

ASIAN DEVELOPMENT BANK

PCR:PRC 25023

PROJECT COMPLETION REPORT

ON THE

**TANGSHAN AND CHENGDE ENVIRONMENTAL IMPROVEMENT PROJECT
(Loan 1270-PRC)**

IN THE

PEOPLE'S REPUBLIC OF CHINA

September 2002

CURRENCY EQUIVALENTS

Currency Unit – yuan (CNY)

| | | At Appraisal (15 Oct 1993) | At Project Completion (15 June 2002) |
|---------|---|--------------------------------------|--|
| CNY1.00 | = | \$0.173 | \$0.121 |
| \$1.00 | = | CNY5.787 | CNY8.276 |

ABBREVIATIONS

| | | |
|-------|---|--|
| ADB | – | Asian Development Bank |
| CCGC | – | Chengde Coal Gas Company |
| CCGP | – | Chengde Coal Gasification Plant |
| CMG | – | Chengde municipal government |
| CISG | – | Chengde Iron and Steel Group |
| EA | – | executing agency |
| EIA | – | environmental impact assessment |
| EIRR | – | economic internal rate of return |
| FIRR | – | financial internal rate of return |
| ICB | – | international competitive bidding |
| IS | – | international shopping |
| PATCF | – | Pollution abatement at Tangshan No. 6 Ceramic Factory |
| PATPF | – | Pollution abatement at Tangshan No. 2 Porcelain Factory |
| PCO | – | Project Coordination Office |
| PIA | – | project implementation agency |
| PRC | – | People's Republic of China |
| SEIA | – | summary environmental impact assessment |
| TA | – | technical assistance |
| TCF | – | Tangshan No. 6 Ceramic Factory |
| TCGC | – | Tangshan Coal Gas Company |
| TDHS | – | Tangshan District Heating System |
| TGSD | – | Tangshan Gas Supply and Distribution |
| TMG | – | Tangshan municipal government |
| TPCCG | – | Coal gasification plants at Tangshan Porcelain and Ceramic Factories |
| TPF | – | Tangshan No. 2 Porcelain Factory |
| TWTP | – | Tangshan Wastewater Treatment Plant |
| WACC | – | weighted average cost of capital |

WEIGHTS AND MEASURES

| | | |
|-----------------|---|---------------------------|
| BOD | – | biological oxygen demand |
| COD | – | chemical oxygen demand |
| cu m | – | cubic meter |
| mg/l | – | milligram per liter |
| NO _x | – | nitrogen oxides |
| pH | – | acidity value |
| SO ₂ | – | sulfur dioxide |
| sq m | – | square meter |
| TSP | – | total suspended particles |
| KJ | – | kilojoule |

NOTE

- (i) The fiscal year (FY) of the Government and the implementation agencies ends on 31 December.
- (ii) In this report, "\$" refers to US dollars.

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BASIC DATA

A. Loan Identification

| | |
|-----------------------|---|
| 1. Country | People's Republic of China |
| 2. Loan Number | 1270-PRC |
| 3. Project Title | Tangshan and Chengde Environmental Improvement |
| 4. Borrower | People's Republic of China |
| 5. Executing Agencies | Part A: Tangshan Municipal Government Part B: Chengde Municipal Government |
| 6. Amount of Loan | \$140.0 million |
| 7. PCR Number | PCR: PRC 693 |

B. Loan Data

| | |
|-------------------------------|---|
| 1. Appraisal | |
| - Date Started | 17 Aug 1993 |
| - Date Completed | 2 Sep 1993 |
| 2. Loan Negotiations | |
| - Date Started | 25 Oct 1993 |
| - Date Completed | 27 Oct 1993 |
| 3. Date of Board Approval | 25 Nov 1993 |
| 4. Date of Loan Agreement | 22 Mar 1994 |
| 5. Date of Loan Effectiveness | |
| - In Loan Agreement | 22 Jun 1994 |
| - Actual | 9 Jun 1994 |
| - Number of Extensions | Nil |
| 6. Closing Date | |
| - In Loan Agreement | 30 Jun 1999 |
| - Actual | 29 Sep 2000 |
| - Number of Extensions | One |
| 7. Terms of Loan | |
| - Interest Rate | Pool-based variable lending rate for US dollars |
| - Maturity | 25 years |
| - Grace Period | 5 years |
| 8. Terms of Relending | |
| - Interest Rate | Pool-based variable lending rate for US dollars |
| - Maturity | 25 years |
| - Grace Period | 5 years |
| - Second-Step Borrower | Part A: Tangshan Municipal Government Part B: Chengde Municipal Government |

9. Terms of Onlending
- Interest Rate Pool-based variable lending rate for US dollars
 - Maturity 25
 - Grace Period 5
 - Third-Step Borrower Subproject 1 – Tangshan Gas Company
Subproject 2 – Tangshan Heating Power Corp.
Subproject 3 – Tangshan Ceramic Industrial
Coal Gas Company, Ltd.
Subproject 4 – Tangshan No. 2 Porcelain
Factory
Subproject 5 – Tangshan No. 6 Ceramic
Factory
Subproject 6 – Tangshan Sewage Treatment
Company
Subproject 7 – Chengde Coal Gasification
Company, Ltd.

10. Disbursements

a. Dates

| Initial Disbursement | Final Disbursement | Time Interval |
|-----------------------------|------------------------------|----------------------|
| 6 Dec 1994 | 29 Sep 2000 | 5 years, 9 months |
| Effective Date | Original Closing Date | Time Interval |
| 09 Jun 1994 | 30 Jun 1999 | 5 years |

b. Amount (\$ million)

| Category | Original Allocation | Last Revised Allocation | Amount Cancelled | Amount Disbursed |
|-------------------------|----------------------------|--------------------------------|-------------------------|-------------------------|
| Machinery and Equipment | 109.81 | 121.30 | 14.78 | 106.52 |
| Consulting Services | 1.67 | 0.95 | 0.20 | 0.75 |
| Training | 1.03 | 0.66 | 0.09 | 0.57 |
| Unallocated | 10.40 | 0 | 0 | 0 |
| IDC | 17.09 | 17.09 | 0 | 17.09 |
| Total | 140.00 | 140.0 | 15.07 | 124.93 |

IDC = interest during construction.

11. Local Costs (ADB-Financed)

- Amount (\$) 0
- Percentage of Local Costs 0
- Percentage of Total Cost 0

C. Project Data

1. Project Cost (\$ million)

| Cost | Appraisal Estimate | Actual |
|-----------------------|--------------------|---------------|
| Foreign Exchange Cost | 140.00 | 124.93 |
| Local Currency Cost | 97.00 | 166.93 |
| Total | 237.00 | 291.86 |

2. Financing Plan (\$ million)

| Cost | Appraisal Estimate | | | Actual | | |
|--------------------------|--------------------|--------------|---------------|---------------|---------------|---------------|
| | Foreign | Local | Total | Foreign | Local | Total |
| Implementation Costs | | | | | | |
| Borrower-Financed | 0.00 | 33.90 | 33.90 | 0.00 | 85.95 | 85.95 |
| ADB-Financed | 122.91 | 0.00 | 122.91 | 107.84 | 0.00 | 107.84 |
| Other External Financing | 0.00 | 54.20 | 54.20 | 0.00 | 73.97 | 73.97 |
| Total | 122.91 | 97.00 | 219.91 | 107.84 | 159.92 | 267.76 |
| IDC Costs | | | | | | |
| Borrower-Financed | 0.00 | 8.90 | 8.90 | 0.00 | 7.01 | 7.01 |
| ADB-Financed | 17.09 | 0.00 | 17.09 | 17.09 | 0.00 | 17.09 |
| Other External Financing | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Total | 140.00 | 97.00 | 237.00 | 124.93 | 166.93 | 291.86 |

ADB = Asian Development Bank, IDC = interest during construction.

3. Cost Breakdown by Project Component (\$ million)

| Component | Appraisal Estimate | | | Actual | | |
|---------------------------------|--------------------|--------------|---------------|---------------|---------------|---------------|
| | Foreign | Local | Total | Foreign | Local | Total |
| Land | 0.00 | 1.46 | 1.46 | 0.00 | 10.23 | 10.23 |
| Site Preparation | 0.00 | 0.26 | 0.26 | 0.00 | 1.32 | 1.32 |
| Engineering and Machinery | 100.20 | 44.27 | 144.47 | 106.53 | 21.64 | 128.17 |
| Civil Works | 0.10 | 11.40 | 11.50 | 0.00 | 115.54 | 115.54 |
| Engineering and Domestic Design | 0.00 | 7.49 | 7.49 | 0.00 | 9.57 | 9.57 |
| Training | 1.03 | 0.32 | 1.35 | 0.56 | 0.52 | 1.08 |
| Consultants | 1.67 | 0.00 | 1.67 | 0.75 | 1.10 | 1.85 |
| Base Cost | 103.00 | 65.20 | 168.20 | 107.84 | 159.92 | 267.76 |
| Physical Contingency | 9.51 | 6.48 | 15.99 | 0.00 | 0.00 | 0.00 |
| Subtotal | 112.51 | 71.68 | 184.19 | 107.84 | 159.92 | 267.76 |
| Price Contingency | 10.40 | 16.42 | 26.82 | 0.00 | 0.00 | 0.00 |
| IDC | 17.09 | 8.90 | 25.99 | 17.09 | 7.01 | 24.01 |
| Total | 140.00 | 97.00 | 237.00 | 124.93 | 166.93 | 291.86 |

IDC = interest during construction.

4. Project Schedule

| Milestone | Appraisal Estimate | Actual |
|--|--------------------|-----------------------|
| Date of Contract with Foreign Consultants | Jul 1993 | |
| Subproject 1 | | Apr 1994 |
| Subproject 2 | | Apr 1994 |
| Subproject 3 | | Jul 1994 |
| Subproject 4 | | Jul 1994 |
| Subproject 5 | | Apr 1994 |
| Subproject 6 | | Apr 1994 |
| Subproject 7 | | Mar 1994 |
| Completion of Detailed Engineering Designs | | |
| Subproject 1 | Sep 1995 | Jun 1996 |
| Subproject 2 | Dec 1994 | Sep 1999 |
| Subproject 3 | Apr 1996 | Dec 1995 |
| Subproject 4 | Jun 1996 | Jul 1996 |
| Subproject 5 | Jun 1996 | Dec 1996 |
| Subproject 6 | Aug 1995 | May 1994 |
| | | Dec 1998 ^a |
| Subproject 7 | Oct 1996 | Sep 1997 |
| Equipment and Supplies Dates | | |
| First Procurement | | |
| Subproject 1 | | Jul 1995 |
| Subproject 2 | | Jul 1995 |
| Subproject 3 | | Feb 1995 |
| Subproject 4 | | Feb 1995 |
| Subproject 5 | | Aug 1995 |
| Subproject 6 | | Aug 1995 |
| Subproject 7 | | Dec 1995 |
| Last Procurement | | |
| Subproject 1 | | Oct 1999 |
| Subproject 2 | | Apr 1999 |
| Subproject 3 | | Mar 1996 |
| Subproject 4 | | Mar 1997 |
| Subproject 5 | | May 2000 |
| Subproject 6 | | Jun 2000 |
| Subproject 7 | | Jul 1998 |
| Completion of Equipment Installation | | |
| Subproject 1 | Sep 1997 | Dec 1999 |
| Subproject 2 | May 1998 | Dec 2000 |
| Subproject 3 | Dec 1997 | Jun 1996 |
| Subproject 4 | Dec 1998 | Jun 1997 |
| Subproject 5 | Mar 1998 | Apr 1996 |
| Subproject 6 | Jan 1997 | Jun 1997 |
| | | Mar 2001 ^a |
| Subproject 7 | Jan 1997 | Jun 1999 |
| Completion of Tests and Commissioning | | |
| Subproject 1 | Apr 1998 | Dec 1999 |
| Subproject 2 | Aug 1998 | Dec 1997 |

^a Expansion.

| Milestone | Appraisal Estimate | Actual |
|-----------------------|--------------------|-----------------------|
| Subproject 3 | Jun 1998 | May 1996 |
| Subproject 4 | Dec 1998 | Mar 1998 |
| Subproject 5 | Sep 1998 | Jul 1996 |
| Subproject 6 | Sep 1998 | Jun 1997 |
| | | Jun 2001 ^a |
| Subproject 7 | Sep 1998 | Dec 1999 |
| Beginning of Start-Up | | |
| Subproject 1 | Jun 1998 | Oct 1996 |
| Subproject 2 | Sep 1998 | Jan 1998 |
| Subproject 3 | Jan 1998 | Jun 1996 |
| Subproject 4 | Jan 1999 | Apr 1998 |
| Subproject 5 | Oct 1998 | Jul 1996 |
| Subproject 6 | Jan 1999 | Jul 1997 |
| | | Jul 2001 ^a |
| Subproject 7 | May 1999 | Jan 2000 |

^a Expansion.

Project Performance Report Ratings: From March 2000 to September 2000, the development objective was satisfactory and implementation progress was highly satisfactory.

D. Data On Asian Development Bank Missions

| Name of Mission | Date | No. of Persons | No. of Person-Days | Specialization of Members ^a |
|--|---------------------|----------------|--------------------|--|
| Fact-Finding | 9-30 May 1993 | 11 | 231 | a,b,c,d,e |
| Appraisal | 17 Aug-02 Sep 1993 | 6 | 96 | a,d,e,f,g |
| Review 1 | 22-29 May 1995 | 1 | 7 | a |
| Review 2 | 9-14 Feb 1996 | 1 | 5 | a |
| Review 3 | 1-5 Nov 1996 | 1 | 5 | a |
| Review 4 | 2-11 Jul 1997 | 1 | 9 | a |
| Review 5 | 29 May – 5 Jun 1998 | 1 | 7 | a |
| Review 6 | 1-7 Jun 1999 | 2 | 12 | a,h |
| Review 7 | 7-14 Apr 2000 | 2 | 14 | a,h |
| Project Completion Review ^b | 8-20 May 2002 | 4 | 39 | a,b,e,i |

^a - engineer, b - financial analyst, c – environmental specialist, d – economist, e – staff consultant, f – programs officer, g – counsel, h – energy specialist, i - assistant project analyst.

^b The Mission comprised C. S. Chin, Sr. Portfolio Specialist and Mission Leader; M. Pajarillo, Energy Specialist (Financial); M. D. Kawashima, Assistant Project Analyst; and staff consultant.

I. PROJECT DESCRIPTION

1. Urban centers in the People's Republic of China (PRC) have been facing major environmental problems as a result of rapid industrialization and use of coal as the main source of energy. The use of obsolete and energy-intensive industrial processes and technology and the lack of adequate measures to mitigate environmental impacts coupled with inappropriate economic policies including low administered prices for raw materials and energy have further compounded environmental degradation. Major cities in the PRC are faced with massive environmental problems. Recognizing the seriousness of the adverse impact of environmental degradation on its population and natural habitats, and the associated costs to the economy, the Government formulated a comprehensive plan to address the serious air and water pollution problems. The Tangshan and Chengde Environmental Improvement Project formed an integral part of this plan.

2. The main objective of the Project was to address the deterioration of the environment in Tangshan and Chengde municipalities by improving the quality of air and water through the use of cleaner coal-based energy, treatment of wastewater, and energy conservation. The Project also supported the strengthening of institutional capacity for environmental management and monitoring, and the improvement of efficiency and accountability.

3. The Project as appraised consisted of two parts: part A for the six subprojects in Tangshan and part B for one subproject in Chengde. The seven subprojects comprised the following: constructing a coal gas supply and distribution network system to replace direct coal burning in homes and commercial establishments in Tangshan municipality (subproject 1); setting up district heating distribution system to heat homes and commercial establishments in Tangshan (subproject 2); constructing coal gasification plants in Tangshan No. 2 Porcelain Factory (TPF) and Tangshan Ceramic No. 6 Factory (TCF) to provide the two factories with a cleaner form of energy (subproject 3); replacing coal- and heavy oil-fired kilns with coal gas-fired kilns at TPF (subproject 4); replacing coal-fired kilns with coal gas-fired kilns at TCF (subproject 5); constructing a wastewater treatment plant to treat wastewater from the northern district of Tangshan (subproject 6); and constructing a coal gasification plant and gas distribution network to replace direct coal burning in Chengde municipality (subproject 7).

4. In November 1993, the Asian Development Bank (ADB) approved a loan of \$140 million from its ordinary capital resources for the Project. The loan carried a term of 25 years, including a grace period of 5 years, with variable interest rate determined according to ADB's variable lending rate system for US dollar loans, and an annual commitment charge. The loan proceeds were re-lent on the same terms and conditions to Tangshan municipal government (TMG), the Executing Agency (EA) for subprojects 1 to 6; and to Chengde municipal government (CMG), the EA for subproject 7. Each, in turn, lent the proceeds to the seven project implementation agencies (PIAs), on the same terms and conditions as the ADB loan, with the PIAs taking on the foreign exchange and interest variable risks.

5. All subprojects in the original project scope as envisaged at appraisal were completed either ahead of schedule or on schedule, except for the reformation of kilns in subproject 4 and the gas distribution network in subproject 7.¹ The original loan closing date was extended by 12 months to accommodate the construction of an additional wastewater treatment plant using loan savings. A total of \$124.9 million in loan funds was disbursed and \$15.1 million was canceled. The PIAs started loan repayment in 1999 and have repaid the principal of \$8.94 million.

¹ However, the reformation of the five coal-fired kilns in subproject 4 is still ongoing and the reformation of the seven heavy oil-fired kilns has yet to begin and can only be completed by end-2003.

II. EVALUATION OF DESIGN AND IMPLEMENTATION

A. Relevance of Design and Formulation

6. Recognizing that increasing environmental problems are constraining sustainable economic growth and development, and with the heavy emphasis on sustainable economic development, the Government has been increasing investments in environmental improvements. This action is in line with ADB's strategy for the PRC, which aims to achieve three strategic objectives: improving economic efficiency, reducing poverty, and improving the environment and conserving natural resources. The Project supports ADB's strategy for the PRC and is an integral part of the Government's national program for urban environmental improvement. The Project was formulated with technical assistance (TA)² and was designed to reduce air and water pollution—which have reached severe levels—in Tangshan and Chengde municipalities. ADB's country strategies for economic growth and environmental protection were achieved by financing direct investment in the supply and distribution of a cleaner form of coal-based energy, conserving energy through industrial renovation, and strengthening the policy and regulatory framework, including capacity building for provincial environmental protection agencies.

7. The project design was generally sound and the formulation process was considered adequate. Stakeholders were consulted through the normal government process and the project scope was determined through consultations with local and central governments, project enterprises, and various interested groups. The selected subprojects were major polluters in their respective municipalities, which were experiencing severe urban pollution. The TA confirmed that environmental improvement by reducing direct coal burning by using coal gas, district heating based on combined heat and power systems, removing dust in industrial furnaces and boilers, developing centralized wastewater treatment facilities, and closing down polluting enterprises for which mitigation measures were not practical or not viable were cost-effective and financially sustainable. The major events in project implementation are listed in Appendix 1.

B. Project Outputs

1. Subproject 1 – Tangshan Gas Supply and Distribution Network (TGSD)

8. TGSD aimed to provide piped coal gas to households in Tangshan so as to encourage households to switch from open coal burning to cleaner energy for cooking and heating. TGSD as appraised comprised (i) installing 23.8 kilometers (km) of medium-pressure and 36.3 km low-pressure pipeline network; (ii) providing two 50,000 cubic meter per day (cu m/day) gasholders, gas compression, and booster station; (iii) constructing two gas purification plants; (iv) a control and monitoring system; and (v) staff training and consulting services. TGSD was implemented as appraised except that one gas purification plant and one gasholder were not built as coal gas supplied by Tangshan Iron and Steel Plant is already purified. Instead, a waste gas and liquefied petroleum gas blending station was constructed to supplement the gas supply so as to meet the increasing demand for coal gas. About 24 km of medium-pressure and 38 km of low-pressure pipeline network were laid. The coal gas supply increased by 315,000 cu m/day to 670,000 cu m/day serving an additional 70,000 households in Tangshan. Currently, the supply can no longer meet the demand and Tangshan Gas Company, the PIA for TGSD, is exploring the possibility of tapping natural gas from the main gas supply line to Tianjin. TGSD helped to

² ADB. 1992. Technical Assistance to the People's Republic of China for the *Tangshan and Chengde Environmental Improvement Project*. Manila.

transform Tangshan into one of the leading cities in the PRC with the most extensive gas and heating pipeline network and to eliminate open coal burning, thereby improving air quality in the municipality.

2. Subproject 2 – Tangshan District Heating System (TDHS)

9. TDHS aimed to provide piped hot water to households and commercial establishments in Tangshan to encourage the switch from open coal burning to district heating. TDHS included (i) electric equipment and heat exchangers, (ii) instrumentation and control, (iii) computer-based heat supply, (iv) control and monitoring system, (v) water treatment facilities, (vi) installing a 29.5 km pipeline network system, and (vii) staff training and consulting services. TDHS was implemented as planned except that the actual pipeline network laid was 33.5 km, thus providing a potentially larger heating area. However, the actual heating area is only about 50% of the appraisal estimate of 8.5 million square meters (sq m) because the delayed commissioning of the second phase of an independent cogeneration plant (Xijiao Cogeneration Plant) which was supposed to provide the bulk of heating source resulted in inadequate heat supply. Hence, TDHS partially succeeded in providing centralized heating, but has eliminated small and medium-size boilers and households stoves and has effectively contributed to improved air quality in the municipality as the area not yet connected to the district heating network is using bottled liquefied petroleum gas for heating.

3. Subproject 3 – Coal Gasification Plants at Tangshan Porcelain and Ceramic Factories (TPCCG)

10. TPCCG was to provide coal gas for firing porcelain and ceramic wares in place of the more polluting heavy oil and coal. TPCCG envisaged (i) two coal preparation plants, (ii) two coal gasification plants, (iii) wastewater treatment facilities, (iv) a pipeline network system, and (v) staff training and consulting services. About half of the envisaged facilities were built (only those located in TCF) as TPF was able to secure its coal gas requirement from the city gas distribution network. The facilities built were able to meet the full coal gas requirement of TCF. Although only one gasification plant was constructed, both factories are using coal gas, thus contributing to reduced air pollution in Tangshan.

4. Subproject 4 – Pollution Abatement at Tangshan No. 2 Porcelain Factory (PATPF)

11. PATPF aimed to replace or convert less efficient kilns with more energy-efficient kilns using coal gas as heating source. PATPF comprised (i) replacing all five coal-fired kilns with seven new gas-fired kilns and providing two gas-fired roller kilns, (ii) converting seven heavy oil-fired kilns to gas-fired kilns, (iii) equipment and machinery, (iv) instrumentation, and (v) staff training and consulting services. At completion, two new gas-fired kilns were constructed, but replacing the coal-fired kilns is still ongoing and converting oil-fired kilns to gas-fired kilns has yet to begin. The new kilns only recently achieved the required performance for producing high-quality porcelain wares after they were further modified by the PIA concerned. While the quality of porcelain wares and air quality have improved, the financial health of TPF has not improved.

5. Subproject 5 – Pollution Abatement at Tangshan No. 6 Ceramic Factory (PATCF)

12. PATCF aimed to replace inefficient kilns with or convert them to more efficient kilns using coal gas as heating source. PATCF included (i) replacing the three coal-fired kilns with two 100-meter gas-fired tunnel kilns, (ii) equipment and machinery, (iii) instrumentation and

control, and (iv) staff training and consulting services. PATCF was carried out as planned. However, the new moulding equipment could not be operated due to the sudden bankruptcy of the equipment supplier and lack of knowledge and skills to operate the new equipment. Nonuse of the equipment has adversely affected the financial health of TCF although the subproject has contributed in improving air quality in Tangshan.

6. Subproject 6 – Tangshan Wastewater Treatment Plant (TWTP)

13. The objective of TWTP was to treat wastewater collected from the eastern district of Tangshan so as to reduce the pollution load in the Dou River. TWTP comprised (i) a secondary wastewater plant to treat 150,000 cu m/day; (ii) a lift pump station with a capacity of 50,000 cu m/day, (iii) about 5 km pipeline network system, and (iv) staff training and consulting services. TWTP was implemented as planned with an expanded scope. ADB approved the EA's request to double the treatment plant capacity to accommodate wastewater from the northern district. TWTP enables Tangshan to treat about 60% of the total wastewater generated in the area. This plant and two other existing plants in the city were able to treat about 66% of the wastewater generated, putting Tangshan in the forefront in wastewater treatment in the PRC.

7. Subproject 7 – Chengde Coal Gasification Plant (CCGP)

14. CCGP aimed to provide coal gas to households, commercial establishments, and industrial users in Chengde to encourage them to switch from coal burning to a cleaner form of energy for cooking and heating. CCGP included (i) a coal preparation plant, (ii) coke and gas-making plants including a gas purification plant with a daily coal gas production of about 729,000 cu m/day, (iii) a wastewater treatment plant and other auxiliary plants and facilities, (iv) gas distribution network and storage facilities, and (v) staff training and consulting services. CCGP was implemented as appraised. Two coke and gas-making plants and two 50,000 cu m and one 100,000 cu m gasholders were constructed. In addition, one mixing station was built to recover waste gas from the nearby blast furnace of Chengde Iron and Steel plant for the use of its subsidiary industrial users, as the number of household users was much lower than projected while the change in consumer mix has not contributed much to improving air quality in the Chengde city area, the air quality in the Luanhe area, where most of the industrial users are, has improved. In spite of the improvement contributed by the Project, Chengde air pollution indices did not show reduction due to an increase in air pollution arising from the substantial increase in the population, vehicles, and tourists.

C. Project Costs

15. At appraisal, the total cost including contingencies and interest and other charges during construction was estimated at \$237.00 million equivalent, including a foreign exchange component of \$140.00 million representing 59% of the project cost. At completion, the actual project cost was \$291.86 million equivalent comprising of \$124.93 million in foreign exchange and \$166.93 million equivalent in local currency cost, resulting in a cost overrun of \$54.86 million, or 23% more than the appraisal estimate. The breakdown of the appraisal estimate and actual project costs is shown in Appendix 2. The overrun was all in the local currency cost (\$69.92 million) and was due to the expanded project scope for subprojects 1, 6, and 7. However, the actual foreign cost was lower than the appraisal estimate by \$15.1 million because the cost of imported equipment was lower due to strong international competitive bidding.

16. The actual cost of subproject 1 was \$16.03 million, 45% higher than the appraisal estimate of \$11.0 million due to the inclusion of a blending station and a more extensive pipeline

network system to serve a larger number of households. The actual cost of subproject 2—\$40.15 million—was lower than the appraisal estimate by 29% because of the lower-than-expected cost of equipment brought about by strong competitive bidding. The actual cost of subproject 3—\$3.55 million—was 65% lower than the appraisal estimate because the project scope was reduced when it was realized that coal gas supplied from the city is available to TPF. The actual cost of \$17.98 million for subproject 4 was lower than the appraisal estimate by 14% because of lower equipment cost. The actual cost of subproject 5—\$19.08 million—was higher than the appraisal estimate by 59% because of higher moulding equipment cost brought about by limited competition among few suppliers. Subproject 6 was completed at a total cost of \$47.56 million, 64% higher than the appraisal estimate of \$29.00 million. Doubling the treatment capacity from 150,000 to 300,000 cu m/day led to the higher cost. In fact, the capital cost per ton capacity is lower than the appraisal estimate. Subproject 7 was completed at \$147.50 million, 66% higher than the appraisal estimate. The cost was higher because one waste gas recovery station was added and the pipeline network became longer because of rerouting to bypass a road tunnel for safety reasons.

17. The financing plan envisaged at appraisal included a \$140.0 million loan from ADB to finance the entire foreign currency cost representing 59% of the Project. The local currency cost of \$97.0 million equivalent was to be met by domestic loans of \$54.20 million equivalent, and equity contribution and internal cash generation from the respective PIAs, including advance payment of user fee by users. The actual funding came from the ADB loan of \$124.93 million representing 43% of the total project cost, \$73.97 million equivalent from domestic borrowing and \$92.96 million equivalent from equity contribution from the PIAs. Additional borrowing from domestic banks and additional investments from the PIAs financed the cost overrun in local currency. A summary of the proposed financing plan and the actual funding source is in Appendix 3.

D. Disbursements

18. The loan proceeds were disbursed in accordance with ADB's *Loan Disbursement Handbook*. Disbursements were made mainly through letters of credit and direct payment procedures. The first disbursement was made to subproject 1 in December 1994, 6 months after the loan became effective. The loan was closed on 29 September 2000, 15 months later than expected. The total loan amount disbursed amounted to \$124.93 million and the remaining unutilized amount of \$15.1 million was canceled. Overall utilization of the ADB loan was therefore about 89%. Contract awards and disbursements closely matched the appraisal projections for the first 2 years, but lagged in the third and fifth years because of delayed implementation of the expanded project scope for subproject 6 and slow implementation of the gas pipeline network in subproject 7 (Appendix 4). No imprest fund was considered necessary during appraisal.

E. Project Schedule

19. The loan was approved on 25 November 1993 and became effective on 9 June 1994. Considering that the Project consisted of seven subprojects located in two municipalities and there were two project agreements, two subsidiary loan agreements for relending, and seven subsidiary loan agreements for onlending, the total days of 196 from loan approval to loan effectiveness is considered a good achievement. Due to delayed implementation of the expanded wastewater treatment plant, the loan closing date of 30 June 1999 was extended to 30 June 2000 and was eventually closed on 29 September 2000 after the final disbursement was made. The actual and projected implementation schedules are in Appendix 5. The seven

subprojects including the additional expanded project scope were completed with two ahead of schedule and five with delays of 6-10 months.

20. Subproject 1 started in July 1995 and was basically completed by end-1997. However pipe laying for additional residential areas continued up to end-1999. The new pipeline was put into operation in stages whenever a section of the network was completed. Subproject 2 began in July 1994 and the original project scope was completed in December 1997. However, the pipeline network for additional areas continued up to end-2000. Part of the network was used to supply heat during the winter of 1997. Subproject 3 began in April 1995 and was completed in June 1996. Subproject 4 started in October 1994 and was basically completed in May 1996 but was only used starting April 1997 after defects noted during commissioning were rectified.³ Subproject 5 started in April 1995. The two new kilns were completed in May 1996 and have been operating since then. However, the other new production line for ceramic sanitary wares was completed only toward the end of 1999 but remains inoperable, because the sudden bankruptcy of the manufacturer of the moulding equipment hampered the installation and commissioning process. All attempts to operate the new moulding equipment and other production line failed as the PIA staff lacked experience and knowledge of operation. The new production process remains inoperable, resulting in heavy losses to the PIA. Subproject 6 started in May 1994 and was completed in July 1997. The trial run of the new treatment plant was successfully concluded in June 1997 and the plant has been in commercial operation since then, treating about 90,000 cu m of wastewater daily on the average. Since there were substantial loan savings and there were no facilities for treating wastewater from the northern district, ADB approved in November 1997 TMG's request to expand the treatment facilities to accommodate wastewater from the northern district. However, construction for the expanded facilities started only in June 1998 due to the delay in securing the State Development and Planning Commission's formal approval to begin work. The expanded facilities were completed in end-2000, resulting in the need to extend the loan by 12 months. The expanded facilities have been in operation since early 2001, treating an average 80,000 cu m wastewater daily from the northern district. Subproject 7 started in April 1996 and was completed in June 1999. It has been producing coal gas of about 729,000 cu m/day since January 2000.

F. Implementation Arrangements

21. As envisaged at appraisal, TMG through its ADB project coordination office (PCO) under the direct supervision of the first standing vice mayor was the EA for subprojects 1 to 6, while CMG was the EA for subproject 7. The deputy project director of TMG PCO, who is concurrently the director of Tangshan Environmental Protection Bureau, provided overall supervision and coordination in implementing subprojects 1 to 6, while CMG delegated the supervision and coordination in implementing subproject 7 to Chengde Iron and Steel Group (CISG). A leading group, headed by the general manager of CISG and directly supervised by the first standing vice mayor of Chengde, was established to supervise and coordinate subproject 7. The individual enterprises were the PIAs: Tangshan Gas Company (TGC) was the PIA for subproject 1, Tangshan Heat and Power Company (THPC) for subproject 2, TPF for subproject 4, TCF for subproject 5, Tangshan Wastewater Treatment Company (TWTC) for subproject 6, and Chengde Coal Gas Company (CCGC) for subproject 7. Implementation was as envisaged. However, except for subproject 3, with TCF as PIA, it was no longer practical to establish a separate coal gas company to serve only TCF as the other proposed gas plant was deleted (para. 10). Each PIA was headed by the general manager and staffed with well-qualified

³ The reformation of existing kilns, however, is still ongoing and is expected to be completed only by end-2003. Because of persistent problems associated with the new kilns and subsequent poor performance of Tangshan No. 2 Porcelain Factory (TPF), the reformation of the existing kilns was deferred to 2001.

personnel to implement the project as envisaged at appraisal. The current organization setup of the PIAs is shown in Appendix 6. These arrangements proved very effective as the Project was implemented effectively and technical problems encountered were promptly resolved. However, TCF is still unable to resolve problems associated with the new moulding equipment, while due to lack of experience with new and sophisticated technology, TPF took more than two years to solve the problems on the new kilns.

G. Conditions and Covenants

22. Overall, the loan covenants have been complied with, except for the financial covenants on tariff, debt service, and debt-to-equity ratio (Appendix 7). In addition, TCF and TPF are still receiving indirect government subsidies to cover their heavy losses. The inability of the PIAs to comply with the financial covenants is due partly to the failure to obtain from the price regulatory board higher tariffs for gas, and district heating and sewage charges adequate for full cost recovery; and partly to high operating costs brought about by overstaffing, inability to adopt modern management techniques, and lower-than-anticipated demand for services and products offered by the Project. The Government has been advised of the urgent need to raise the tariffs for gas, and district heating and sewerage charges and to explore better and cost-effective alternatives to target subsidies to the poor. The project progress reports and annual audited financial reports were submitted as required and on time, but they include only the balance sheets for the ADB-funded projects. The annual reports on the benefit monitoring and evaluation system and annual statement of collected levies were not regularly submitted and often were late.

23. The financial covenants were designed to ensure adequate income generation by the PIAs to service the ADB loan and the domestic debts, enhance the sustainability of their operation, and provide adequate funds for future development. The failure of the PIAs to obtain approval from the price regulatory board for sufficient tariff to achieve full cost recovery has resulted in their poor financial health. The enterprises reason that the generally low tariff for gas, heating and sewage charges are to attract and encourage potential users to switch to a cleaner form of energy, and to serve the public good in general. These, however, are done at the expense of the overall financial health of the enterprises. Past missions had urged the Government, through policy dialogues, to provide reasonable tariffs and to consider other forms of more direct assistance to the poor who cannot afford the higher tariff. The right tariff will send the proper signal to the public to conserve energy and water resources.

24. With the scope of subproject 3 reduced to include only the coal gasification plant at the TCF site, which produces gas solely for its use, it was considered impractical to establish the Tangshan Ceramic Industrial Coal Gas Company (TCGC). ADB agreed to TMG's request that the newly established TCGC be dissolved and that subproject 3 be implemented by TCF.

H. Related Technical Assistance

25. ADB approved a project preparatory TA grant to review and ascertain the technical, financial, and economic feasibility of the Project. This TA confirmed that the project scope and selection of subprojects were appropriate and the Project was cost-effective and financially sound. While coal gas is inferior to natural gas in terms of pollution, it was the preferred option then as natural gas was not available near the project sites nor was there a plan to pipe in more costly natural gas from the western region. An advisory TA grant⁴ for strengthening the

⁴ ADB. 1993. Technical Assistance to the People's Republic of China for *the Institutional Strengthening of Environmental Protection Bureau in Tangshan and Chengde Municipalities*. Manila.

environmental protection bureaus in Tangshan and Chengde municipalities was also approved prior to loan approval. The TA assisted the two bureaus in implementing environmental policies and regulations cost-effectively and in formulating sustainable measures to improve environmental conditions in the two municipalities. In conclusion, both the project preparatory and advisory TAs were rated as successful.

I. Consultant Recruitment and Procurement

26. Using its own funds, each PIA engaged one or two domestic design institutes, in accordance with procurement procedures acceptable to ADB, to assist in preparing preliminary and detailed design and feasibility studies. Each PIA also engaged at its own expense, the services of domestic consultants to assist in project supervision and commissioning. In addition, ADB approved advance action for recruiting international consultants to review and ascertain the adequacy of design. Accordingly, each PIA engaged international consultants in accordance with ADB's *Guidelines on the Use of Consultants* to review the technical design and documents prior to bidding. The earlier review of the design and technical specification helped ensure the timely procurement of equipment and early completion of most of the project facilities. No international consultant was engaged for in-site project supervision as the PIAs were able and confident to use their own in-house expertise to assist in supervision. Where weaknesses in supervision particularly on technical matters were detected, the PIAs decided to engage domestic consulting firm to assist in supervision. This resulted in substantial savings under loan category for consulting services. For procurements using international competitive bidding (ICB) and international shopping (IS) procedures, domestic procurement agencies were engaged to draft bidding documents and assist in bid evaluation and contract management. The services of the various consultants and design institutes were considered satisfactory. The arrangement of using a procurement agency to assist in procurements proved to be wise as the PIAs, with limited understanding of the English language, were unfamiliar with overseas procurements and ADB procedures. All PIAs were satisfied with the procurement agencies except for one agency that was unable to provide adequate safeguards and institute effective remedies to the problems associated with the sudden bankruptcy of the manufacturer of the moulding equipment for TCF. In addition, the same procurement agency recommended to TPF the award of a prototype biscuit kiln that had not been commercially tried. The recommended kiln underperformed and could not operate in accordance with the design specifications. TPF had to engage, at its own expense, a domestic expert to rectify the deficiencies before the kilns could function normally.

27. All equipment was procured in accordance with ADB's *Guidelines for Procurement*. Equipment with contract value above \$500,000 each was procured following ICB procedures; those with contract value below \$500,000 each was procured using IS procedures. However, ADB approved direct purchase for procuring technical service and resin mould for subproject 5 after ADB was notified that the firm selected was the only one with expertise in operating similar moulding equipment after the bankrupt manufacturer. ADB also approved the direct purchase of a construction crane, which was urgently needed for implementing subproject 6; and the process license for coal gasification in subproject 7, after it was ascertained that the licensed process technology is appropriate. While some PIAs considered ADB guidelines to be cumbersome, all agreed that the guidelines ensured procurement of the most suitable equipment at the most competitive price and accounted for the substantive savings in foreign costs for equipment procured using loan funds. The details of the procurement packages financed by ADB and the mode of procurement are given in Appendix 8.

J. Performance of Consultants, Contractors, and Suppliers

28. The domestic design institutes were able to provide appropriate preliminary design on time, and their feasibility studies were reasonably good. All PIAs were satisfied with their services. Domestic consultants recruited for project supervision and the procurement agencies engaged were likewise generally satisfactory, except for one procurement agency. This procurement agency failed to institute or recommend necessary safeguards such as a higher performance bond and larger retention fees during contract negotiations to protect the interest of the PIAs when selecting a prototype kiln where performance could not be ascertained and when the moulding equipment was delivered in advance of actual installation. This procurement agency did not take an active part in exploring remedial measures after the bankruptcy of the moulding equipment supplier, nor after noting the underperformance of the new kiln. On hindsight, this agency should have utilized its overseas office in Germany to investigate diligently the financial health of the supplier before contract award to ensure that the moulding equipment that was delivered earlier than required would be installed when required. The international consultants were able to provide the much-needed review on technical design and bidding documents. In addition, some training sessions were organized with their assistance. All PIAs were satisfied with their services.

29. The civil work contractors and the equipment installation contractors engaged were competent and completed all assignments in a satisfactory manner and with good quality except for the pipe-laying contractor in subproject 7. The pipeline was not properly secured and the uneven settlement of the underground pipe resulted in pipe leakages. Consequently, some sections had to be excavated to check on leaks and carry out repair. This partly accounts for the late supply of gas to Chengde. Equipment suppliers also generally complied with their contractual terms, except for the suppliers of the moulding equipment and the biscuit kiln. The moulding equipment manufacturer went bankrupt before the equipment could be installed. It was necessary to engage domestic experts to help in installation, but despite numerous attempts including the engagement of foreign experts, the equipment could not be used and caused heavy losses to TCF. Despite numerous attempts, the biscuit kiln supplier was unable to rectify the problems encountered in operating the kilns. TPF had to engage domestic experts to rectify the problems at its own expense. Before their turnover, all completed facilities underwent performance tests conducted by independent experts. Most facilities either met or exceeded the design requirements.

K. Performance of the Borrower and the Executing Agency

30. The Borrower executed the loan and project agreements in about 4 months and completed all requirements for loan effectiveness within the normally allowed 90 days from loan signing. Project implementation started promptly after the loan became effective. Implementation was generally in line with arrangements envisaged at appraisal. To ensure smooth project implementation and to avoid payment of import taxes, TMG invited the relevant government authorities including custom authorities to brief them on proper procedures for importation and customs clearance after the Government decided to remove the tax exemption for ADB-financed goods effective 1 January 1997. Procurements were accelerated to ensure all imported equipment would be delivered before the deadline for imposition of the import tax. Thus, some equipment was delivered ahead of schedule and even before the site was ready for its installation. This situation has not allowed the inclusion of adequate safeguards in the procurement process that would have prevented the nonoperation of the moulding equipment in subproject 5. On hindsight, the contract should have provisions for a higher performance bond or retention sum to protect the owner against poor or incomplete performance of the contractor. TMG and CMG paid special attention throughout project implementation to ensure early

completion of all activities by the respective PIAs. The vice mayor actively participated by closely monitoring work progress and assisted in resolving problems. The training provided under the Project enabled the assisted enterprises to operate and maintain the project facilities in a systematic manner. The performance of the Borrower and that of the two EAs were highly satisfactory.

L. Performance of ADB

31. ADB regularly fielded missions to review progress and to assist in resolving procurement and implementation problems. All procurement matters referred to ADB were promptly cleared. ADB took an active part in assisting TCF to find solutions to the non-performing moulding equipment, although with little success. Both TMG and CMG and all the PIAs highly appreciated the advice and assistance of the review missions. When there was substantive loan savings in subproject 6, and realizing that increasing the wastewater treatment capacity would further improve the water quality and environment in the Dou River in the city section, ADB promptly approved TMG's proposal to double the capacity through a major change in project scope. ADB also supported measures including minor revisions in the project scope to maximize and enhance the project benefits. In addition, ADB granted an extension of the loan closing date by 12 months to accommodate the construction of the expanded wastewater treatment plant. Although there were two changes in the designated project officer and transfer of the project from one division to another, ADB and the government officials maintained effective communication and good coordination. Overall ADB's performance can be considered highly satisfactory.

III. EVALUATION OF PERFORMANCE

A. Relevance

32. The Project was consistent with the Government's priorities in sustainable economic development and was an integral part of the national plan for urban environmental improvement. Likewise, the project was in line with ADB's operational priorities for the country then and continues to remain relevant under the current priorities. The Project was assessed to be highly relevant.

B. Efficacy in Achievement of Purpose

33. The performance of the Project confirms that it has achieved its objectives to (i) reduce air and water pollution in Tangshan and Chengde municipalities, (ii) address environment-related policy issues in the industry sector of the two municipalities, (iii) promote energy conservation and the use of cleaner energy sources, and (iv) strengthen managerial and technical skills in the entities concerned and establish accountability. On the other hand, the objective to demonstrate that investments for environmental improvement can be financially viable has not been fully achieved. The Project was rated as efficacious.

1. Gas Supply and Distribution

34. The objective of reducing air pollution in Tangshan and Chengde through the use of a cleaner and more energy-efficient form of energy has been achieved, as direct open coal burning has largely been eliminated. The coal gas supply to Tangshan has increased by 315,000 cu m/day to 670,000 cu m/day, serving an additional 70,000 households. Piped gas is now available to about 90% of the city population, which makes Tangshan one of the municipalities with the highest concentration of piped-gas users in the PRC. The gas supply in

Chengde has increased by 470,000 cu m/day, serving 10 industrial users and 1,600 households. The use of coal gas in industries has improved the quality of air in the Luanhe area. Although the main aim of supplying coal gas to over 80% of domestic users did not materialize, as the city population preferred to continue using bottled liquefied petroleum gas (LPG), air pollution in the city area has been effectively controlled through the banning of open coal burning and increased use of bottled LPG. The two targeted ceramic and porcelain factories are using coal gas for firing kilns but TPF still has not completed the conversion of all old kilns to coal gas. Nevertheless, air pollution in TPF was effectively controlled with the installation of bag filters and suspension of the operation of some old kilns.

2. District Heating

35. The objective of replacing direct coal burning by heat produced from combined heat and power plants has been partly achieved. While the district heating network exceeded the appraisal estimate, the actual heating area is only 4.5 million sq m, which is about 50% of the target because of the inadequate heat supply from the cogeneration plant. In areas not provided with district heating, citizens are observed to be using coal gas for heating, thus effectively contributing to the improvement in air quality in the urban areas (Appendix 9).

3. Reformation of Kilns

36. The objective of reforming kilns by using environment-friendly technologies, conserving energy, and improving the efficiency of plant operations has been partly met. While new coal gas-fired kilns were constructed in the two target ceramic and porcelain factories, the new kilns in TPF could not perform as designed until recent modifications. The result, however, is a lower production capacity for high-grade porcelain wares. Because the new moulding equipment could not be used, TCF has incurred heavy financial losses. The conversion of coal-fired kilns to gas-fired kilns is still ongoing, and the conversion of heavy oil-fired kilns to gas-fired kilns in TPF has not yet started.

4. Wastewater Treatment

37. The objective of reducing the contamination of water resources by providing wastewater treatment facilities has been achieved. The completed wastewater facilities in Tangshan can treat 300,000 cu m of wastewater daily, twice the volume envisaged at appraisal. The percentage of wastewater treated is about 60% of the municipal wastewater, making Tangshan one of the cities with the highest treatment ratio. As a result, the water quality in the Dou River has improved to class IV⁵ (Appendix 10), aquatic life has returned, and recreation activities along the riverbanks have resumed.

C. Efficiency in Achievement of Outputs and Purpose

1. Financial Performance

38. The financial performance of the seven subprojects under the loan has been less than satisfactory. The reevaluated financial internal rate of return (FIRR) of all the seven subprojects is lower than what was envisaged at appraisal primarily because of the combined effect of lower

⁵ Class IV standard is one of the five classes. Class I, the highest standard, is for natural reserved and water supply sources with limited treatment. Class II and III designate water for fishing and recreation and may be used as water supply sources with full treatment. Class IV is water suitable for industrial uses and noncontact, recreational uses. Class V denotes water for agricultural purposes and scenic viewing.

tariffs and selling prices, lower production output, and higher raw material costs. Tariffs charged by the utility companies are not adequate for full cost recovery and debt servicing requirements. The selling prices of the output of the ceramic and porcelain plants are kept low due to stiff market competition. Actual production volumes are also lower than designed due to the technical problems encountered, which were resolved only recently in the case of subproject 4 and have remained unresolved in the case of subproject 5. On the other hand, the cost of raw material inputs, notably coal, has substantially increased from the level assumed at appraisal. As a result, the profitability of the project enterprises has been marginal or negative. The financial projections for the next 10 years likewise show that their income level will not be adequate to cover the debt service requirement and the enterprises have to rely continuously on government support to honor their repayment obligations. The six enterprises have been implementing measures to reduce their operating costs, including reducing staff and company overhead to the minimum. However, these are not sufficient to financially turn the company around. A substantial increase in the tariffs, improvement in the selling prices of the output, higher capacity utilization, and reduction in the cost of production inputs are necessary. The financial performance of the project enterprises is shown in Appendix 11.

39. The FIRR was reevaluated for the individual subprojects. Calculations were made on the basis of the actual financial performance up to 2001 and the financial projections made by the enterprises, with some adjustments to reflect more realistic assumptions. Capital costs were based on the actual expenditures incurred. Incremental revenues were based on sales of products and services associated with investments for the project and were assumed to increase as full capacity utilization is achieved in the later years of commercial operation. The level of actual operating and maintenance costs was maintained, with some adjustments to reflect increased production capacity. Revenues and expenses were maintained in year 2001 prices. The recalculated FIRRs of the seven subprojects compared with the estimates at appraisal are shown in Table 1. The weighted average costs of capital (WACC) at appraisal and at the time of the PCR are also shown. Detailed calculations are in Appendix 12. The FIRRs are higher than the WACC except for subprojects 3 and 5, and 4. On the whole, the revised FIRR of the Project remains above the WACC.

Table 1: The FIRRs and WACCs at Appraisal and at the PCR

| Subproject | FIRR at Appraisal (%) | FIRR at PCR (%) | WACC at Appraisal (%) | WACC at PCR (%) |
|---------------|-----------------------|-----------------|-----------------------|-----------------|
| 1 | 12.1 | 9.8 | 5.1 | 5.6 |
| 2 | 10.8 | 5.9 | 5.3 | 5.0 |
| 3 and 5 | 10.8 | 3.0 | 5.6 | 4.4 |
| 4 | 8.3 | 4.2 | 5.6 | 5.3 |
| 6 | 11.8 | 7.0 | 5.3 | 5.2 |
| 7 | 10.6 | 7.6 | 5.3 | 5.8 |
| Whole Project | - | 7.1 | | |

FIRR = financial internal rate of return, PCR = project completion report, WACC = weighted average cost of capital.

2. Economic Performance

40. The economic performance of the individual subprojects was reevaluated following the methodology used in the appraisal, but with the addition of the environmental benefits, which were already identified but were not quantified at that time. Incremental costs and benefits were determined for each subproject based on the results of comparing “with” and “without” the project scenarios to determine the net benefit stream. The economic life of the subprojects, assumed at appraisal to be 20 years, was maintained. The residual value was assumed to be

zero at the end of economic life. All costs and benefits were expressed in year 2001 constant prices. The financial costs of nontradable items were converted to their economic values using conversion factors⁶ used for projects in the PRC. Imported equipment was valued at its international price while the value for local equipment was converted into economic border prices by applying the appropriate conversion factor. Other tradable items were valued at their free-on-board price. Taxes, import duties, and all financial charges, including interest during construction, were excluded. For all subprojects 1, 2 and 7, the economic benefits were valued in terms of (i) coal savings resulting from reduced energy consumption and lesser coal utilization, (ii) reduction in transportation cost by avoiding long distance and in-city transport and handling charges, and (iii) local environmental benefits from avoided air emissions due to non burning of coal. In addition to these, the benefits from enhanced product quality and increased production output were included for subproject 3 and 5, and 4. For subproject 6 where no EIRR was calculated at appraisal due to the difficulty in quantifying the economic benefits, the EIRR was determined following the methodology adopted in the proposed Wuhan wastewater project where the benefits were estimated in terms of (i) increase in the value of residential property, or the increase in housing price due to environmental quality improvement in the related area; and (ii) cost savings due to the economies of scale of the wastewater treatment plant. In the absence of a specific survey of the relative values of the residential properties in Tangshan, the property values in Wuhan were used but adjusted by the local average income per capita. For the local environmental benefits, reduction in sulfur dioxide (SO₂), total suspended particulates (TSP) and nitrogen oxide (NO_x) emissions due to non burning of coal was considered.

41. The recalculated EIRRs of the subprojects compared with those at appraisal are in Table 2. Detailed calculations are in Appendix 13.

Table 2: The EIRRs at Appraisal and at the PCR

| Subproject | EIRR at Appraisal (%) | EIRR at PCR (%) |
|---------------|--------------------------|--------------------|
| 1 | 18.6 | 14.4 |
| 2 | 12.3 | 14.1 |
| 3 and 5 | 16.1 | 5.0 |
| 4 | 14.8 | 10.7 |
| 6 | – | 14.1 |
| 7 | 14.0 | 10.1 |
| Whole Project | – | 11.9 |

EIRR = economic internal rate of return, PCR = project completion report.

The lower EIRRs are due to the higher capital costs, lower benefits, and higher operating costs than anticipated at appraisal.

D. Preliminary Assessment of Sustainability

42. In line with deepening the market economy and PRC's entry into the World Trade Organization, all the PIAs were granted the status of autonomous legal entities responsible for their own profits and losses. The PIAs have been restructured into state-owned limited-liability companies concentrating on commercializing their core activities and adopting modern management in their operations. With the increasing attention to measures to improve the

⁶ The conversion factors used in this evaluation are 1.1 for civil works, 1.1 for local machinery, and 0.93 for others.

environmental and the Government's determination to use economic incentives to promote sound environmental policies, further tariff reforms are expected shortly and the financial health of the utility entities are expected to improve with increased users and higher tariff. The Project as formulated does not face any risks. Since gas, heat, and wastewater treatment are essential services for the public good—except for the two ceramic and porcelain factories—the entities continued operation is assured. TPF sustainability is assured, now that it is producing high-grade porcelain wares, which are in great demand, and it has recaptured the market lost when the new kilns were unable to produce consistent high-grade wares. The sustainability of TCF is less assured unless the high-cost moulding equipment and production line can be put to proper use and aggressive marketing and new product research and development are pursued in earnest. Overall, the Project is likely to be sustainable.

E. Environmental, Sociocultural, and Other Impacts

43. An environmental impact assessment (EIA) report was prepared for each subproject in accordance with PRC's Environmental Protection Law, and was approved by the State Environmental Protection Agency and the local environmental protection bureaus. The summary EIA (SEIA) prepared by the Borrower was circulated to the Board on 23 July 1993. During project implementation, mitigating measures as outlined in the SEIA were carried out under the supervision of the EAs or the appointed supervising firms. Proper enclosures were erected during excavation and excavated soil was used for landfill in degraded land. Traffic was temporarily disrupted along major roads where excavation on the roadside was carried out, particularly for the laying of the underground pipeline. However, proper signages were erected to advise motorists of the affected roads, and affected persons were generally tolerant of the temporary inconvenience, knowing that the Project would benefit the citizens and assist in environmental improvement. Land acquisition was kept to a minimum to reduce costs and to avoid resettlement issues. Most of the project facilities other than the expanded wastewater treatment plant and gasholder were carried out on owned land. About 10.8 hectares (ha) of farmland and warehouse land was acquired for the expanded wastewater treatment plant and about 2.5 ha of farmland was acquired for the gasholder, both with cash compensation. Six of the seven subprojects provided environmental benefits by changing the fuel mix of the factories and consumer groups from coal to cleaner burning coal gas and cleaner source of energy. The new facilities, which are more energy efficient and fitted with more effective pollution control devices, reduced coal and raw material consumption in all seven subprojects. The wastewater treatment subproject (No. 6) reduced pollution load in the Dou River and improved water quality in the river to Class IV. It increased the city wastewater treatment rates to about 60%, making Tangshan as one of the cities with the highest wastewater treatment ratio. As a result, aquatic life has returned and residents have resumed recreation activities and water sports along the riverbanks. Farmers downstream were happy with the better quality river water. Used for irrigation, it has improved their crop yield by over 5%. In addition, the training provided under an earlier TA (footnote 4) and monitoring equipment provided by other aid agencies have enhanced monitoring and effective surveillance of point polluting sources and resulted in higher levy and fines collections. Levy and fines collected in 2001 amounted to CNY17.3 million. Surveillance equipment linked to the monitoring control room of Tangshan Environmental Protection Bureau and located at six strategic locations in the city helps to pinpoint polluting sources and prevents further pollution discharge. All vacant land within the project area has been planted with grass, flowering plants and trees. In fact, subproject 6 was awarded a plaque for garden style landscape. Moreover, the elimination of direct open coal burning has improved the air quality in Tangshan municipality. As a result, the population in Tangshan have a cleaner environment and breathe better air. The number of days when air quality was rated as Class II and better has gone up from less than 80 days in 1994 to 145 days in 2001. Subproject 7 has improved air quality in Luanhe area where most of the industries being supplied coal gas by the

subproject are located. However, the subproject has not contributed much to the improvement of air quality in the Chengde city area as only about 1,600 households of the targeted 96,000 households are supplied with coal gas produced by the project. Air quality has not improved in Chengde after the project facilities came onstream not only because of a significantly lower number of coal gas users, but because of the substantial increase in the city population, vehicles, and tourists. Nevertheless, the deterioration in air quality has been basically arrested. Training provided under the Project enable the assisted enterprises to operate and maintain the project facilities in a more systematic and efficient manner, except for the moulding equipment in subproject 5 for which no training was ever provided (Appendix 14). Management training provided under the Project enabled the enterprises to be better structured and run more professionally.

44. More specifically, subproject 1 replaced about 181,000 tons (t) of coal per year, with a corresponding reduction in discharge of sulfur dioxide (SO₂) and TSP by 4,340 t/year and 6,510 t/year, respectively. Gas is currently supplied for about 94.5% of the city population in Tangshan. Subproject 2 dismantled over 50 medium-size and 170 small polluting and inefficient boilers, 100,000 household stoves, and 123 unsightly chimneys and freed limited and valuable land for other uses. There was also a corresponding reduction in SO₂ and TSP by 5,750 t/year and 86,000 t/year, respectively. The gas supply in subproject 3 and reformation of kilns in subprojects 4 and 5 have reduced coal consumption by 20,000 t/year and discharge of SO₂ and TSP by 1,001 t/year and 675.5 t/year, respectively. Subproject 6 removed over 89% of the chemical oxygen demand (COD) and biological oxygen demand (BOD), and over 95% of suspended solid in the wastewater collected from the western and northern districts of Tangshan, and made Tangshan one of the cities in the PRC with the highest wastewater treatment ratio. The PIA is planning to recycle treated water for industry and for watering parks in the city. Subproject 7 removed 50,000 t of heavy particulates yearly, replaced 100,000 t of coal yearly, and allowed recovery of 25,430 t of coal tar, 5,700 t benzene, 570 t sulfur and coal savings of 94.8 t per year, in addition to recovering 420,315 million cu m of waste gas discharge daily from CISG, which otherwise would have been discharged to the atmosphere. The physical targets and actual achievements of all subprojects are compared in Appendix 15.

3. Social Impact

45. The facilities under the Project were constructed in their own premises except for the expanded wastewater plant and the gasholder in Chengde. A total of 13.3 ha of farmland and warehouse land was acquired with adequate cash compensation in accordance with the Land Administration Law. TMG and CMG provided temporary land for the laying of the pipeline free of charge. No houses were relocated as no residential land was involved. In subproject 7, about 500 farmers near the project vicinity including all affected farmers from the acquired farmland were subsequently absorbed as regular factory workers after they underwent 12 months of industrial training by the enterprise. Their living standard has since improved as they are receiving regular incomes that are twice their past incomes. In addition to the temporary employment of about 6,500 person-years during project implementation, with about 60% recruited from nearby areas, the Project employed about 11,721 permanent staff of whom 5,204 are female.

IV. OVERALL ASSESSMENT AND RECOMMENDATIONS

A. Overall Assessment

46. The Project was implemented as envisaged at appraisal except for some changes in project scope to enhance the project benefits and take into account actual conditions at the sites

and new government requirements. The Project basically achieved its main objective of reducing air and water pollution in Tangshan and Chengde municipalities. The Project was completed as envisaged, except for two of the seven subprojects, within the schedule established at appraisal. Delays took place in two subprojects. In subproject 4, the conversion of coal-fired and heavy oil-fired kilns is still ongoing. Installation of the pipeline network for coal gas in Chengde was completed about 12 months later. The facilities provided under the Project performed as envisaged, except for the new moulding equipment in subproject 5 and the new kilns in subproject 4. The former remained inoperative while the latter were rectified with assistance from domestic experts. Actual achievements were generally lower than those estimated at appraisal. Tariffs for gas, heat, and wastewater treatment were below the levels required for full cost recovery. The lower tariff coupled with the lower achievements has prevented the project entities to achieve good financial performance and to comply with the financial covenants of the loan. Consequently, the reevaluated FIRR are lower than at appraisal, but are still above the cost of capital. With the achievement of the main objective of air improvement despite the about 1.3% increase in the city population in the last 10 years and an annual economic growth rate of about 10% per annum, the Project is rated as successful. This PCR is a sample of about 50% of all PCR proposed this year that has been independently reviewed by the Operations Evaluation Department. The review has validated the methodology used and the rating given.

B. Lessons Learned

47. The financial performance of the project utility entities is basically weak because the low utility tariffs approved by the regulatory board are insufficient to cover operating and capital costs. The low tariff has affected the financial viability of four subprojects, namely, subprojects 1, 2, 6, and 7. Unless utility tariffs are increased to a level allowing for full cost recovery, the project entities may have a problem in sustaining their operation without some form of government assistance. Unless tariffs are reviewed and adjusted yearly on a regular basis, ADB should in the future consider mechanisms for automatic tariff adjustments.

48. The engagement of a domestic agency to assist the EAs in procurement proved to be wise, particularly as the EAs were not familiar with ADB's *Guidelines for Procurement*. The arrangement in which the procurement agency provides expertise in preparing bidding documents ensured smooth and timely procurement and also enabled valuable experience to be passed on to the new EAs. However, when selecting prototype equipment whose performance has not been assured and when equipment is delivered ahead of the required time as in the cases of subprojects 4 and 5, appropriate safeguards such as a higher performance bond and a larger retention fee should have been considered during contract negotiation to protect clients against non-performance of suppliers' obligations.

C. Recommendations

1. Project-Related

49. The slow and complex internal procedures to secure various approvals by the relevant authorities for the construction of the expanded wastewater treatment plant resulted in the delayed completion of subproject 6. Unless all required internal approvals have been secured by the EA, ADB should not approve any major changes in project scope even if there are substantial loan savings and substantial benefit is expected.

50. Although in their current operations none of the assisted enterprises is able to comply with the loan's financial covenants, the covenants should be maintained in their existing form to

constantly remind the Borrower, EAs, and PIAs to continue to institute cost-cutting measures and to seek reasonable tariffs and new markets which are essential for improving the financial health of their enterprises. The Borrower must give the assurance that financial covenants will be met before future projects are processed. A time schedule for tariff adjustment must be incorporated in the loan covenants to ensure the financial health of the project entity.

51. As the annual activity inputs for benefit and monitoring evaluation (BME) were not submitted regularly, the EAs should be instructed to submit at the beginning of each year for the next 3 years their respective BME to ADB to enable ADB to evaluate the improvement in air and water quality as well as the financial health of the assisted enterprises. The report should be followed up by the 2003 country portfolio review mission.

52. The project performance audit report for the project could be prepared in 2004 or later. By then, the project facilities will be fully operational for over 2 years and more useful data would become available for better assessment of the project performance.

2. General

53. The financial performance of the project entities is lower-than the projected for two reasons: the lower capacity utilization due to reduced demand, and lower tariffs and prices for outputs produced. A thorough survey and more accurate assessment of user demand are essential during appraisal to ensure more realistic assumptions for supply and demand. If there is a strong possibility that market conditions may change rapidly over the short to medium term, a midterm review during project implementation may be useful to allow midterm corrective measures.

54. Government policies should be consistent throughout project implementation to ensure no drastic changes, which may have an adverse bearing on the project cost, or its financial viability as in the case of the removal of tax exemption for ADB-funded procurement. The sudden decision of the Government to remove tax exemption for projects funded by international financial institutions prompted TMG to expedite procurement. The early delivery of imported equipment resulted in the subsequent nonoperation of the moulding equipment (para. 12). CCGC, TPF, and TCF should establish a well-staffed market unit to entice new users and to explore new markets, now that the new facilities are capable of full capacity utilization. TPF and TCF should also establish a research and development unit to formulate new products, which are in demand and have a stronger appeal to potential consumers in a competitive market. In addition, TCF should explore other ways and means to make its moulding equipment usable and to improvise in using the kiln (otherwise over \$6.1 million worth of equipment would remain unutilized).

CHRONOLOGY OF MAJOR EVENTS

| | |
|-------------|---|
| 9 May 1993 | Fact-Finding Mission fielded |
| 24 Jun 1993 | Approved advance action for the engagement of consultants |
| 21 Jul 1993 | Summary environmental impact assessment circulated |
| 13 Aug 1993 | Management Review Meeting |
| 17 Aug 1993 | Appraisal Mission fielded |
| 21 Oct 1993 | Staff Review Committee meeting |
| 25 Oct 1993 | Loan negotiations held |
| 25 Nov 1993 | ADB approved a loan of \$140.0 million from ADB's ordinary capital resources to the People's Republic of China (PRC) for the <i>Tangshan and Chengde Environmental Improvement Project</i> (Loan 1270-PRC). |
| 22 Mar 1994 | Loan signing |
| 29 Mar 1994 | Consultants contract with CdF Ingenerie S.A., France, for subproject 7 signed |
| 12 Apr 1994 | Consultants contract with Ekono Energy Ltd., Finland, for subproject 2 signed |
| 21 Apr 1994 | Consultants contract with Acres International Ltd., Canada for subproject 1 signed |
| 6 May 1994 | Consultants contract with Montgomery Watson, Hongkong, for subproject 6 signed |
| 19 Jun 1994 | Loan effectiveness |
| 14 Aug 1994 | Consultants contract with Acres International Ltd., Canada, for Subprojects 3, 4 and 5 signed. |
| 6 Dec 1994 | First disbursement |
| 15 Mar 1995 | Overseas training to Finland under subproject 2 approved |
| 5 May 1995 | Staff member of subproject 7 and research institute visited France to review and confirm the detailed design with CdF Ingenerie. |
| 22 May 1995 | Inception Mission |
| 31 Jul 1995 | Contract awarded to Gebrueder Netzsch of Germany for the supply of forming equipment for domestic porcelain ware in subproject 4 |

| | |
|-------------|--|
| 31 Jul 1995 | Contract awarded to Acme Marls Ltd. of UK for the supply of tunnel kiln and supplementary equipment in subproject 5. |
| 1 Aug 1995 | Contract awarded to Gebrueder Netzsch of Germany for the supply of vertical sanitary ware slip casting equipment in subproject 5 |
| 7 Aug 1995 | Staff member of Subproject 7 visited Germany to execute the Concept Design Contract with Krupp Koppers. |
| 18 Oct 1995 | SCADA and computer management system procured in subproject 1 |
| Nov 1995 | Civil work under subproject 7 commenced. |
| Apr 1996 | First batch of 63 operators under subproject 7 trained at Beijing Coke Plant and Shijiazhuang Coke Plant |
| Jul 1996 | Two pressure casting machines and one universal roller machine in subproject 4 installed and commissioned with unsuccessful result |
| Sep 1996 | Subproject 3 completed and in commercial operation |
| 1 Nov 1996 | Review Mission |
| Apr 1997 | Commenced commissioning of three new kilns in subproject 4 |
| 30 Jun 1997 | Two gasholders in Zhaozhuang storage station and purification station in Banbidian in subproject 1 completed and put into operation |
| 3 Jul 1997 | Approved to directly engage Tangshan Victory Group as contractor to complete the outstanding work for the casting equipment in subproject 5 |
| Aug 1997 | Commenced construction of distribution network in subproject 7 |
| 8 Oct 1997 | Contract for the supply of microcomputer-based SCADA system awarded in subproject 2 |
| 7 Nov 1997 | Received request from the Borrower to utilize loan savings to expand the wastewater treatment facilities in subproject 6 |
| 10 Dec 1997 | Vice President (East) approved the request to utilize loan savings to expand wastewater treatment plant in subproject 6 and to delete one of the 2 coal gasification plants in subproject 3 due to availability of sufficient coal gas from the Tangshan Municipality. |
| Dec 1997 | New combined heat and power plant in subproject 2 commissioned |

| | |
|-------------|--|
| 31 Mar 1998 | The Borrower requested further reallocation of \$5.82 million of the unutilized loan proceeds from subproject 2 to subproject 4. |
| 14 Apr 1998 | Commissioning of biscuit kiln under Subproject 4 started. |
| 5 May 1998 | Director, IED approved the Borrower's request for a further reallocation of loan proceeds from subproject 2 to subproject 4. |
| Jul 1998 | One set of 100,000 m ³ gasholder completed and operation started. |
| 3 Nov 1998 | Trial operation of No. 1 oven battery in subproject 7 commenced. |
| 10 Dec 1998 | Trial operation of gas supply system for industrial users in subproject 7 |
| 26 Feb 1999 | The Ministry of Finance requested extension of the loan closing date by one year from 30 June 1999 to 30 June 2000. |
| 12 Mar 1999 | Approved extension of loan closing date to 30 June 2000. |
| 25 Apr 1999 | The No. 2 coke oven battery commenced operation. |
| 30 Jun 1999 | Original loan closing date |
| 29 Jul 1999 | Approved reallocation of loan proceeds in subproject 1 and request for additional procurement packages using direct purchase procedure to optimize the operation of the existing SCADA system in subproject 2 |
| 7 Feb 2000 | Director, IED approved the utilization of anticipated loan savings in subproject 4 through a minor change in Project scope and reallocation of loan funds from subproject 4 to subproject 5 and the direct award of the contract for completion and performance guarantee of casting machines in Subproject 5. |
| 13 Mar 2000 | Corporate name of subproject 5, Tangshan No. 6 Ceramic Factory changed to Tangshan Deshunlong Ceramic Factory |
| 17 Apr 2000 | Project performance rating for development objectives was changed from highly satisfactory to satisfactory category effective 1 March 2000 due to delay in the supply of coal gas to households and low household connection rate in Chengde city. |
| 9 Jun 2000 | Contract with Acme Marls, UK, for the supply of kilns for high-grade domestic porcelain terminated |
| 29 Sep 2000 | ADB cancelled the undisbursed loan balance of \$15.07 million and loan account closed. |
| 8 May 2002 | Project Completion Review Mission fielded. |

PROJECTED AND ACTUAL COSTS

(\$ million)

| Component | Appraisal Estimate | | | Actual | | |
|---|--------------------|--------------|--------------|--------------|--------------|--------------|
| | FX | LC | Total | FX | LC | Total |
| Subproject 1: Gas Supply and Distribution Network System | | | | | | |
| Land | 0.00 | 0.00 | 0.00 | 0.00 | 0.54 | 0.54 |
| Site Preparation | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Equipment and Machinery | 4.15 | 2.49 | 6.64 | 5.15 | 0.95 | 6.10 |
| Civil Works | 0.00 | 1.17 | 1.17 | 0.00 | 7.34 | 7.34 |
| Engineering and Domestic Design | 0.00 | 0.28 | 0.28 | 0.00 | 0.26 | 0.26 |
| Training | 0.15 | 0.03 | 0.18 | 0.07 | 0.05 | 0.12 |
| Consultants | 0.08 | 0.00 | 0.08 | 0.04 | 0.02 | 0.06 |
| Base Cost | 4.38 | 3.97 | 8.35 | 5.26 | 9.16 | 14.42 |
| Physical Contingency | 0.44 | 0.40 | 0.84 | 0.00 | 0.00 | 0.00 |
| Subtotal | 4.82 | 4.37 | 9.19 | 5.26 | 9.16 | 14.42 |
| Price Contingency | 0.57 | 0.62 | 1.19 | 0.00 | 0.00 | 0.00 |
| IDC (including Financial Charges) | 0.61 | 0.01 | 0.62 | 0.61 | 1.00 | 1.61 |
| Total | 6.00 | 5.00 | 11.00 | 5.87 | 10.16 | 16.03 |
| Subproject No. 2: District Heating System | | | | | | |
| Land | 0.00 | 0.00 | 0.00 | 0.00 | 0.81 | 0.81 |
| Site Preparation | 0.00 | 0.26 | 0.26 | 0.00 | 0.68 | 0.68 |
| Equipment and Machinery | 17.66 | 15.61 | 33.27 | 14.12 | 5.85 | 19.97 |
| Civil Works | 0.00 | 1.90 | 1.90 | 0.00 | 9.69 | 9.69 |
| Engineering and Domestic Design | 0.00 | 1.07 | 1.07 | 0.00 | 5.68 | 5.68 |
| Training | 0.17 | 0.06 | 0.23 | 0.17 | 0.06 | 0.23 |
| Consultants | 0.50 | 0.00 | 0.50 | 0.23 | 0.00 | 0.23 |
| Base Cost | 18.33 | 18.90 | 37.23 | 14.52 | 22.77 | 37.29 |
| Physical Contingency | 1.83 | 1.89 | 3.72 | 0.00 | 0.00 | 0.00 |
| Subtotal | 20.16 | 20.79 | 40.95 | 14.52 | 22.77 | 37.29 |
| Price Contingency | 2.17 | 6.26 | 8.43 | 0.00 | 0.00 | 0.00 |
| IDC (including Financial Charges) | 3.67 | 3.95 | 7.62 | 2.42 | 0.44 | 2.86 |
| Total | 26.00 | 31.00 | 57.00 | 16.94 | 23.21 | 40.15 |
| Subproject No. 3: Coal Gasification Plants (No. 2 Porcelain Factory) | | | | | | |
| Land | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Site Preparation | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Equipment and Machinery | 5.97 | 0.60 | 6.57 | 2.35 | 0.92 | 3.27 |
| Civil Works | 0.00 | 0.16 | 0.16 | 0.00 | 0.00 | 0.00 |
| Engineering and Domestic Design | 0.00 | 0.57 | 0.57 | 0.00 | 0.00 | 0.00 |
| Training | 0.10 | 0.01 | 0.11 | 0.00 | 0.00 | 0.00 |
| Consultants | 0.05 | 0.00 | 0.05 | 0.09 | 0.00 | 0.09 |
| Base Cost | 6.12 | 1.34 | 7.46 | 2.44 | 0.92 | 3.36 |
| Physical Contingency | 0.61 | 0.13 | 0.74 | 0.00 | 0.00 | 0.00 |
| Subtotal | 6.73 | 1.47 | 8.20 | 2.44 | 0.92 | 3.36 |
| Price Contingency | 0.61 | 0.45 | 1.06 | 0.00 | 0.00 | 0.00 |
| IDC (including Financial Charges) | 0.66 | 0.08 | 0.74 | 0.10 | 0.09 | 0.19 |
| Total | 8.00 | 2.00 | 10.00 | 2.54 | 1.01 | 3.55 |

| Component | Appraisal Estimate | | | Actual | | |
|---|--------------------|-------------|--------------|--------------|--------------|--------------|
| | FX | LC | Total | FX | LC | Total |
| Subproject No. 4: Pollution Abatement at No. 2 Porcelain Factory | | | | | | |
| Land | 0.00 | 0.35 | 0.35 | 0.00 | 0.43 | 0.43 |
| Equipment and Machinery | 8.36 | 4.40 | 12.76 | 5.85 | 0.00 | 5.85 |
| Civil Works | 0.00 | 0.58 | 0.58 | 0.00 | 2.50 | 2.50 |
| Engineering and Domestic Design | 0.00 | 0.39 | 0.39 | 0.00 | 5.56 | 5.56 |
| Training | 0.10 | 0.02 | 0.12 | 0.06 | 0.27 | 0.33 |
| Consultants | 0.09 | 0.00 | 0.09 | 0.03 | 0.00 | 0.03 |
| Base Cost | 8.55 | 5.74 | 14.29 | 5.94 | 8.76 | 14.70 |
| Physical Contingency | 0.86 | 0.57 | 1.43 | 0.00 | 0.00 | 0.00 |
| Subtotal | 9.41 | 6.31 | 15.72 | 5.94 | 8.76 | 14.70 |
| Price Contingency | 1.07 | 1.59 | 2.66 | 0.00 | 0.00 | 0.00 |
| IDC (including Financial Charges) | 1.52 | 1.10 | 2.62 | 2.18 | 1.10 | 3.28 |
| Total | 12.00 | 9.00 | 21.00 | 8.12 | 9.86 | 17.98 |
| Subproject No. 5: Pollution Abatement at No. 6 Ceramic Factory | | | | | | |
| Land | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Equipment and Machinery | 4.54 | 2.00 | 6.54 | 11.96 | 0.00 | 11.96 |
| Civil Works | 0.00 | 1.50 | 1.50 | 0.00 | 5.15 | 5.15 |
| Engineering and Domestic Design | 0.00 | 0.60 | 0.60 | 0.00 | 0.00 | 0.00 |
| Training | 0.10 | 0.02 | 0.12 | 0.07 | 0.00 | 0.07 |
| Consultants | 0.03 | 0.00 | 0.03 | 0.03 | 0.00 | 0.03 |
| Base Cost | 4.67 | 4.12 | 8.79 | 12.06 | 5.15 | 17.21 |
| Physical Contingency | 0.47 | 0.41 | 0.88 | 0.00 | 0.00 | 0.00 |
| Subtotal | 5.14 | 4.53 | 9.67 | 12.06 | 5.15 | 17.21 |
| Price Contingency | 0.43 | 0.70 | 1.13 | 0.00 | 0.00 | 0.00 |
| IDC (including Financial Charges) | 0.43 | 0.77 | 1.20 | 1.12 | 0.75 | 1.87 |
| Total | 6.00 | 6.00 | 12.00 | 13.18 | 5.90 | 19.08 |
| Subproject No. 6: Tangshan Dongjiao Wastewater Treatment Plant | | | | | | |
| Land | 0.00 | 0.11 | 0.11 | 0.00 | 1.82 | 1.82 |
| Equipment and Machinery | 15.65 | 4.41 | 20.06 | 19.61 | 0.64 | 20.25 |
| Civil Works | 0.10 | 0.41 | 0.51 | 0.00 | 1.15 | 1.15 |
| Engineering and Domestic Design | 0.00 | 0.85 | 0.85 | 0.00 | 18.62 | 18.62 |
| Training | 0.11 | 0.07 | 0.18 | 0.14 | 0.92 | 1.06 |
| Consultants | 0.27 | 0.00 | 0.27 | 0.17 | 0.00 | 0.17 |
| Base Cost | 16.13 | 5.85 | 21.98 | 19.92 | 23.15 | 43.07 |
| Physical Contingency | 0.81 | 0.59 | 1.40 | 0.00 | 0.00 | 0.00 |
| Subtotal | 16.94 | 6.44 | 23.38 | 19.92 | 23.15 | 43.07 |
| Price Contingency | 1.72 | 1.33 | 3.05 | 0.00 | 0.00 | 0.00 |
| IDC (including Financial Charges) | 2.34 | 0.23 | 2.57 | 3.36 | 1.14 | 4.50 |
| Total | 21.00 | 8.00 | 29.00 | 23.28 | 24.29 | 47.57 |

| Component | Appraisal Estimate | | | Actual | | |
|---|--------------------|--------------|--------------|--------------|--------------|---------------|
| | FX | LC | Total | FX | LC | Total |
| Subproject No 7: Chengde Coal Gasification Plant | | | | | | |
| Land | 0.00 | 1.00 | 1.00 | 0.00 | 6.63 | 6.63 |
| Equipment and Machinery | 39.56 | 14.33 | 53.89 | 47.49 | 5.12 | 52.61 |
| Civil Works | 0.00 | 5.17 | 5.17 | 0.00 | 74.33 | 74.33 |
| Engineering and Domestic Design | 0.00 | 3.16 | 3.16 | 0.00 | 2.44 | 2.44 |
| Training | 0.20 | 0.10 | 0.30 | 0.05 | 0.41 | 0.46 |
| Consultants | 0.60 | 0.00 | 0.60 | 0.16 | 1.08 | 1.24 |
| Base Cost | 40.36 | 23.76 | 64.12 | 47.70 | 90.01 | 137.71 |
| Physical Contingency | 4.04 | 2.34 | 6.38 | 0.00 | 0.00 | 0.00 |
| Subtotal | 44.40 | 26.10 | 70.50 | 47.70 | 90.01 | 137.71 |
| Price Contingency | 3.30 | 5.16 | 8.46 | 0.00 | 0.00 | 0.00 |
| IDC (including Financial Charges) | 7.30 | 2.74 | 10.04 | 7.30 | 2.49 | 9.79 |
| Total | 55.00 | 34.00 | 89.00 | 55.00 | 92.50 | 147.50 |

FX = foreign currency, IDC = interest during construction, LC = local currency.

PROJECT COST AND FINANCING SOURCES
(\$ million)

Table A3.1: Project Cost

| Subproject | Appraisal | | | Actual | | |
|---|---------------|--------------|---------------|---------------|---------------|---------------|
| | FX | LC | Total | FX | LC | Total |
| Subproject 1: Gas Supply & Dist. Network | 6.00 | 5.00 | 11.00 | 5.87 | 10.16 | 16.03 |
| Subproject 2: District Heating System | 26.00 | 31.00 | 57.00 | 16.94 | 23.21 | 40.15 |
| Subproject 3: Coal Gasification Plants | | | | | | |
| No. 2 Porcelain Factory | 8.00 | 2.00 | 10.00 | 2.54 | 1.01 | 3.55 |
| No. 6 Ceramic Factory | 6.00 | 2.00 | 8.00 | 0.00 | 0.00 | 0.00 |
| Subproject 4: Pollution Abatement at No. 2 | 12.00 | 9.00 | 21.00 | 8.12 | 9.86 | 17.98 |
| Subproject 5: Pollution Abatement at No. 6 | 6.00 | 6.00 | 12.00 | 13.18 | 5.90 | 19.08 |
| Subproject 6: Tangshan Dongjiao Wastewater | 21.00 | 8.00 | 29.00 | 23.28 | 24.29 | 47.57 |
| Subproject 7: Chengde Coal Gasification Plant | 55.00 | 34.00 | 89.00 | 55.00 | 92.50 | 147.50 |
| Total | 140.00 | 97.00 | 237.00 | 124.93 | 166.93 | 291.86 |

FX = foreign currency, LC = local currency.

Table A3.2: Financing Sources

| Subproject | Appraisal | | | | Actual | | | |
|--------------|---------------|----------------------|---------------|---------------|---------------|----------------------|---------------|---------------|
| | ADB Loan | Commercial Bank Loan | Own Resources | Total | ADB Loan | Commercial Bank Loan | Own Resources | Total |
| Subproject 1 | 6.00 | 0.20 | 4.80 | 11.00 | 5.87 | 0.00 | 10.16 | 16.03 |
| Subproject 2 | 26.00 | 23.00 | 8.00 | 57.00 | 16.94 | 13.84 | 9.37 | 40.15 |
| Subproject 3 | 14.00 | 0.50 | 3.50 | 18.00 | 2.54 | 0.50 | 0.51 | 3.55 |
| Subproject 4 | 12.00 | 8.00 | 1.00 | 21.00 | 8.12 | 6.63 | 3.23 | 17.98 |
| Subproject 5 | 6.00 | 5.50 | 0.50 | 12.00 | 13.18 | 5.10 | 0.80 | 19.08 |
| Subproject 6 | 21.00 | 2.00 | 6.00 | 29.00 | 23.28 | 23.07 | 1.22 | 47.57 |
| Subproject 7 | 55.00 | 15.00 | 19.00 | 89.00 | 55.00 | 25.30 | 67.20 | 147.50 |
| Total | 140.00 | 54.20 | 42.80 | 237.00 | 124.93 | 74.44 | 92.49 | 291.86 |

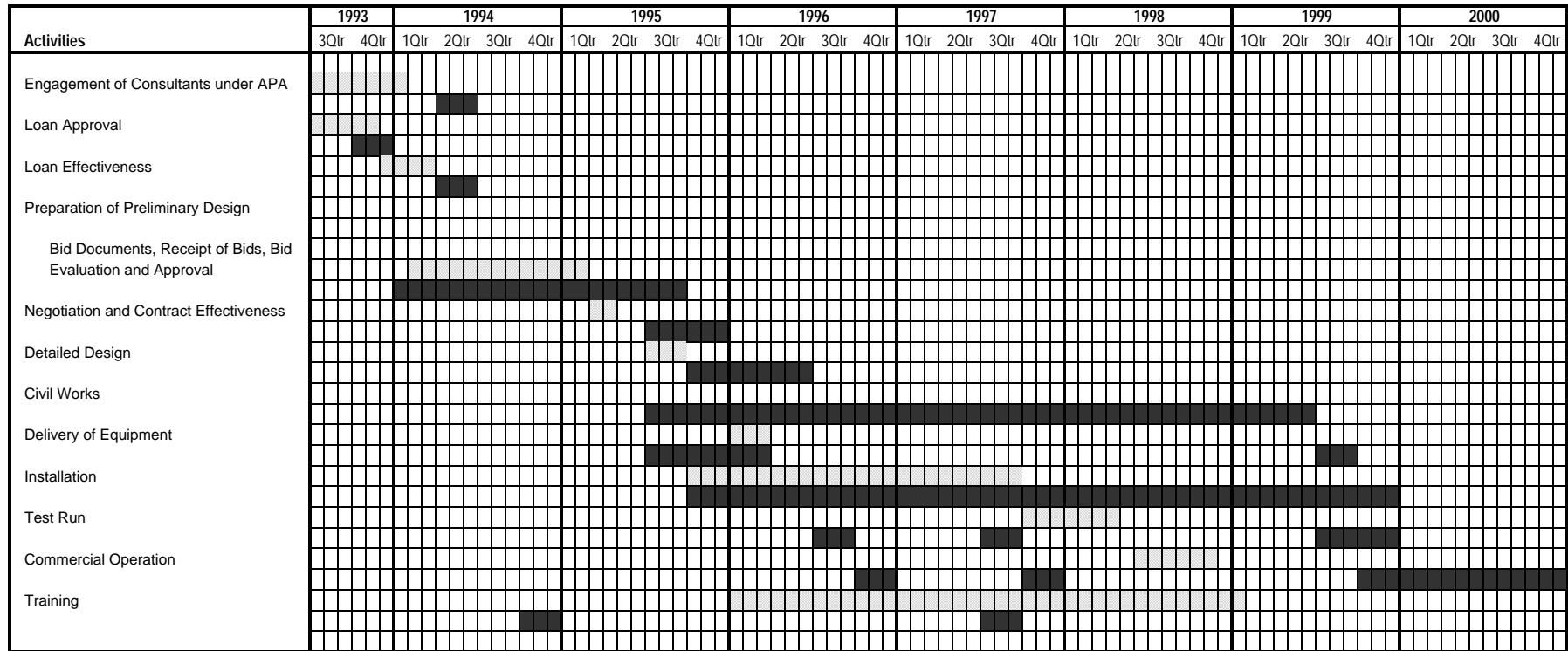
ADB = Asian Development Bank.

LOAN DISBURSEMENTS

| Year | Quarter | Projected (\$ million) | Actual | | % of Loan |
|------|-----------------|---------------------------|---|--|--------------|
| | | | Quarterly Disbursement (\$ million) | Cumulative Disbursement (\$ million) | |
| 1994 | I | 0.000 | 0.000 | 0.000 | 0.0 |
| | II | 0.100 | 0.000 | 0.000 | 0.0 |
| | III | 0.200 | 0.000 | 0.000 | 0.0 |
| | IV | 0.300 | 0.172 | 0.172 | 0.1 |
| | Subtotal | 0.600 | 0.172 | | |
| 1995 | I | 0.000 | 0.266 | 0.438 | 0.4 |
| | II | 0.000 | 0.564 | 1.002 | 0.8 |
| | III | 0.000 | 4.398 | 5.400 | 4.3 |
| | IV | 17.000 | 13.362 | 18.762 | 15.0 |
| | Subtotal | 17.000 | 18.590 | | |
| 1996 | I | 15.000 | 11.345 | 30.107 | 24.1 |
| | II | 18.000 | 10.802 | 40.909 | 32.7 |
| | III | 17.000 | 6.972 | 47.881 | 38.3 |
| | IV | 9.000 | 6.381 | 54.262 | 43.4 |
| | Subtotal | 59.000 | 35.500 | | |
| 1997 | I | 10.170 | 3.763 | 58.025 | 46.4 |
| | II | 11.856 | 4.870 | 62.895 | 50.3 |
| | III | 0.079 | 10.807 | 73.702 | 59.0 |
| | IV | 3.420 | 12.860 | 86.562 | 69.3 |
| | Subtotal | 25.525 | 32.300 | | |
| 1998 | I | 6.000 | 3.772 | 90.334 | 72.3 |
| | II | 12.000 | 5.208 | 95.542 | 76.5 |
| | III | 6.000 | 4.098 | 99.640 | 79.8 |
| | IV | 8.000 | 5.502 | 105.142 | 84.2 |
| | Subtotal | 32.000 | 18.580 | | |
| 1999 | I | 0.400 | 1.851 | 106.993 | 85.6 |
| | II | 0.700 | 5.642 | 112.635 | 90.2 |
| | III | 0.500 | 1.350 | 113.985 | 91.2 |
| | IV | 1.400 | 1.190 | 115.175 | 92.2 |
| | Subtotal | 3.000 | 10.033 | | |
| 2000 | I | 8.400 | 3.246 | 118.421 | 94.8 |
| | II | 4.800 | 3.826 | 122.247 | 97.9 |
| | III | 0.000 | 2.685 | 124.932 | 100.0 |
| | IV | 0.000 | 0.000 | 124.932 | 100.0 |
| | Subtotal | 13.200 | 9.757 | | |
| | | Total | 124.932 | | |

IMPLEMENTATION SCHEDULE

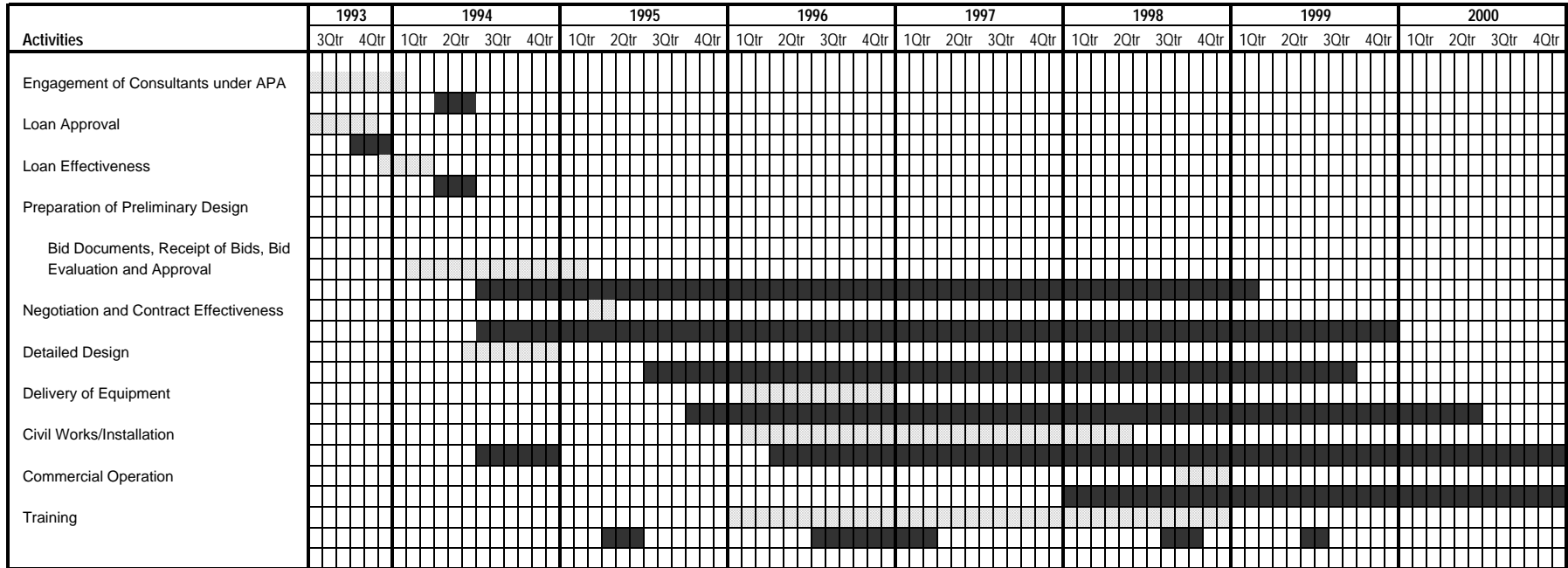
Figure A5.1: Subproject 1 – Gas Supply and Distribution Network System Subproject



Projected
 Actual

APA = Advanced Procurement Action.

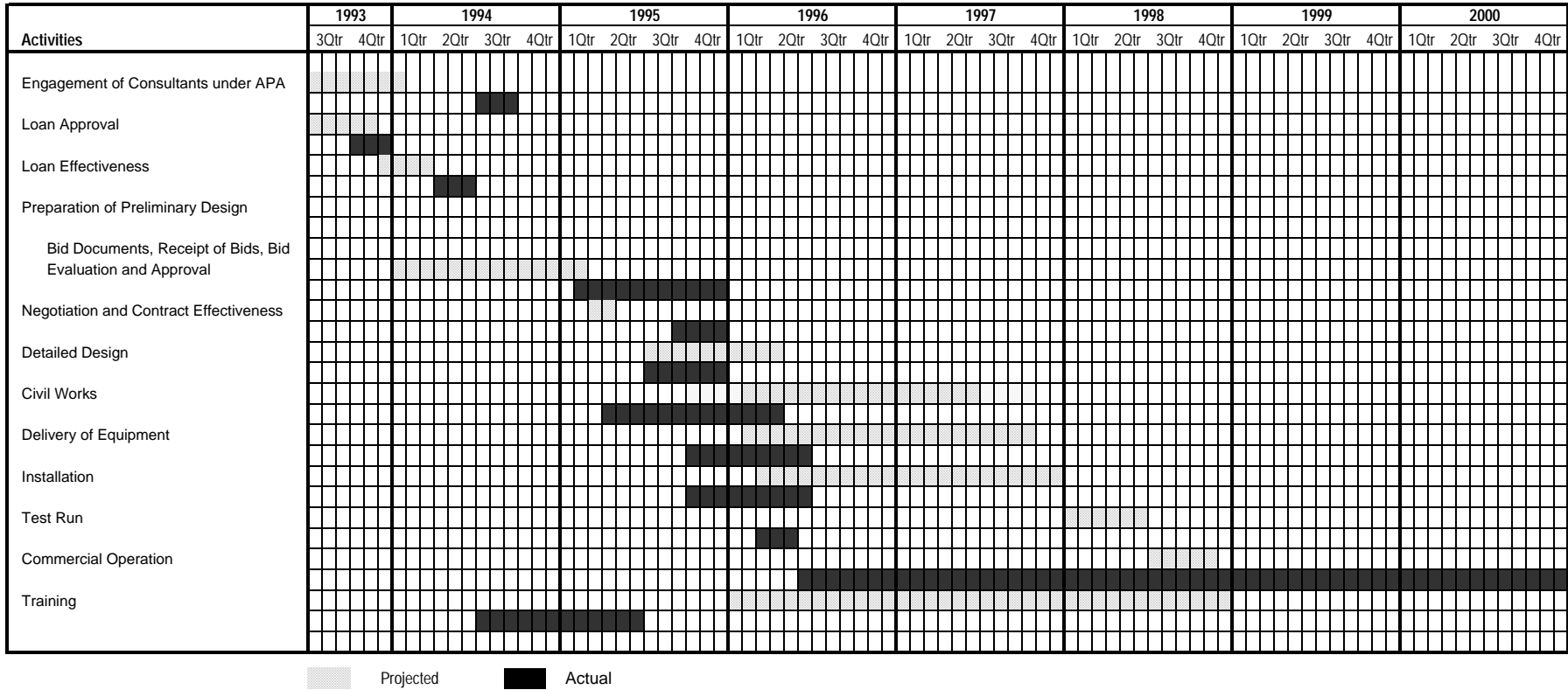
Figure A5.2: Subproject 2 – District Heating System



Projected Actual

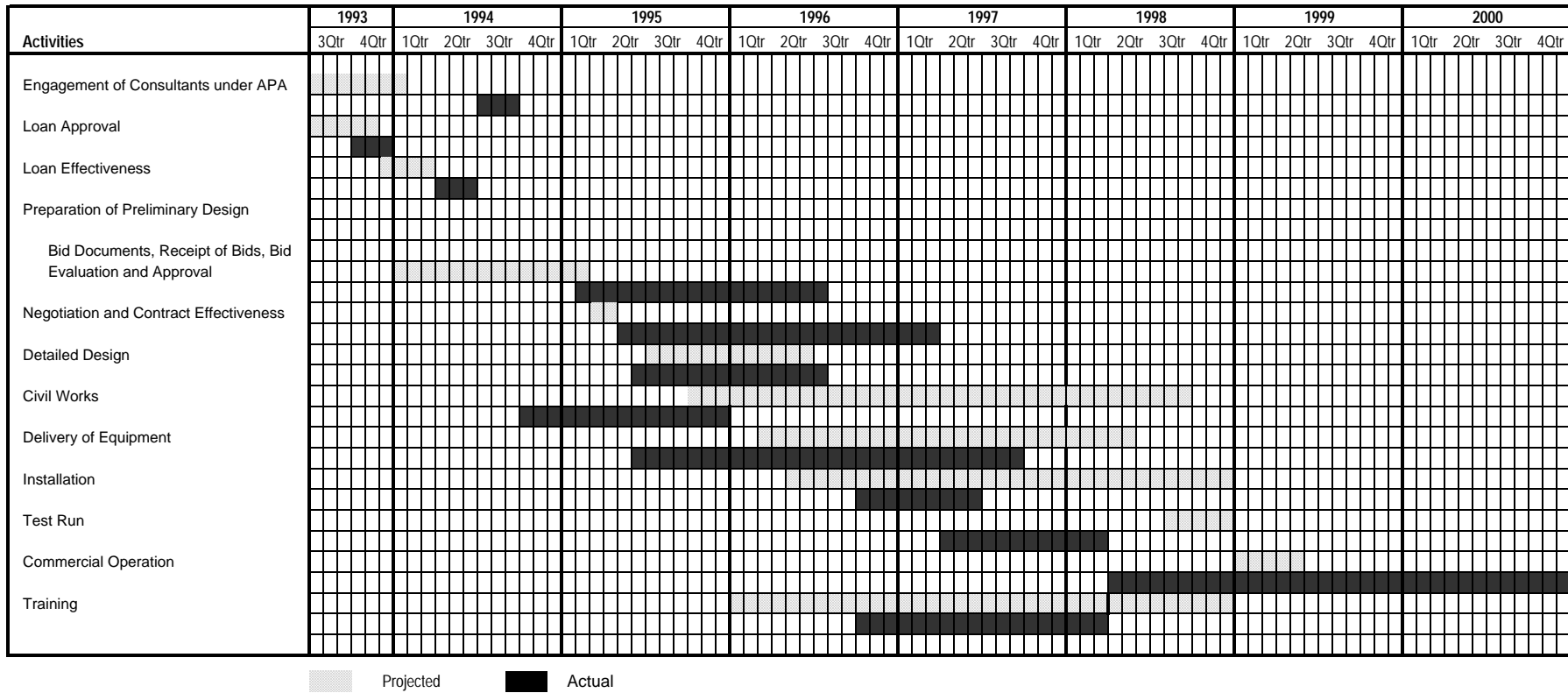
APA = Advanced Procurement Action.

Figure A5.3: Subproject 3 – Coal Gasification Plants at No. 2 Porcelain Factory and No. 6 Ceramic Factory



APA = Advanced Procurement Action.

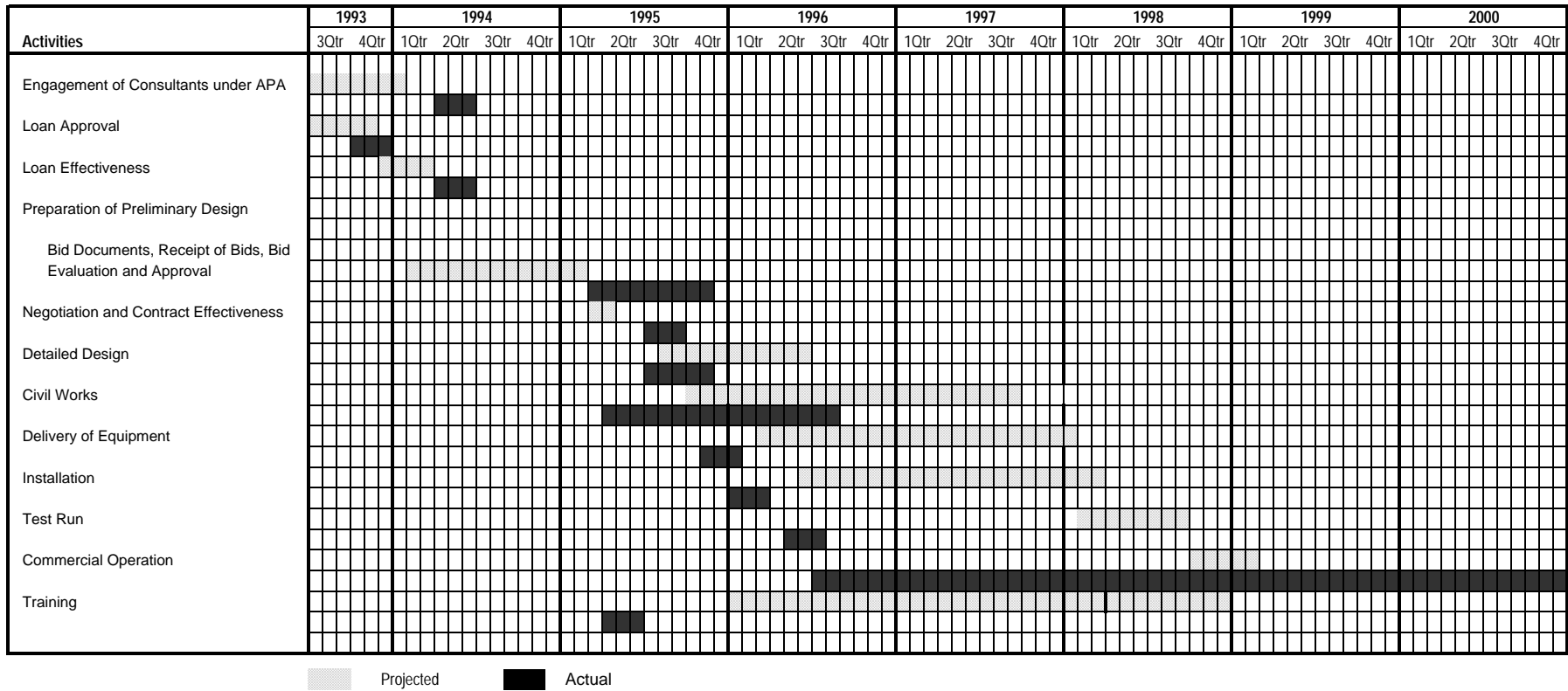
Figure A5.4: Subproject 4 – Pollution Abatement at Tangshan No. 2 Porcelain Factory



Projected Actual

APA = Advanced Procurement Action.

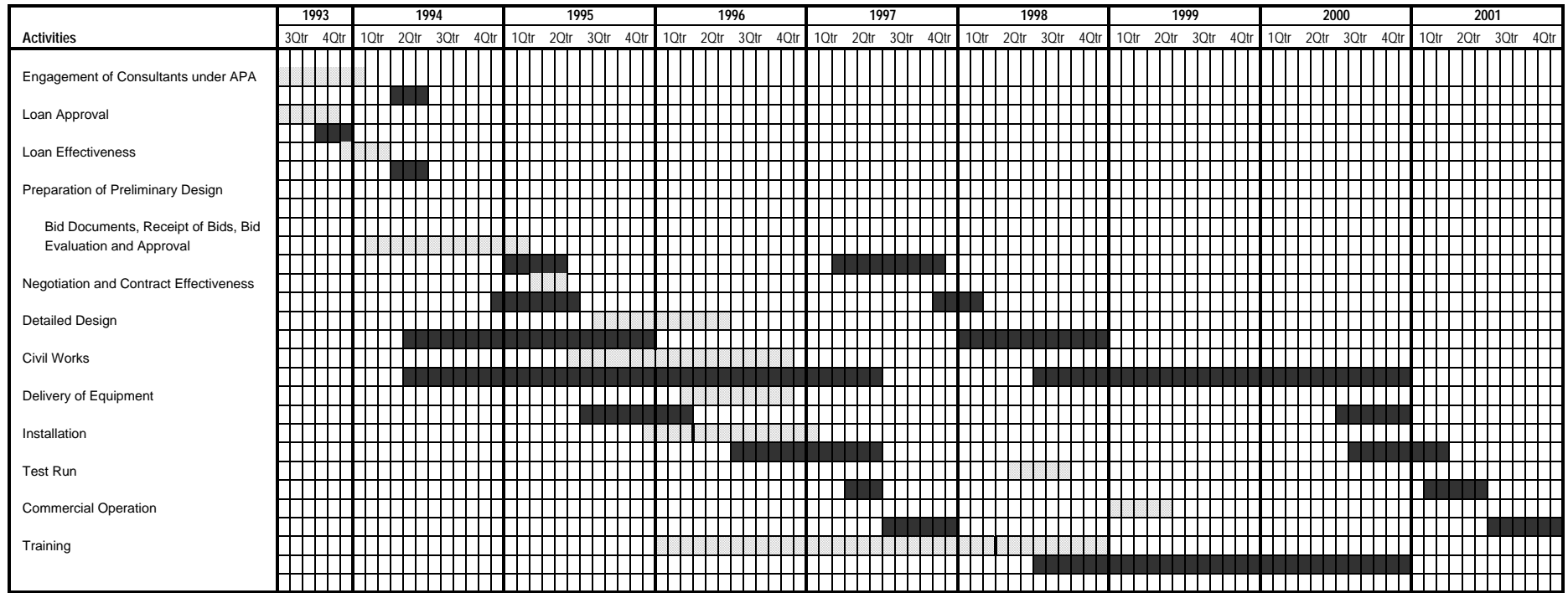
Figure A5.5: Subproject 5 – Pollution Abatement at Tangshan No. 6 Ceramic Factory



Projected Actual

APA = Advanced Procurement Action.

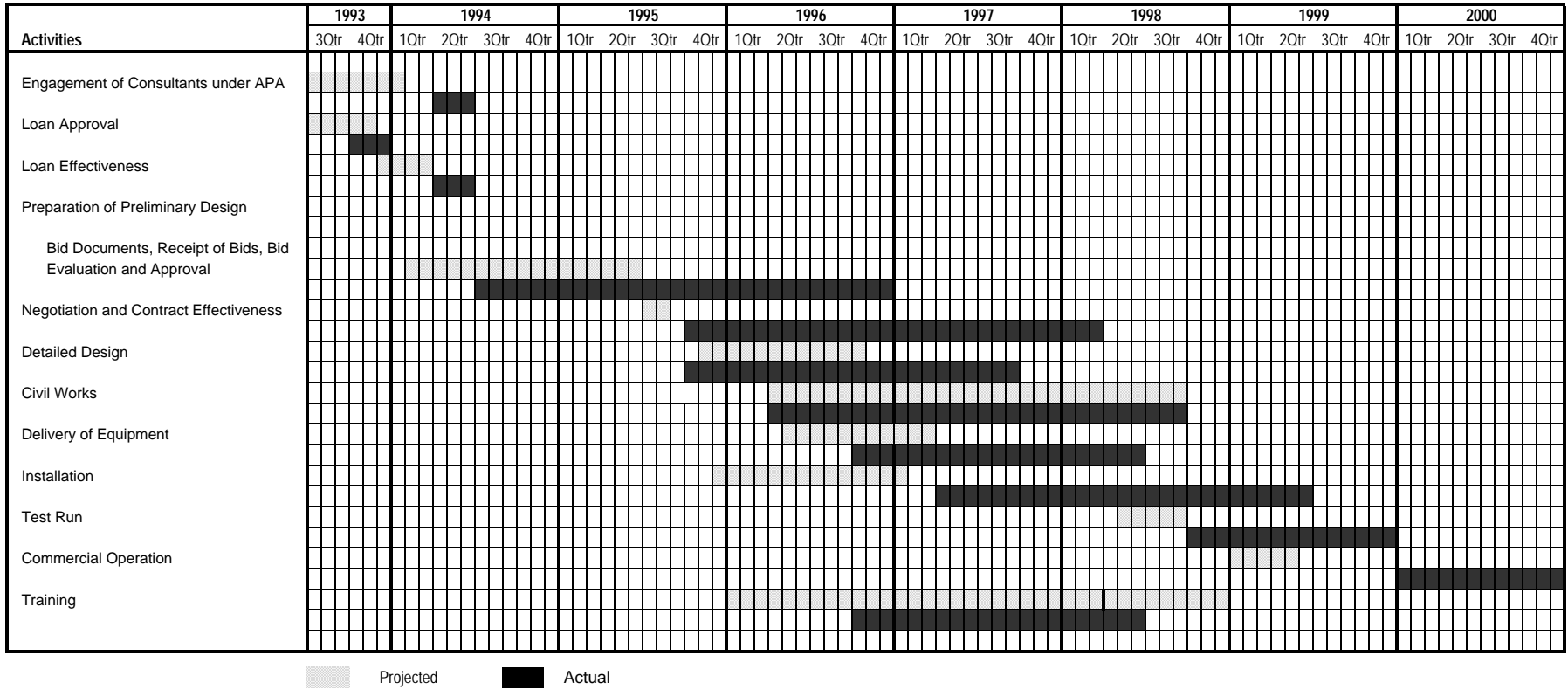
Figure A5.6: Subproject 6 – Tangshan Dongjiao Wastewater Treatment Plant and Expansion Project



Projected Actual

APA = Advanced Procurement Action.

Figure A5.7: Subproject 7 – Chengde Coal Gasification Plant



APA = Advanced Procurement Action.

ORGANIZATION CHARTS OF PROJECT IMPLEMENTATION AGENCIES
Figure A6.1: Subproject 1 – Tangshan Gas Company

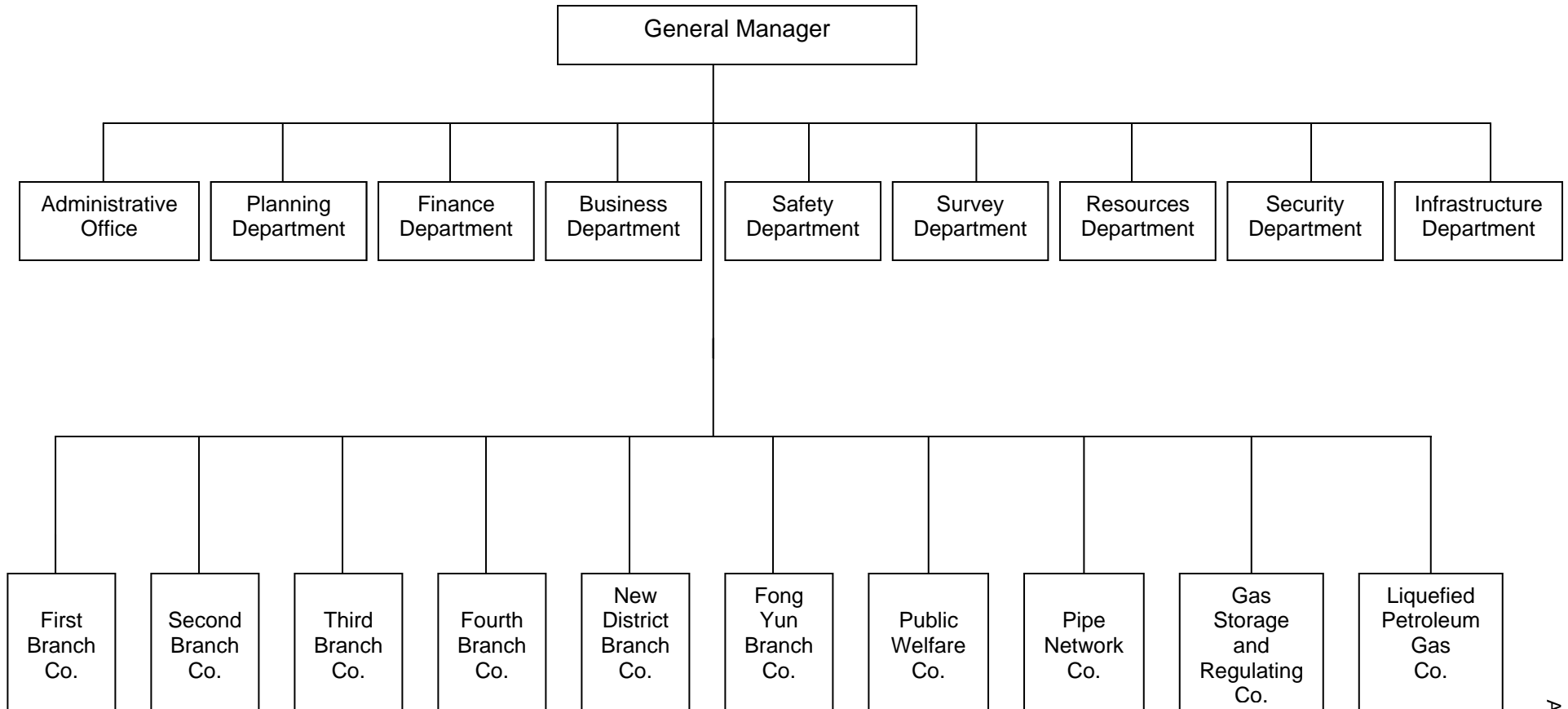
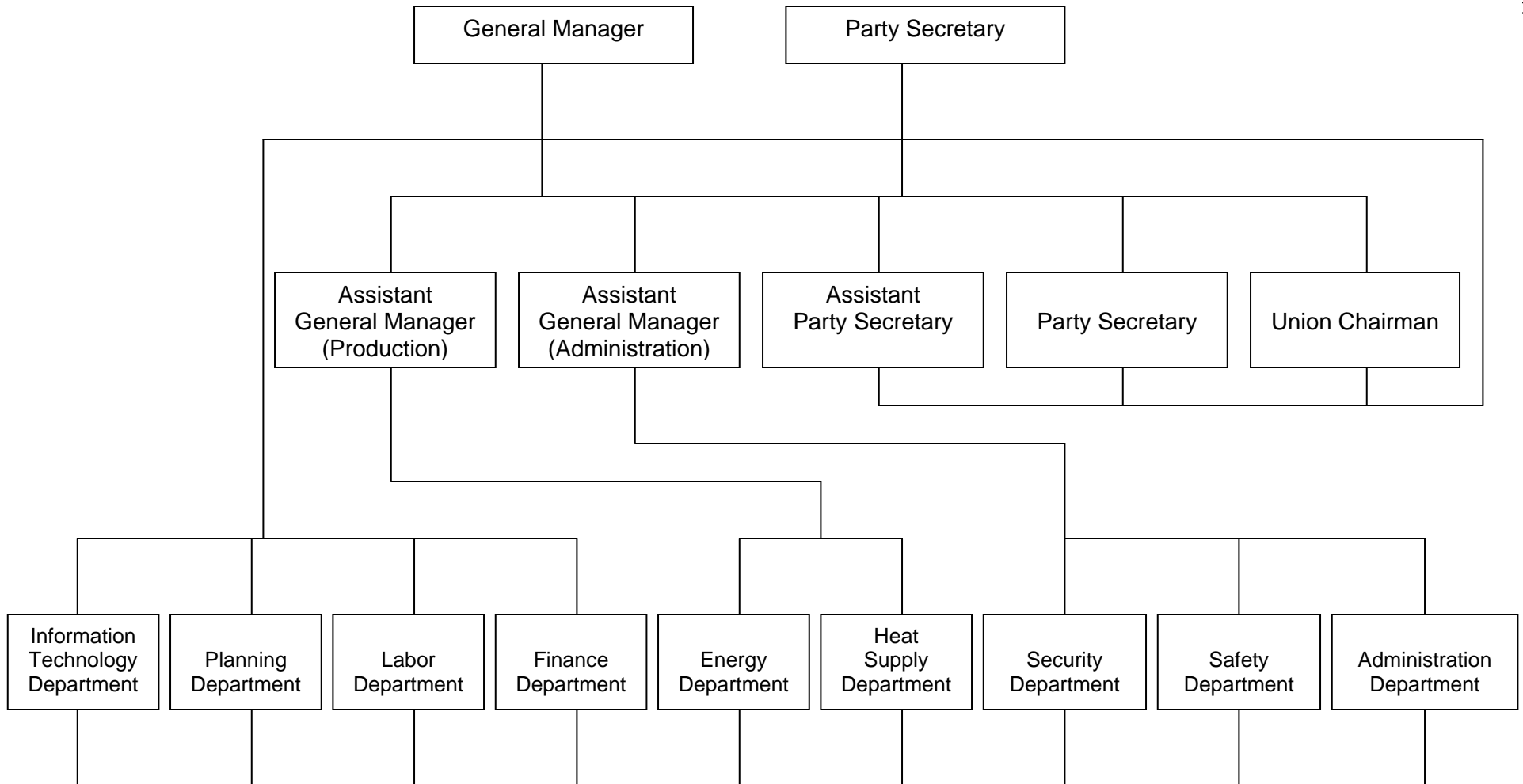


Figure A6.2: Subproject 2 – Tangshan Heating Power Corporation



**Figure A6.3: Subproject 3 – Tangshan No. 2 Porcelain Factory and
Subproject 4 – Tangshan No. 6 Ceramic Factory**

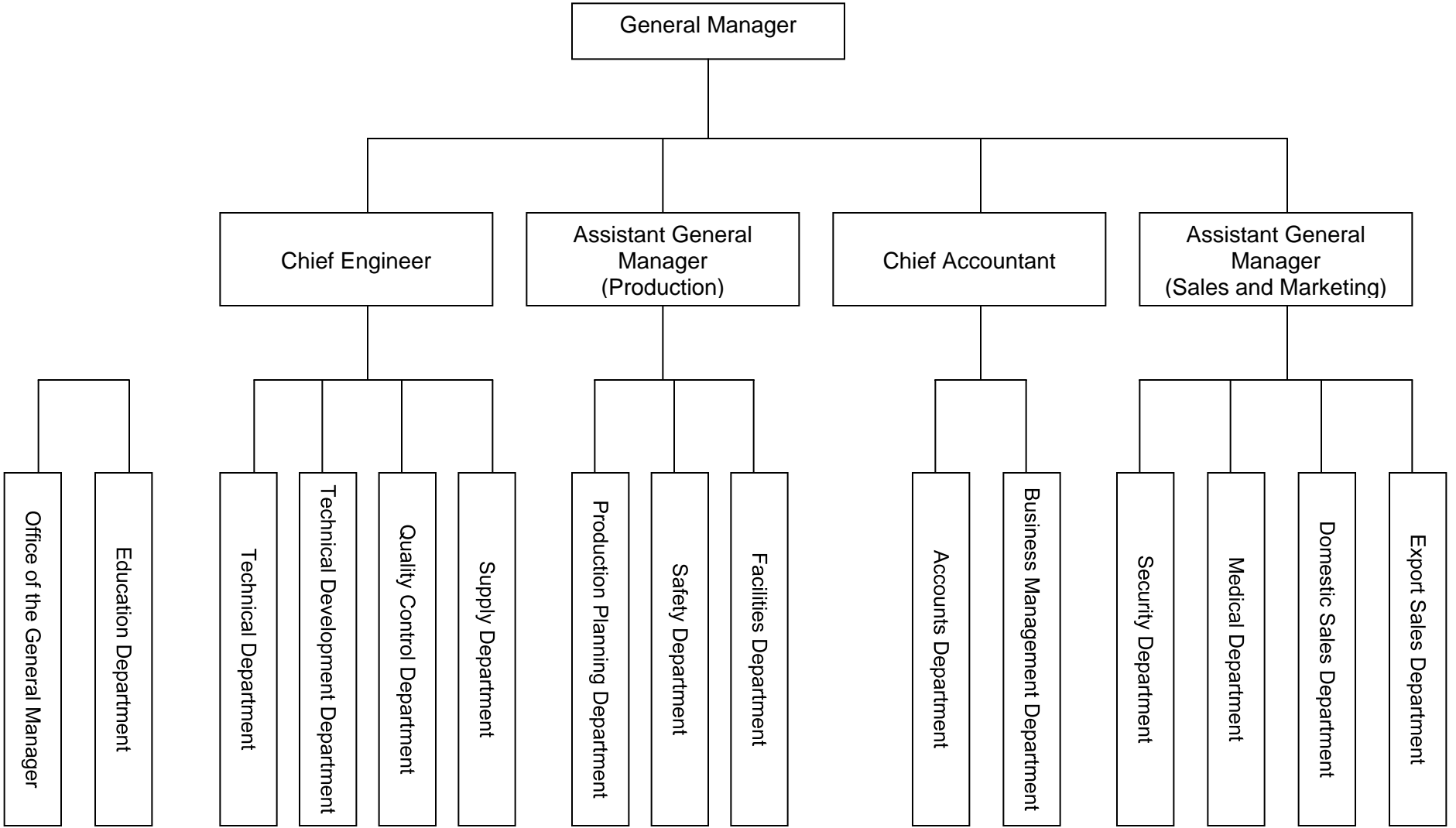


Figure A6.4: Subproject 6 – Tangshan Wastewater Treatment Company

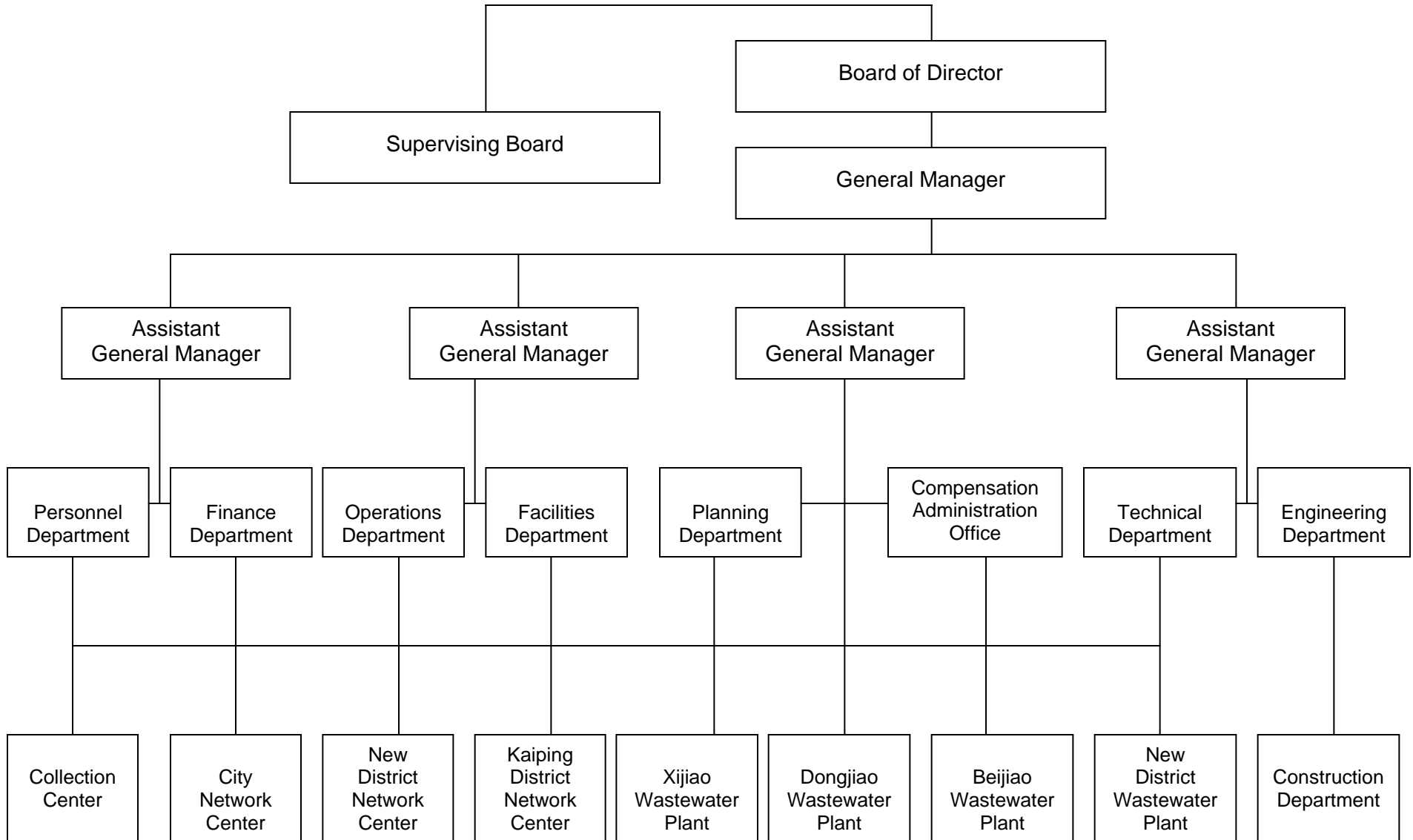
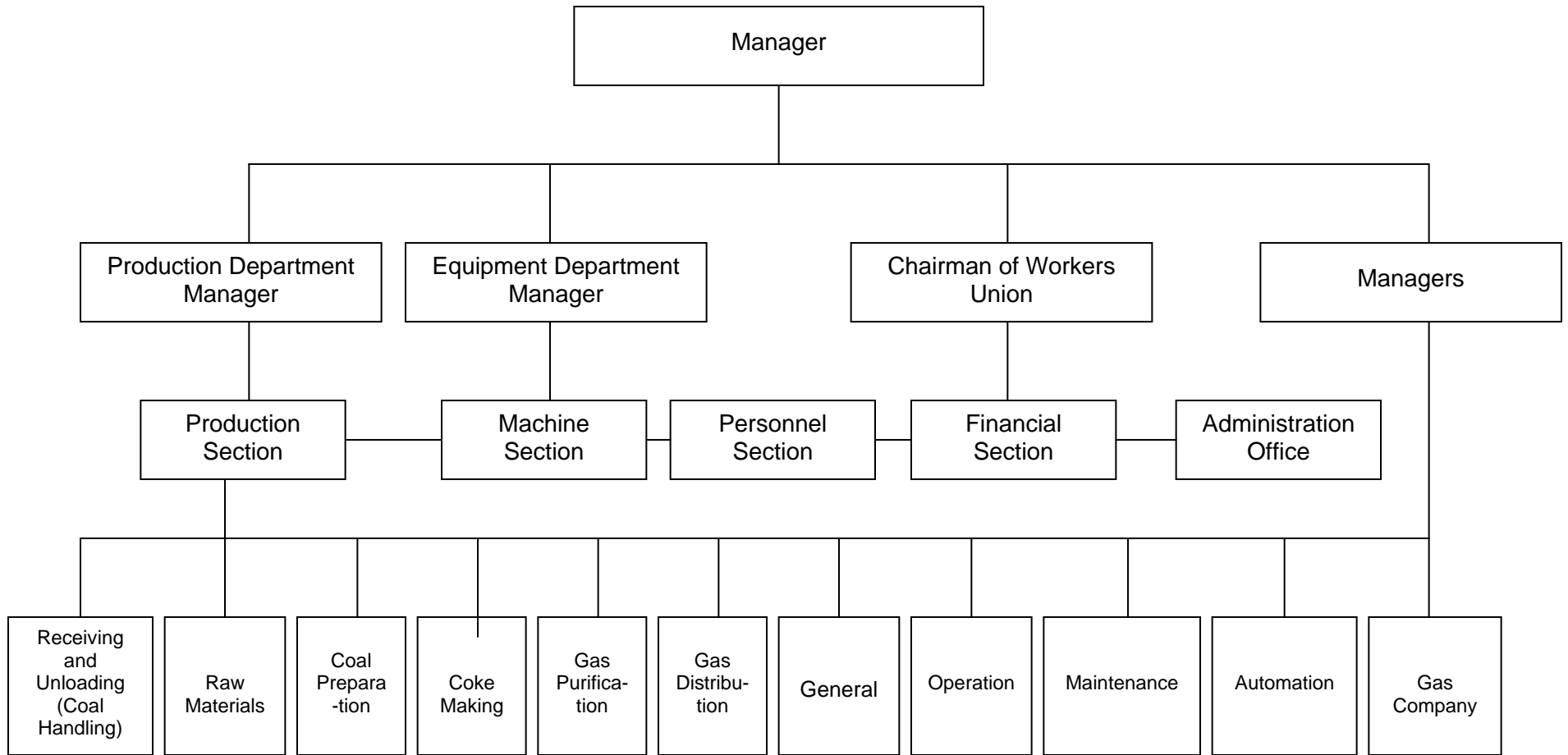


Figure A6.5: Subproject 7 – Chengde Coal Gas Company



COMPLIANCE WITH LOAN COVENANTS

| Covenant | Reference | Remarks |
|--|------------------------------------|---------------|
| Loan Effectiveness | | |
| 1. The Loan Agreement (LA) will be approved by the State Council of the Borrower. | LA, Section 6.01(a) | Complied with |
| 2. The subsidiary loan agreement will be duly executed and signed on behalf of the parties thereto and will become effective and binding on them. | LA, Section 6.01 (b) | Complied with |
| 3. Each of the project implementing agencies (PIAs) will have received Corporate business licenses or evidence satisfactory to ADB demonstrating the legal status of the PIAs. | LA, Section 6.01(c) | Complied with |
| Procurement | | |
| 4. Procurement of goods and services will be in accordance with ADB's <i>Guidelines for Procurement</i> . | LA, Schedule 4, para. 2 | Complied with |
| Consultants | | |
| 5. The selection and engagement of international consultants will be subject to ADB's <i>Guidelines on the Use of Consultants</i> . | LA, Schedule 5, para. 2 | Complied with |
| Execution of the Project | | |
| 6. TMG will maintain a Project Coordination Office (PCO) throughout the implementation period for subprojects 1 to 6 under the direct supervision of the first standing Vice Mayor of Tangshan. | LA, Schedule 6, para. 1 | Complied with |
| 7. CMG will maintain a PCO throughout the implementation period for subproject 7 under the direct supervision of the first Standing Vice Mayor of Chengde. | LA, Schedule 6, para. 2 | Complied with |
| Environment | | |
| 8. Each EA, through its Environmental Protection Bureau and each PIA will ensure that its component of the project is designed, implemented, operated and maintained in strict conformity with the Environmental Protection Law and with all applicable national and local environmental protection regulations and standards. | LA, Schedule 6, para. 4(a) and (c) | Complied with |

| Covenant | Reference | Remarks |
|---|--------------------------|---------------|
| <p>9. The Borrower and each EA will</p> <p>(a) implement the levy system provided under the Environmental Protection Law of 1989 on the basis of the "Polluter Pays Principle."</p> <p>(b) implement measures for the prompt collection of amounts levied against major polluters in Tangshan and Chengde; and</p> <p>(c) submit to ADB on an annual basis a statement of levies imposed and collected in the preceding year.</p> | LA, Schedule 6, para. 6 | Complied with |
| <p>10. The Borrower and each EA will ensure that measures agreed upon by ADB and each EA on the recommendation of the consultant engaged under TA 1916-PRC: Institutional Strengthening of the EPB at Tangshan and Chengde municipalities are implemented within the agreed time frame.</p> | LA, Schedule 6, para. 7 | Complied with |
| <p>11. The Borrower and Tangshan Municipal Government (TMG) will ensure that the Tangshan Victory Ceramic (Group) Company (i) will implement all necessary measures to bring about, by the beginning of 1998, a substantial reduction in the emission of pollutants from its existing facilities as well as any future expansion of its activities so as to make a significant contribution to the overall environmental improvement in the urban district in which it is located; and (ii) complies at all times, with improvement in the urban district in which it is located; and (ii) complies at all times, with all relevant environmental laws and regulations including reporting requirements to TMG.</p> | LA, Schedule 6, para. 8 | Complied with |
| Policy | | |
| <p>12. The Borrower will ensure that the price of coal in Tangshan and Chengde for domestic households, commercial establishments, and industrial enterprises is, at all times, decontrolled and based on market price.</p> | LA, Schedule 6, para. 10 | Complied with |

| Covenant | Reference | Remarks |
|--|---------------------------------|--|
| 13. The Borrower and each EA will not provide any subsidy or budgetary grant to any PIAs after 1993. | LA, Schedule 6, para. 11 | Not Complied with |
| 14. The Borrower will ensure that each PIA implements the Regulations on Transforming the Management Mechanism of State-owned industrial Enterprises issued in July 1992. | LA, Schedule 6, para. 12 | Complied with |
| 15. TMG and CMG will ensure utility enterprises set prices at levels that allow full recovery of operating and capital costs and provide an adequate return on investment or provide a regulatory framework for the determination of the final price of any utility in order to increase the efficiency and profitability of the utility enterprise and to ensure consumer protection. | LA, Schedule 6, para. 14 and 15 | Not complied with, as tariffs were kept low by the regulating board to encourage more users. |
| 16. The Borrower and each EA will permit the utility enterprises to sell any byproducts produced by them on a commercial basis. | LA, Schedule 6, para. 16 | Complied with |
| Financial | | |
| 17. Maintain at all times (i) a debt service ratio of not less than 1.3:1, and (ii) a debt-equity ratio of not higher than 70:30 except that in the 3 years following compilation of the Project the applicable debt-equity ratio will be 80:20. | PA, Section 2.17 | Not complied with as all seven enterprises were not generating sufficient revenue to meet these covenants. |
| Reports | | |
| 18. Each PIA will, for the first 5 years after the project facilities have reached full capacity, submit to ADB, on an annual basis a BME report. | LA, Schedule 6, para. 22 | Partly complied with |
| 19. Each PIA will carry out its components with diligence and efficiency, and in conformity with sound administrative, financial, engineering, environmental, and industrial practices. | PA, Section 2.01(a) | Complied with |
| 20. Each PIA will submit to ADB quarterly progress reports on the execution of the Project and on the operation and management of the project facilities. | PA, Section 2.08(b) | Complied with |

| Covenant | Reference | Remarks |
|--|---------------------|--------------------|
| <p>21. Promptly after physical completion of the Project, but in any event not later than 3 months thereafter or such later date as ADB may agree for this Project, each PIA will prepare and submit to ADB a report, in such form and in such detail as ADB reasonably requests, on the execution and initial operation of the Project, including its costs, the performance of the project enterprises of their obligations under the Project Agreement (PA), and the accomplishment of the purpose of the loan.</p> | PA, Section 2.08(d) | Delayed compliance |
| Accounts | | |
| <p>22. Each PIA will (i) maintain separate accounts for the subproject; (ii) have such accounts and related financial statements audited annually; and (iii) furnish ADB promptly after their preparation but in any event not later than 6 months after the close of the fiscal year certified copies of such audited accounts and financial statements and the report of the auditors, all in the English language.</p> | PA, Section 2.09 | Complied with |

LIST OF CONTRACT PACKAGES

| PCSS No. | Item | Mode of Procurement | Date of Contract | Contract Number | Contract Amount (\$) |
|---|--|---------------------|------------------|---------------------|----------------------|
| Subproject 1: Gas Supply and Distribution Network System | | | | | |
| 0001 | Consulting Services | Others | 21 Apr 94 | CCATGC-94011 | 45,521 |
| | Training | | | | 75,868 |
| 0010 | Steel pipes, steel plates, shape steel | ICB | 14 Jul 95 | CCNFA-S952286 | 3,201,216 |
| 0044 | Gas emergency welding and maintenance vehicles | IS | 27 Oct 95 | CHKFD-S953045 | 214,500 |
| 0045 | Gas detectors | IS | 18 Oct 95 | CHKFD-S953046 | 120,057 |
| 0046 | SCADA and computer Management system | IS | 18 Oct 95 | CCNFD-S954050 | 433,536 |
| 0047 | Gas Automatic and metric instruments | IS | 18 Oct 95 | CCNFD-S953044 | 173,725 |
| 0121 | Gas valve and gas pressure regulator | IS | 6 Apr 99 | CCNFC-S992066 | 93,450 |
| 0122 | Gas detection vehicle and portable electric treading | IS | 14 Apr 99 | CBEFC-S992067 | 154,734 |
| 0123 | Gas inspection instrument and equipment | IS | 6 Apr 99 | CUSFC-S992068 | 168,971 |
| 0124 | Gas and natural gas mixed equipment, gas maintenance | IS | 6 Aug 99 | CCNFC-S992190 | 248,327 |
| 0131 | Gas emergency welding and maintenance vehicles | IS | 22 Oct 99 | CHNFC-S992275 | 218,370 |
| 0132 | Steel pipes | IS | 22 Oct 99 | CCNFC-S992276 | 122,830 |
| Subproject 2: District Heating System | | | | | |
| 0002 | Consulting Services | Others | 12 Apr 94 | 94MMG-400(62)51FI | 288,906 |
| 0030 | Training | | | | 188,572 |
| 0021 | Hydraulic truck crane | IS | 26 Jul 95 | 95MMG-407(62)73US | 435,055 |
| 0022 | Loader and excavator | IS | 28 Jul 95 | 95MMG-407(62)74CN | 179,800 |
| 0023 | Welded steel pipes | ICB | 16 Aug 95 | 95MMG-407(62)71CN | 2,976,780 |
| 0024 | Seamless steel pipes | ICB | 16 Aug 95 | 95MMG-407(62)72CN | 266,998 |
| 0025 | Valves for pipeline | ICB | 24 Aug 95 | 95MMG-407(62)75HK | 491,380 |
| 0026 | Valves for substation | ICB | 24 Aug 95 | 95MMG-407(62)76HK | 1,721,530 |
| 0032 | Expansion joint | ICB | 6 Oct 95 | 95MMG-407(62)77CN | 400,234 |
| 0033 | Plate heat exchangers | ICB | 16 Oct 95 | 95MMG-407(62)79CN | 1,040,000 |
| 0034 | Circulating pump | ICB | 6 Oct 95 | 95MMG-407(62)78CN | 848,956 |
| 0035 | Fixed speed pump | ICB | 6 Oct 95 | 95MMG-407(62)80CN | 253,417 |
| 0036 | Variable speed pump | ICB | 6 Oct 95 | 95MMG-407(62)81CN | 550,173 |
| 0060 | Special engineering vehicles | IS | 1 Mar 96 | 96MMG-407(62)01HK | 261,978 |
| 0104 | Microcomputer-based dispatching and SCADA | IS | 22 Sep 97 | 97MMG-407(62)300DM | 165,632 |
| 0106 | Microcomputer-based SCADA Sys. (Pkg.14) | ICB | 5 Nov 97 | 97MMG-407(62) 301HK | 1,832,395 |
| 0107 | Valves | IS | 10 Jul 97 | 98DM01M6212905411 | 151,090 |
| 0108 | Water treatment equipment | IS | 22 Jul 98 | 98HK01M6215017412 | 375,090 |
| 0109 | Trash separator | IS | 22 Jul 98 | 98HK01M6215017413 | 357,161 |
| 0110 | Water filter | IS | 22 Jul 98 | 98CN01M6212905414 | 67,520 |
| 0111 | Steel Pipes | IS | 22 Jul 98 | 98CN01M6212901415 | 311,447 |
| 0112 | Expansion joints | IS | 22 Jul 98 | 98HK01M6215017416 | 649,955 |
| 0113 | Expansion joints | IS | 22 Jul 98 | 98HK01M6215017417 | 82,700 |
| 0119 | Cement (Package 2) | IS | 15 Apr 99 | 99CN01M6213101422 | 231,000 |
| 0120 | Steel bars (Package 1) | IS | 15 Apr 99 | 99HK01M6212901423 | 310,484 |
| 0125 | Data logger | IS | 23 Apr 99 | 99DMO1M6215402440 | 156,400 |
| Subproject 3: Coal Gasification Plants at Tangshan No. 2 Porcelain Factory/No. 6 Ceramic Factory | | | | | |
| 0004 | Consulting services | Others | 14 Aug 94 | CCACCC-940815 | 96,293 |
| 0008 | Architectural steel (round steel bars and mounting) | IS | 21 Feb 95 | CCNFA-S952039 | 195,550 |
| 0031 | Coal preparation section and gas producing section | ICB | 28 Sep 95 | CCNFD-S953004 | 1,365,416 |
| 0058 | Transport vehicles | IS | 20 Mar 96 | CUSFD-S963072 | 494,668 |
| 0059 | Production control and management equipment | IS | 20 Mar 96 | CUSFD-S953073 | 298,968 |
| Subproject 4: Reformation of Kilns at Tangshan No. 2 Porcelain Factory | | | | | |
| 0005 | Consulting Services | Others | 14 Aug 94 | CCA2PF-940815 | 31,255 |
| | Training | | | | 66,927 |
| 0008 | Architectural steel (round steel bars) and mounting | IS | 21 Feb 95 | CCMFA-S952039 | 282,640 |

| PCSS No. | Item | Mode of Procurement | Date of Contract | Contract Number | Contract Amount (\$) |
|----------|---|---------------------|------------------|-----------------|----------------------|
| 0012 | Kilns for high-grade domestic porcelain | ICB | 24 Jul 95 | CGBFA-S952290 | 3,555,600 |
| 0013 | Production equipment for domestic porcelain | ICB | 24 Jul 95 | CHKFA-S952294 | 829,920 |
| 0014 | Forming equipment for domestic porcelainwares | ICB | 31 Jul 95 | CDEFA-S952291 | 620,930 |
| 0075 | Double head roller forming machine | IS | 19 Sep 96 | CJPFDF-S963316 | 127,980 |
| 0076 | Forming and drying production line | ICB | 7 Mar 97 | CJPFDF-S970067 | 778,610 |

Subproject 5: Reformation of Kilns at Tangshan No. 6 Ceramic Factory

| | | | | | |
|------|--|--------|-----------|----------------|------------------|
| 0006 | Consulting services Training | Others | 14 Aug 94 | CCA6PF-940815 | 28,339 67,455 |
| 0011 | Vertical sanitaryware slip casting equipment | ICB | 1 Aug 95 | CDEFA-S952293 | 5,567,052 |
| 0015 | Tunnel kilns and supplementary equipment | ICB | 8 Aug 95 | CGBFA-S952292 | 3,610,369 |
| 0016 | Automatic electrostatic glaze spraying machine | ICB | 8 Aug 95 | CGBFA-S9523361 | 542,245 |
| 0101 | Technical service | DP | 11 Jun 97 | CCNFC-S972020 | 1,580,980 |
| 0133 | Resin mould | DP | 16 Nov 99 | Ceramic01 | 480,000 |
| 0137 | 2000 cu.m. gasholder | IS | 18 Apr 00 | ITC-951010A | 157,000 |
| 0138 | Shuttle kiln 30 cu m and accessories | IS | 7 May 00 | D11000508 | 430,000 |

Subproject 6: Tangshan Dongjiao Wastewater Treatment Plant

| | | | | | |
|------|--|--------|-----------|--------------------|-----------|
| 0009 | Consulting services | Others | 6 May 94 | 94MMG-400(62)61HK | 248,786 |
| 0094 | Overseas training | | 16 Jun 97 | 97MMG-407(62)251HK | 140,000 |
| 0017 | Loading and craning equipment | DP | 16 Aug 95 | 95MMG-407(62)57CN | 251,987 |
| 0018 | Penstock and valve | IS | 16 Aug 95 | 95MMG-407(62)56HK | 241,289 |
| 0019 | Cleaning equipment of wastewater pipeline | IS | 16 Aug 95 | 95MMG-407(62)55HK | 243,400 |
| 0020 | Timber | IS | 16 Aug 95 | 95MMG-407(62)54CN | 43,500 |
| 0027 | Sewage pretreatment equipment | ICB | 27 Jul 95 | 95MMG-407(62)51CN | 652,328 |
| 0028 | Mechanical equipment of oxidation ditch | ICB | 27 Jul 95 | 95MMG-407(62)52CN | 3,316,570 |
| 0029 | Sludge treatment and chlorination equipment | ICB | 27 Jul 95 | 95MMG-407(62)53CN | 753,400 |
| 0037 | Electrical equipment | ICB | 12 Oct 95 | 95MMG-407(62)60CN | 871,354 |
| 0038 | Spectrophotograph and other lab equipment | ICB | 12 Oct 95 | 95MMG-407(62)61CN | 56,239 |
| 0039 | Water quality testing equipment | ICB | 12 Oct 95 | 95MMG-407(62)62US | 286,249 |
| 0040 | Mobile water quality testing equipment | ICB | 12 Oct 95 | 95MMG-407(62)63US | 164,648 |
| 0041 | Measuring Instrument and control system | ICB | 12 Oct 95 | 95MMG-407(62)64US | 511,377 |
| 0042 | Cement | ICB | 10 Sep 95 | 95MMG-407(62)58CN | 654,120 |
| 0043 | Steel | ICB | 10 Sep 95 | 95MMG-407(62)59CN | 1,086,832 |
| 0115 | Steel | IS | 3 Feb 99 | 99CN01M6212901418 | 452,800 |
| 0116 | Steel | IS | 3 Feb 99 | 99CN01M6212901419 | 499,140 |
| 0117 | Cement | IS | 3 Feb 99 | 99CN01M6212901420 | 382,500 |
| 0118 | Cement | IS | 3 Feb 99 | 99CN01M6212901421 | 352,750 |
| 0126 | Sewage pre-treatment equipment (Pkg. No. 1) | ICB | 7 Sep 99 | 99HK01M6214914430 | 813,100 |
| 0127 | Mechanical equipment of oxidation ditch (Pkg. No. 2) | ICB | 7 Sep 99 | 99DN01M6215017431 | 3,071,820 |
| 0128 | Sludge treatment and Chlorinating equipment (Pkg. 3) | ICB | 7 Sep 99 | 99CN01M6214902432 | 888,287 |
| 0129 | Electrical equipment | ICB | 7 Sept 99 | 99CN01M6214902434 | 903,633 |
| 0130 | Equipment of Instrument, control system | ICB | 7 Sept 99 | 99CN01M6214902435 | 461,787 |
| 0134 | Chemical facilities and water pollution monitoring equipment | IS | 3 Mar 00 | 99CN01M6214902436 | 272,590 |
| 0135 | Loader and hoisting apparatus | IS | 3 Mar 00 | 99CN01M6214902437 | 291,098 |
| 0139 | Sanding winding glass steel pipes | ICB | 25 May 00 | 99CN01M6214902438 | 1,759,860 |
| 0140 | Pumps, electric equipment, and instruments | IS | 6 Jun 00 | 99CN01M6214902439 | 326,285 |

Subproject 7: Coal Gasification Plant at Chengde

| | | | | | |
|------|--|--------|-----------|---------------|-------------------|
| 0003 | Consulting Services Training | Others | 29 Mar 94 | 940329CCFC001 | 157,704 54,544 |
| 0007 | Licence and process design for gas treatment plant | Direct | 19 Dec 94 | CDEFA-S944717 | 608,929 |
| 0048 | Equipment for coal storage yard and spare parts | ICB | 29 Dec 95 | CCNFD-S954522 | 1,621,600 |
| 0049 | Supplemental equipment for coal storage yard | ICB | 29 Dec 95 | CCNFD-S954523 | 1,500,600 |
| 0050 | Exhauster | ICB | 29 Jan 96 | CDEFD-S963022 | 1,835,000 |

| PCSS No. | Item | Mode of Procurement | Date of Contract | Contract Number | Contract Amount (\$) |
|----------|--|---------------------|------------------|-----------------|----------------------|
| 0051 | Gas holder and spare parts | ICB | 9 Feb 96 | CCNFD-S963030 | 3,437,896 |
| 0052 | Oven Machinery and spare parts | ICB | 9 Feb 96 | CCNFD-S963031 | 2,591,125 |
| 0053 | Belt conveyor and spare parts | ICB | 9 Feb 96 | CCNFD-S963032 | 1,326,232 |
| 0054 | Coal preparation and spare parts | ICB | 9 Feb 96 | CCNFD-S963033 | 327,240 |
| 0055 | Equipment for coke making and screening | ICB | 9 Feb 96 | CCNFD-S963034 | 1,407,382 |
| 0056 | Refractory brick for coke oven and spare parts | ICB | 9 Feb 96 | CCNFD-S963035 | 2,084,195 |
| 0057 | Gas compressors | ICB | 9 Feb 96 | CCNFD-S963036 | 565,412 |
| 0061 | Special equipment - electrostatic tar precipitator | ICB | 24 May 96 | CCNFD-S963074 | 1,486,200 |
| 0062 | Materials for gas distribution (cast iron incl sparts) | ICB | 5 Jul 96 | CCNFD-S963226 | 1,787,200 |
| 0063 | Supply, delivery, and installation of non-standard equipment including spare parts | ICB | 5 Jul 96 | CCNFD-S963227 | 2,904,200 |
| 0064 | Transportation and machine repair shop | ICB | 30 Jun 96 | CCNFD-S963228 | 1,419,150 |
| 0065 | Pumps, etc. (general equipment) | ICB | 5 Jul 96 | CCNFD-S963229 | 444,950 |
| 0066 | Air compressors, refrigerators (Public utilities) | ICB | 4 Jul 96 | CCNFD-S963230 | 1,048,900 |
| 0067 | Cables and transformers (incl spare parts) | ICB | 5 Jul 96 | CCNFD-S963231 | 1,475,020 |
| 0068 | Construction/auxiliary reinforced bars (engineering mat) | ICB | 5 Jul 96 | CCNFD-S963232 | 2,900,000 |
| 0069 | Radio telemetering system | ICB | 5 Jul 96 | CCNFD-S963233 | 181,500 |
| 0070 | General electric equipment (switchgear cabinet) | ICB | 30 Jun 96 | CCNFD-S963234 | 898,310 |
| 0071 | PLC System | ICB | 30 Jun 96 | CCNFD-S963235 | 125,960 |
| 0072 | TDC 3000 and host computer | ICB | 30 Jun 96 | CUSFD-S963236 | 676,000 |
| 0073 | Transmitters, control valves, temperature sensor, etc. | ICB | 5 Jul 96 | CHKFD-S963237 | 1,370,660 |
| 0074 | Gasholder including spare parts | ICB | 30 Jun 96 | CCNFD-S963266 | 1,712,340 |
| 0077 | Equipment inside thawing room | IS | 4 Apr 97 | CCNFC-S970126 | 279,700 |
| 0078 | Weighing and metering equipment | IS | 4 Apr 97 | CCNFC-S970122 | 406,600 |
| 0079 | PLC automatic control system for raw materials | IS | 4 Apr 97 | CCNFC-S970123 | 170,000 |
| 0080 | Electrical equipment (Pkg. 8-7) | IS | 4 Apr 97 | CCNFC-S970132 | 339,360 |
| 0081 | Ventilation and Dedusting | IS | 4 Apr 97 | CCNFC-S970124 | 437,800 |
| 0082 | Steel tube (Pkg. 10-3) | IS | 4 Apr 97 | CCNFC-S970119 | 602,600 |
| 0083 | Steel plate (Pkg. 10-4) | IS | 4 Apr 97 | CCNFC-S970130 | 479,150 |
| 0084 | Steel pipe (Pkg. 10-5) | IS | 4 Apr 97 | CCNFC-S970120 | 592,800 |
| 0085 | Building materials (Pkg. 10-6) | IS | 4 Apr 97 | CCNFC-S970131 | 531,360 |
| 0086 | General valves (Pkg. 10-7) | IS | 4 Apr 97 | CCNFC-S970129 | 277,700 |
| 0087 | Supplemental Instrument (Pkg. 12) | IS | 4 Apr 97 | CCNFC-S970117 | 414,900 |
| 0088 | Telecommunication system | IS | 4 Apr 97 | CCNFC-S970115 | 165,940 |
| 0089 | Cable rack (Pkg 13-3) | IS | 4 Apr 97 | CCNFC-S970127 | 66,600 |
| 0090 | Analyzers | IS | 4 Apr 97 | CCNFC-S970128 | 183,400 |
| 0091 | Gas fan for mixing station (Pkg. 15) | IS | 4 Apr 97 | CCNFC-S970121 | 580,200 |
| 0092 | Equipment for maintenance (Pkg 8-3) | IS | 4 Apr 97 | CCNFC-S970118 | 163,100 |
| 0093 | Equipment for public utilities (Pkg. 11) | IS | 4 Apr 97 | CCNFC-S970125 | 414,500 |
| 0095 | Belt conveyor and auxiliary Device (Pkg 8-1 & 8-2) | ICB | 5 Jun 97 | CCNFC-S972006 | 1,228,800 |
| 0096 | Boiler and power equipment (Pkg. 17) | ICB | 4 Jun 97 | CCNFC-S972007 | 1,363,600 |
| 0097 | Gas valves (Pkg 10-1) | ICB | 10 Jun 97 | CCNFC-S972008 | 328,200 |
| 0098 | Supplementary cables (Package No. 13) | ICB | 5 Jun 97 | CCNFC-S972009 | 500,800 |
| 0099 | Household gas meter plus spare parts | ICB | 4 Jun 97 | CCNFC-S972010 | 341,600 |
| 0100 | Additional package for coking equipment | ICB | 4 Jun 97 | CCNFC-S972013 | 535,700 |
| 0102 | Branch pipe to gas users (Subpackage No. 10-8) | IS | 10 Jul 97 | CCNFC-S972052 | 495,600 |
| 0103 | Material for steel structure | IS | 10 Jul 97 | CCNFC-S972051 | 496,000 |
| 0105 | Special materials (Pkg No. 10-2) | IS | 7 Nov 97 | CCNFC-S972166 | 123,500 |
| 0114 | IC card for gas meter and spare parts (Pkg. 13-5) | IS | 20 Jul 98 | CCNFC-S982526 | 232,241 |

DP = direct purchase, ICB = international competitive bidding, IS = international shopping, SCADA = supervisory control and data acquisition.

AIR POLLUTION INDICES FROM 1988 TO 2001
(mg/cu m)

| | 1988–1992 Average | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 |
|---|------------------------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| Air Quality in Chengde Municipality | | | | | | | | | | |
| SO ₂ | 0.339 | — | — | — | — | 0.223 | 0.215 | 0.174 | 0.185 | 0.203 |
| TSP | 1.253 | — | — | — | — | 0.338 | 0.339 | 0.316 | 0.348 | 0.473 |
| NO _x | 0.060 | — | — | — | — | 0.043 | 0.039 | 0.045 | 0.044 | 0.055 |
| Air Quality in Tangshan Municipality | | | | | | | | | | |
| SO ₂ | 0.177 | 0.133 | 0.131 | 0.094 | 0.084 | 0.076 | 0.063 | — | 0.055 | 0.008 |
| TSP | 0.640 | 0.390 | 0.680 | 0.330 | 0.335 | 0.345 | 0.362 | — | 0.278 | 0.325 |
| NO _x | 0.051 | — | — | — | — | — | — | — | 0.034 | — |

mg/cu m = milligram per cubic meter, NO_x = nitrogen oxides, SO₂ = sulfur dioxide, TSP = total suspended particles.
Source: Tangshan Environmental Protection Bureau.

WASTEWATER ANALYSIS AT WASTEWATER TREATMENT PLANT

Table A10.1: Analysis at Dongjiao Wastewater Treatment Plant
(mg/l)

| Item | 1999 | | 2000 | | 2001 | |
|------|----------|----------|----------|----------|----------|----------|
| | Influent | Effluent | Influent | Effluent | Influent | Effluent |
| COD | 849 | 46.3 | 335 | 57.6 | 300 | 68.7 |
| BOD | 67.3 | 8.1 | 46.8 | 11.8 | 58.7 | 9.7 |
| SS | 874 | 37.7 | 536 | 26.7 | 569 | 27.6 |
| TP | 0.43 | — | — | — | — | — |
| TN | 10.5 | 8 | — | — | — | — |
| PH | — | 7.2 | — | 6.9 | — | 6.1 |

BOD = biological oxygen demand, COD = chemical oxygen demand, mg/l = milligrams per liter, pH = acidity value, SS = suspended solid, TN = total phosphorous.

Source: Tangshan Environmental Protection Bureau.

Table A10.2: Analysis at Beijiao Wastewater Treatment Plant
(mg/l)

| Item | 2001 | | 2002 (up to May) | |
|-----------------|----------|----------|------------------|----------|
| | Influent | Effluent | Influent | Effluent |
| COD | 370.6 | 58.1 | 383.9 | 31.8 |
| BOD | 164.1 | 16.3 | 161.6 | 5.8 |
| SS | 236.1 | 27.6 | 189.5 | 17.5 |
| NH ₃ | 23.7 | 2.3 | 47.2 | 4.4 |

BOD = biological oxygen demand, COD = chemical oxygen demand, mg/l = milligrams per liter, NH₃ = ammonia, pH = acidity value; SS = suspended solid TN = total nitrogen TP = total phosphorous.

Source: Tangshan Environmental Protection Bureau.

Table A10.3: Water Analysis At City Section Of Dou River
(mg/l except for pH)

| Item | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 (up to May) |
|------|------|-------|------|------|------|------|------|------|------|---------------------|
| pH | 7.99 | 7.87 | 7.89 | — | — | — | — | 7.72 | 7.09 | — |
| COD | 7.90 | 6.14 | 7.02 | — | — | 36.6 | 46.3 | 57.6 | 68.7 | 31.81 |
| BOD | 6.15 | 16.36 | 6.96 | — | — | 5.5 | 8.09 | 11.8 | 9.7 | 5.81 |
| SS | 28.8 | 74.7 | 16.2 | — | — | 29.7 | 37.7 | 26.7 | 27.6 | 17.5 |

BOD = biological oxygen demand, COD = chemical oxygen demand, mg/l = milligrams per liter, pH = acidity value, SS = suspended solid.

Source: Tangshan Environmental Protection Bureau.

FINANCIAL PERFORMANCE OF SUBPROJECT ENTERPRISES
Table A11.1: Financial Performance of Tangshan Gas Company ^a
(CNY '000)

| Item | Year Ending December 31 | | | | | | |
|---|-------------------------|----------------|----------------|----------------|----------------|----------------|----------------|
| | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 |
| INCOME STATEMENT | | | | | | | |
| Sales | 38,371 | 49,736 | 60,967 | 61,522 | 81,606 | 95,767 | 96,454 |
| Less: Cost of Sales | 35,002 | 42,838 | 50,926 | 53,987 | 64,690 | 81,540 | 83,648 |
| Operating Expenses | 5,046 | 7,022 | 9,769 | 11,614 | 15,024 | 16,955 | 19,151 |
| Operating Income | (1,677) | (124) | 272 | (4,080) | 1,892 | (2,729) | (6,344) |
| Less: Interest Expense (Income) | (901) | (1,583) | (998) | (2,461) | (594) | (1,825) | (1,467) |
| Nonoperating Income/(Expense) | 2,733 | 3,167 | 6,055 | 3,617 | 3,759 | 4,208 | 7,093 |
| Other Adjustments | 0 | 0 | 0 | 450 | (3,130) | 67 | 498 |
| Net Income Before Tax | 1,956 | 4,625 | 7,324 | 2,449 | 3,116 | 3,371 | 2,714 |
| Net Income After Tax | 1,956 | 4,625 | 7,324 | 1,641 | 2,088 | 2,258 | 1,818 |
| CASH-FLOW STATEMENT | | | | | | | |
| Net Income After Tax | 1,956 | 4,625 | 7,324 | 1,641 | 2,088 | 2,258 | 1,818 |
| Add: Depreciation | 5,664 | 7,039 | 5,402 | 5,758 | 7,055 | 13,639 | 10,567 |
| Internal Cash Generation | 7,620 | 11,664 | 12,727 | 7,399 | 9,143 | 15,897 | 12,386 |
| Borrowings | 42,602 | 18,906 | 10,767 | 12,207 | 31,982 | 17,164 | 1,592 |
| Other Local Sources | 2,161 | 11,476 | 4,136 | 1,739 | 1,884 | 92,709 | 9,285 |
| Total Sources of Funds | 52,383 | 42,046 | 27,629 | 21,345 | 43,009 | 125,771 | 23,263 |
| Capital Expenditures | 36,389 | 52,944 | 28,004 | 27,481 | 29,572 | 17,289 | 22,967 |
| Debt Service | 1,956 | 4,625 | 7,324 | 1,641 | 10,289 | 8,208 | 7,090 |
| Changes in Working Capital and Others | 14,429 | (28,715) | (22,894) | (9,018) | (21,671) | 81,692 | (245) |
| Total Application of Funds | 52,775 | 28,854 | 12,435 | 20,103 | 18,191 | 107,190 | 29,813 |
| Changes in Cash | (392) | 13,191 | 15,194 | 1,241 | 24,819 | 18,581 | (6,550) |
| Cash Balance, Beg. of Year | 7,986 | 7,594 | 20,786 | 35,980 | 37,221 | 62,040 | 80,621 |
| Cash Balance, End of Year | 7,594 | 20,786 | 35,980 | 37,221 | 62,040 | 80,621 | 74,072 |
| BALANCE SHEET | | | | | | | |
| Current Assets | 53,092 | 46,281 | 83,888 | 74,214 | 107,054 | 162,416 | 171,966 |
| Cash and Deposits | 7,594 | 20,786 | 35,980 | 37,221 | 62,040 | 80,621 | 74,072 |
| Accounts Receivable | 11,122 | 11,073 | 25,779 | 17,437 | 18,158 | 37,161 | 37,260 |
| Inventories | 26,589 | 7,250 | 15,882 | 19,309 | 21,310 | 37,383 | 43,741 |
| Others | 7,787 | 7,172 | 6,247 | 246 | 5,547 | 7,252 | 16,894 |
| Net Fixed Assets | 55,953 | 53,378 | 50,570 | 53,170 | 115,530 | 125,937 | 166,300 |
| Plant in Service | 110,712 | 115,176 | 117,770 | 126,128 | 195,543 | 219,590 | 270,520 |
| Less: Accumulated Depreciation | 54,759 | 61,798 | 67,200 | 72,958 | 80,013 | 93,652 | 104,220 |
| Construction in Progress | 41,025 | 89,408 | 113,373 | 132,407 | 92,681 | 76,888 | 45,462 |
| Long-Term Investments | 49 | 148 | 620 | 681 | 627 | 766 | 3,766 |
| Other Assets | 0 | 0 | 972 | 1,000 | 938 | 815 | 1,278 |
| Total Assets | 150,120 | 189,213 | 249,423 | 261,472 | 316,829 | 366,822 | 388,772 |
| Current Liabilities | 7,033 | 15,745 | 61,051 | 59,155 | 86,875 | 122,054 | 135,358 |
| Accounts Payable | 2,845 | 1,990 | 11,955 | 11,062 | 4,912 | 9,856 | 6,270 |
| Short-Term Loans | 0 | 0 | 0 | 5,000 | 0 | 15,000 | 15,000 |
| Others | 4,188 | 13,754 | 49,096 | 43,093 | 81,963 | 97,198 | 114,088 |
| Long-term Debt | 69,391 | 88,297 | 99,064 | 111,271 | 137,023 | 62,887 | 61,179 |
| Equity | 73,696 | 85,172 | 89,307 | 91,047 | 92,931 | 181,882 | 192,235 |
| Paid-In Capital | 68,070 | 68,070 | 68,070 | 68,070 | 68,070 | 76,979 | 76,979 |
| Surplus, Reserves and Retained Earnings | 5,626 | 17,101 | 21,237 | 22,976 | 24,861 | 104,903 | 115,256 |
| Total Liabilities and Equity | 150,120 | 189,213 | 249,423 | 261,472 | 316,829 | 366,822 | 388,772 |
| Financial Indicators | | | | | | | |
| Debt Service Coverage Ratio (times) | 3.90 | 2.52 | 1.74 | 4.51 | 0.89 | 1.94 | 1.75 |
| Debt/Debt plus Equity (% Debt) | 48 | 51 | 53 | 55 | 60 | 26 | 24 |

^a Accounts are for the combined operations of the company. Cash-flow statements were reconstructed from available accounts.

Table A11.2: Financial Performance of Tangshan Heating Power Company^a
(CNY '000)

| Item | Year Ending December 31 | | | | | | |
|---|-------------------------|----------------|----------------|----------------|----------------|----------------|----------------|
| | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 |
| INCOME STATEMENT | | | | | | | |
| Sales | 86,710 | 86,940 | 101,630 | 102,330 | 146,280 | 159,720 | 167,860 |
| Less: Cost of Sales | 83,990 | 80,940 | 93,170 | 99,790 | 136,030 | 145,460 | 153,770 |
| Operating Expenses | 6,580 | 6,800 | 9,800 | 11,080 | 14,840 | 13,830 | 15,190 |
| Operating Income | (3,860) | (800) | (1,340) | (8,540) | (4,590) | 430 | (1,100) |
| Less: Interest Expense (Income) | (1,310) | (1,450) | (1,820) | (3,260) | (2,100) | (1,940) | (1,480) |
| Nonoperating Income/(Expense) | 4,040 | 4,190 | 3,790 | 5,860 | 5,070 | (460) | 2,050 |
| Other Adjustments | 1,740 | 0 | 0 | 30 | 0 | 0 | 0 |
| Net Income Before Tax | 3,230 | 4,840 | 4,270 | 610 | 2,580 | 1,910 | 2,430 |
| Net Income After Tax | 2,740 | 3,240 | 2,860 | 420 | 1,620 | 1,280 | 560 |
| CASH-FLOW STATEMENT | | | | | | | |
| Net Income After Tax | 2,740 | 3,240 | 2,860 | 420 | 1,620 | 1,280 | 560 |
| Add: Depreciation | 11,350 | 10,110 | 14,910 | 6,979 | 38,416 | 29,221 | 28,551 |
| Internal Cash Generation | 14,090 | 13,350 | 17,770 | 7,399 | 40,036 | 30,501 | 29,111 |
| Borrowings | 8,920 | 3,790 | 12,640 | 62,530 | 264,140 | 5,940 | 0 |
| Other Local Sources | 20 | 6,280 | (7,170) | 6,420 | 0 | 0 | 0 |
| Total Sources of Funds | 23,030 | 23,420 | 23,240 | 76,349 | 304,176 | 36,441 | 29,111 |
| Capital Expenditures | 47,270 | 73,188 | 32,700 | 61,457 | 300,226 | 38,218 | 11,051 |
| Debt Service | 0 | 6,180 | 2,020 | 18,000 | 40,323 | 18,072 | 19,035 |
| Changes in Working Capital and Others | (26,490) | (69,038) | (19,970) | (15,928) | (109,903) | (17,529) | (15,745) |
| Total Application of Funds | 20,780 | 10,330 | 14,750 | 63,529 | 230,646 | 38,761 | 14,341 |
| Changes in Cash | 2,250 | 13,090 | 8,490 | 12,820 | 73,530 | (2,320) | 14,770 |
| Cash Balance, Beg. of Year | 11,760 | 14,010 | 27,100 | 35,590 | 48,410 | 121,940 | 119,620 |
| Cash Balance, End of Year | 14,010 | 27,100 | 35,590 | 48,410 | 121,940 | 119,620 | 134,390 |
| BALANCE SHEET | | | | | | | |
| Current Assets | 95,930 | 133,430 | 163,890 | 144,200 | 168,900 | 208,330 | 239,350 |
| Cash and Deposits | 14,010 | 27,100 | 35,590 | 48,410 | 121,940 | 119,620 | 134,390 |
| Accounts Receivable | 7,330 | 8,620 | 2,040 | 7,580 | 4,360 | 3,030 | 1,730 |
| Inventories | 8,550 | 16,420 | 17,960 | 14,360 | 12,240 | 13,670 | 16,940 |
| Others | 66,040 | 81,290 | 108,300 | 73,850 | 30,360 | 72,010 | 86,290 |
| Net Fixed Assets | 121,960 | 168,120 | 151,410 | 157,570 | 420,880 | 387,860 | 360,490 |
| Plant in Service | 122,220 | 168,710 | 152,380 | 159,050 | 423,060 | 390,600 | 363,850 |
| Less: Accumulated Depreciation | 260 | 590 | 970 | 1,480 | 2,180 | 2,740 | 3,360 |
| Construction in Progress | 23,720 | 1,370 | 1,720 | 3,700 | 2,550 | 5,390 | 15,300 |
| Other Assets | 1,550 | 1,570 | 1,450 | 1,480 | 1,130 | 1,110 | 1,070 |
| Total Assets | 243,160 | 304,490 | 318,470 | 306,950 | 593,460 | 602,690 | 616,210 |
| Current Liabilities | 56,650 | 110,850 | 118,520 | 117,630 | 173,240 | 185,310 | 208,880 |
| Accounts Payable | 310 | 220 | 740 | 490 | 710 | 240 | 220 |
| Short-Term Loans | 0 | 17,600 | 19,200 | 0 | 0 | 0 | 0 |
| Others | 56,340 | 93,030 | 98,580 | 117,140 | 172,530 | 185,070 | 208,660 |
| Long-Term Debt | 30,350 | 34,140 | 46,780 | 29,310 | 259,650 | 255,780 | 251,530 |
| Equity | 156,160 | 159,500 | 153,170 | 160,010 | 160,570 | 161,600 | 155,800 |
| Paid-in Capital | 145,410 | 151,690 | 144,520 | 150,940 | 150,940 | 150,940 | 150,940 |
| Surplus, Reserves and Retained Earnings | 10,750 | 7,810 | 8,650 | 9,070 | 9,630 | 10,660 | 4,860 |
| Total Liabilities and Equity | 243,160 | 304,490 | 318,470 | 306,950 | 593,460 | 602,690 | 616,210 |
| Financial Indicators | | | | | | | |
| Debt Service Coverage Ratio (times) | - | 2.16 | 8.80 | 0.41 | 0.99 | 1.69 | 1.53 |
| Debt / Debt plus Equity (% Debt) | 16 | 18 | 23 | 15 | 62 | 61 | 62 |

^a Accounts are for the combined operations of the company. Cash-flow statements were reconstructed from available accounts.
Source: Tangshan Heating Power Company.

Table A11.3: Financial Performance of Tangshan No. 6 Ceramic Factory ^a
(CNY '000)

| Item | Year Ending December 31 | | | | | | |
|---|-------------------------|---------------|----------------|----------------|----------------|-----------------|-----------------|
| | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 |
| INCOME STATEMENT | | | | | | | |
| Sales | 18,147 | 18,147 | 21,647 | 26,827 | 26,382 | 19,158 | 7,003 |
| Less: Cost of Sales | 9,636 | 11,194 | 11,980 | 18,876 | 29,737 | 27,596 | 10,738 |
| Operating Expenses | 8,309 | 8,309 | 6,882 | 9,477 | 11,918 | 11,485 | 11,050 |
| Operating Income | 201 | (1,357) | 2,785 | (1,525) | (15,274) | (19,923) | (14,784) |
| Less: Interest Expense (Income) | 0 | 1,840 | 1,535 | 1,486 | 13,020 | 10,310 | 6,969 |
| Nonoperating Income/(Expense) | 0 | 253 | 32 | 31 | 13 | (576) | 608 |
| Other Adjustments | 0 | 3,096 | 49 | 184 | 25,286 | (46,804) | 0 |
| Net Income Before Tax | 201 | 152 | 1,331 | (2,796) | (2,995) | (77,613) | (21,146) |
| Net Income After Tax | 201 | 152 | 1,331 | (2,796) | (2,995) | (77,613) | (21,146) |
| CASH-FLOW STATEMENT | | | | | | | |
| Net Income After Tax | 201 | 152 | 1,331 | (2,796) | (2,995) | (77,613) | (21,146) |
| Add: Depreciation | 3,665 | 8,423 | 634 | 3,225 | 2,476 | 9,668 | 5,067 |
| Interest Expense | 0 | 1,840 | 1,535 | 1,486 | 13,020 | 10,310 | 6,969 |
| Internal Cash Generation | 3,866 | 10,415 | 3,500 | 1,915 | 12,502 | (57,635) | (9,109) |
| Borrowings | 6,437 | 10,411 | 900 | 5,326 | 60,000 | 62,900 | 66,168 |
| Other Local Sources | 14,227 | 19,548 | 0 | 100 | 1,191 | 59,830 | (59,128) |
| Total Sources of Funds | 24,531 | 40,373 | 4,400 | 7,341 | 73,692 | 65,095 | (2,069) |
| Capital Expenditures | 96,499 | 41,072 | 16,546 | 3,019 | 60,419 | 109,061 | 0 |
| Debt Service | 14,263 | 12,390 | 1,535 | 0 | 5,463 | 8,012 | 10,015 |
| Changes in Working Capital and Others | (86,230) | (14,243) | (14,045) | 5,183 | 7,587 | (53,819) | (10,967) |
| Total Application of Funds | 24,531 | 39,219 | 4,036 | 8,202 | 73,469 | 63,254 | (952) |
| Changes in Cash | 0 | 1,154 | 364 | (861) | 223 | 1,841 | (1,117) |
| Cash Balance, Beg. of Year | 0 | 0 | 1,154 | 1,518 | 657 | 880 | 2,721 |
| Cash Balance, End of Year | 0 | 1,154 | 1,518 | 657 | 880 | 2,721 | 1,604 |
| BALANCE SHEET | | | | | | | |
| Current Assets | 18,006 | 26,185 | 52,558 | 66,123 | 73,395 | 39,720 | 39,459 |
| Cash and Deposits | 0 | 1,154 | 1,518 | 657 | 880 | 2,721 | 1,604 |
| Accounts Receivable | 9,889 | 13,612 | 17,118 | 15,817 | 13,377 | 13,597 | 12,657 |
| Inventories | 6,498 | 3,091 | 620 | 791 | 3,766 | 9,787 | 15,237 |
| Others | 1,619 | 8,327 | 33,302 | 48,858 | 55,373 | 13,615 | 9,961 |
| Net Fixed Assets | 27,217 | 46,120 | 45,503 | 42,278 | 99,694 | 150,453 | 139,933 |
| Plant in Service | 46,794 | 74,120 | 74,137 | 74,137 | 134,029 | 194,456 | 189,003 |
| Less: Accumulated Depreciation | 19,577 | 28,000 | 28,634 | 31,859 | 34,335 | 44,003 | 49,071 |
| Construction in Progress | 2,739 | 15,397 | 12,610 | 15,628 | 16,155 | 64,789 | 57,337 |
| Long-Term Investments | 13 | 106 | 106 | 106 | 106 | 106 | 4,587 |
| Other Assets | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Total Assets | 47,974 | 87,808 | 110,777 | 124,136 | 189,351 | 255,068 | 241,315 |
| Current Liabilities | 19,522 | 39,795 | 60,533 | 71,262 | 78,281 | 98,882 | 100,825 |
| Accounts Payable | 3,548 | 2,498 | 4,570 | 5,778 | 5,541 | 19,377 | 19,102 |
| Short-Term Loans | 0 | 12,710 | 12,340 | 16,911 | 17,113 | 25,164 | 25,216 |
| Others | 15,973 | 24,587 | 43,623 | 48,573 | 55,628 | 54,341 | 56,507 |
| Long-Term Debt | 5,797 | 5,658 | 6,558 | 11,884 | 71,884 | 134,784 | 199,362 |
| Equity | 22,655 | 42,355 | 43,686 | 40,989 | 39,185 | 21,402 | (58,872) |
| Paid-In Capital | 29,310 | 14,818 | 26,600 | 26,600 | 27,100 | 86,930 | 27,800 |
| Surplus, Reserves and Retained Earnings | (6,655) | 27,537 | 17,086 | 14,389 | 12,085 | (65,528) | (86,672) |
| Total Liabilities and Equity | 47,974 | 87,808 | 110,777 | 124,136 | 189,351 | 255,068 | 241,315 |
| Financial Indicators | | | | | | | |
| Debt Service Coverage Ratio (times) | 0.27 | 0.84 | 2.28 | — | 2.29 | (7.19) | (0.91) |
| Debt/Debt plus Equity (% Debt) | 20 | 12 | 13 | 22 | 65 | 86 | 142 |

^a Accounts are for the combined operations of the company. Cash-flow statements were reconstructed from available accounts.

Table A11.4: Financial Performance of Tangshan No. 2 Porcelain Factory^a
(CNY '000)

| Item | Year Ending December 31 | | |
|---|-------------------------|-----------------|----------------|
| | 1999 | 2000 | 2001 |
| INCOME STATEMENT | | | |
| Sales | 3,909 | 4,175 | 788 |
| Less: Cost of Sales | 3,983 | 5,154 | 1,241 |
| Operating Expenses | 7,743 | 3,309 | 2,616 |
| Operating Income | (7,817) | (4,288) | (3,069) |
| Less: Interest Expense (Income) | 6,147 | 7,413 | 5,111 |
| Nonoperating Income/(Expense) | 29 | (927) | (1,006) |
| Other Adjustments | 164 | (25,717) | 346 |
| Net Income Before Tax | (13,771) | (38,345) | (8,840) |
| Net Income After Tax | (13,771) | (38,345) | (8,840) |
| CASH FLOW STATEMENT | | | |
| Net Income After Tax | (13,771) | (38,345) | (8,840) |
| Add: Depreciation | 6,233 | 6,728 | 2,446 |
| Interest Expense | 6,147 | 7,413 | 5,111 |
| Internal Cash Generation | (1,391) | (24,205) | (1,283) |
| Borrowings | 15,940 | 651 | 49,944 |
| Other Local Sources | (10,632) | 62,160 | (54,130) |
| Total Sources of Funds | 3,916 | 38,606 | (5,469) |
| Capital Expenditures | 2,002 | (25,159) | (9,664) |
| Debt Service | 6,147 | 7,413 | 5,119 |
| Changes in Working Capital and Other Assets | (3,611) | 56,469 | (546) |
| Total Application of Funds | 4,538 | 38,722 | (5,091) |
| Changes in Cash | (622) | (116) | (378) |
| Cash Balance, Beg. of Year | 1,324 | 702 | 585 |
| Cash Balance, End of Year | 702 | 585 | 207 |
| BALANCE SHEET | | | |
| Current Assets | 14,959 | 8,520 | 11,456 |
| Cash and Deposits | 702 | 585 | 207 |
| Accounts Receivable | 879 | 196 | 1,059 |
| Inventories | 12,314 | 6,300 | 5,289 |
| Others | 1,065 | 1,439 | 4,900 |
| Net Fixed Assets | 136,852 | 124,348 | 115,865 |
| Plant in Service | 150,828 | 145,052 | 139,016 |
| Less: Accumulated Depreciation | 13,977 | 20,705 | 23,151 |
| Construction in Progress | 8,666 | 2,767 | 0 |
| Long-Term Investments | 10,606 | 10,604 | 10,604 |
| Other Assets | 21,763 | 8,280 | 7,420 |
| Total Assets | 192,846 | 154,520 | 145,346 |
| Current Liabilities | 25,934 | 11,693 | 15,553 |
| Accounts Payable | 4,569 | 4,239 | 2,031 |
| Short-Term Loans | 7,420 | 8 | 8,160 |
| Others | 13,945 | 7,446 | 5,361 |
| Long-Term Debt | 128,117 | 80,218 | 130,154 |
| Equity | 38,795 | 62,609 | (361) |
| Paid-in Capital | 20,634 | 82,794 | 28,664 |
| Surplus, Reserves and Retained Earnings | 18,161 | (20,185) | (29,025) |
| Total Liabilities and Equity | 192,846 | 154,520 | 145,346 |
| Financial Indicators: | | | |
| Debt Service Coverage Ratio (times) | (0.23) | (3.27) | (0.25) |
| Debt / Debt plus Equity (% Debt) | 77 | 56 | 100 |

^a Accounts are for the combined operations of the company. Cash-flow statements were reconstructed from available accounts.
Source: Tangshan No.2 Porcelain Factory.

Table A11.5: Financial Performance of Tangshan Wastewater Treatment Plant^a
(CNY '000)

| Item | Year Ending December 31 | | | |
|---|-------------------------|----------------|----------------|-----------------|
| | 1998 | 1999 | 2000 | 2001 |
| INCOME STATEMENT | | | | |
| Sales | 27,118 | 28,445 | 34,564 | 43,820 |
| Less: Cost of Sales | 19,965 | 20,329 | 32,000 | 40,685 |
| Operating Expenses | 6,430 | 7,557 | 3,913 | 6,732 |
| Operating Income | 723 | 560 | (1,349) | (3,598) |
| Less: Interest Expense (Income) | (23) | 14 | (2) | 9 |
| Nonoperating Income/(Expense) | 0 | (24) | 2,048 | 3,854 |
| Other Adjustments | 0 | 0 | 0 | 1 |
| Net Income Before Tax | 746 | 521 | 700 | 248 |
| Net Income After Tax | 500 | 349 | 469 | 166 |
| CASH FLOW STATEMENT | | | | |
| Net Income After Tax | 500 | 349 | 469 | 166 |
| Add: Depreciation | 6,322 | 6,660 | 9,887 | 9,970 |
| Internal Cash Generation | 6,822 | 7,009 | 10,356 | 10,136 |
| Borrowings | 70,195 | 1,480 | 71,660 | 20,890 |
| Other Local Sources | 79,235 | 7 | 1,201 | 294 |
| Total Sources of Funds | 156,252 | 8,496 | 83,217 | 31,320 |
| Capital Expenditures | 144,481 | 56,869 | 134,761 | 50,465 |
| Debt Service | 50 | 7,785 | 18,577 | 16,054 |
| Changes in Working Capital and Other Assets | 10,383 | (58,864) | (86,410) | (18,722) |
| Total Application of Funds | 154,913 | 5,791 | 66,928 | 47,797 |
| Changes in Cash | 1,339 | 2,705 | 16,289 | (16,476) |
| Cash Balance, Beg. of Year | 0 | 1,339 | 4,045 | 20,333 |
| Cash Balance, End of Year | 1,339 | 4,045 | 20,333 | 3,857 |
| BALANCE SHEET | | | | |
| Current Assets | 14,328 | 24,326 | 55,846 | 36,617 |
| Cash and Deposits | 1,339 | 4,045 | 20,333 | 3,857 |
| Accounts Receivable | 5,245 | 9,622 | 14,698 | 9,354 |
| Inventories | 204 | 540 | 591 | 666 |
| Others | 7,540 | 10,120 | 20,224 | 22,740 |
| Net Fixed Assets | 137,737 | 132,271 | 224,692 | 216,621 |
| Plant in Service | 144,060 | 145,254 | 247,561 | 249,460 |
| Less: Accumulated Depreciation | 6,322 | 12,983 | 22,869 | 32,839 |
| Construction in Progress | 181 | 10,846 | 43,321 | 88,823 |
| Long-Term Investments | 158 | 538 | 538 | 3,621 |
| Other Assets | 82 | 62 | 42 | 21 |
| Total Assets | 152,487 | 168,044 | 324,438 | 345,703 |
| Current Liabilities | 2,607 | 16,566 | 107,139 | 111,470 |
| Accounts Payable | 190 | 297 | 139 | 263 |
| Short-Term Loans | 0 | 7,000 | 1,000 | 1,000 |
| Others | 2,416 | 9,269 | 106,000 | 110,207 |
| Long-Term Debt | 70,195 | 71,675 | 136,855 | 153,495 |
| Equity | 79,685 | 79,803 | 80,444 | 80,738 |
| Paid-in Capital | 72,485 | 72,485 | 72,485 | 72,485 |
| Surplus, Reserves and Retained Earnings | 7,200 | 7,318 | 7,959 | 8,253 |
| Total Liabilities and Equity | 152,487 | 168,044 | 324,438 | 345,703 |
| Financial Indicators | | | | |
| Debt Service Coverage Ratio (times) | 136.55 | 0.90 | 0.56 | 0.63 |
| Debt / Debt plus Equity (% Debt) | 47 | 47 | 63 | 66 |

^a Accounts are for the combined operations of the company. Cash-flow statements were reconstructed from available accounts.
Source: Tangshan Wastewater Treatment Plant.

Table A11.6: Financial Performance of Chengde Coal Gas Company ^a
(CNY '000)

| Item | Year Ending December 31 | |
|---|-------------------------|------------------|
| | 2000 | 2001 |
| INCOME STATEMENT | | |
| Sales | 395,342 | 477,144 |
| Less: Cost of Sales | 398,071 | 444,664 |
| Operating Expenses | 8,957 | 12,168 |
| Operating Income | (11,686) | 20,313 |
| Less: Interest Expense (Income) | 36,170 | 23,561 |
| Nonoperating Income/(Expense) | (161) | (179) |
| Other Adjustments | (15,357) | (678) |
| Net Income Before Tax | (63,374) | (4,106) |
| Net Income After Tax | (63,374) | (4,106) |
| CASH-FLOW STATEMENT | | |
| Net Income After Tax | (63,374) | (4,106) |
| Add: Depreciation | 20,183 | 43,240 |
| Interest Expense | 36,170 | 23,561 |
| Internal Cash Generation | (7,022) | 62,696 |
| Borrowings | 1,960 | 14,028 |
| Other Local Sources | 9,107 | 800 |
| Total Sources of Funds | 4,045 | 77,524 |
| Capital Expenditures | 139,711 | 73,874 |
| Debt Service | 49,308 | 60,393 |
| Changes in Working Capital and Other Assets | (188,715) | (60,025) |
| Total Application of Funds | 304 | 74,242 |
| Changes in Cash | 3,741 | 3,282 |
| Cash Balance, Beg. of Year | 986 | 4,728 |
| Cash Balance, End of Year | 4,728 | 8,009 |
| BALANCE SHEET | | |
| Current Assets | 107,174 | 53,541 |
| Cash and Deposits | 4,728 | 8,009 |
| Accounts Receivable | 0 | 3 |
| Inventories | 39,173 | 22,577 |
| Others | 63,273 | 22,952 |
| Net Fixed Assets | 785,088 | 943,288 |
| Plant in Service | 805,595 | 1,007,035 |
| Less: Accumulated Depreciation | 20,506 | 63,747 |
| Construction in Progress | 316,563 | 190,065 |
| Long-Term Investments | | |
| Other Assets | 28,171 | 27,104 |
| Total Assets | 1,236,996 | 1,213,998 |
| Current Liabilities | 628,493 | 603,314 |
| Accounts Payable | 87,863 | 154,190 |
| Short-Term Loans | 0 | 0 |
| Others | 540,630 | 449,123 |
| Long-term Debt | 521,259 | 526,746 |
| Equity | 87,244 | 83,938 |
| Paid-in Capital | 123,200 | 123,200 |
| Surplus, Reserves and Retained Earnings | (35,956) | (39,262) |
| Total Liabilities and Equity | 1,236,996 | 1,213,998 |
| Financial Indicators | | |
| Debt Service Coverage Ratio (times) | (0.14) | 1.04 |
| Debt / Debt plus Equity (% Debt) | 86 | 86 |

^a Accounts are for the Asian Development Bank-funded Project only. Cash-flow statements were reconstructed from available accounts. Source: Tangshan Chengde Coal Gas Company.

FINANCIAL REEVALUATION

1. The financial internal rate of return (FIRR) was reevaluated using financial data and assumptions provided by the enterprises. Capital costs were based on actual investments made for the Tangshan and Chengde Environmental Improvement Project. Incremental revenues were based on sales of products and services associated with the investments made under the Project. Production volume will increase from the current production level until full plant capacity is attained within the next several years. Incremental operation and maintenance costs were based on the actual costs presented in the financial statements and adjusted to reflect assumed increases in volume. As at appraisal, the economic life of the subprojects was assumed for 20 years with zero residual value. All revenues and expenditures are in constant year 2001 prices.
2. The FIRRs of the seven subprojects were recalculated at 9.8% for subproject 1, 5.9% for subproject 2, 3.0% for subproject 3 and 5, 4.2% for subproject 4, 7.0% for subproject 6, and 7.6% for subproject 7. The FIRRs at appraisal were 12.1%, 10.8%, 10.8%, 8.3%, 11.8%, and 10.6%, respectively. The much lower FIRRs are mainly due to the inadequate approved tariffs and lower prices of ceramic and porcelain products due to strong competition, combined with lower-than-expected demand and lower production output for the products and services. The higher actual investment costs (except for subprojects 1 and 2, which have lower costs due to the reduced project scope), coupled with project implementation delays, likewise contributed to the lower FIRRs. The technical problems in the porcelain and ceramic factories (the problem in the ceramic factory remains unresolved to date) have pulled down the FIRRs and continue to threaten the viability of these two subprojects.
3. The FIRRs of the subprojects are still higher than their weighted average cost of capital (WACC), except for subprojects 3 and 5, and subproject 4. The WACCs at the time of the project completion report are 5.6% for subproject 1, 5.0% for subproject 2, 4.4% for subproject 3 and 5, 5.3% for subproject 4, 5.2% for subproject 6, and 5.8% for subproject 7. These costs are comparable with the levels calculated at appraisal. On the whole, the revised FIRR of the Project remains above the WACC.
4. The estimated WACC, posttax, in real terms was derived following the methodology in the Revised Financial Management Guidelines using actual capital mix and costs of funds. The real interest costs of the loan funds were considered, while the cost of equity was assumed to be 12%. Income tax was assumed at 33% and domestic inflation at 4.0% per annum. The WACC calculated at appraisal assumed higher costs of debt and equity as well as higher inflation rate.

Table A12.1: Financial Internal Rate of Return – Tangshan Gas Project
(CNY million)

| Year | Incremental Revenues | Capital Cost | Incremental Operating Cost | Net Cash Flow |
|--------------|----------------------|---------------|----------------------------|---------------|
| 1993 | | 1,140 | | (1,140) |
| 1994 | | 632 | | (632) |
| 1995 | | 3,191 | | (3,191) |
| 1996 | | 1,738 | | (1,738) |
| 1997 | | 2,109 | | (2,109) |
| 1998 | | 467 | | (467) |
| 1999 | 2,118 | 812 | 2,082 | (775) |
| 2000 | 3,512 | 1,718 | 2,990 | (1,196) |
| 2001 | 3,513 | 159 | 3,297 | 57 |
| 2002 | 5,606 | | 4,773 | 833 |
| 2003 | 6,300 | | 5,219 | 1,081 |
| 2004 | 7,240 | | 5,823 | 1,417 |
| 2005 | 11,039 | | 8,754 | 2,284 |
| 2006 | 12,105 | | 9,470 | 2,635 |
| 2007 | 12,105 | | 9,470 | 2,635 |
| 2008 | 12,105 | | 9,470 | 2,635 |
| 2009 | 12,105 | | 9,470 | 2,635 |
| 2010— | 12,105 | | 9,470 | 2,635 |
| 2019 | 12,105 | | 9,470 | 2,635 |
| Total | 208,795 | 11,966 | 165,520 | 31,309 |
| FIRR | | | | 9.8% |

Table A12.2: Financial Internal Rate of Return – Tangshan Heating Power Project
(CNY million)

| Year | Incremental Revenues | Capital Cost | Incremental; Operating Cost | Net Cash Flow |
|--------------|----------------------|---------------|-----------------------------|---------------|
| 1993 | | 407 | | (407) |
| 1994 | | 1,008 | | (1,008) |
| 1995 | | 4,143 | | (4,143) |
| 1996 | 98 | 6,640 | | (6,542) |
| 1997 | 20 | 3,233 | | (3,213) |
| 1998 | 2,307 | 5,933 | 1,514 | (5,140) |
| 1999 | 3,300 | 4,534 | 2,314 | (3,549) |
| 2000 | 4,051 | 3,846 | 2,717 | (2,512) |
| 2001 | 4,476 | 0 | 3,007 | 1,469 |
| 2002 | 5,144 | 0 | 3,211 | 1,933 |
| 2003 | 5,068 | 0 | 3,157 | 1,911 |
| 2004 | 6,723 | 1,659 | 3,967 | 1,097 |
| 2005 | 9,736 | 1,603 | 6,070 | 2,064 |
| 2006 | 9,736 | | 6,070 | 3,667 |
| 2007 | 9,736 | | 6,070 | 3,667 |
| 2008 | 9,736 | | 6,070 | 3,667 |
| 2009 | 9,736 | | 6,070 | 3,667 |
| 2010— | 9,736 | | 6,070 | 3,667 |
| 2018 | 9,736 | | 6,070 | 3,667 |
| Total | 167,495 | 33,007 | 104,862 | 29,626 |
| FIRR | | | | 5.9% |

Table A12.3: Financial Internal Rate of Return – Tangshan No. 6 Ceramic Project
(CNY million)

| Year | Incremental Revenues | Capital Cost | Incremental Operating Cost | Net Cash Flow |
|--------------|----------------------|---------------|----------------------------|---------------|
| 1995 | | 8,750 | | (8,750) |
| 1996 | 665 | 3,707 | (61) | (2,981) |
| 1997 | 891 | 1,489 | (444) | (154) |
| 1998 | 1,494 | 0 | 234 | 1,260 |
| 1999 | 1,748 | 920 | 270 | 558 |
| 2000 | 1,196 | | 2,292 | (1,096) |
| 2001 | 114 | | 745 | (631) |
| 2002 | 2,057 | | 1,287 | 770 |
| 2003 | 2,704 | | 1,629 | 1,075 |
| 2004 | 2,704 | | 1,629 | 1,075 |
| 2005 | 2,704 | | 1,629 | 1,075 |
| 2006 | 2,704 | | 1,629 | 1,075 |
| 2007 | 2,704 | | 1,629 | 1,075 |
| 2008 | 2,704 | | 1,629 | 1,075 |
| 2009 | 2,704 | | 1,629 | 1,075 |
| 2010— | 2,704 | | 1,629 | 1,075 |
| 2018 | 2,704 | | 1,629 | 1,075 |
| Total | 51,427 | 14,866 | 30,381 | 6,180 |
| FIRR | | | | 3.0% |

Table A12.4: Financial Internal Rate of Return – Tangshan No. 2 Porcelain Project
(CNY million)

| Year | Incremental Revenues | Capital Cost | Incremental Operating Cost | Net Cash Flow |
|--------------|----------------------|---------------|----------------------------|---------------|
| 1994 | | 621 | | (621) |
| 1995 | | 2,943 | | (2,943) |
| 1996 | | 6,843 | | (6,843) |
| 1997 | | 1,383 | | (1,383) |
| 1998 | | 381 | | (381) |
| 1999 | 263 | 200 | 40 | 24 |
| 2000 | 280 | | 53 | 227 |
| 2001 | 53 | | 3 | 49 |
| 2002 | 1,200 | | 244 | 956 |
| 2003 | 1,576 | | 381 | 1,195 |
| 2004 | 1,576 | | 381 | 1,195 |
| 2005 | 1,576 | | 381 | 1,195 |
| 2006 | 1,576 | | 381 | 1,195 |
| 2007 | 1,576 | | 381 | 1,195 |
| 2008 | 1,576 | | 381 | 1,195 |
| 2009 | 1,576 | | 381 | 1,195 |
| 2010— | 1,576 | | 381 | 1,195 |
| 2019 | 1,576 | | 381 | 1,195 |
| Total | 28,590 | 12,371 | 6,810 | 9,408 |
| FIRR | | | | 4.2% |

**Table A12.5: Financial Internal Rate of Return –
Tangshan Wastewater Treatment Plant Project**
(CNY million)

| Year | Incremental Revenues | Capital Cost | Incremental Operating Cost | Net Cash Flow |
|--------------|----------------------|-----------------|----------------------------|-----------------|
| 1994 | | 1,160 | | (1,160) |
| 1995 | | 1,930 | | (1,930) |
| 1996 | | 7,720 | | (7,720) |
| 1997 | | 3,855 | | (3,855) |
| 1998 | 1,851 | 937 | 636 | 278 |
| 1999 | 1,970 | 5,557 | 732 | (4,319) |
| 2000 | 2,384 | 10,036 | 471 | (8,123) |
| 2001 | 3,203 | 3,544 | 1,089 | (1,429) |
| 2002 | 4,247 | | 1,651 | 2,597 |
| 2003 | 4,937 | | 2,053 | 2,884 |
| 2004 | 5,491 | | 2,351 | 3,140 |
| 2005 | 6,399 | | 2,650 | 3,748 |
| 2006 | 6,399 | | 2,650 | 3,748 |
| 2007 | 6,399 | | 2,650 | 3,748 |
| 2008 | 6,399 | | 2,650 | 3,748 |
| 2009 | 6,399 | | 2,650 | 3,748 |
| 2010— | 6,399 | | 2,650 | 3,748 |
| 2019 | 6,399 | | 2,650 | 3,748 |
| Total | 120,061.0 | 34,738.6 | 48,737.8 | 36,584.6 |
| FIRR | | | | 7.0% |

**Table A12.6: Financial Internal Rate of Return –
Chengde Coal Gasification Project**
(CNY million)

| Year | Incremental Revenues | Capital Cost | Incremental Operating Cost | Net Cash Flow |
|--------------|----------------------|----------------|----------------------------|----------------|
| 1994 | | 2,247 | | (2,247) |
| 1995 | | 295 | | (295) |
| 1996 | | 8,210 | | (8,210) |
| 1997 | | 19,280 | | (19,280) |
| 1998 | | 27,909 | | (27,909) |
| 1999 | | 34,728 | | (34,728) |
| 2000 | 39,804 | 12,171 | 38,063 | (10,430) |
| 2001 | 47,713 | 6,540 | 40,184 | 989 |
| 2002 | 56,369 | | 43,554 | 12,815 |
| 2003 | 56,369 | | 43,554 | 12,815 |
| 2004 | 56,369 | | 43,554 | 12,815 |
| 2005 | 56,369 | | 43,554 | 12,815 |
| 2006 | 56,369 | | 43,554 | 12,815 |
| 2007 | 56,369 | | 43,554 | 12,815 |
| 2008 | 56,369 | | 43,554 | 12,815 |
| 2009 | 56,369 | | 43,554 | 12,815 |
| 2010— | 56,369 | | 43,554 | 12,815 |
| 2020 | 56,369 | | 43,554 | 12,815 |
| Total | 1,158,526 | 111,380 | 905,765 | 141,382 |
| FIRR | | | | 7.6% |

Table A12.7: Summary of Financial Internal Rate of Return
(CNY million)

| Year | Incremental Revenues | Total Capital Cost | Incremental Operating Cost | Net Cash Flow |
|--------------|-----------------------------|---------------------------|-----------------------------------|----------------------|
| 1993 | | 1,548 | | (1,548) |
| 1994 | | 5,668 | | (5,668) |
| 1995 | | 21,252 | | (21,252) |
| 1996 | | 34,858 | | (34,035) |
| 1997 | | 31,349 | | (29,994) |
| 1998 | 5,653 | 35,627 | 2,384 | (32,358) |
| 1999 | 9,399 | 46,752 | 5,437 | (42,790) |
| 2000 | 51,226 | 27,771 | 46,586 | (23,131) |
| 2001 | 59,072 | 10,243 | 48,325 | 504 |
| 2002 | 74,623 | 0 | 54,719 | 19,904 |
| 2003 | 76,954 | 0 | 55,992 | 20,962 |
| 2004 | 80,103 | 1,659 | 57,704 | 20,740 |
| 2005 | 87,822 | 1,603 | 63,037 | 23,182 |
| 2006 | 88,889 | | 63,753 | 25,136 |
| 2007 | 88,889 | | 63,753 | 25,136 |
| 2008 | 88,889 | | 63,753 | 25,136 |
| 2009 | 88,889 | | 63,753 | 25,136 |
| 2010— | 88,889 | | 63,753 | 25,136 |
| 2020 | 88,889 | | 63,753 | 25,136 |
| Total | 1,711,901 | 1,645 | 1,290,331 | 273,099 |
| | FIRR | | | 7.1% |

ECONOMIC REEVALUATION

1. The economic evaluation of the Tangshan and Chengde Environmental Improvement Project was carried out following the methodology that was used in the appraisal, but with the addition of environmental benefits, which were already identified but were not quantified at that time. Incremental costs and benefits were determined for each subproject to determine the net benefit stream. The economic life of the project was assumed to be 20 years after full operation. The residual value at the end of the economic life was assumed to be zero. All prices and costs are expressed in year 2001 values.

2. The economic capital costs of the subprojects were derived from the actual financial cost components and converted to their economic values by applying the conversion factors¹ used for projects in the People's Republic of China. Imported equipment was valued at international prices while the value of local equipment was translated into economic border prices by using the appropriate conversion factor. Nontradable items were converted to their economic values by using the standard conversion factor of .93. Taxes, import duties, and all financial charges including interest during construction were excluded. The economic benefits were valued in terms of (i) enhanced product quality and increased production output, (ii) coal savings from reduced energy consumption and reduced coal utilization and applying the economic prices of coal, (iii) reduced transportation cost achieved by avoiding long distance and in-city transport and handling charges, and (iv) local environmental benefits from avoided air emission due to non-burning of coal. For subproject 6 where no economic internal rate of return (EIRR) was calculated at appraisal due to the difficulty in quantifying the economic benefits, the EIRR was determined following the methodology adopted in the proposed Wuhan wastewater project where the benefits were estimated in terms of (i) increase in the value of residential property, or the increase in housing price due to environmental improvement in the related area; and (ii) cost savings due to the economies of scale of the wastewater treatment plant. In the absence of a specific survey of the relative values of the residential properties in Tangshan, the property values in Wuhan were used but adjusted by the local average income per capita. For the local environmental benefits, reduction in sulfur dioxide (SO₂), total suspended particles (TSP), and nitrogen oxides (NO_x) emissions was considered following the benefits transfer method.

3. The recalculated EIRR was at 14.4% for subproject 1, 14.1% for subproject 2, 5.0% for subprojects 3 and 5, 10.7% for subproject 4, 14.1% for subproject 6, and 10.1% for subproject 7. The respective EIRRs estimated at appraisal, except for subproject 6, were 18.6, 12.3, 16.1, 14.8, and 14.0%. The low EIRRs are primarily due to higher investment costs (except for subprojects 1 and 2, which have lower costs due to the reduced scope) coupled with implementation delays, higher input costs, and reduced benefits as a result of lower production and revenues.

¹ The conversion factors used in this evaluation are 1.1 for civil works, 1.1 for local machinery, and 0.93 for others.

Table A13.1: Economic Internal Rate of Return – Tangshan Gas Project
(CNY million)

| Year | Incremental Benefit | Capital Cost | Incremental Cost | Net Benefit |
|--------------|---------------------|---------------|------------------|---------------|
| 1993 | | 1,170 | | (1,170) |
| 1994 | | 682 | | (682) |
| 1995 | | 3,291 | | (3,291) |
| 1996 | | 1,859 | | (1,859) |
| 1997 | | 2,294 | | (2,294) |
| 1998 | | 471 | | (471) |
| 1999 | 1,926 | 854 | 1,658 | (586) |
| 2000 | 2,465 | 1,841 | 2,674 | (2,050) |
| 2001 | 2,540 | 175 | 2,496 | (132) |
| 2002 | 3,154 | | 2,652 | 502 |
| 2003 | 4,391 | | 3,063 | 1,328 |
| 2004 | 6,200 | | 3,667 | 2,533 |
| 2005 | 8,292 | | 4,366 | 3,926 |
| 2006 | 10,541 | | 5,118 | 5,423 |
| 2007 | 10,541 | | 5,118 | 5,423 |
| 2008 | 10,541 | | 5,118 | 5,423 |
| 2009 | 10,541 | | 5,118 | 5,423 |
| 2010— | 10,541 | | 5,118 | 5,423 |
| 2019 | 10,541 | | 5,118 | 5,423 |
| Total | 176,541 | 12,637 | 92,228 | 71,675 |
| EIRR | | | | 14.4% |

Table A13.2: Economic Internal Rate of Return – Tangshan Heating Power Project
(CNY million)

| Year | Incremental Benefit | Capital Cost | Incremental Cost | Net Benefit |
|--------------|---------------------|---------------|------------------|----------------|
| 1993 | | 401 | | (401) |
| 1994 | | 1,031 | | (1,031) |
| 1995 | | 4,182 | | (4,182) |
| 1996 | | 6,697 | | (6,697) |
| 1997 | | 3,289 | | (3,289) |
| 1998 | 1,726 | 6,054 | 1,668 | (5,996) |
| 1999 | 3,909 | 4,596 | 2,515 | (3,202) |
| 2000 | 5,387 | 4,021 | 2,971 | (1,606) |
| 2001 | 5,627 | | 3,312 | 2,316 |
| 2002 | 5,627 | | 3,312 | 2,316 |
| 2003 | 5,627 | | 3,312 | 2,316 |
| 2004 | 7,653 | | 5,578 | 2,075 |
| 2005 | 15,604 | | 7,686 | 7,918 |
| 2006 | 15,604 | | 5,951 | 9,653 |
| 2007 | 15,604 | | 5,951 | 9,653 |
| 2008 | 15,604 | | 5,951 | 9,653 |
| 2009 | 15,604 | | 5,951 | 9,653 |
| 2010— | 15,604 | | 5,951 | 9,653 |
| 2019 | 15,604 | | 5,951 | 9,653 |
| Total | 267,891 | 30,271 | 112,000 | 125,677 |
| EIRR | | | | 14.1% |

Table A13.3: Economic Internal Rate of Return – Tangshan No. 6 Ceramic Project
(CNY million)

| Year | Incremental Benefit | Capital Cost | Incremental Cost | Net Benefit |
|--------------|---------------------|---------------|------------------|---------------|
| 1995 | | 9,115 | | (9,115) |
| 1996 | 1,129 | 3,836 | 83 | (2,790) |
| 1997 | 830 | 1,507 | 465 | (1,142) |
| 1998 | 2,191 | 0 | 1,411 | 780 |
| 1999 | 2,465 | 920 | 1,411 | 134 |
| 2000 | 1,087 | | 75 | 1,013 |
| 2001 | 639 | | 66 | 573 |
| 2002 | 2,523 | | 1,726 | 797 |
| 2003 | 3,644 | | 2,316 | 1,328 |
| 2004 | 3,644 | | 2,316 | 1,328 |
| 2005 | 3,644 | | 2,316 | 1,328 |
| 2006 | 3,644 | | 2,316 | 1,328 |
| 2007 | 3,644 | | 2,316 | 1,328 |
| 2008 | 3,644 | | 2,316 | 1,328 |
| 2009 | 3,644 | | 2,316 | 1,328 |
| 2010— | 3,644 | | 2,316 | 1,328 |
| 2018 | 3,644 | | 2,316 | 1,328 |
| Total | 65,014 | 15,377 | 42,289 | 11,498 |
| EIRR | | | | 5.0% |

Table A13.4: Economic Internal Rate of Return – Tangshan No. 2 Porcelain Project
(CNY million)

| Year | Incremental Benefit | Capital Cost | Operating Cost | Net Benefit |
|--------------|---------------------|---------------|----------------|---------------|
| 1994 | | 614 | | (614) |
| 1995 | | 2,996 | | (2,996) |
| 1996 | | 7,312 | | (7,312) |
| 1997 | | 1,469 | | (1,469) |
| 1998 | | 390 | | (390) |
| 1999 | 398 | 208 | 17 | 174 |
| 2000 | 465 | | 25 | 440 |
| 2001 | 66 | | 0 | 66 |
| 2002 | 2,133 | | 75 | 2,058 |
| 2003 | 2,839 | | 100 | 2,739 |
| 2004 | 2,839 | | 100 | 2,739 |
| 2005 | 2,839 | | 100 | 2,739 |
| 2006 | 2,839 | | 100 | 2,739 |
| 2007 | 2,839 | | 100 | 2,739 |
| 2008 | 2,839 | | 100 | 2,739 |
| 2009 | 2,839 | | 100 | 2,739 |
| 2010— | 2,839 | | 100 | 2,739 |
| 2019 | 2,839 | | 100 | 2,739 |
| Total | 51,319 | 12,990 | 1,793 | 36,520 |
| EIRR | | | | 10.7% |

**Table A13.5: Economic Internal Rate of Return –
Tangshan Wastewater Treatment Plant Project**
(CNY million)

| Year | Incremental Benefit | Capital Cost | Incremental Cost | Net Benefit |
|--------------|---------------------|---------------|------------------|----------------|
| 1994 | | 1,204 | | (1,204) |
| 1995 | | 2,058 | | (2,058) |
| 1996 | | 7,893 | | (7,893) |
| 1997 | | 4,125 | | (4,125) |
| 1998 | 158 | 888 | 706 | (1,436) |
| 1999 | 656 | 5,760 | 797 | (5,901) |
| 2000 | 1,079 | 10,259 | 515 | (9,694) |
| 2001 | 498 | 3,785 | 1,195 | (4,482) |
| 2002 | 133 | | 1,353 | (1,220) |
| 2003 | 166 | | 1,668 | (1,502) |
| 2004 | 13,919 | | 1,909 | 12,010 |
| 2005 | 13,919 | | 1,909 | 12,010 |
| 2006 | 13,919 | | 1,909 | 12,010 |
| 2007 | 13,919 | | 1,909 | 12,010 |
| 2008 | 13,919 | | 1,909 | 12,010 |
| 2009 | 13,919 | | 1,909 | 12,010 |
| 2010— | 13,919 | | 1,909 | 12,010 |
| 2019 | 13,919 | | 1,909 | 12,010 |
| Total | 225,395 | 35,972 | 36,777 | 152,645 |
| EIRR | | | | 14.1% |

**Table A13.6: Economic Internal Rate of Return –
Chengde Coal Gasification Project**
(CNY million)

| Year | Incremental Benefit | Capital Cost | Incremental Cost | Net Benefit |
|--------------|---------------------|----------------|------------------|----------------|
| 1993 | | 0.0 | | 0.0 |
| 1994 | | 2,092 | | (2,092) |
| 1995 | | 274 | | (274) |
| 1996 | | 8,400 | | (8,400) |
| 1997 | | 20,792 | | (20,792) |
| 1998 | | 28,843 | | (28,843) |
| 1999 | | 35,566 | | (35,566) |
| 2000 | 52,149 | 12,566 | 41,583 | (2,000) |
| 2001 | 58,092 | 7,478 | 44,206 | 6,408 |
| 2002 | 58,025 | | 42,811 | 15,214 |
| 2003 | 58,025 | | 42,811 | 15,214 |
| 2004 | 58,025 | | 42,811 | 15,214 |
| 2005 | 58,025 | | 42,811 | 15,214 |
| 2006 | 58,025 | | 42,811 | 15,214 |
| 2007 | 58,025 | | 42,811 | 15,214 |
| 2008 | 58,025 | | 42,811 | 15,214 |
| 2009 | 58,025 | | 42,811 | 15,214 |
| 2010— | 58,025 | | 42,811 | 15,214 |
| 2011 | 58,025 | | 42,811 | 15,214 |
| 2012 | 58,025 | | 42,811 | 15,214 |
| 2013 | 58,025 | | 42,811 | 15,214 |
| 2014 | 58,025 | | 42,811 | 15,214 |
| 2015 | 58,025 | | 42,811 | 15,214 |
| 2016 | 58,025 | | 42,811 | 15,214 |
| 2017 | 58,025 | | 42,811 | 15,214 |
| 2018 | 58,025 | | 42,811 | 15,214 |
| 2019 | 58,025 | | 42,811 | 15,214 |
| 2020 | 58,025 | | 42,811 | 15,214 |
| Total | 1,212,721 | 116,009 | 899,205 | 197,507 |
| EIRR | | | | 10.1% |

Table A13.7: Summary of Economic Internal Rate of Return
(CNY million)

| Year | Incremental Benefit | Capital Cost | Incremental Cost | Net Benefit |
|--------------|----------------------------|---------------------|-------------------------|--------------------|
| 1993 | | 1,571 | | (1,571) |
| 1994 | | 5,623 | | (5,623) |
| 1995 | | 21,917 | | (21,917) |
| 1996 | 1,129 | 35,997 | 83 | (34,951) |
| 1997 | 830 | 33,476 | 465 | (33,111) |
| 1998 | 4,075 | 36,645 | 3,785 | (36,354) |
| 1999 | 9,354 | 47,903 | 47,980 | (44,946) |
| 2000 | 62,632 | 28,687 | 50,465 | (13,898) |
| 2001 | 67,462 | 11,438 | 49,881 | 4,749 |
| 2002 | 71,596 | | 51,929 | 19,667 |
| 2003 | 74,692 | | 53,270 | 21,422 |
| 2004 | 92,279 | | 56,381 | 35,899 |
| 2005 | 102,322 | | 59,187 | 43,135 |
| 2006 | 104,572 | | 58,205 | 46,367 |
| 2007 | 104,572 | | 58,205 | 46,367 |
| 2008 | 104,572 | | 58,205 | 46,367 |
| 2009 | 104,572 | | 58,205 | 46,367 |
| 2010— | 104,572 | | 58,205 | 46,367 |
| 2020 | 104,572 | | 58,205 | 46,367 |
| Total | 2,054,947 | 223,257 | 1,246,498 | 0 |
| EIRR | | | | 11.9% |

TRAINING PROVIDED UNDER THE PROJECT

| Item | Type | No. of Staff | Person-Days | Location |
|----------------------------------|-----------|--------------|----------------|--|
| A. International Training | | | | |
| Subproject 1 | Technical | 9 | 135 | Canada and France |
| Subproject 2 | Technical | 39 | 585 | Finland, Italy, United Kingdom, Germany, United States |
| Subproject 3 | --- | --- | --- | --- |
| Subproject 4 | --- | --- | --- | --- |
| Subproject 5 | Technical | 7 | 147 | United Kingdom |
| Subproject 6 | Technical | 11 | 330 | United Kingdom |
| Subtotal | | 66 | 1,197 | |
| B. Domestic Training | | | | |
| Subproject 1 | --- | --- | --- | --- |
| Subproject 2 | Operation | 120 | 14,400 | People's Republic of China (PRC) |
| Subproject 3 | --- | --- | --- | --- |
| Subproject 4 | --- | --- | --- | --- |
| Subproject 5 | --- | --- | --- | --- |
| Subproject 6 | Operation | 20 | 600 | PRC |
| Subproject 7 | Operation | 1,200 | 170,000 | PRC |
| Subtotal | | 1,340 | 185,000 | |
| Total | | 1,406 | 186,197 | |

ATTAINMENT OF PROJECT OBJECTIVES

| Component No. | Description | Target | Actual |
|---------------|---|---|--|
| 1 | Tangshan Gas Supply and Distribution – Tangshan Gas Co. (TGC) | <p>Increase coal gas supply by 305,000 cu m/day to 670,000 cu m/day. Supply additional 55,000 household in Tangshan municipal government (TMG) (about 90% of households in TMG will have access to town gas)</p> <p>Coal savings: 181,000 t/yr</p> <p>Debt service ratio not less than 1.3 times</p> <p>Debt-equity ratio not greater than 70:30</p> <p>Gas price : Domestic 0.80/cu m) average : Commercial 1.50/cu m) 0.85 cu m : Industry 0.90/cu m)</p> <p>Connection fees:</p> <p>Sales volume : 241.2 million cu m in 2000</p> <p>Financial internal rate of return (FIRR) : 12.1%</p> <p>Economic internal rate of return (EIRR) : 18.6%</p> | <p>Coal gas increased by 315,000 cu m/day to 670,000 cu m/day. Supplying additional 70,000 households in TMG (about 94.5% of households in TMG are being supplied with coal gas). Supply cannot meet demand. TGC intends to tap into the proposed natural gas pipeline from Russia when it materializes.</p> <p>CNY600 per household or CNY100 per sq m for industrial users 128.3 million cu m in 2001</p> <p>9.8%</p> <p>14.4%</p> |
| 2 | Tangshan District Heating – Tangshan Heating Power Company (THPC) | <p>Supply space heating to about 8.5 million sq m comprising 4.93 million sq m of residential space and 3.57 million commercial establishments and public buildings in western section of the central district of TMG</p> <p>Heating: Demand charge :) Energy charge :)</p> <p>Connection fees :</p> <p>Coal savings: 380,000 mt/yr</p> <p>Eliminate: 156 small inefficient industrial boilers and 100,000 households stoves and 123 chimneys</p> <p>Coverage: 15.4 million sq m by 2000</p> <p>Debt service ratio not less than 1.3</p> <p>Debt-equity ratio not greater than 70:30</p> <p>FIRR: 10.8%</p> <p>EIRR: 12.3%</p> | <p>Supply space heating for 4.17 million sq m (2.38 million sq m of residential space and buildings) in western section of central district. The remaining targeted area of 4.33 million sq m though connected for district heating could not be provided with heating due to insufficient heating supply.</p> <p>CNY20/sq m/yr (about 4 months)</p> <p>No connection fee</p> <p>Eliminated 220 small industrial boilers and 100,000 households' stoves and 123 chimneys demolished.</p> <p>12.8 million sq m by end 2001</p> <p>5.9%</p> <p>14.1%</p> |

| Component No. | Description | Target | Actual |
|---------------|--|--|--|
| 3 | Coal Gasification for TPF and TCP (Tangshan Ceramic Coal Gasification Company) | <p>Supply 288,000 cu m/day of coal gas with heating value of about 60,000 KJ/cu m to TPF plus wastewater treatment of 7,800 cu m/day for recycling 88% of the plant requirement.</p> <p>Supply 144,000 cu m/day of coal gas with heating value of about 6,300 KJ/cu m to TCF</p> <p>Coal savings: 20,000 t/yr</p> <p>Debt service ratio not less than 1.3 times</p> <p>Debt-equity ratio not greater than 80:20</p> <p>FIRR: 15.3%</p> <p>EIRR: NA</p> | <p>Not done. Instead using coal gas supplied by TGC.</p> <p>144,000 cu m/day with heating value of 6,300 KJ/cu m to TCP</p> <p>20,000 t/yr</p> |
| 4 | Tangshan No. 2 Porcelain Factory (TPF) | <p>Replace five coal-fired kilns with seven gas-fired kilns.</p> <p>Conversion of all six heavy oil-fired kilns to gas-fired.</p> <p>Replace two push-slab kilns with two gas-fired roller kilns (one to be financed by TPF)</p> <p>Target : 36.9 million pieces in 2000</p> <p>Debt service ratio of not less than 1.3 times</p> <p>Debt-equity ratio not greater than 70:30</p> <p>FIRR: 8.3%</p> <p>EIRR: 14.8%</p> | <p>Three coal-fired tunnel kilns fitted with dust removal system. Only two coal-fired kilns demolished and being replaced by coal gas-fired kilns. Three kilns completed and in use since May 1997. The remaining four kilns to be constructed in 2003. Seven new tunnel kilns using coal gas to be built using own funds. Out of six rollers kilns, two to be converted to coal gas, found to continue using heavy oil.</p> <p>Two push-slab kilns to be demolished</p> <p>Achieved 60.3 million pieces in 2001.</p> <p>4.2%</p> <p>10.7%</p> |
| 5 | Tangshan No. 6 Ceramic Factory (TCF) | <p>Replace all three coal-fired tunnel kilns with two 100 m long gas-fired tunnel kilns.</p> <p>Replace all five dome kilns with one new gas-fired tunnel kiln using TCF's own resources</p> <p>Convert two 100m long tunnel kilns from coal-fired to gas-fired.</p> | <p>All three coal-fired kilns demolished and replaced by two coal gas fired tunnel kilns. Demolished.</p> <p>Demolished. Export products reached 70% passing rate. Local products reached 90% passing rate.</p> |

| Component No. | Description | Target | Actual |
|---------------|---|--|---|
| | | Target: 0.9 million pieces by 2000 Debt service ratio not less than 1.3 times Debt-equity ratio not greater than 80:20 | Due to nonoperation of new product line, produced only 0.4 million pieces in 2001. |
| | | FIRR: 10.8% EIRR: 16.1% | 3.0% 5.0% |
| 6 | Tangshan Wastewater Treatment Plant | Construction of a 150,000 cu m/day wastewater treatment plant to treat 100,000 cu m/day of industrial wastewater and 50,000 cu m/day of domestic sewage from southeastern part of the central district of TMG to the following level: BOD : 15 mg/l COD : 40 mg/l SS : 20 mg/l Ammonia : 10 mg/l Debt service ratio not less than 1.3 times Debt-equity ratio not greater than 80:20 Construction of a 150,000 cu m/day wastewater treatment plant for northeastern part of the central district. Sewage charge : Connection fees : FIRR: : 11.8% EIRR : NA | The lower volume was due to pending connection of additional sewage lines in the eastern section. The water quality in Dou River reached IV standard and class V standard downstream (at the city section). Average 100,000 cu m/day of wastewater from eastern section treated to class II standard. BOD reduced by 6,354.6 t/yr COD reduced by 9,387.8 t/yr SS reduced by 8,814.7 t/yr Average 80,000 cu m/day of wastewater treated. In total about 65% of wastewater in the city is being treated. CNY0.53/cu m 7.0% 14.1% |
| 7 | Chengde Coal Gasification Plant—Chengde Coal Gas Company (CCGC) | Construction of a 729,000 cu m/day coal gasification plant Supply coal gas to about 80% of total domestic households (140,000 cu m/day), commercial establishments and public facilities (65,000 cu m/day and industrial users (265,000 cu m/day) Recovery of coal tar Coke Benzene Sulfur | Completed and in full operation since May 1999. Able to achieve 729,000 cu m/day of coal gas. Coal gas presently supplied to 10 industrial users and 1,600 households. Low demand for coal gas by households due to concern on safety, reliability, and cost. On the average, each household consumed about CNY30 per month of coal gas, which is equivalent to the average daily income of household. |

| Component No. | Description | Target | Actual |
|---------------|---|--------|------------------------------------|
| | Coal savings: 284,000 t/yr Eliminate: small and inefficient industrial boilers, household stoves and chimneys Debt equity service ratio not less than 1.3 times | | |
| | Debt-equity ratio not greater than 80:20 | | |
| | Gas price : Domestic | | CNY.080/cu m |
| | : Commercial | | CNY1.0/cu m |
| | : Industrial | | CNY0.60/cu m |
| | Connection fees: | | CNY1,800 to CNY2,500 per household |
| | FIRR : 10.6% | | 7.6% |
| | EIRR: 14.0% | | 10.1% |

BOD = biological oxygen demand, COD = chemical oxygen demand, cu m = cubic meter, KJ = kilojoule, SS = suspended solid, sq m = square meter, t/yr = ton per year.