

FINANCIAL ANALYSIS

1. **Methodology.** The subprojects in the four Urban Services Improvement Investment Program towns of Anaklia, Marneuli, Mestia, and Zugdidi in Georgia were analyzed following the *Handbook for Economic Analysis of Water Supply Projects*¹ and the *Financial Management and Analysis of Projects* of the Asian Development Bank (ADB).² The financial analysis assessed subproject ability to meet future costs, including capital expenditure, operation and maintenance (O&M) costs, total debt service, and depreciation.

2. The analysis was conducted on a without-project and with-project basis by estimating incremental costs and revenues over 25 years. The main financial viability parameters were (i) the financial internal rate of return (FIRR), which should be greater than the weighted average cost of capital (WACC), with the financial net present value as proxy; (ii) operating ratio, which should be less than or equal to one when the investment program becomes fully operational; and (iii) tariff affordability, normally considered affordable if the resulting monthly charge is 5% or less than the average monthly household income.³ Details of the analysis are in Cash Flow Statements.

3. The analysis looked closely at the operating ratio as a main indicator of sustainability, with total operating expense (i.e., operation and maintenance (O&M), depreciation, and taxes) measured against total operating revenues. A ratio of less than one reflects total cost recovery and thus a certain level of sustainability; if greater than one, sustainability is lacking, requiring increased tariffs, reduced costs, and/or viability gap funding (VGF).

4. **Assumptions.** The first tranche of the multitranche financing facility will improve water supply intake and treatment facilities in Zugdidi, Anaklia, Mestia, and Marneuli.⁴ Subprojects will include only headworks, treatment plants, and water transmission pipelines. Water supply analysis was based on average demand of 100 liters per capita per day for domestic connections.⁵ Nondomestic demand was based on the historical volume of water demand. Other key assumptions included the following: (i) investment base cost at June 2010 prices; (ii) physical contingencies at 10%; (iii) local inflation at 6% from 2010 to 2015 and 5% from 2016; (iv) foreign inflation at 1% annually; (v) O&M costs covering salaries, chemicals, power, repair, raw water cost, maintenance, and an allowance for bad debts based on historical operations data and the design technology used; (vi) asset useful life of 10 years for equipment and 50 years for civil works; and (vii) historical population growth rates. Tranche 1 of the loan was based on Asian Development Fund (ADF) terms and conditions. Interest was assumed capitalized during construction. Tourist inflow assumed for Mestia and Anaklia was a critical factor affecting service delivery in the two towns.

5. Revenues were based on domestic and nondomestic demand for water and sewerage services.⁶ Tariffs were programmed to increase every 2 years to cover (i) O&M costs, (ii) O&M costs plus depreciation, and (iii) O&M costs plus total debt service. Tariff increments were

¹ ADB. 1999. *Handbook for Economic Analysis of Water Supply Projects*. Manila.

² ADB. 2005. *Financial Management and Analysis of Projects*. Manila.

³ Cash Flow Statements (accessible from the list of linked documents in Appendix 2 of the report and recommendation of the President).

⁴ For the purpose of analysis, Anaklia was included under Zugdidi because of the service center structure of the United Water Supply Company of Georgia.

⁵ Rural households were also considered because the water transmission pipeline could supply villages along the route from the water source to the urban centers, especially in Zugdidi and Anaklia.

⁶ Revenues were considered from existing customers only, as no service expansion is planned under tranche 1. Affordability analysis was conducted for this group of customers.

benchmarked on affordability to domestic customers and targeted cost recovery. In the analysis, the actual collection rate of 40%–46% for domestic customers was expected to reach 90% by 2015. The collection rate for nondomestic customers, currently 99%, was maintained throughout the projection period.

6. **Non-incremental and incremental water.** The demand forecast assumes that all water from existing alternative sources (i.e., bottled water, neighbors' borehole, own borehole, well with bucket, and natural springs) will be replaced with subproject water supply. This was featured as non-incremental water in the economic analysis. System improvements from the subproject will reduce nonrevenue water from the current 60% in Marneuli, 80% in Mestia, and 60% in Zugdidi to 30% by 2020.⁷ The reduction in nonrevenue water will make billable water available to the system, thereby contributing to cost recovery. This was featured as incremental water, a source of benefits in the economic analysis.

7. **Capital cost estimates.** The three subprojects (Zugdidi and Anaklia are under one subproject) require an investment of \$105 million including contingencies (Table 1).

Table 1: Subproject Capital Cost
(\$ million)

Particulars	% Total	Total	Marneuli	Mestia	Zugdidi
Civil Works and Equipment	47.83	50.23	5.86	1.30	43.07
Water supply system	45.44	47.71	5.09	0.93	41.70
WSS vehicles and equipment	2.40	2.51	0.77	0.37	1.38
Consulting and Management Costs	18.95	19.89	2.42	0.68	16.80
Total Base Cost	66.78	70.12	8.27	1.97	59.87
Physical contingency	6.44	6.76	0.75	0.16	5.85
Price contingency	5.80	6.09	0.71	0.16	5.22
Total Contingencies	12.24	12.85	1.46	0.32	11.06
Interest during construction	2.10	2.20	0.26	0.05	1.89
Taxes and duties	14.22	14.93	1.75	0.41	12.780
Balancing amount ^a	4.66	4.89			
Total Cost	100.00	105.00	11.75	2.76	85.60

WSS = water supply and sanitation.

^a The balancing amount includes the amount that is available for other tranches of the investment program and has not been loaded on the tranche 1 subprojects.

Source: Asian Development Bank estimates.

8. **Weighted average cost of capital.** The WACC was calculated in real terms and used as the hurdle rate for the FIRR to measure subproject viability. Funding sources are the ADF loan⁸ and the government contribution. Average inflation is estimated at 1.0% for foreign costs and at 5.0% for local costs. The rates are computed on an after-tax basis, resulting in the WACC in real terms estimated at 2.3% for tranche 1 of the loan, presented in Table 2. For individual subprojects, the WACC is 2.2% because the balancing amount is not included in the capital costs for the subprojects and the ADB-financed portion consequently increases, thereby shifting the weight onto the ADB portion of the capital.

⁷ The Zugdidi central water distribution system has not been used since 1993. UWSCG currently supplies drinking water from boreholes to the villages of Anaklia, Zeda Etseri, and Ingiri, as well as the city's settlements of people internally displaced by the 1992–1993 civil war in Abkhazia.

⁸ The ADF loan interest rate is 1% during the 8-year grace period and 1.5% thereafter.

Table 2: Weighted Average Cost of Capital

Particulars	Capital	% of Total	Nominal Rate	Tax Rate	After Tax	Inflation Rate	Real Rate	Real WACC
ADB	80.00	76	1.30%	20%	1.04%	1.0%	0.0%	0.03%
Government	25.00	24	15.00%	0%	15.00%	5.0%	9.5%	2.27%
Total	105.00							2.30%

ADB = Asian Development Bank, WACC = weighted average cost of capital.

Source: Asian Development Bank estimates.

9. **Financing plan.** The investment will be financed by an ADF loan, estimated at \$80 million or 76% of total capital investment, and a government contribution of \$25 million, or 24% of the total capital investment (Table 3).

Table 3: Subproject Financing Plan
(\$ million)

Particulars	% of Total	Total	Marneuli	Mestia	Zugdidi
Amount to Be Financed					
Investment in project	93.20	97.90	11.49	2.71	83.71
IDC	2.10	2.20	0.26	0.05	1.89
Balancing amount	4.70	4.89			
Total Capital Investment	100.00	105.00	11.74	2.76	85.60
Financed by					
ADB	73.40	77.10	9.05	2.13	65.93
Disbursement	71.30	74.90	8.77	2.07	64.04
IDC	2.10	2.20	0.26	0.05	1.89
Balancing amount	4.70	4.89			
Government	21.90	23.01	2.70	0.64	19.67
Total Financed	100.00	105.00	11.75	2.76	85.60

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

Source: Asian Development Bank estimates.

10. **Operation and maintenance costs.** Subproject O&M costs include service center staff salaries, power and energy, chemical treatment, maintenance, and miscellaneous expenses and are based on engineering estimates and United Water Supply Company of Georgia (UWSCG) historical financial operations data. Bad debt is assumed at 1.0% of sales. Escalation is applied based on local inflation. Depreciation is assumed at 2.0% annually on 50-year civil works and at 6.7%–10.0% on 10–15-year materials and equipment.

11. **Current tariffs.** Current water tariffs in the subprojects, effective September 2010,⁹ are differentiated between domestic (metered and unmetered) and nondomestic (metered) use. All domestic customers are not yet metered, while nondomestic customers are all metered since September 2010. For domestic customers, UWSCG has set the tariff per cubic meter (m³) for water supply and sanitation at \$0.15/m³ (\$0.11/m³ for water and \$0.04/m³ for sanitation), while unmetered domestic customers are charged \$1.01/person/month for water supply and \$0.13–\$0.36/person/month for sanitation.¹⁰ Nondomestic customers are charged the maximum rate of \$1.94/m³ for water and \$0.51/m³ for sanitation, or a total of \$2.45/m³.

⁹ Prior to these new tariffs, there had been no tariff increase for 5 years.

¹⁰ UWSCG does not apply a unified tariff because of differing economic status and service levels of the service centers.

12. **Proposed tariff rate increases.** In the financial projections, where revenues and costs are given in nominal terms, tariffs are projected to increase biennially to cover O&M costs and total debt service. In the FIRR cash flows, revenues and costs are taken in real terms. Projected rate increases will start in 2013 to smooth the pace of increase after project completion.

13. **Affordability analysis.** An affordability analysis compared household water expenditure with average household income. Table 4 presents affordability levels in each subproject for 2014, 2020, and 2025. The number of household members and average household income are based on socioeconomic surveys conducted in the subprojects during project preparation and adjusted for inflation. Also shown are willingness to pay and the coping costs with which households address poor water supply.

Table 4: Tariff Affordability

Particulars	Marneuli			Mestia			Zugdidi		
	2014	2020	2025	2014	2020	2025	2014	2020	2025
Members per household	4.2	4.2	4.2	3.3	3.3	3.3	3.5	3.5	3.5
Consumption (liters per capita per day)	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Metered tariff rate (\$/m ³)	0.2	0.4	0.6	0.1	0.2	0.3	0.1	0.3	0.5
Unmetered tariff rate (\$/person/month)	1.2	2.2	3.5	1.2	2.1	2.9	1.2	2.1	3.3
Average consumption/month (m ³)	12.6	12.6	12.6	9.9	9.9	9.9	10.5	10.5	10.5
Average household income (\$/month)	316.3	335.8	352.9	169.7	180.1	189.3	208.4	221.2	232.5
Coping strategy (\$/m ³) ^a	5.7	...	...	0.0	...	...	1.1	...	...
HH willingness to pay (\$/month) ^a	2.9	...	...	1.9	...	...	2.3	...	...
Average metered HH water bill (\$/month)	2.6	4.9	7.8	1.4	2.3	3.2	1.4	2.8	4.9
Average unmetered HH water bill (\$/month)	5.0	9.4	14.8	4.0	6.9	9.6	4.2	7.3	11.6
% of income spent on metered WS	0.8	1.5	2.2	0.8	1.3	1.7	0.7	1.3	2.1
% of income spent on unmetered WS	1.6	2.8	4.2	2.4	3.8	5.0	2.0	3.3	5.0

... = not available, HH = household, lpcd = liters per capita per day, m³ = cubic meter, WS = water supply.

^a Based on focus group discussions.

Source: Asian Development Bank estimates.

14. The analysis found tariff increases required for the three subprojects to be affordable but unable to generate enough revenue to cover O&M costs and total debt service. VGF was therefore considered for application during and after project implementation to cover these costs. Table 4 shows that the proposed monthly charge for the three subprojects is within the generally accepted limit of 5% of household income. As exponential increases are politically unacceptable, VGF is proposed to provide the buffer to meet required operating ratios before financial reforms and progressive tariff increases reduce dependence on subsidies.

15. **Cost-recovery and viability gap fund analysis.** The analysis determined the tariffs required to cover O&M costs and depreciation or total debt service, whichever is higher. Where tariffs are insufficient for full cost recovery, the shortfall has been assessed for VGF. Tariff increases are proposed every 2 years from 2013 to 2025, averaging 20% per year. The period of analysis to determine VGF is from 2011 to 2017 and from 2018¹¹ to 2025. Table 5 indicates the tariff and VGF requirement. For example, the Marneuli subproject has an average annual revenue for 2011-17 of \$1 million, O&M of \$0.93 million, and O&M plus total debt service

¹¹ Loan repayment starts in 2018.

payment of \$0.97 million for the same period. However, the Marneuli subproject needs a VGF of \$2 million per year from 2011 to 2013 to push its FIRR above the WACC.

Table 5: Cost Recovery Tariffs and Required Annual Viability Gap Funding

Subproject	Period (year)	Average Annual Revenue (\$ million)	Average Annual O&M (\$ million)	Average Annual O&M + Total Debt Service (\$ million)	FIRR 2011–2035 (%)	VGF (FIRR>WACC)	
						Average Annual VGF 2011–2013 (\$ million)	FIRR 2011–2035 (%)
Marneuli	2011–2017	1.00	0.93	0.97	-	2.00	5.12
	2018–2025	2.06	1.29	1.64			
Mestia	2011–2017	0.23	0.02	0.03	11.3	0.00	11.33
	2018–2025	0.83	0.02	0.11			
Zugdidi	2011–2017	1.28	0.71	0.99	-	24.03	6.33
	2018–2025	4.37	1.82	4.35			

FIRR = financial internal rate of return, O&M = operation and maintenance, VGF = viability gap funding, WACC = weighted average cost of capital.

Source: Asian Development Bank estimates.

16. **Sensitivity analysis.** Table 6 provides the results of sensitivity tests, which found subprojects to be highly sensitive to adverse economic conditions. The sensitivity analysis assumes that the government will provide VGF.

Table 6: Subproject Financial Internal Rate of Return

Particulars	Marneuli		Mestia		Zugdidi	
	FIRR	FNPV	FIRR	FNPV	FIRR	FNPV
	(%)	(\$ million)	(%)	(\$ million)		(\$ million)
Base case	5.12	1.88	11.33	3.84	6.33	10.24
Capital cost plus 20%	2.20	0.01	9.40	3.39	1.30	(3.26)
O&M costs plus 10%	3.50	0.79	11.30	3.82	5.90	8.78
Revenue less 10%	2.50	0.19	10.20	3.21	5.10	6.66
1 year delay in benefit	3.50	0.91	10.10	3.45	5.40	8.02
Switching value ^a for capital cost	20.10		170.80		15.20	
Switching value ^a for revenue	11.10		–61.40		–28.60	
WACC	2.20		2.20		2.20	

FIRR = financial internal rate of return, FNPV = financial net present value, O&M = operation and maintenance, WACC = weighted average cost of capital.

^a Switching value is the change in parameter that will make FIRR equal to WACC.

Source: Asian Development Bank estimates.

17. **Conclusion.** The subprojects are financially viable when (i) tariff increases are implemented every 2 years from 2013 to 2025, which should be affordable to domestic consumers, and (ii) the government provides VGF that includes counterpart funds, subventions for O&M, and total debt service to ensure service sustainability. As income affordability is a major factor in rationalizing tariffs, monthly household income needs to be reviewed periodically. The sensitivity analysis indicates that subproject FIRRs are above the WACC even under adverse economic conditions, except for Zugdidi where the FIRR falls below the WACC when the capital cost is increased by 20%.