FINANCIAL ANALYSIS

A. Introduction

1. The financial analysis was undertaken for the proposed project in accordance with Asian Development Bank (ADB) policies and guidelines.[1] A financial evaluation (financial cost–benefit analysis) was conducted for the water supply and wastewater treatment component under the Liuchuan Industrial Park (LIP) infrastructure development subproject, which has a cost-recovery objective. Subprojects and components without cost-recovery objectives include (i) a technical and vocational education and training (TVET) subproject which will promote skills development and labor employment in Baiyin municipality, (ii) an intelligent transport system (ITS) subproject which will improve road safety and enhance public bus service in Baiyin central district, and (iii) a road component under the LIP infrastructure development subproject. A financial sustainability analysis assessed the sustainability of these subprojects and components.

B. Financial Evaluation of the Water and Sanitation Components under the Liuchuan Industrial Park Infrastructure Development

1. Methodology

2. The financial internal rate of return (FIRR) was estimated for the water supply and wastewater treatment component to assess the revenue-generating capacity to meet all cash requirements including investment and operation and maintenance (O&M) costs, and a reasonable rate of return on investment. Discounted cash flow approach was applied for the exercise and all costs and benefits were expressed in March 2014 price levels. The weighted average cost of capital (WACC) based on financial assumptions was compared with the FIRR to ascertain the financial viability of the component. A sensitivity analysis was undertaken to test the robustness of the FIRR to changes in underlying parameters, i.e., increases in capital and operating costs, low demand associated with revenue reductions, and combinations of these impacts. Cash flow projections were based on the realistic estimate of water and wastewater tariffs, and it was assessed whether cumulative cash flow will meet cash operating costs, debt service, and capital replacement, particularly of mechanical and electrical equipment. A single entity will be engaged as an operator for the water supply and sanitation services. Tariff affordability was also assessed to ensure tariff setting is within consumers' ability to pay.

2. Financial Assumptions

3. Financial projections of 25 years from project commencement and 20 years after project completion (cash flows) were prepared to determine the annual required revenue to ensure that the cumulative cash flow would meet cash operating costs, depreciation, and debt service. Project revenue will be derived from water sales and wastewater treatment fees. Cost streams used for calculating the FIRR are capital investment and O&M costs. Capital costs include (i) the base cost, including the investment cost for the associated water intake facility, primary and secondary water supply treatment facilities, water transfer pipelines, water and wastewater distribution pipelines, and sludge handling equipment; and (ii) physical contingencies. O&M costs include personnel salaries, cost of chemicals and agents, utility cost (e.g., electricity),

[1] ADB. 2014. Financial Management, Cost Estimates, Financial Analysis, and Financial Performance Indicators. *Operations Manual.* OMG2/BP. Manila; ADB. 2005. *Financial Management and Analysis of Projects*. Manila; ADB. 2009. *Financial Due Diligence: A Methodology Note.* Manila.

plant maintenance cost, administration and taxes.[2] The water and wastewater demand projections are based on (i) a water supply population of 38,848 in 2020 with water consumption of 120 liters per person per day for domestic use throughout the projection period, (ii) industrial water demand based on type of industries and their typical daily water consumption based on the industrial demand assessment, and (iii) a wastewater generation rate of 90% of water consumption.[3] Other assumptions include that (i) the ADB loan repayment period is 25 years including a 5-year grace period, and (ii) the baseline tariffs used to estimate the revenues are tariffs in Jingyuan county, where the LIP is located, in 2013. The future tariff increase was projected by making a conservative and realistic projection based on historical tariff revisions in Jingyuan county and Baiyin municipality. The analysis identified the financial viability of the water supply plant and the wastewater treatment plant to meet cash operating costs, to build up funds to cover capital replacement, and to pay debt service. The Baiyin municipal government (BMG) will pay the debt service for the ADB loan, while the LIP Management Committee (LMC) will cover the domestic bank loans. Net cash flows were determined after income taxes were calculated at 25%. No residual value was assumed. The foreign exchange rate of CNY6.1 = $1.0 was used for the analysis.

3. Weighted Average Cost of Capital

4. The financing sources were assumed to comprise the BMG equity contribution, domestic bank loans, and an ADB foreign currency loan. The Ministry of Finance of the People's Republic of China (PRC) will relend the funds from ADB with the same terms and conditions to the Gansu provincial government and the BMG. The loan rate will be on a 5-year US dollar fixed swap rate plus the ADB margin of 0.5% and a maturity premium of 0.1%, a total of 2.5% per annum. The cost of equity was calculated at 8.0%, assuming a risk-free rate of return of 6.0% plus a 2.0% margin. The domestic loan rates from two domestic banks are 6.7% and 7.2%. Income tax is assumed at 17.0%, with the WACC calculated on an after-tax basis. The other assumptions are a domestic inflation rate of 3.0% and an international inflation rate of 1.0%. The computed real WACC for the component is 2.5% (Table 1).

Table 1: Weighted Average Cost of Capital

Source	Amount[a] ($ million)	Weighting (%)	Nominal Rate (%)	Tax (%)	Nominal Rate after Tax (%)	Inflation Rate (%)	Real Term (%)	WACC (%)
ADB loan	82.8	63.1	2.48	17.00	2.06	1.00	1.05	0.66
BMG equity	36.9	28.1	8.00	0.00	8.00	3.00	4.85	1.37
ICBC Bank	11.5	8.7	7.20	17.00	5.98	3.00	2.89	0.25
Gansu Bank	11.5	8.7	6.66	17.00	5.53	3.00	2.45	0.21
Real WACC								**2.49**

ADB = Asian Development Bank, BMG = Baiyin municipal government, ICBC = Industrial and Commercial Bank of China, WACC = weighted average cost of capital.

[a] The project cost includes expected future domestically funded projects for water distribution pipeline network expansion planned during the financial projection period.

Source: Asian Development Bank estimates.

[2] O&M cost for water is assumed at CNY1.03 per cubic meter (m^3) of water produced in 2014 prices. For wastewater, O&M cost is CNY0.68/m^3 of wastewater treated. The total O&M cost is 6.5% of the total investment cost.

[3] In the LIP, the population is projected to grow from 12,797 in 2015 to 38,848 in 2020 and 77,897 in 2030 with domestic service connections of 4,266 in 2015, 12,949 in 2020, and 25,966 in 2030. Industrial connections are expected to increase from 8–10 in 2020 to 35–40 in 2030. Demand follows projected short-term industrial development schedules of the LIP during 2015–2017 to serve existing industries and corresponding domestic worker household water requirements. Forecasts for 2020 and 2030 were based on the industrial demand assessment. The long-term demands accounted for daytime and nighttime worker population growth and incorporated worker household members in the LIP. Three population patterns have been investigated and the most conservative projection, based on actual land demand assessment, was used for the analysis.

4. Financial Internal Rate of Return

5. The FIRR at 3.4% is higher than the WACC of 2.5%. The water supply and wastewater treatment services in the LIP are therefore considered financially viable (Table 2). Sensitivity analysis shows that the FIRR remains higher in the case of a 10% increase in investment cost and operating cost but is most sensitive to a 10% decrease in revenue, which will decrease the FIRR to 2.0%, and to a simultaneous 10% increase in capital costs and operating costs and a 10% decrease in revenue, which will decrease the FIRR to 0.7%. The financial viability of the project will need to be monitored carefully.

Table 2: Financial Internal Rate of Return and Sensitivity Analysis

Sensitivity Analysis	FIRR (%)	Net Present Value (CNY million)	Sensitivity Indicator (%)
Base case	3.41	90.2	
(i) Capital costs: +10%	2.69	20.4	2.1
(ii) Operating costs: +10%	2.85	34.6	1.6
(iii) Reduction in revenue: –10%	2.02	(44.2)	4.1
(iv) Combination of (i), (ii), and (iii)	0.73	(169.7)	
(v) 1-year delay in implementation	2.46	(2.9)	2.8
Weighted average cost of capital	**2.49**		

( ) = negative value, FIRR = financial internal rate of return.
Source: Asian Development Bank estimates.

5. Water and Wastewater Tariffs

6. The existing water and wastewater tariffs in Jingyuan county were applied for the analysis. The water tariffs are CNY1.4 per cubic meter (m^3) for domestic customers and CNY2.2/m^3 for industrial customers. The wastewater tariffs are CNY0.7/m^3 for domestic users and CNY1.0/m^3 for nondomestic users. The analysis assumed a tariff increase of 10% every 3 years from 2017.[4] The water and wastewater tariffs during the first year of operation in 2020 are CNY1.7/m^3 for domestic customers and CNY2.7/m^3 for industrial customers for water supply, and CNY0.9/m^3 for domestic customers and CNY1.2/m^3 for industrial customers for sanitation. A lesson from past projects indicates that the water tariff should be carefully estimated during project preparation. Given that users of water and sanitation services are primarily industries and the current level of tariffs in Jingyuan county are low, the projected increase is considered conservative. In the event that revenues are not adequate to finance O&M costs and repay the loan, the Jingyuan county government (JCG), through the LMC, will provide subsidies.

6. Affordability

7. The tariff analysis includes assessments of affordability for project beneficiaries. The primary social objective of water and wastewater tariff structures should be to ensure that all members of the community have access to these services without placing an undue burden on their household expenditures. The average household incomes were based on socioeconomic survey and adjusted to current prices. Considering the average household size of three people and monthly water consumption of 10.8 m^3 for nonpoor households and 7.2 m^3 for poor households in the LIP and surrounding villages,[5] the projected water tariff increase would result

[4] Jingyuan county is an agricultural county and the water tariffs for domestic and industry users are lower than those of Baiyin urban district. The estimated tariff levels are considered low against other competing industrial parks in Baiyin: CNY2.4/m^3 for domestic and residential customers and CNY3.7/m^3 for nondomestic customers and industry. The projected tariff increases were considered feasible since the projected water and wastewater tariffs in 2019 are still lower than the levels of Baiyin urban district in 2013.

[5] Daily water consumption per capita is estimated at 80 liters (for poor people) and 120 liters (for nonpoor people).

in an estimated water and sanitation bill in 2020 of about CNY26.5 per month for a nonpoor household and CNY17.7 for a poor household, which is equivalent to 1.1% of a nonpoor household's monthly income and 1.5% of a poor household's monthly income. The share of income expended is therefore considered affordable.

C. Financial Sustainability Analysis

8. The historical financial performance of project-related entities was analyzed to determine their financial capacity to provide for cash requirements including equity contribution during construction and O&M and debt service and loan repayment during operation. In the project, the BMG is assumed as the end borrower of the ADB loan. The BMG will provide the counterpart funding to ensure project completion, and thereafter pay debt service for the ADB loan. The project counterpart fund will be transferred to the JCG and then to the LMC on a grant basis. For the domestic bank loans, the LMC will be the borrower and the JCG will provide a guarantee. The entities responsible for O&M of the project facilities and equipment are the LMC for the road component under the LIP infrastructure development subproject, the JCG for the TVET subproject, the BMG for the traffic security and control system part of the ITS subproject, and the Baiyin Public Transportation Company (BPT) for the public transportation management part of the ITS subproject.

1. Approach

9. Based on the revenue and expenditure statements during 2009–2013, financial projections until 2040 were undertaken for the entities to assess historical financial performance including capital structure, internal funds generation to support current operations, debt service capacity, and ability to finance O&M of the nonrevenue-generating components after construction. The analysis calculated the historical compound average growth rate of revenues and expenditures until 2015, used 7.5% per annum for 2016–2020, after which the rates are gradually reduced to 2040.[6]

2. Counterpart Fund and Debt Service Coverage

10. Project counterpart funds and debt service as a percentage of revenue of the BMG, JCG, and LMC are given in Table 3. As a percentage of annual revenues in 2015, the maximum annual capital expenditure, which comprises counterpart funds and interest during construction, is projected to be about 0.5% for Baiyin. Similarly, debt service for the ADB loan during operation is projected to be 0.1% in 2020, when the repayment of loan principle starts. These findings indicate acceptable fiscal risk since the fiscal revenues of the municipal government are expected to grow in line with economic development, providing more resource mobility for the municipal government to finance the project components and ensure loan repayment. For the LMC, a combined financial impact of debt service was projected at 12.7%–66.6% of its revenue in 2015–2019. This is because the LMC was established for the LIP, which will not be in full operation until 2020. Since the LMC's fiscal revenue relies solely on the JCG, additional due diligence analysis on debt service was also conducted against the JCG. The fiscal impact of domestic bank debt service was estimated at 0.2%–1.5% of the JCG's fiscal budget, indicating that the JCG has enough capacity to provide additional financial support to shoulder debt

[6] The gross domestic product (GDP) growth target for the PRC under the Twelfth Five-Year Plan, 2011–2015 is 7.5%. Much higher GDP growth was projected for the BMG and JCG. In the analysis, the future GDP growths are given as 7.5% per annum for 2016–2020, 5.0% per annum for 2021–2025, 3.0% per annum for 2026–2035, and 1.0% per annum for 2036–2040.

service for local banks. This fiscal risk of the LMC is mitigated by loan assurance of providing comprehensive fiscal support from the JCG to ensure smooth start-up of the LIP development.

3. Operation and Maintenance Cost

11. The BMG will finance recurrent costs for O&M for the traffic police ITS managed by its public security bureau and the JCG will finance the O&M for the TVET subproject managed by its human resource and social security bureau. As a percentage of annual revenues in the first year of operation, the funds for O&M during operation are projected to be (i) 3.5%–3.8% of revenues for the LMC for the road component under the LIP infrastructure development subproject,[7] (ii) less than 0.1% for the TVET subproject under the JCG, (iii) 0.1% for the BMG for the traffic security and control system part of the ITS subproject, and (iv) 1.3% for the BPT for the public transportation management part of the ITS subproject. This indicates acceptable fiscal risk since fiscal revenues of the governments and operational entities are expected to grow in line with economic development, providing more resource mobility to finance the project facilities' operation. The analysis concludes that, based on the identified funding sources during project preparation (including new budgets, subsidies, and allocated financing), all subprojects have sufficient funds available for O&M during operation (Table 3).

Table 3: Project Expenditure as Percentage of Revenue of Project Entities

(CNY million)

Item	2015	2016	2017	2018	2019	2020	2025	2030	2035	2040
Baiyin Municipal Government										
Revenues	23,607	25,377	27,280	29,326	31,526	33,890	43,254	50,143	58,129	61,094
Counterpart	77.8	101.3	146.4	120.2	41.5					
% of revenues	0.3	0.4	0.5	0.4	0.1					
O&M cost			1.5	1.5	1.5	1.6	1.8	2.1	2.5	2.9
% of revenues			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Debt service						25.4	30.4	38.4	51.5	-
% of revenues						0.1	0.1	0.1	0.1	-
Total requirement	**77.8**	**101.3**	**146.4**	**121.7**	**43.0**	**27.0**	**32.3**	**40.6**	**54.0**	**2.9**
% of revenues	**0.3**	**0.4**	**0.5**	**0.4**	**0.1**	**0.1**	**0.1**	**0.1**	**0.1**	**0.0**
Jingyuan County Government										
Revenues	5,810	7,227	7,769	8,352	8,978	9,652	12,318	14,280	16,555	17,399
O&M cost			0.4	0.4	0.4	0.4	0.5	0.6	0.7	0.8
% of revenues			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Debt service	84.4	79.4	24.3	22.9	21.4					
% of revenues	1.5	1.1	0.3	0.3	0.2					
Total requirement	**84.4**	**79.4**	**24.7**	**23.3**	**21.9**	**0.4**	**0.5**	**0.6**	**0.7**	**0.8**
% of revenues	**1.5**	**1.1**	**0.3**	**0.3**	**0.2**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**
Liuchuan Industrial Park Management Committee										
Revenues	127	136	147	158	169	181	232	269	312	328
O&M cost						7.0	8.1	9.4	10.9	12.6
% of revenues						3.8	3.5	3.5	3.5	3.5
Debt service	84.4	79.4	24.3	22.9	21.4					
% of revenues	66.6	58.2	16.6	14.5	12.7					
Total requirement	**84.4**	**79.4**	**24.3**	**22.9**	**21.4**	**7.0**	**8.1**	**9.4**	**10.9**	**12.6**
% of revenues	**66.6**	**58.2**	**16.6**	**14.5**	**12.7**	**3.8**	**3.5**	**3.5**	**3.5**	**3.5**
Baiyin Public Transportation Company										
Revenues	49	53	57	62	68	75	119	189	300	477
O&M cost			0.7	0.7	0.8	0.8	0.9	1.1	1.2	1.4
% of revenues			**1.3**	**1.2**	**1.1**	**0.9**	**0.8**	**0.6**	**0.4**	**0.3**

O&M = operation and maintenance.
Source: Asian Development Bank estimates.

[7] The percentage is estimated as less than 0.1% with the financial support from the JCG.