

## FINANCIAL ANALYSIS

### A. Introduction

1. The financial analysis of the Air Quality Improvement in the Greater Beijing–Tianjin–Hebei Region—Shandong Clean Heating and Cooling Project was prepared in accordance with the guidelines on the Financial Management and Analysis of Projects of the Asian Development Bank (ADB).<sup>1</sup> The analysis evaluates the financial viability of three subprojects proposed under this loan; that is, the ability of each subproject to recover project investment and operating costs from revenues over its technical useful lifetime. The financial analysis also includes a financial management assessment and financial performance analysis of each subproject’s implementing agencies. The result showed that both Jinan Heating Group (JHG) and Jinan Thermal Power Co., Ltd. (JTPC) have adequate financial management systems and procedures in place to meet ADB requirements.

### B. Key Assumptions of the Financial Analysis

2. The cost estimates presented in this analysis are based on the most recent data provided by each subproject’s implementing agencies during the project’s fact-finding mission. Cost estimates and cash flows are expressed in real terms (2018 prices), on an after-tax basis.

3. **Capital expenditures.** Capital expenditures were based on detailed estimates of investment costs from feasibility studies and procurement plans for each proposed subproject. Capital costs included base costs and physical contingencies where appropriate. Price contingencies were excluded in line with ADB’s guidelines on the Financial Management and Analysis of Projects.<sup>2</sup> Base costs included the cost of civil works, equipment and materials, installation, and related expenses (e.g., design and technical services).

4. **Incremental costs and revenues.** Incremental costs and revenues were calculated by subtracting the revenues that would have been incurred under a without-project scenario (a continuation of coal-based district heating). For the West Jinan Waste Heat Utilization and Clean Energy Subproject (subproject 1), only the waste heat component of the subproject is incremental, because it replaces heat served by coal district heating. The other components of the West Jinan subproject are nonincremental, because they serve new demand. All components of the Shanghe Coal-Free Clean Heating Demonstration Subproject (subproject 2) and the East Jinan Low-Emission Combined District Heating and Cooling Subproject (subproject 3) are nonincremental.

5. **Operating costs.** Operating costs were based on the feasibility studies of each proposed subproject. They include purchased heat and power; wages and benefits; repair fees; and other fees, such as management and manufacturing fees, where applicable. Incremental costs for subproject 1, West Jinan, were calculated by subtracting total operating costs of the without-project scenario (the coal and electricity costs of running the coal-fired district heating system) from the total operating costs of the with-project scenario.

6. **Revenues.** Revenues were based on the expected volume of electricity, heating, and cooling sales. The heating tariff for the West Jinan subproject, is CNY26.7 per square meter (m<sup>2</sup>) for residential customers and 35.22/m<sup>2</sup> for public buildings. The waste heat network covers an

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<sup>1</sup> ADB. 2005. *Financial Management and Analysis of Projects*. Manila.

<sup>2</sup> Price contingencies were excluded when deflating CAPEX in the calculation of real cash flows. The average domestic inflation rate during 2019–2023 was used as the common deflator.

area of 69.2 million m<sup>2</sup> for residential customers and 10.8 million m<sup>2</sup> for public customers, for a total heating area of 80 million m<sup>2</sup>. Heating revenue from running the coal-fired district heating plant (the without-project scenario) was subtracted from the with-project revenues to obtain incremental revenues. The heating tariff for public customers under the coal-fired district heating system is 39.8 CNY/m<sup>2</sup>. Therefore, net incremental revenues for the waste heat component are negative. The heating area for the biomass combined heat and power plant is 0.6 million m<sup>2</sup> for residential customers and 0.9 million m<sup>2</sup> for public customers. Estimated electricity consumption is 121 gigawatt-hours (GWh). The electricity tariff for biomass cogeneration in West Jinan is CNY0.64 per kilowatt-hour (kWh) for all customers.

7. In Shanghe County, residents pay CNY24/m<sup>2</sup> for heating in urban areas. Public customers are charged CNY30.91/m<sup>2</sup>. The total heating area for urban and township customers is about 7.5 million m<sup>2</sup>. In rural areas, residents pay for heating via an electricity tariff. The unsubsidized price for rural customers is CNY0.50/kWh. The estimated electricity consumption of rural residents is 212 GWh, resulting in annual revenues of CNY106 million. The county government will provide a CNY0.20/kWh discount on electricity tariffs for up to 6,000 kWh of electricity consumption per year for rural households. This subsidy is not counted as revenue for JHG but is used to lower the JHG's value-added tax (VAT) liability.

8. For the East Jinan subproject, a residential heating tariff of CNY26.70/m<sup>2</sup>, and a public heating tariff of CNY35.86/m<sup>2</sup> are applied. The total heating area of the East Jinan subproject is 20.76 million m<sup>2</sup> for residential customers and 48.44 million m<sup>2</sup> for residential customers. District cooling tariffs are CNY0.54/kWh. The total estimated cooling volume for the subproject is 103.5 GWh.

9. **Taxation.** Taxation was applied to electricity, heating, and cooling sales. VAT was assumed to be 10% on residential heat and district cooling supply sales for JHG customers. JTPC residential customers and public customers are exempt from VAT.<sup>3</sup> The corporate income tax rate is 25%.

10. **Depreciation.** Depreciation was calculated on a straight-line basis for every year of operation. For the West Jinan subproject, this was after 5 years of construction, while for the other two subprojects, operation began on the first year and reached full expansion after 5 years. A 5% residual value remained at the end of the subprojects' life in accordance with the subproject's feasibility study.<sup>4</sup> The project life for the West Jinan subproject is 20 years (excluding 5 years of construction) and the project lives for the East Jinan and Shanghe subprojects are 25 years.

11. **Financing and debt service costs.** The subprojects are financed using a combination of loans from ADB, domestic commercial loans, and equity from implementing agencies and project beneficiaries. An interest rate of 2.02% was assumed for the ADB loan, which is based on the 20-year euro interbank offered rate (EURIBOR) swap rate (1.42%), a 0.50% contractual loan spread for sovereign loans, and a maturity premium of 0.10% per year. The loan tenor is 25 years, with a 5-year grace period and a 20-year repayment period. The interest rate on the domestic loans was assumed to be 4.90%, which is based on the benchmark interest rate of the central bank of the People's Republic of China. Domestic loan tenors for the subprojects range between 7 and 15 years. The cost of equity for the implementing agencies was assumed to be 8% per year. A 1% premium for foreign exchange risk weighted by ABD's capital contribution to each subproject was

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<sup>3</sup> ADB. 2018. *West Jinan Feasibility Study Report*. Manila.

<sup>4</sup> The residual value of the Shanghe and East Jinan subprojects is slightly larger than 5% because depreciation is calculated as the networks are built.

added to the calculation of the weighted average cost of capital (WACC) for each project. Financing charges during the 5-year project implementation period included (i) interest during construction, which was calculated based on an interest rate of 0.331%; and (ii) a commitment fee, which was calculated based on an interest rate of 0.15%.

### C. Financial Viability of Subprojects

12. To derive each subproject's financial internal rate of return (FIRR), annual incremental cash flows over the subprojects' technical useful life were used. The FIRR was computed on an after-tax basis in real terms based on 2018 prices. It included (i) physical contingencies—but no price contingencies and financial charges—included in investment cash flows; and (ii) real operating cash flow, without considering the impact of inflation. Each FIRR was compared with the WACC for the respective subproject. The results of the financial analysis are in Table 1.

**Table 1: Projected Financial Indicators**

Subproject Number	Subproject Name	Total Investment (CNY million)	FIRR (%)	WACC (%)	DSCR
1	West Jinan Waste Heat Utilization and Clean Energy Subproject	1,930.29	8.40	2.02	2.54
2	Shanghe Coal-Free Clean Heating Demonstration Subproject	1,873.76	6.71	1.67	1.34
3	East Jinan Low-Emission Combined District Heating and Cooling Subproject	871.11	14.27	1.84	2.73

DSCR = debt service coverage ratio, FIRR = financial internal rate of return, WACC = weighted average cost of capital.

Source: Asian Development Bank estimates.

13. As shown in Table 1, in each subproject, the FIRR is higher than the WACC, indicating that the projects are financially viable.

### D. Sensitivity Analysis

14. Three scenarios were considered to investigate the sensitivity of the subprojects' financial viabilities: a 20% increase in capital costs; a 10% increase in operating costs, since a 20% increase is unlikely; and a 2-year delay in construction. The sensitivity analysis shows that the subprojects would remain financially viable, with FIRRs exceeding the subprojects' WACCs (Table 2). The FIRR of subproject 1 is particularly sensitive to increases in operating expenses, but remains above the WACC.

**Table 2: Sensitivity Analysis of Financial Internal Rates of Return (%)**

Subproject	Subproject Name	Base Case FIRR	CAPEX +20%	OPEX +10%	2-Year Project Delay	WACC
1	West Jinan Waste Heat Utilization and Clean Energy Subproject	8.40	6.67	2.79	6.87	2.02
2	Shanghe Coal-Free Clean Heating Demonstration Subproject	6.71	4.43	5.68	4.51	1.67
3	East Jinan Low-Emission Combined District Heating and Cooling Subproject	14.27	10.96	12.28	12.99	1.84

CAPEX = capital expenditures, FIRR = financial internal rate of return, OPEX = operating expenditures, WACC = weighted average cost of capital.

Source: Asian Development Bank estimates.

## E. Summary of Financial Management and Financial Performance Analysis of Partner Agencies

15. The financial strength of both JHG and JTPC is solid with steadily growing operation cashflows. However, neither company is familiar with ADB's disbursement procedures, and this may delay disbursement.<sup>5</sup> To address this risk, ADB delivered training on disbursement to JHG and JTPC staff during project preparation. ADB will provide more training sessions during implementation. The financial leverage of JHG and JTPC is high and they lack experience in managing foreign exchange risk. To mitigate the potential risks, financial leverage of both JHG and JTPC should be controlled below 80% and both companies should set aside a mandatory reserve in a separate bank account equivalent to 1% of their ADB loan amount. JHG and JTPC will report the status of their reserve account in their regular monitoring report. The summary key financial data for JTPC are in Table 3 and financial data for JHG are in Table 4.

**Table 3: Summary Financial Data for Jinan Thermal Power Co., Ltd., 2013–2017**  
(CNY million)

Item	2013	2014	2015	2016	2017
Adjusted sales revenue	1,643.3	1,688.2	1,651.3	1,958.9	2,010.5
Adjusted net operating income	128.2	178.0	47.3	179.8	80.0
Adjusted earnings before tax	226.5	267.0	152.7	267.4	108.5
Adjusted net income	226.5	263.1	151.9	260.3	104.6
Current Assets	1,369.7	1,450.5	1,470.0	1,656.3	2,259.9
Account receivables	72.7	96.9	143.6	46.5	58.9
Fixed assets	2,230.3	2,471.9	2,690.1	3,080.2	3,333.7
Total assets	4,215.5	4,614.8	4,908.7	5,861.6	7,065.1
Current liabilities	1,887.1	1,896.8	1,988.3	2,185.4	3,266.6
Long-term liabilities	740.4	851.5	828.5	1,066.4	1,147.9
Shareholder equity	1,588.0	1,866.5	2,091.9	2,609.7	2,650.6
Earnings before interest, tax, depreciation and amortization	463.2	453.3	381.3	529.4	346.2
Interest expense	64.5	50.1	30.7	17.4	16.1
Growth index of sales (2013 = 100)	100.0	102.7	100.5	119.2	122.3
Growth index of assets (2013 = 100)	100.0	109.5	116.4	139.0	167.6
Growth rate of assets (%)		9.5	6.4	19.4	20.5
Item	2013	2014	2015	2016	2017
Months of sales in receivables	0.5	0.7	1.0	0.3	0.4
Current ratio	0.7	0.8	0.7	0.8	0.7
Interest coverage ratio	7.2	9.1	12.4	30.4	21.6
Debt service coverage ratio	0.4	1.3	1.8	4.3	11.4
Total liabilities–asset ratio (%)	62.3	59.6	57.4	55.5	62.5
Operating income margin (%)	7.8	10.5	2.9	9.2	4.0
Net profit margin (%)	13.8	15.6	9.2	13.3	5.2
Net Profit Rate of Assets (%)	5.4	5.8	3.1	4.6	1.5
Net Profit Rate of Equity (%)	14.3	14.3	7.3	10.2	4.1

Source: Jinan Thermal Power Co., Ltd. annual report.

<sup>5</sup> Financial Management Assessment Report (accessible from the list of linked documents in Appendix 2 of the Report and Recommendation of the President).

**Table 4: Summary Financial Data for Jinan Heating Group, 2013–2017**

(CNY million)

<b>Item</b>	<b>2013</b>	<b>2014</b>	<b>2015</b>	<b>2016</b>	<b>2017</b>
Adjusted sales revenue	927.5	1,105.3	1,535.0	2,012.9	2,083.9
Adjusted net operating income	31.0	88.4	303.4	377.6	(57.1)
Adjusted earnings before tax	95.7	166.4	371.7	279.0	(31.7)
Adjusted net income	95.2	165.5	370.7	278.1	(35.0)
Current assets	1,706.9	2,073.5	2,375.3	3,202.7	3,537.7
Account receivables	85.1	86.6	52.1	64.4	96.3
Fixed assets	1,169.4	1,408.0	1,913.4	2,110.4	3,436.6
Total assets	3,379.2	4,256.0	5,201.6	6,415.4	7,922.6
Current liabilities	1,796.3	1,918.4	2,067.1	2,600.5	3,174.2
Long-term liabilities	641.7	1,175.2	1,399.6	1,565.3	2,434.3
Shareholder equity	941.2	1,162.4	1,734.9	2,249.6	2,314.1
Earnings before interest, tax, depreciation and amortization	228.5	294.9	526.5	430.8	225.4
Interest expense	28.6	23.3	22.2	2.6	51.3
Growth index of sales (2013 = 100)	100.0	119.2	165.5	217.0	224.7
Growth index of assets (2013 = 100)	100.0	125.9	153.9	189.8	234.4
Growth rate of assets (%)		25.9	22.2	23.3	23.5
Months of sales in receivables	1.1	0.9	0.4	0.4	0.6
Current ratio	1.0	1.1	1.1	1.2	1.1
Interest coverage ratio	8.0	12.7	23.7	163.7	4.4
Debt service coverage ratio	(0.2)	(0.3)	0.3	3.4	3.7
Total liabilities–asset ratio (%)	72.1	72.7	66.6	64.9	70.8
Operating income margin (%)	3.3	8.0	19.8	18.8	(2.7)
Net profit margin (%)	10.3	15.0	24.1	13.8	(1.7)
Net profit rate of assets (%)	2.8	3.9	7.1	4.3	(0.4)
Net profit rate of equity (%)	10.2	14.3	21.4	12.4	(1.4)

() = negative.

Source: Jinan Heating Group [annual report](#).