettlement | S | HS |
| | 06/97 | 3 | Pr. Financial Analyst, Pr. Power Engineer, Consultant-Resettlement | S | HS |
| | 12/97 | 3 | Pr. Power Engineer, Pr. Financial Analyst, Consultant-Resettlement | S | HS |
| | 05/98 | 4 | Pr. Power Engineer, Power Engineer, Pr. Financial Analyst, Consultant-Resettlement | S | HS |
| | 11/98 | 3 | Pr. Power Engineer, Restructuring Specialist, Consultant-Resettlement | S | HS |
| | 09/99 | 5 | Pr. Power Engineer, Sr. Energy Specialist, Energy Specialist, Financial Management Specialist, Consultant-Resettlement | S | HS |
| | 05/00 | 9 | Pr. Power Engineer, Pr. Energy Specialist, Sr. Energy Specialist, Sr. Power Engineer, Power Engineer, Energy Specialist, Financial Management Specialist, Consultant-IT, Consultant-Resettlement | HS | HS |
| | 06/01 | 6 | Lead Power Engineer, Lead Energy Specialist, Sr. Energy Specialist, Consultants (3) | HS | HS |
| 11/01 | 3 | Lead Power Engineer, Lead Energy Specialist, Operations Officer | HS | HS | |
| 04/02 | 1 | Lead Power Engineer | HS | HS | |
| 09/02 | 2 | Sr. Operations Officer, Consultant-Resettlement | HS | HS | |

| | <i>Date (month/year)</i> | <i>No. of persons</i> | <i>Specializations represented</i> | <i>Performance rating</i> | |
|------------|----------------------------------|---------------------------|---|------------------------------------|-----------------------------------|
| | | | | <i>Implementation progress</i> | <i>Development objectives</i> |
| Completion | Stakeholder Workshop 11/02 | 7 | Lead Power Specialist, Sr. Operations Officer, Lead Power Engineer, YP, Consultants- Power, Market, Resettlement (3) | | |
| | 09/03 | 2 | Lead Power Engineer, Sr. Operations Officer | HS | HS |

Other Project Data

FOLLOW-ON OPERATIONS

| <i>Operation</i> | <i>Loan no.</i> | <i>Amount (US\$ million)</i> | <i>Board date</i> |
|--------------------------------|-----------------|----------------------------------|-------------------|
| Tongbai Pumped Storage project | 4529 | 320 | |

Annex B. Structure of the Chinese Electric Power Industry

There is no longer a ministry for energy or electricity in China at the state (national) level. The Ministry of Electric Power was dissolved in 1998 and its administrative and regulatory functions were transferred to the State Economic and Trade Commission (SETC), the State Development and Planning Commission (SDPC), and the Ministry of Finance (MOF).

A State Electricity Regulatory Commission (empowered by the State Council) was set up in 2003. It is in the process of establishing six regional and numerous provincial bureaux. Regulatory responsibilities remain divided between SERC and the National Development and Reform Commission (NDRC), whose Energy Bureau is responsible for sector policy-making, while its Pricing Bureau is still the ultimate authority on power tariffs.

The State Power Corporation, created in 1998, was wound up in 2002 as Part of the State Council mandated “big bang” in the sector. Nearly 500 power plants under its control were divided up among five generation companies.

Generation companies created from the former SPC:

- China Huadian Corporation – controls 38 GW of capacity, of which 75 percent is thermal.
- China Datang Corporation – controls 42 GW of capacity of which 12 percent is hydroelectric
- China Guodian Corporation – controls 37 GW of capacity, of which 80 percent is thermal.
- China Power Investment Corporation – controls 28 GW of capacity, of which 67 percent is thermal. It controls the former SPC- owned nuclear plants.
- China Huaneng Group – controls 32 GW of capacity (8 percent of total national capacity) – It predates the 2002 breakup of generation as it was set up in 1985 to attract foreign investment to joint-venture projects in the power sector.

There is also a large amount of generation capacity run by other “independent” companies, many of which are small in size and run on a “semi-commercial” basis.

Transmission companies created from the former SPC:

- State Grid Corporation of China – owns and controls five regional grid companies covering North, Northeast, Northwest, East and Central China. It also owns provincial power companies like SEPC and ZEPC.

China Southern Power Grid Co. – covers the remaining 5 provinces in the extreme south of China (Guangdong, Yunnan, Guizhou, Hainan and Guangxi).

Annex C. World Bank Studies of Reforms in the Chinese Electric Power Sector

“Strategic options for power sector reform in China”, Ministry of Finance/Ministry of Electric Power/World Bank, ESMAP Report No. 156/93, (1993).

“China Power Sector Reform: Towards Competition and Improved Performance”, WB Report No. 12929 (1994).

“Power Sector Regulation in a Socialist Market Economy” WB Discussion Paper No. 361, (1997).

“The private sector and power generation in China”, WB Discussion Paper No. 406, (2000).

“Fostering competition in China’s power markets”, WB Discussion paper No. 426, (2001).

“New Wave Of Power Sector Reform In China”, State Development and Planning Commission/World Bank/Energy Foundation, Workshop Report and Working Papers, (2001).

“Private participation in infrastructure in China: Issues & recommendations for the roads, water and power sectors”, WB Working paper No. 2 (2003).

“Making competition work in electricity”, Sally Hunt, Chinese language edition published by the World Bank (2004).

Annex D. Borrower's Comments



四川省电力公司

SICHUAN ELECTRIC POWER CORPORATION

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Fax Transmission Page

| | | | |
|----------------------|------------------------|-------------------------|--------------|
| To | Mr. Alain Barbu | From | Zhu Changlin |
| Fax | +1 202 522 3123 | Date | 2005/6/16 |
| Subject: | Comments on draft PPAR | Number of pages: | 2 pages |
| Organization: | OED, the World Bank | | |

Dear Mr. Alain Barbu,

We have received your draft Project Performance Assessment Report.

Upon reading the draft report, we know, generally, the principal ratings for Sichuan Power Transmission Project are basically the same as those in the ICR except the rating on institutional development impact, which is upgraded from "substantial" to "high". I concur with the consultant opinion of the Bank in upgrading of that rating.

Sichuan Power Transmission Project and Ertan Hydropower Station financed with World Bank are now playing a critical role in the present tight situation of electricity supply and demand in Sichuan.

The new management of SEPC has been making tremendous efforts in strengthening management of operations with strong support from the State Grid Corporation of China and the People's Government of Sichuan Province. The performance of SEPC has been improving steadily, which fundamentally change the then deteriorating financial situation in the late years (2001 to 2002) of the Project.

The 500 kV transmission networks in Sichuan is now stepping into a new era of speedy expansion. The 500 kV Ertan power transmission networks built under the Project is currently being reinforced.

I would like to take this opportunity to express my gratitude again to the World Bank and the Bank project team in particular for the longstanding support for the Project.

Best regards

Sincerely Yours



Zhu Changlin, General Manager

Sichuan Electric Power Corporation



Ertan Hydropower Development Company, Ltd.

98 Shuanglin Road, Chengdu, China
Postcode: 610021
Tel: 86 28 82907333
Fax: 86 28 82907711

June 20, 2005

Mr. Fernando Manibog
The World Bank
Fax: 001 202 522 3123

Dear Mr. Manibog,

We acknowledge receipt of the draft of *Project Performance Assessment Report* for Ertan Hydroelectric Project I & II and another two projects in China.

As far as Ertan Project is concerned, we think the descriptions and comments contained in the Report are true and objective. The ratings given in the Report is in line with the ICR, indicating that the latter has generally reflected the true situation of the Project. The comments and lessons discussed in the Report are not only important for the World Bank to improve its futures lending operations, but also much valuable for us to ensure a successful development of future projects on the Yalong.

As the Report has noted, EHDC has achieved a lot over the last three years in areas like power sales, financial performance and institutional development. We believe that the company has come to a track of healthy and steady development, and we are confident in its future growth.

Of course, the Report has also recorded the issues still in existence, i.e. delayed completion of the secondary resettlement and slow progress in effecting the approved power tariff. On resettlement, EHDC is well aware of the World Bank's "zero-endurance policy", and thus has always been positively working with the government authorities to bring the resettlement work to a full success. To finish the outstanding work in a fast and proper manner, we will continue to give our full support to the resettlement departments. As Mr. Mathrani was informed during his visit, the resettlement offices have already worked out a plan, and we will urge them to accelerate the process so that these people may get properly resettled sooner, gradually restoring and raising their income level.

As for the power tariff, our goal is to achieve the government-approved tariff within 2-3 years, and we have been actively working toward this goal. Based on what we have achieved, we are confident.



Ertan Hydropower Development Company, Ltd.

The involvement of the World Bank in Ertan did not only solve the financing problem, but more importantly brought in advanced management concept and mechanism, thereby making the success of Ertan not only reflected in good control of the project quality, schedule and costs, but also demonstrated by the high-standard implementation of the resettlement and environment management, and by systematic enhancement of the capacity of EHDC as an IPP. This will benefit the company on a long-term basis.

In conclusion I would like to take this opportunity to thank you for the great assistance the World Bank has given us over the years, and the persistent endeavors the Bank has made to help improve our business environment.

Yours sincerely,

A handwritten signature in black ink, appearing to be the name "Chen Yunhua" in Chinese characters.

Chen Yunhua
General Manager

cc: Mr. Alain Barbu
Manager Sector, Thematic and Global Evaluation Group
Operations Evaluation Department
The World Bank

Mr. Wu Jinkang
Director
International Department
Ministry of Finance
Fax: 010-68551125

Helen Phillip

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