

FINANCIAL ANALYSIS

A. Methodology

1. The financial analysis of the project covers 26 subcomponents, of which 16 are revenue-generating and 10 are nonrevenue-generating. The financial analysis of the revenue-generating subcomponents has been carried out in accordance with the Financial Management and Analysis of Projects of the Asian Development Bank (ADB).¹

2. The financial analysis of the revenue-generating components assessed the project subcomponents' ability to generate sufficient revenues from operations to meet all costs, including operation and maintenance (O&M), debt servicing, and a reasonable rate of return on investment. The analysis incorporated the required tariff increases and compared them with the weighted average cost of capital (WACC). Sensitivity analysis was conducted to assess the impact of changes on costs and revenues. Financial projections (balance sheet, income and cash flow statements) have been developed for the proposed water supply, wastewater, heating, and solid waste components based on their projected operational performance. Financial projections were carried out to ensure that the revenue-generating components are financially viable. Financial projections were prepared over the period 2014–2033 to ascertain the overall financial sustainability of the components' operation. Finally, the affordability of tariffs is assessed by determining the percentage of household income to meet the estimated monthly bill from piped water supply and wastewater, solid waste, and heating services.

3. Financial sustainability analysis was carried out for nonrevenue-generating components. A detailed review of each county government's financial statements of the last 5 years (2005–2009) was undertaken to assess historical financial performance, capital structure, and generation of internal funds to support current operations, i.e., to provide counterpart funds during implementation, the ability to service debts, and to finance O&M of the subcomponents during operation. Projections were prepared to assess the likely financial performance of the county governments during operation of the completed facilities.

B. Assumptions

4. Capital cost includes the base cost of the subcomponents. It also includes physical contingencies but excludes price contingencies and financial charges during development (as a result of debt financing). O&M costs are based on specific operating characteristics of individual subcomponents. O&M costs include personnel salaries and welfare, plant maintenance costs, administration, insurance, fuel costs, and other expenses. O&M costs are based on the feasibility study report. All financial costs and benefits are expressed in June 2010 prices.

5. The revenues from the subcomponents are derived from water and wastewater sales, heating, and solid waste charges. Revenues are calculated based on projected production and consumption volumes of water supply and wastewater, proposed tariffs, and collection efficiency. Net cash flows are determined after income taxes. Income tax is calculated at 25%. The financial internal rate of return (FIRR) was calculated using incremental annual cash flows over 20 years with no residual value. A foreign exchange rate of CNY6.6:\$1 is used.

¹ ADB. 2005. *Financial Management and Analysis of Projects*. Manila.

6. The WACC of each subcomponent is compared with the FIRR to ascertain the financial viability of the subcomponent. WACC is calculated on a post-tax basis and is based on the London interbank offered rate plus an ADB margin (0.3%), cost of equity of 8%, income tax of 25%, domestic inflation rate of 4%, and international inflation rate of 0.07%. The WACC for the subcomponents ranges from 2.3% to 2.7%.

C. Financial Internal Rate of Return and Sensitivity Analyses

7. The FIRRs for the components are: 4.8% for solid waste, 14.3% for heating, 3.9% for wastewater, and 4.1% for water supply. These figures are all above the WACC, which ranges from 2.3% to 2.7% for the separate components. The components are therefore considered financially feasible. The FIRR of each of the individual subcomponent was calculated and is shown in Table 1.

Table 1: Financial Internal Rate of Return

Component	FIRR (%)	NPV (CNY million)
Buerjin		
1. Solid waste management	4.7	4.4
2. Wastewater	3.7	5.0
3. Water supply	4.0	20.4
Overall	4.1	29.8
Fuhai		
1. Solid waste management	4.8	6.0
2. Wastewater	4.6	7.0
Overall	4.7	13.0
Habahe		
1. Solid waste management	5.0	5.0
2. Wastewater	3.8	5.0
Overall	4.4	10.0
Jimunai		
1. Heating	9.2	26.1
2. Solid waste management	4.8	4.1
3. Wastewater	3.8	4.3
Overall	5.9	34.5
Qinghe		
1. Heating	19.4	76.5
2. Solid waste management	4.7	3.3
3. Qinghe county seat wastewater	3.9	3.0
4. Qinghe county seat water supply	4.7	7.0
5. Takeshiken wastewater	3.6	2.7
6. Takeshiken water supply	3.6	3.0
Overall	6.7	95.5
Overall Project	5.2	182.7

FIRR = financial internal rate of return, NPV = net present value.

Source: Asian Development Bank estimates.

8. The financial viability of the subcomponent was subjected to sensitivity analysis. Variables considered include (i) 10% increase in capital costs; (ii) 10% increase in operating costs; (iii) 10% reduction in benefits; (iv) 1-year delay in project implementation; and (v) cases 1, 2, and 3 combined. The project is most sensitive to increases in costs and decreases in

revenues associated with corresponding reduction in revenues. The combined increases in capital and operating costs and decreases in revenues would render the project unviable (Table 2). In the event that revenues will not be enough to finance O&M and to repay the loan, the county governments will provide subsidies.

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

Component	Case 1: 10% Increase in Capital Costs	Case 2: 10% Reduction in Benefits	Case 3: 10% Increase in Operating Costs	Case 4: Cases 1–3	Case 5: 1-Year Delay in Implementation
Buerjin					
1. Solid waste management	3.1	2.4	4.2	0.5	3.6
2. Wastewater	2.9	2.6	3.4	1.6	3.2
3. Water supply	3.1	3.0	3.8	2.2	3.4
Overall	3.0	2.7	3.8	1.4	3.4
Fuhai					
1. Solid waste management	3.5	2.9	4.5	1.2	3.4
2. Wastewater	3.6	3.3	4.2	2.2	4.1
Overall	3.6	3.1	4.4	1.7	3.8
Habahe					
1. Solid waste management	3.5	3.5	3.5	3.5	3.5
2. Wastewater	2.9	2.6	3.4	1.5	3.4
Overall	3.2	3.1	3.5	2.5	3.5
Jimunai					
1. Heating	7.7	4.8	6.2	0.5	8.8
2. Solid waste management	3.3	2.7	4.3	0.9	3.6
3. Wastewater	2.9	2.6	3.4	1.6	3.3
Overall	4.6	3.4	4.6	1.0	5.1
Qinghe					
1. Heating	17.5	13.6	15.5	8.4	19.2
2. Solid waste management	3.3	2.7	4.2	1.0	3.5
3. Qinghe County seat wastewater	3.1	2.7	3.5	1.5	3.5
4. Qinghe County seat water supply	3.7	3.5	4.4	2.4	3.1
5. Takeshiken wastewater	3.0	2.7	3.3	1.8	2.8
6. Takeshiken water supply	2.9	2.7	3.4	1.8	2.9
Overall	5.6	4.7	5.7	2.8	5.8
Overall Project	4.0	3.4	4.4	1.9	4.3

Source: Asian Development Bank estimates.

D. Tariffs and Affordability

9. It is anticipated that tariffs will be increased gradually—particularly water, wastewater, and solid waste—to cover O&M, depreciation, and/or debt service as the project improves service delivery. Tariffs will be increased gradually until full cost recovery is achieved, taking into account affordability factors. When revenues are insufficient to cover O&M, the county governments will provide subsidies.

10. Tariffs for water, wastewater, and solid waste will need to be increased when the ADB-financed facilities come into operation. By 2016 (Habahe); 2018 (Fuhai, Jimunai, and Qinghe county seat); and 2019 (Buerjin) tariffs will recover O&M and depreciation. By 2019 (Fuhai, Habahe, and Jimunai); 2020 (Qinghe county seat); and 2021 (Buerjin) full cost recovery will be achieved. Except for Takeshiken Port, tariffs will recover O&M by 2018 and full cost recovery will be attained in 2024. The project will provide capacity building on tariff setting and tariff reforms.

11. The affordability of tariffs was calculated for all households and for low-income (poor) households. Combined tariffs for water, wastewater, and solid waste services ranged from 0.5% to 1.9% of the income for average households across the counties, and between 0.6% and 2.3% for low-income households. Current heating service charges in Jimunai and Qinghe are CNY25.50/square meter and the level of recovery is around 100% once the project is operational. No increase in heating tariffs was assumed in the analysis of the heating components; thus, combined tariffs for water, wastewater, and solid waste ranged from 1.2% to 3.6% of the income of average households and between 1.5% and 3.9% for low-income households.

Table 3: Summary of Combined Households' Affordability as % of Household Income

Item	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Buerjin												
Average-income household	1.8%	1.8%	1.6%	1.9%	1.5%	1.4%	1.2%	1.3%	1.2%	1.1%	1.0%	1.0%
Low-income household	2.1%	2.0%	1.9%	2.3%	1.7%	1.6%	1.4%	1.4%	1.3%	1.2%	1.2%	1.1%
Fuhai												
Average-income household	1.4%	1.3%	1.2%	1.1%	1.0%	0.9%	0.8%	0.8%	0.7%	0.6%	0.6%	0.5%
Low-income household	1.9%	1.8%	1.6%	1.5%	1.4%	1.3%	1.1%	1.0%	1.0%	0.9%	0.8%	0.7%
Habahe												
Average-income household	1.2%	1.1%	1.0%	0.9%	0.8%	0.8%	0.7%	0.7%	0.6%	0.5%	0.5%	0.5%
Low-income household	1.6%	1.5%	1.4%	1.2%	1.1%	1.0%	0.9%	0.9%	0.8%	0.7%	0.7%	0.6%
Jimunai												
Average-income household	3.4%	3.1%	2.8%	2.6%	2.3%	2.1%	1.9%	1.8%	1.6%	1.4%	1.3%	1.2%
Low-income household	3.8%	3.5%	3.2%	2.9%	2.7%	2.5%	2.3%	2.1%	1.9%	1.7%	1.6%	1.5%
Qinghe County												
Average-income household	3.6%	3.3%	3.0%	2.7%	2.5%	2.3%	2.1%	1.9%	1.7%	1.6%	1.5%	1.4%
Low-income household	3.9%	3.6%	3.3%	3.0%	2.8%	2.6%	2.4%	2.3%	2.1%	1.9%	1.8%	1.7%
Qinghe Takeshiken												
Average-income household	0.6%	0.6%	0.5%	0.6%	0.6%	0.5%	0.6%	0.6%	0.6%	0.6%	0.6%	0.6%
Low-income household	0.7%	0.7%	0.7%	0.7%	0.7%	0.7%	0.7%	0.8%	0.7%	0.8%	0.8%	0.7%

Source: Asian Development Bank estimates.

E. Financial Analysis of Nonrevenue-Generating Components

12. Financial analysis of nonrevenue-generating components to ensure their fiscal sustainability was carried out by analyzing county government finances. The county governments receive taxes, nontax income, shared revenues with central government, and transfer and subsidies. Financial sustainability of the subcomponents during both the implementation and operation phase was determined. Fiscal impact assessment of the implementing agencies was done by comparing annual revenues from the aforementioned financial sources with the annual counterpart funds required for (i) capital expenditures during project implementation, and (ii) recurrent costs for O&M and debt services of the components

during operation. Interest and principal repayments for the ADB loan were estimated based on a grace period of 5 years and a maturity of 20 years. Table 4 shows the annual amount of counterpart funds that each county government must provide for its project subcomponents. Counterpart funds ranged from 0.1% to 5.0% of the counties 2009 revenues.

Table 4: Annual Counterpart Funds as % of Revenues

County	2011	2012	2013	2014	2015
Buerjin					
Annual contribution (CNY'000)	20,703	45,181	27,069	6,230	1,428
Percent of total revenues	2.7	5.0	2.6	0.5	0.1
Fuhai					
Annual contribution (CNY'000)	9,490	47,221	30,319	7,913	1,278
Percent of total revenues	0.9	3.7	2.0	0.4	0.1
Habahe					
Annual contribution (CNY'000)	16,624	44,237	18,013	1,130	1,151
Percent of total revenues	1.9	4.5	1.7	0.1	0.1
Jimunai					
Annual contribution (CNY'000)	16,602	24,111	31,137	17,145	1,227
Percent of total revenues	2.8	3.6	4.0	1.9	0.1
Qinghe					
Annual contribution (CNY'000)	5,699	26,823	21,667	2,876	834
Percent of total revenues	0.6	2.5	1.7	0.2	0.0

Source: Asian Development Bank estimates.

13. The analysis indicates that, based on the fund sources established during project preparation (including new budgets, subsidies, and allocation that will be earmarked) all components have sufficient funds available for counterpart funds during implementation, and funds for O&M and debt service during operation. Annual forecast debt service and O&M are found to be about 0.20%, 0.22%, 0.38%, 0.31%, and 0.04% of projected annual revenues in 2009 of the county governments of Buerjin, Fuhai, Habahe, Jimunai, and Qinghe (Table 5). This indicates acceptable fiscal risk since it is expected that fiscal revenues of the county governments will grow in line with economic development, providing more resource mobility for the county governments to finance the proposed subcomponents. Even if the county government will service the loan of the water supply, wastewater, and solid waste during the transition period until such time that full cost recovery has been reached, the contributions of the county government are between 0.54% and 1.34% of total revenues in 2016.

Table 5: Annual County O&M and Debt Service

County	Buerjin	Fuhai	Habahe	Jimunai	Qinghe
Loan: Nonrevenue-generating	50,963	92,128	90,825	58,813	12,892
Annual debt service and O&M (CNY'000)	8,322	15,045	14,832	9,604	2,105
Annual debt service and O&M (% of total revenues in 2009)	0.20	0.22	0.38	0.31	0.04
Loan: Nonrevenue-generating including water, wastewater, and solid waste (CNY'000)	165,000	132,000	132,000	107,204	77,577
Annual debt service and O&M (CNY'000)	15,541	17,569	17,438	12,668	6,200
Annual debt service and O&M (% of total revenues in 2016)	1.34	0.80	0.95	1.16	0.54

O&M = operation and maintenance.

Source: Asian Development Bank estimates.