

CHAPTER 10 PROJECT EVALUATION

10.1 Economic Evaluation

As for the economic benefit of the Project, we estimated quantitatively the labor saving with the improvement of the water supply. As the basis of labor cost, we adopted the average income of the residents of four cities/towns in the study area. There is substantial discrepancy between the income of the residents in Balti and Soroca, and income of the residents in Falesti and Riscani; the average monthly family income (average size of family is 3 person) is about 600 lei in Balti and Soroca and about 400 lei in Falesti and Riscani.

As regards economic benefit other than labor saving, we can consider the positive effect on the health of the residents but it is very difficult to estimate quantitatively. The increase of the land value and the positive effect in industrial promotion may not have direct correlation with water supply improvement.

When all the four packages proposed in this FS are implemented, the EIRR is 4.75% (Table 10.1). This EIRR considers only labor saving by water supply improvement. Actual EIRR will exceed this value if we consider other positive effects. If we consider only package 1 and 2, that is, excluding the pipeline extension to Falesti and Riscani, EIRR will increase to 8.75% (Table 10.2).

The water supply situation is very serious in both Falesti and Riscani with respect to both quality and quantity, but the cost of the pipeline extension to two towns, small number of residents and the low income of the residents will decrease the monetary value of labor saving.

10.2 Financial Evaluation

The scope of the financial evaluation in the feasibility study is focused to ACSB. The WITH is the case that the proposed four packages in FS are implemented and the WITHOUT is that the proposed packages are not implemented. As for the equipment that is now out of operation due to power disconnection, we assumed that the normal and stable operation in long-term period of this old equipment would be impossible. Technical judgment by the professional engineers in the study team supports this treatment. Thus the object of the analysis is the difference between WITH and WITHOUT. The cumulative liabilities, account receivables and the depreciation of the existing facilities are out of analysis in this feasibility study because they are included in both WITH and WITHOUT. The time frame of the feasibility study is from 2003 to 2015.

We have set up the following three cases for the analysis of the feasibility study.

Case 1: All the four packages are implemented with low interest loan.

Case 2: The package one and two are implemented with low interest loan and the package three and four are implemented with subsidy.

Case 3: The package one and two are implemented with low interest loan and the package three and four are suspended.

Currently, the wholesale price of ACSB is 1.43 lei/m³. ACSB is trying to increase the tariff to 1.62 lei/m³ and it will be realized within a couple of years. The 1.62 lei/m³ is at 2002 price level and it is assumed that the tariff increase will be possible in proportion to inflation rate and real GDP growth rate. As a result, the water tariff of ACSB at 2015 will be 6.00 lei/m³ (2015 price). The VAT (value added tax, currently 20%) is excluded from the analysis.

The revenue from water sales depends on the three factors, i.e., billing volume, tariff structure and collection rate. The major cause of financial trouble of ACSB was low collection rate. This must be improved. But until 2006, we expect the normalization of the payment from the retail Apa Canals to ACSB, thus assume 100 % collection rate.

Initial investment costs consist of Machine and Electrical Equipment and Civil Works. Engineering fee and contingencies are added. The professional engineers estimate these costs. The depreciation period is 20 years for machine and electrical equipment and 40 years for civil works at straight-line method (10% salvage value).

In addition to the O&M costs, we have to add the general and administrative expense. We adopt the general and administrative expenditure of ACSB at 1999 financial reports when ACSB operated during 12 months. The O&M costs will be assumed to increase in proportion to inflation and at the rate of 70 % on real GDP growth.

As for the financial resources, the internal financing is absolutely impossible for ACSB.

The loan condition assumed is 2 percent interest rate, 30 years loan with 10-year grace period. The loan at this category reflects grant nature at substantial degree. It has to be kept in mind that a loan at this condition is usually not available and that the analysis actually shows the necessity of government subsidy.

FIRR was 3.62% in Case 1 (Table 10.3), 7.99% in Case 2 (Table 10.4), and 6.51% in Case 3 (Table 10.5). The Case 1 shows the lowest FIRR because all the four packages will be implemented with low interest loan. Even with extremely low interest loan, the result of the analysis shows that the project is not feasible without government subsidy. With government subsidy for package 3 and 4, the FIRR is improved to 7.99%. If the package 3 and 4 is excluded from the project, the FIRR will be 6.51%.

If O&M expenditure increases in proportion to the real GDP per capita growth, FIRR in Case 1 will be 1.91%, FIRR in Case 2 will be 5.89%, and FIRR in Case 3 will be 4.39%. The rationalization to keep O&M in low level is absolutely necessary.

If the expected tariff collection rate is decreased to 90%, the FIRR in Case 1 becomes negative, FIRR in Case 2 will be 2.63%, and FIRR in Case 3 will be 1.13%. Thus, the collection rate at high level is critically important.

Until the year that new facilities will be operated, the two or four retail Apa Canals have to establish the systems of the retail tariff collection and the payment to ACSB. During past one year, the improvement of the financial management in ACB and ACS is remarkable. We are able to expect full tariff collection from these two cities.

The pro forma financial statements are estimated for three cases. The year that net income become positive is 2010 in Case 1 (Table 10.6), 2006 in Case 2 (Table 10.7), and 2006 in Case 3 (Table 10.8). The water sales start from 2006 and the depreciation does not require actual cash outlay, therefore, the financial situation of ACSB will be not so serious. The cumulative liabilities will disappear at 2014 in Case 1, 2009 in Case 2, and 2009 in Case 3. After that, ACSB will be able to accumulate the profit rapidly, and the cumulative trade liabilities before 2002 will be repaid with this surplus.

As for the cash flow, the first four years in Case 1, first three years in Case 2 and Case 3 will face to cash shortage. There is no cash income during first three years (2003-2005), but the payment of the interest for the loan will start from the first year. Therefore, short-term working capital must be secured somehow for the project implementation.

The negative equity situation will disappear at 2014 in Case 1, at 2004 in Case 2, and at 2004 in Case 3. But before these years, the cash position will be abundant and these cash will be used for the repayment of the trade liability before 2002.

ACB and ACS informally accepted 1.62 lei/m³ level of wholesale tariff. But in order to realize this new tariff, the stable water supply from ACSB is necessary. From the last year, ACS did not increase any new debt to ACSB. The existing debt to ACSB by ACS was accumulated before the summer of 2001. The new uniform tariff in ACB will support the stable payment to ACSB.

As for ACF and ACR, there are some uncertainties in payment to ACSB. But even in Riscani, there was financial improvement between 2001 and 2002. We believe that new uniform tariff in Balti will have effect on surrounding cities and the economic recovery in the region will improve the financial situation of local Apa Canals.

As mentioned above, the substantial portion of the outstanding debt of ACSB will be able to be repaid using the surplus cash in the pro forma financial statements. In addition to the cash surplus from the operation, the collection of the existing tariff receivables will be utilized to debt repayment firstly. Therefore, we envisage full repayment until 2015 if the assumption of the analysis will be realized.

Table 10.1 EIRR Estimate for ACSB (Case 1)

(2002 USD)

Year	Total Cost	Labor Saving	Net Benefit	EIRR
2003	581,140		(581,140)	
2004	10,049,240		(10,049,240)	
2005	8,821,000		(8,821,000)	
2006	7,092,027	2,353,684	(4,738,343)	
2007	1,378,163	2,530,988	1,152,825	
2008	1,578,510	2,720,138	1,141,628	
2009	1,678,655	2,921,876	1,243,221	
2010	1,790,318	3,136,988	1,346,670	
2011	1,911,684	3,369,436	1,457,752	
2012	2,040,583	3,617,286	1,576,703	
2013	2,174,443	3,881,498	1,707,055	
2014	2,319,752	4,163,132	1,843,380	
2015	2,474,114	4,463,132	1,989,018	
2016	2,474,114	4,463,132	1,989,018	
2017	2,474,114	4,463,132	1,989,018	
2018	2,474,114	4,463,132	1,989,018	
2019	2,474,114	4,463,132	1,989,018	
2020	2,474,114	4,463,132	1,989,018	
2021	2,474,114	4,463,132	1,989,018	
2022	2,474,114	4,463,132	1,989,018	
2023	2,498,458	4,463,132	1,964,674	
2024	3,206,437	4,463,132	1,256,695	
2025	7,715,706	4,463,132	(3,252,574)	
2026	7,646,328	4,463,132	(3,183,196)	
2027	2,474,114	4,463,132	1,989,018	
2028	2,474,114	4,463,132	1,989,018	
2029	2,474,114	4,463,132	1,989,018	
2030	2,474,114	4,463,132	1,989,018	
2031	2,474,114	4,463,132	1,989,018	
2032	2,474,114	4,463,132	1,989,018	
2033	2,474,114	4,463,132	1,989,018	
2034	2,474,114	4,463,132	1,989,018	
2035	2,474,114	4,463,132	1,989,018	
2036	2,474,114	4,463,132	1,989,018	
2037	2,474,114	4,463,132	1,989,018	
2038	2,474,114	4,463,132	1,989,018	
2039	2,474,114	4,463,132	1,989,018	
2040	2,474,114	4,463,132	1,989,018	
2041	2,474,114	4,463,132	1,989,018	
2042	2,474,114	4,463,132	1,989,018	4.75%

Table 10.2 EIRR Estimate for ACSB (Case 3)

(2002 USD)

Year	Total Cost	Labor Saving	Net Benefit	EIRR
2003	581,000		(581,000)	
2004	9,492,000		(9,492,000)	
2005	3,210,000		(3,210,000)	
2006	1,240,027	2,119,722	879,695	
2007	1,319,753	2,279,402	959,649	
2008	1,400,640	2,449,750	1,049,110	
2009	1,488,910	2,631,435	1,142,525	
2010	1,578,583	2,825,164	1,246,581	
2011	1,680,460	3,034,506	1,354,046	
2012	1,782,904	3,257,719	1,474,815	
2013	1,893,009	3,495,668	1,602,659	
2014	2,011,333	3,749,267	1,737,934	
2015	2,136,879	4,019,486	1,882,607	
2016	2,136,879	4,019,486	1,882,607	
2017	2,136,879	4,019,486	1,882,607	
2018	2,136,879	4,019,486	1,882,607	
2019	2,136,879	4,019,486	1,882,607	
2020	2,136,879	4,019,486	1,882,607	
2021	2,136,879	4,019,486	1,882,607	
2022	2,136,879	4,019,486	1,882,607	
2023	2,635,435	4,019,486	1,384,051	
2024	10,432,458	4,019,486	(6,412,972)	
2025	4,740,887	4,019,486	(721,401)	
2026	2,136,879	4,019,486	1,882,607	
2027	2,136,879	4,019,486	1,882,607	
2028	2,136,879	4,019,486	1,882,607	
2029	2,136,879	4,019,486	1,882,607	
2030	2,136,879	4,019,486	1,882,607	
2031	2,136,879	4,019,486	1,882,607	
2032	2,136,879	4,019,486	1,882,607	
2033	2,136,879	4,019,486	1,882,607	
2034	2,136,879	4,019,486	1,882,607	
2035	2,136,879	4,019,486	1,882,607	
2036	2,136,879	4,019,486	1,882,607	
2037	2,136,879	4,019,486	1,882,607	
2038	2,136,879	4,019,486	1,882,607	
2039	2,136,879	4,019,486	1,882,607	
2040	2,136,879	4,019,486	1,882,607	
2041	2,136,879	4,019,486	1,882,607	
2042	2,136,879	4,019,486	1,882,607	8.75%

Table 10.3 FIRR Estimate for ACSB (Case 1, O&M 70%)

(2002 USD)

Year	Land	Civil Works	M&E	OM&GA	Total Outflow	Revenue	Net Cashflow	FIRR
2003	140	27,049	553,951		581,140		(581,140)	
2004	8,240	813,692	9,227,308		10,049,240		(10,049,240)	
2005	0	5,823,991	2,997,009		8,821,000		(8,821,000)	
2006	0	5,746,905	105,095	1,240,027	7,092,027	1,870,556	(5,221,471)	
2007				1,378,163	1,378,163	2,125,217	747,054	
2008				1,578,510	1,578,510	2,492,122	913,612	
2009				1,678,655	1,678,655	2,693,549	1,014,894	
2010				1,790,318	1,790,318	2,913,931	1,123,613	
2011				1,911,684	1,911,684	3,154,910	1,243,226	
2012				2,040,583	2,040,583	3,412,702	1,372,119	
2013				2,174,443	2,174,443	3,682,550	1,508,107	
2014				2,319,752	2,319,752	3,976,979	1,657,227	
2015				2,474,114	2,474,114	4,291,644	1,817,530	
2016				2,474,114	2,474,114	4,291,644	1,817,530	
2017				2,474,114	2,474,114	4,291,644	1,817,530	
2018				2,474,114	2,474,114	4,291,644	1,817,530	
2019				2,474,114	2,474,114	4,291,644	1,817,530	
2020				2,474,114	2,474,114	4,291,644	1,817,530	
2021				2,474,114	2,474,114	4,291,644	1,817,530	
2022				2,474,114	2,474,114	4,291,644	1,817,530	
2023			498,556	2,474,114	2,972,670	4,291,644	1,318,974	
2024			8,304,577	2,474,114	10,778,691	4,291,644	(6,487,047)	
2025			2,697,308	2,474,114	5,171,422	4,291,644	(879,778)	
2026			94,586	2,474,114	2,568,700	4,291,644	1,722,944	
2027				2,474,114	2,474,114	4,291,644	1,817,530	
2028				2,474,114	2,474,114	4,291,644	1,817,530	
2029				2,474,114	2,474,114	4,291,644	1,817,530	
2030				2,474,114	2,474,114	4,291,644	1,817,530	
2031				2,474,114	2,474,114	4,291,644	1,817,530	
2032				2,474,114	2,474,114	4,291,644	1,817,530	
2033				2,474,114	2,474,114	4,291,644	1,817,530	
2034				2,474,114	2,474,114	4,291,644	1,817,530	
2035				2,474,114	2,474,114	4,291,644	1,817,530	
2036				2,474,114	2,474,114	4,291,644	1,817,530	
2037				2,474,114	2,474,114	4,291,644	1,817,530	
2038				2,474,114	2,474,114	4,291,644	1,817,530	
2039				2,474,114	2,474,114	4,291,644	1,817,530	
2040				2,474,114	2,474,114	4,291,644	1,817,530	
2041				2,474,114	2,474,114	4,291,644	1,817,530	
2042				2,474,114	2,474,114	4,291,644	1,817,530	3.62%

Note: O&M will increase at 70 percent of the growth of per capita GDP.

Table 10.4 FIRR Estimate for ACSB (Case 2, O&M 70%)

(2002 USD)

Year	Land	Civil Works	M&E	OM&GA	Total Outflow	Revenue	Net Cashflow	FIRR
2003	140	27,049	553,951		581,140		(581,140)	
2004	0	274,690	9,217,310		9,492,000		(9,492,000)	
2005	0	316,658	2,893,342		3,210,000		(3,210,000)	
2006	0	0	0	1,240,027	1,240,027	1,870,556	630,529	
2007				1,378,163	1,378,163	2,125,217	747,054	
2008				1,578,510	1,578,510	2,492,122	913,612	
2009				1,678,655	1,678,655	2,693,549	1,014,894	
2010				1,790,318	1,790,318	2,913,931	1,123,613	
2011				1,911,684	1,911,684	3,154,910	1,243,226	
2012				2,040,583	2,040,583	3,412,702	1,372,119	
2013				2,174,443	2,174,443	3,682,550	1,508,107	
2014				2,319,752	2,319,752	3,976,979	1,657,227	
2015				2,474,114	2,474,114	4,291,644	1,817,530	
2016				2,474,114	2,474,114	4,291,644	1,817,530	
2017				2,474,114	2,474,114	4,291,644	1,817,530	
2018				2,474,114	2,474,114	4,291,644	1,817,530	
2019				2,474,114	2,474,114	4,291,644	1,817,530	
2020				2,474,114	2,474,114	4,291,644	1,817,530	
2021				2,474,114	2,474,114	4,291,644	1,817,530	
2022				2,474,114	2,474,114	4,291,644	1,817,530	
2023			498,556	2,474,114	2,972,670	4,291,644	1,318,974	
2024			8,295,579	2,474,114	10,769,693	4,291,644	(6,478,049)	
2025			2,604,008	2,474,114	5,078,122	4,291,644	(786,478)	
2026			0	2,474,114	2,474,114	4,291,644	1,817,530	
2027				2,474,114	2,474,114	4,291,644	1,817,530	
2028				2,474,114	2,474,114	4,291,644	1,817,530	
2029				2,474,114	2,474,114	4,291,644	1,817,530	
2030				2,474,114	2,474,114	4,291,644	1,817,530	
2031				2,474,114	2,474,114	4,291,644	1,817,530	
2032				2,474,114	2,474,114	4,291,644	1,817,530	
2033				2,474,114	2,474,114	4,291,644	1,817,530	
2034				2,474,114	2,474,114	4,291,644	1,817,530	
2035				2,474,114	2,474,114	4,291,644	1,817,530	
2036				2,474,114	2,474,114	4,291,644	1,817,530	
2037				2,474,114	2,474,114	4,291,644	1,817,530	
2038				2,474,114	2,474,114	4,291,644	1,817,530	
2039				2,474,114	2,474,114	4,291,644	1,817,530	
2040				2,474,114	2,474,114	4,291,644	1,817,530	
2041				2,474,114	2,474,114	4,291,644	1,817,530	
2042				2,474,114	2,474,114	4,291,644	1,817,530	7.99%

Note: O&M will increase at 70 percent of the growth of per capita GDP.

Table 10.5 FIRR Estimate for ACSB (Case 3, Package 1 and 2 only, O&M 70%)

(2002 USD)

Year	Land	Civil Works	M&E	OM&GA	Total Outflow	Revenue	Net Cashflow	FIRR
2003	140	27,049	553,951		581,000		(581,000)	
2004	0	274,690	9,217,310		9,492,000		(9,492,000)	
2005	0	316,658	2,893,342		3,210,000		(3,210,000)	
2006	0	0	0	1,240,027	1,240,027	1,870,556	630,529	
2007				1,319,753	1,319,753	2,025,053	705,300	
2008				1,400,640	1,400,640	2,185,751	785,111	
2009				1,488,910	1,488,910	2,357,456	868,545	
2010				1,578,583	1,578,583	2,540,867	962,284	
2011				1,680,460	1,680,460	2,742,019	1,061,559	
2012				1,782,904	1,782,904	2,951,376	1,168,472	
2013				1,893,009	1,893,009	3,174,813	1,281,805	
2014				2,011,333	2,011,333	3,419,344	1,408,011	
2015				2,136,879	2,136,879	3,673,956	1,537,077	
2016				2,136,879	2,136,879	3,673,956	1,537,077	
2017				2,136,879	2,136,879	3,673,956	1,537,077	
2018				2,136,879	2,136,879	3,673,956	1,537,077	
2019				2,136,879	2,136,879	3,673,956	1,537,077	
2020				2,136,879	2,136,879	3,673,956	1,537,077	
2021				2,136,879	2,136,879	3,673,956	1,537,077	
2022				2,136,879	2,136,879	3,673,956	1,537,077	
2023			498,556	2,136,879	2,635,435	3,673,956	1,038,521	
2024			8,295,579	2,136,879	10,432,458	3,673,956	(6,758,501)	
2025			2,604,008	2,136,879	4,740,887	3,673,956	(1,066,931)	
2026			0	2,136,879	2,136,879	3,673,956	1,537,077	
2027				2,136,879	2,136,879	3,673,956	1,537,077	
2028				2,136,879	2,136,879	3,673,956	1,537,077	
2029				2,136,879	2,136,879	3,673,956	1,537,077	
2030				2,136,879	2,136,879	3,673,956	1,537,077	
2031				2,136,879	2,136,879	3,673,956	1,537,077	
2032				2,136,879	2,136,879	3,673,956	1,537,077	
2033				2,136,879	2,136,879	3,673,956	1,537,077	
2034				2,136,879	2,136,879	3,673,956	1,537,077	
2035				2,136,879	2,136,879	3,673,956	1,537,077	
2036				2,136,879	2,136,879	3,673,956	1,537,077	
2037				2,136,879	2,136,879	3,673,956	1,537,077	
2038				2,136,879	2,136,879	3,673,956	1,537,077	
2039				2,136,879	2,136,879	3,673,956	1,537,077	
2040				2,136,879	2,136,879	3,673,956	1,537,077	
2041				2,136,879	2,136,879	3,673,956	1,537,077	
2042				2,136,879	2,136,879	3,673,956	1,537,077	6.51%

Note: O&M will increase at 70 percent of the growth of per capita GDP.

Table 10.6 Apa Canal Soroca-Balti Proforma Financial Statements (Case 1)

Year	(USD, Current Price)														
	2,003	2,004	2,005	2,006	2,007	2,008	2,009	2,010	2,011	2,012	2,013	2,014	2,015		
Income Statement															
Revenue				2,361,472	2,823,823	3,485,183	3,964,636	4,514,189	5,144,102	5,856,566	6,651,436	7,560,355	8,586,867		
O&M+GeneAdmi				1,565,464	1,831,196	2,207,515	2,470,813	2,773,516	3,117,013	3,501,862	3,927,487	4,409,918	4,950,291		
Depreciation		28,035	306,370	782,495	1,114,947	1,114,947	1,114,947	1,114,947	1,114,947	1,114,947	1,114,947	1,114,947	1,114,947		
Interest	12,463	241,514	453,124	600,881	600,881	600,881	600,881	600,881	600,881	600,881	600,258	588,805	578,225		
Total Expenditure	12,463	269,549	759,495	2,948,840	3,547,023	3,923,342	4,186,640	4,489,343	4,832,840	5,217,689	5,642,691	6,113,670	6,643,462		
Net Income	(12,463)	(269,549)	(759,495)	(587,368)	(723,200)	(438,160)	(222,004)	24,846	311,261	638,877	1,008,745	1,446,685	1,943,405		
Cum Net Income	(12,463)	(282,012)	(1,041,507)	(1,628,874)	(2,352,074)	(2,790,234)	(3,012,238)	(2,987,392)	(2,676,131)	(2,037,254)	(1,028,509)	418,177	2,361,581		
Fund Flow Statement															
Loan	623,156	11,452,520	10,580,539	7,387,821											
Revenue	0	0	0	2,361,472	2,823,823	3,485,183	3,964,636	4,514,189	5,144,102	5,856,566	6,651,436	7,560,355	8,586,867		
Total Inflow	623,156	11,452,520	10,580,539	9,749,293	2,823,823	3,485,183	3,964,636	4,514,189	5,144,102	5,856,566	6,651,436	7,560,355	8,586,867		
Investment	623,156	11,452,520	10,580,539	7,387,821											
O&M+GeneAdmi	0	0	0	1,565,464	1,831,196	2,207,515	2,470,813	2,773,516	3,117,013	3,501,862	3,927,487	4,409,918	4,950,291		
Interest	12,463	241,514	453,124	600,881	600,881	600,881	600,881	600,881	600,881	600,881	600,258	588,805	578,225		
Loan Repayment															
Total Outflow	635,620	11,694,034	11,033,663	9,554,166	2,432,076	2,808,396	3,071,694	3,374,397	3,717,894	4,102,742	4,558,902	5,602,307	6,661,326		
Net Inflow	(12,463)	(241,514)	(453,124)	195,127	391,747	676,787	892,942	1,139,792	1,426,208	1,753,824	2,092,534	1,957,848	1,925,540		
Net Inflow (cum)	(12,463)	(253,977)	(707,101)	(511,974)	(120,227)	556,560	1,449,502	2,589,294	4,015,501	5,769,325	7,861,859	9,819,707	11,745,248		
Balance Sheet															
Cash	(12,463)	(253,977)	(707,101)	(511,974)	(120,227)	556,560	1,449,502	2,589,294	4,015,501	5,769,325	7,861,859	9,819,707	11,745,248		
Fixed Assets ex. Land	623,006	12,066,136	22,646,675	30,034,496	30,034,496	30,034,496	30,034,496	30,034,496	30,034,496	30,034,496	30,034,496	30,034,496	30,034,496		
Cum Depreciation	0	28,035	334,406	1,116,900	2,231,847	3,346,793	4,461,740	5,576,686	6,691,633	7,806,579	8,921,526	10,036,472	11,151,419		
Fixed Assets ex. Land (net)	623,006	12,038,101	22,312,269	28,917,596	27,802,649	26,687,703	25,572,756	24,457,810	23,342,863	22,227,917	21,112,970	19,998,024	18,883,077		
Land	150	9,541	9,541	9,541	9,541	9,541	9,541	9,541	9,541	9,541	9,541	9,541	9,541		
Total Assets	610,543	11,784,124	21,605,168	28,405,622	27,682,422	27,244,262	27,022,258	27,047,103	27,358,364	27,997,242	28,974,829	29,817,731	30,628,325		
Loan (net)	623,156	12,075,677	22,656,215	30,044,037	30,044,037	30,044,037	30,044,037	30,044,037	30,044,037	30,044,037	30,012,879	29,440,253	28,911,226		
Capital	(12,613)	(291,553)	(1,051,047)	(1,638,415)	(2,361,615)	(2,799,774)	(3,021,779)	(2,996,933)	(2,685,672)	(2,046,795)	(1,038,049)	377,478	1,717,099		
Total Liabilities and Owner's Equity	610,543	11,784,124	21,605,168	28,405,622	27,682,422	27,244,262	27,022,258	27,047,103	27,358,364	27,997,242	28,974,829	29,817,731	30,628,325		

Table 10.7 Apa Canal Soroca-Balti Proforma Financial Statements (Case 2)

Year	2,003	2,004	2,005	2,006	2,007	2,008	2,009	2,010	2,011	2,012	2,013	2,014	2,015
													(USD, Current Price)
Income Statement													
Revenue				2,361,472	2,823,823	3,485,183	3,964,636	4,514,189	5,144,102	5,856,566	6,651,436	7,560,355	8,586,867
O&M+GeneAdmi				1,565,464	1,831,196	2,207,515	2,470,813	2,773,516	3,117,013	3,501,862	3,927,487	4,409,918	4,950,291
Depreciation		28,035	278,472	451,736	451,736	451,736	451,736	451,736	451,736	451,736	451,736	451,736	451,736
Interest	12,463	228,812	305,819	305,819	305,819	305,819	305,819	305,819	305,819	305,819	305,195	294,378	290,528
Total Expenditure	12,463	256,848	584,290	2,323,018	2,588,750	2,965,069	3,228,367	3,531,070	3,874,567	4,259,416	4,684,418	5,156,031	5,692,554
Net Income	(12,463)	(256,848)	(584,290)	38,454	235,073	520,113	736,269	983,119	1,269,534	1,597,151	1,967,019	2,404,323	2,894,312
Cum Net Income	(12,463)	(269,311)	(853,601)	(815,148)	(580,074)	(59,961)	676,308	1,659,427	2,928,961	4,526,111	6,493,130	8,897,453	11,791,766
Fund Flow Statement													
Loan	623,156	10,817,467	3,850,304	0									
Revenue	0	0	0	2,361,472	2,823,823	3,485,183	3,964,636	4,514,189	5,144,102	5,856,566	6,651,436	7,560,355	8,586,867
Total Inflow	623,156	10,817,467	3,850,304	2,361,472	2,823,823	3,485,183	3,964,636	4,514,189	5,144,102	5,856,566	6,651,436	7,560,355	8,586,867
Investment	623,156	10,817,467	3,850,304	0									
O&M+GeneAdmi	0	0	0	1,565,464	1,831,196	2,207,515	2,470,813	2,773,516	3,117,013	3,501,862	3,927,487	4,409,918	4,950,291
Interest	12,463	228,812	305,819	305,819	305,819	305,819	305,819	305,819	305,819	305,819	305,195	294,378	290,528
Loan Repayment											31,158	572,031	764,546
Total Outflow	635,620	11,046,280	4,156,122	1,871,283	2,137,014	2,513,334	2,776,632	3,079,334	3,422,832	3,807,680	4,263,840	5,276,327	6,005,365
Net Inflow	(12,463)	(228,812)	(305,819)	490,189	686,809	971,849	1,188,004	1,434,854	1,721,270	2,048,886	2,387,596	2,284,028	2,581,502
Net Inflow (cum)	(12,463)	(241,276)	(547,094)	(56,905)	629,904	1,601,753	2,789,757	4,224,612	5,945,881	7,994,767	10,382,364	12,666,391	15,247,893
Balance Sheet													
Cash	(12,463)	(241,276)	(547,094)	(56,905)	629,904	1,601,753	2,789,757	4,224,612	5,945,881	7,994,767	10,382,364	12,666,391	15,247,893
Fixed Assets ex. Land	623,006	12,066,136	22,646,675	30,034,496	30,034,496	30,034,496	30,034,496	30,034,496	30,034,496	30,034,496	30,034,496	30,034,496	30,034,496
Cum Depreciation	0	28,035	306,507	758,243	1,209,978	1,661,714	2,113,449	2,565,185	3,016,920	3,468,656	3,920,392	4,372,127	4,823,863
Fixed Assets ex. Land (net)	623,006	12,038,101	22,340,167	29,276,253	28,824,518	28,372,782	27,921,047	27,469,311	27,017,575	26,565,840	26,114,104	25,662,369	25,210,633
Land	150	150	150	150	150	150	150	150	150	150	150	150	150
Total Assets	610,543	11,796,825	21,793,073	29,219,348	29,454,422	29,974,535	30,710,804	31,693,922	32,963,457	34,560,607	36,496,468	38,328,760	40,458,526
Loan (net)	623,156	11,440,623	15,290,927	15,290,927	15,290,927	15,290,927	15,290,927	15,290,927	15,290,927	15,290,927	15,259,769	14,718,896	14,526,381
Capital	(12,613)	356,202	6,502,146	13,928,421	14,163,494	14,683,608	15,419,877	16,402,995	17,672,530	19,269,680	21,236,699	23,609,864	25,932,145
Total Liabilities and Owner's Equity	610,543	11,796,825	21,793,073	29,219,348	29,454,422	29,974,535	30,710,804	31,693,922	32,963,457	34,560,607	36,496,468	38,328,760	40,458,526

Table 10.8 Apa Canal Soroca-Balti Proforma Financial Statements (Case3)

	Year	(USD, Current Price)												
		2,003	2,004	2,005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Income Statement														
Revenue					2,361,472	2,690,733	3,056,729	3,469,940	3,936,248	4,470,880	5,064,880	5,734,360	6,500,274	7,350,976
O&M+GeneAdmi					1,565,464	1,753,585	1,958,767	2,191,528	2,445,502	2,740,001	3,059,656	3,419,160	3,823,603	4,275,540
Depreciation			28,035	278,472	451,736	451,736	451,736	451,736	451,736	451,736	451,736	451,736	451,736	451,736
Interest	12,463	12,463	228,812	305,819	305,819	305,819	305,819	305,819	305,819	305,819	305,819	305,195	294,378	290,528
Total Expenditure	12,463	12,463	256,848	584,290	2,323,018	2,511,139	2,716,321	2,949,082	3,203,056	3,497,555	3,817,210	4,176,091	4,569,716	5,017,803
Net Income	(12,463)	(12,463)	(256,848)	(584,290)	38,454	179,594	340,408	520,858	733,191	973,325	1,247,670	1,558,270	1,930,558	2,333,173
Cum Net Income	(12,463)	(12,463)	(269,311)	(853,601)	(815,148)	(635,554)	(295,146)	225,713	958,904	1,932,229	3,179,899	4,738,169	6,668,727	9,001,899
Fund Flow Statement														
Loan		623,156	10,817,467	3,850,304	0									
Revenue		0	0	0	2,361,472	2,690,733	3,056,729	3,469,940	3,936,248	4,470,880	5,064,880	5,734,360	6,500,274	7,350,976
Total Inflow		623,156	10,817,467	3,850,304	2,361,472	2,690,733	3,056,729	3,469,940	3,936,248	4,470,880	5,064,880	5,734,360	6,500,274	7,350,976
Investment		623,156	10,817,467	3,850,304	0									
O&M+GeneAdmi		0	0	0	1,565,464	1,753,585	1,958,767	2,191,528	2,445,502	2,740,001	3,059,656	3,419,160	3,823,603	4,275,540
Interest	12,463	12,463	228,812	305,819	305,819	305,819	305,819	305,819	305,819	305,819	305,819	305,195	294,378	290,528
Loan Repayment												31,158	572,031	764,546
Total Outflow		635,620	11,046,280	4,156,122	1,871,283	2,059,403	2,264,586	2,497,346	2,751,321	3,045,820	3,365,475	3,755,513	4,690,012	5,330,614
Net Inflow	(12,463)	(12,463)	(228,812)	(305,819)	490,189	631,330	792,144	972,594	1,184,927	1,425,060	1,699,406	1,978,847	1,810,262	2,020,362
Net Inflow (cum)	(12,463)	(12,463)	(241,276)	(547,094)	(56,905)	574,425	1,366,568	2,339,162	3,524,089	4,949,149	6,648,555	8,627,402	10,437,665	12,458,027
Balance Sheet														
Cash	(12,463)	(12,463)	(241,276)	(547,094)	(56,905)	574,425	1,366,568	2,339,162	3,524,089	4,949,149	6,648,555	8,627,402	10,437,665	12,458,027
Fixed Assets ex. Land	623,006	12,066,136	22,646,675	30,034,496	30,034,496	30,034,496	30,034,496	30,034,496	30,034,496	30,034,496	30,034,496	30,034,496	30,034,496	30,034,496
Cum Depreciation	0	28,035	306,507	758,243	1,209,978	1,661,714	2,113,449	2,565,185	3,016,920	3,468,656	3,920,392	4,372,127	4,823,863	5,285,600
Fixed Assets ex. Land (net)	623,006	12,038,101	22,340,167	29,276,253	28,824,518	28,372,782	27,921,047	27,469,311	27,017,575	26,565,840	26,114,104	25,662,369	25,210,633	24,759,883
land	150	150	150	150	150	150	150	150	150	150	150	150	150	150
Total Assets	610,543	11,796,825	21,793,073	29,219,348	29,398,942	29,739,350	30,260,208	30,993,400	31,966,725	33,214,395	34,741,507	36,100,034	37,668,660	39,000,000
Loan (net)	623,156	11,440,623	15,290,927	15,290,927	15,290,927	15,290,927	15,290,927	15,290,927	15,290,927	15,290,927	15,290,927	15,259,769	14,718,896	14,526,381
Capital	(12,613)	356,202	6,502,146	13,928,421	14,108,015	14,448,423	14,969,281	15,702,473	16,675,798	17,923,468	19,481,737	21,381,138	23,142,279	25,142,279
Total Liabilities and Owner's Equity	610,543	11,796,825	21,793,073	29,219,348	29,398,942	29,739,350	30,260,208	30,993,400	31,966,725	33,214,395	34,741,507	36,100,034	37,668,660	39,000,000

10.3 Environmental Impact Assessment

During the master plan stage, the initial environmental examination (IEE) was conducted to identify environmental items on which the implementation of the master plan would have potential impact, and to propose the content of the Environmental Impact Assessment (EIA), as shown in Table 10.9, to be conducted in the stage of the feasibility study on the priority project. Activities that may have environmental impact are 1) construction of new facilities, and 2) operation of new facilities. These activities included in the priority project that may have potential impacts are as follows:

Construction of new facilities

- Transmission pipelines from Balti to Falesti and Riscani
- Distribution reservoirs in Falesti and Riscani

New operation

- Water transmission (from Balti to Falesti, from Balti to Riscani)

The conclusions of the EIA conducted in the feasibility study are summarized below.

- 1) Measures to prevent negative impacts during construction and operation have been incorporated into preliminary design of the facilities that might otherwise have important potential impact.
- 2) Other impacts are temporal, local, and insignificant.
- 3) As a whole, the implementation of the priority project will contribute to improve hygienic conditions and convenience of daily life of the population, and also give positive influence on the economic activities in the areas.

Table 10.9 Content of EIA Study According to the Result of IEE

N o.	Item	Content of EIA	Result of IEE
1	Resettlement	Quick examination of potential impacts after selection of alternatives for the reservoir sites. Detailed plan will depend on the options proposed.	C
2	Economic Activities	Field inspection of transmission pipeline corridor after formulation of more precise alternatives of pipeline routes Vegetation pattern (agricultural, road protection zone) and engineering structures may be affected by the construction Clarification of potential scale of damages expected and assessment of site specific compensation/mitigation measures.	B and C
3	Traffic and Public Facilities	Assessment of existing traffic conditions and formulation of project relation scenarios. Impact scale identification and development of preventive actions.	B and C
4	Cultural Property	After pre-selection of transmission pipelines corridors and reservoir tanks locations the request for relocation of archeological sites will be necessary. It is normal procedures not only for EIA but for all designing documentation as well.	C
5	Water Rights and Rights of Common	The detailed plan will depend on the formal requirements of fish authorities. Preliminary discussion will be necessary. If identification of effects to the fish rights is obligatory, the field investigation of aquatic population (bio-assessment) should be implemented and potential impacts should be studied as well as compensation/mitigation measures.	C
6	Public Health Condition	Attention should be paid to the identification of water leaking areas within the towns. The capacities and technical conditions of sewer and treatment facilities should be evaluated. Preliminary discussion with health authorities will be helpful.	C
7	Waste	Estimation of waste generation rate and evaluation of their hazard properties. Formulation of mitigation measures.	B
8	Topography and Geology	Quick examination of potential impacts after determination of alternatives for reservoir sites. Detailed plan will depend on the options proposed.	C
9	Groundwater	Quick examination of potential impacts after formulation of technical options for sludge drying bed. Assessment of groundwater table and vulnerability of aquifer affected. Detailed plan will depend on options proposed.	D and C
10	Fauna and Flora	Site specific assessment of natural habitats located closely to the construction sites. Identification of protected species to be affected. Assessment of vulnerable seasons (reproduction, breeding, and migration). Proposals for impact reduction measures.	B
11	Landscape	Quick examination of potential impacts after determination of alternatives for reservoir sites. Detailed plan will depend on the options proposed.	C
12	Air Pollution	Estimation of air pollutant emission from construction vehicles and evaluation of air quality by prediction models.	B
13	Water Pollution	Estimation of pollutant discharges, assessment of toxicity and other effects of drying bed supernatant liquor. Probably a number of toxicity experiments will be required.	B
14	Soil Contamination	Quick examination of potential impacts after selection of technical options for sludge drying bed. Detailed plan will depends on options proposed.	D and C
15	Noise and Vibration	Assessment of noise and vibration by using models (if available) or previous experience or professional judgments. Impact scale and magnitude identification. Development of mitigation measures.	B

Note)

A – Serious impact is expected.

B – Some impact is expected.

C – Extent of impact is unknown. (Examination is needed. Impacts may become clear with progress of the Study)

D – No impact is expected. EIA is not necessary.

CHAPTER 11 RECOMMENDATIONS

1) Improvements of Institutional and Legislative Provisions

To implement projects proposed in the priority project and in the master plan, and to achieve sustainable operation of the facilities developed, it is important to improve the present institutional/legislative systems and the operation and maintenance systems. These improvements are needed, as proposed in this report, at national and local levels, and at the level of water supply utilities. It is recommended to facilitate the proposed improvements under the leadership and coordination of the central government and the cooperation of all the organizations concerned.

2) Financial Assistance to Low-income Population

The responsibility of water supply to the population has been transferred to the municipalities such as cities and towns. However, municipal Apa Canals presently have serious financial problems to perform the duties. Particularly for small scale Apa Canals in such towns as Falesti and Riscani, it is very difficult to achieve the financial independence. It is indispensable for the financial independence of Apa Canals to have water tariff revenues that can cover the cost. However, there are inhabitants whose dispensable incomes are too low to afford such a level of the water tariff. It is recommended that the central government consider the social policy to provide financial assistance to such population.

3) Renewal and Expansion of Existing Distribution Networks

Major components of the priority project are the rehabilitation of the existing Soroca-Balti water supply system and the extensions of the water transmission pipeline to the towns of Falesti and Riscani. However, rehabilitation and/or expansion of water distribution networks in the 4 cities/towns are not included in the priority project. These networks have become quite old, and leakage rates are high at around 30 %. In Falesti and Riscani, the service rate is still low at 30 - 50 % due to insufficient distribution network. To obtain maximum benefit from the implementation of the priority project, the following are necessary: 1) to renew existing distribution pipes step by step in order to reduce the leakage rate, and 2) to expand the distribution networks in Falesti and Riscani in order to raise the service rates. It is recommended to implement these measures in parallel to the implementation of the priority project.

4) Operation and Maintenance of Distribution Reservoirs

The priority project includes the completion of an unfinished distribution reservoir located in the city of Balti. Also included is construction of new distribution reservoirs in the towns of Falesti and Riscani at the end points of the extended transmission pipelines. In the financial project evaluation of the present study, it has been assumed tentatively that these reservoirs would be owned and operated by Apa Canal Soroca-Balti (ACSB). It is recommended that organizations concerned discuss and coordinate the ownerships and operations of these reservoirs so that the facilities can be operated and maintained smoothly.

5) Facility Specifications for the Case of Urgent Implementation

In the preliminary design of the priority project, the capacities of the water transmission pumps were determined based on the total water demand of the 4 cities/towns (Balti, Soroca, Falesti, Riscani) in 2015. However, in the case when all or a part of the project is implemented through a grant as an urgent project, it may be required that the specifications be determined based on a nearer future demand. Therefore, an additional case has been studied by making the following modifications: i) specifications of the transmission pumps are determined base on the water demand in 2008, and ii) in the instrumentation for the pumping stations and distribution reservoirs, some components that do not necessarily require urgently implementation are excluded. The result of the study is summarized in the Appendix to this volume. For the promotion of the project implementation, it is recommended to give sufficient consideration to such a case also.

Appendix

Study for the Case of Urgent Implementation of the Priority Project

In the feasibility study on the priority project presented in Part 3 of the main text, the target year was set to 2015 as it was in the master plan. However, an additional study has been made for the case of more urgent implementation of the project. The result is presented below.

1. Modifications of the 2015 Case

In the preliminary design presented in the main text, the capacities of the water transmission pumps were determined based on the total water demand of the 4 cities/towns (Balti, Soroca, Falesti, Riscani) in the year 2015. In this more urgent case, the pump capacities will be determined based on the water demand in the year 2008.

In the 2015 case, it was designed that each of the pumping stations and distribution reservoirs will have a remote terminal unit (RTU) and transmits data to the central control room in the water treatment plant through optical fiber cable network to realize supervisory control and data acquisitions (SCADA) system. Since this provision is not considered to be an urgent necessity, it will be excluded in the 2008 case.

Other provisions are the same in the 2015 case.

2. Water Demand in 2008

The projected total water demand from the 4 cities/towns in 2008 is 54,500 m³/d, with the following respective quantities:

Soroca	9,900 m ³ /d
Balti	37,900 m ³ /d
Riscani	2,700 m ³ /d
Falesti	4,000 m ³ /d

Figure 1 shows the design water flows.

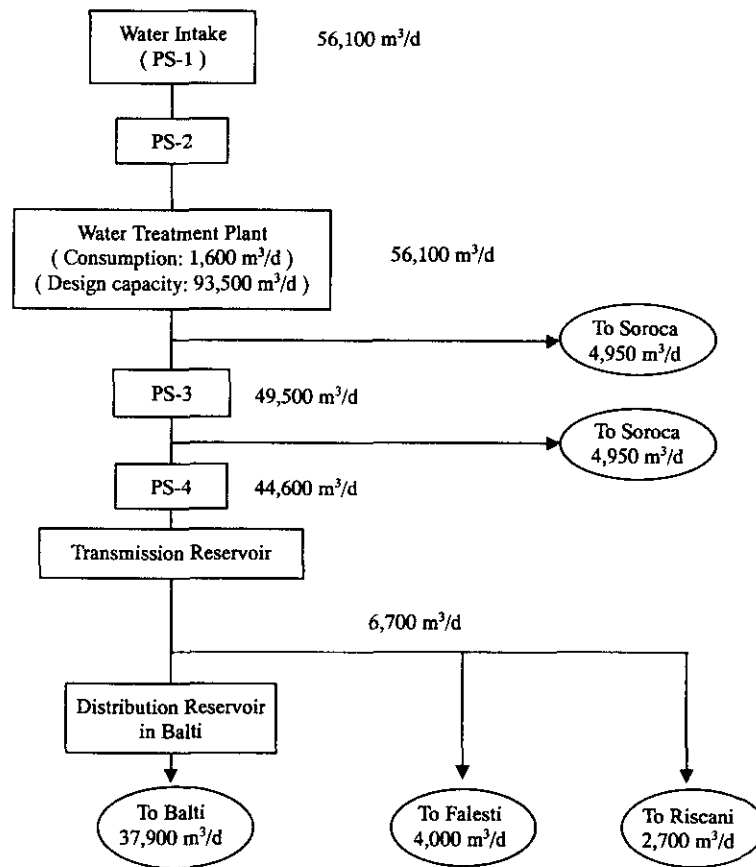


Figure 1 Design Water Flow in 2008

3. Specifications of the Pumps in the Pumping Stations

Pump specifications in the 2008 case are shown in Table 1, that are different from those of the 2015 case, since the design water demands are different. The numbers and types of pump are the same as those of the 2015 case.

Table 1 Specifications of Pumps

Pumping Station	Pump Function	Specification	Number of Pump
PS-1	Intake	19.5 m³/min x 52 m x 250 kW	3
	Bilge	1.0 m³/min x 20 m x 7.5 kW	2
PS-2	Booster	19.5 m³/min x 89 m x 420 kW	3
PS-3	Transmission	17.2 m³/min x 74 m x 320 kW	3
	Backwash	15.0 m³/min x 21.0 m x 75 kW	2
PS-4	Transmission	17.7 m³/min x 80 m x 350 kW	3

4. Water Hammer Prevention

Water hammer prevention measures are the same as those in the 2015 case, since the design water flows are not greatly different between the 2 cases.

5. Construction Schedule and Costs

5.1 Construction Schedule

The construction schedule is the same as that of the 2015 case, since the types of work are the same, and only the difference is specification of pumps.

5.2 Construction Cost

Construction costs of the 2008 case for the improvement of the existing Soroca-Balti water supply system are shown in Table 2 in comparison to the 2015 case.

Table 2 Construction Costs for Improvement of the ACSB Water Supply System

Item		Cost (US\$)	
		2008 Case	2015 Case
Pumping Station	PS-1	1,330,000	1,390,000
	PS-2	1,330,000	1,390,000
	PS-3	1,640,000	1,690,000
	PS-4	1,770,000	1,800,000
	Sub-total	6,070,000	6,270,000
Water Treatment Plant		2,160,000	2,160,000
Transmission Mains		561,000	561,000
Water Supply Instrumentation System		731,000	1,740,000
Total		9,522,000	10,731,000

There is no large difference between the costs of improving the pumping stations in the 2 cases. On the other hand, the cost for the instrumentation system is significantly smaller in the 2008 case resulting from the exclusion of the remote terminal units and optical fiber cables for data transmission from the pumping stations and distribution reservoirs.

5.3 Project Cost

The costs for the implementation of the priority project of the 2008 case consisting of Package 1, as indicated above, through Package 4 are shown in Table 3 in comparison to the 2015 case.

Table 3 Total Project Cost

Item		Cost (US\$)	
		2008 Case	2015 Case
Construction Cost Package 1) - 4)	1) Rehabilitation of the ACSB water supply system	9,522,000	10,731,000
	2) Completion of the unfinished reservoir in Balti	336,000	336,000
	3) Expansion of the transmission pipeline of common section	1,410,000	1,410,000
	4) Expansion of the transmission pipeline to Riscani and Falesti	8,596,000	8,596,000
	Subtotal	19,864,000	21,073,000
Land Acquisition		9,000	9,000
Engineering Service		1,990,000	2,110,000
Physical Contingency		1,990,000	2,110,000
Total		23,853,000	25,300,000

5.4 Operation and Maintenance Cost

Annual operation and maintenance costs for the 2080 case are shown in Table 4.

6. Economic and Financial Evaluations

The results of the economic and financial evaluations for the 2008 case conducted under the same assumptions made in the 2015 case are summarized below.

EIRR is 5.88 % when all of 4 packages are implemented (Table 5), and 11.22 % when packages 1 and 2 only are implemented (Table 6), both being improved substantially in comparison to the 2015 case.

FIRR estimates are as follows: 2.15 % for Case 1 where all of 4 packages are implemented with low interest loan (Table 7), 7.45 % for Case 2 where packages 1 and 2 are implemented with low interest loan and the rest is implemented by government subsidy (Table 8), and 6.26 % for Case 3 where packages 1 and 2 are implemented with low interest loan and the rest is not implemented (Table 9). The FIRRs are somewhat reduced in comparison to the 2015 case, due to the loss of the revenue opportunity in the later period where the water supply quantity will not increase after 2008, while it will increase until 2015 in the 2015 case.

Table 4 Annual Operation and Maintenance Cost (2008 Case)

Year	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Supplied Water (m3/d)	45,100	48,800	54,500	54,500	54,500	54,500	54,500	54,500	54,500	54,500
Supplied Water (m3/y)	16,461,500	17,812,000	19,892,500	19,892,500	19,892,500	19,892,500	19,892,500	19,892,500	19,892,500	19,892,500
Accounted-for water (m3/d)	36,080	39,040	43,600	43,600	43,600	43,600	43,600	43,600	43,600	43,600
Accounted-for water (m3/y)	13,169,200	14,249,600	15,914,000	15,914,000	15,914,000	15,914,000	15,914,000	15,914,000	15,914,000	15,914,000
Electricity	717,000	776,000	867,000	867,000	867,000	867,000	867,000	867,000	867,000	867,000
Chemical for WTP	50,000	54,000	61,000	61,000	61,000	61,000	61,000	61,000	61,000	61,000
Personnel and Repairing for WTP	157,000	170,000	190,000	190,000	190,000	190,000	190,000	190,000	190,000	190,000
O/M cost for Pumping Station	126,000	126,000	126,000	126,000	126,000	126,000	126,000	126,000	126,000	126,000
Total (Annual Operation and Maintenance Cost)	1,050,000	1,126,000	1,244,000	1,244,000	1,244,000	1,244,000	1,244,000	1,244,000	1,244,000	1,244,000

Unit: US\$

[Note] 1.Exchange Rate 1US\$ = Lei 13.6 = Yen 120.0

2. Life spans for facilities and equipment are as follows:

1) Civil and architectural facilities: 40 years

2) Mechanical and electrical equipment: 20 years

Table 5 EIRR Estimate (Case 1 of 2008 Case)

(2002 USD)

Year	Total Cost	Labor Saving	Net Benefit	EIRR
2003	581,140		(581,140)	
2004	10,049,240		(10,049,240)	
2005	8,821,000		(8,821,000)	
2006	7,092,027	2,353,684	(4,738,343)	
2007	1,378,163	2,530,988	1,152,825	
2008	1,578,510	2,720,138	1,141,628	
2009	1,638,032	2,921,876	1,283,844	
2010	1,700,530	3,136,988	1,436,458	
2011	1,766,153	3,369,436	1,603,283	
2012	1,835,057	3,617,286	1,782,229	
2013	1,907,406	3,881,498	1,974,092	
2014	1,983,372	4,163,132	2,179,760	
2015	2,063,137	4,463,132	2,399,995	
2016	2,063,137	4,463,132	2,399,995	
2017	2,063,137	4,463,132	2,399,995	
2018	2,063,137	4,463,132	2,399,995	
2019	2,063,137	4,463,132	2,399,995	
2020	2,063,137	4,463,132	2,399,995	
2021	2,063,137	4,463,132	2,399,995	
2022	2,063,137	4,463,132	2,399,995	
2023	2,561,693	4,463,132	1,901,439	
2024	10,367,714	4,463,132	(5,904,582)	
2025	4,760,445	4,463,132	(297,313)	
2026	2,157,723	4,463,132	2,305,409	
2027	2,063,137	4,463,132	2,399,995	
2028	2,063,137	4,463,132	2,399,995	
2029	2,063,137	4,463,132	2,399,995	
2030	2,063,137	4,463,132	2,399,995	
2031	2,063,137	4,463,132	2,399,995	
2032	2,063,137	4,463,132	2,399,995	
2033	2,063,137	4,463,132	2,399,995	
2034	2,063,137	4,463,132	2,399,995	
2035	2,063,137	4,463,132	2,399,995	
2036	2,063,137	4,463,132	2,399,995	
2037	2,063,137	4,463,132	2,399,995	
2038	2,063,137	4,463,132	2,399,995	
2039	2,063,137	4,463,132	2,399,995	
2040	2,063,137	4,463,132	2,399,995	
2041	2,063,137	4,463,132	2,399,995	
2042	2,063,137	4,463,132	2,399,995	5.88%

Table 6 EIRR Estimate for ACSB (Case 3 of 2008 Case)

(2002 USD)

Year	Total Cost	Labor Saving	Net Benefit	EIRR
2003	521,140		(521,140)	
2004	8,481,000		(8,481,000)	
2005	2,826,000		(2,826,000)	
2006	1,233,219	2,119,722	886,503	
2007	1,308,753	2,279,402	970,649	
2008	1,383,268	2,449,750	1,066,482	
2009	1,435,428	2,631,435	1,196,007	
2010	1,490,196	2,825,164	1,334,968	
2011	1,547,702	3,034,506	1,486,804	
2012	1,608,083	3,257,719	1,649,636	
2013	1,671,484	3,495,668	1,824,184	
2014	1,738,054	3,749,267	2,011,213	
2015	1,807,953	4,019,486	2,211,533	
2016	1,807,953	4,019,486	2,211,533	
2017	1,807,953	4,019,486	2,211,533	
2018	1,807,953	4,019,486	2,211,533	
2019	1,807,953	4,019,486	2,211,533	
2020	1,807,953	4,019,486	2,211,533	
2021	1,807,953	4,019,486	2,211,533	
2022	1,807,953	4,019,486	2,211,533	
2023	2,254,340	4,019,486	1,765,146	
2024	9,196,979	4,019,486	(5,177,493)	
2025	4,106,649	4,019,486	(87,163)	
2026	1,807,953	4,019,486	2,211,533	
2027	1,807,953	4,019,486	2,211,533	
2028	1,807,953	4,019,486	2,211,533	
2029	1,807,953	4,019,486	2,211,533	
2030	1,807,953	4,019,486	2,211,533	
2031	1,807,953	4,019,486	2,211,533	
2032	1,807,953	4,019,486	2,211,533	
2033	1,807,953	4,019,486	2,211,533	
2034	1,807,953	4,019,486	2,211,533	
2035	1,807,953	4,019,486	2,211,533	
2036	1,807,953	4,019,486	2,211,533	
2037	1,807,953	4,019,486	2,211,533	
2038	1,807,953	4,019,486	2,211,533	
2039	1,807,953	4,019,486	2,211,533	
2040	1,807,953	4,019,486	2,211,533	
2041	1,807,953	4,019,486	2,211,533	
2042	1,807,953	4,019,486	2,211,533	11.22%

Table 7 FIRR Estimate for ACSB (Case 1 of 2008 Case)

(2002 USD)

Year	Land	Civil Works	M&E	OM&GA	Total Outflow	Revenue	Net Cashflow	FIRR
2003	140	27,049	553,951		581,140		(581,140)	
2004	8,240	813,692	9,227,308		10,049,240		(10,049,240)	
2005	0	5,823,991	2,997,009		8,821,000		(8,821,000)	
2006	0	5,746,905	105,095	1,240,027	7,092,027	1,870,556	(5,221,471)	
2007				1,378,163	1,378,163	2,125,217	747,054	
2008				1,578,510	1,578,510	2,492,122	913,612	
2009				1,638,032	1,638,032	2,616,728	978,696	
2010				1,700,530	1,700,530	2,747,564	1,047,034	
2011				1,766,153	1,766,153	2,884,943	1,118,790	
2012				1,835,057	1,835,057	3,029,190	1,194,133	
2013				1,907,406	1,907,406	3,180,649	1,273,244	
2014				1,983,372	1,983,372	3,339,682	1,356,309	
2015				2,063,137	2,063,137	3,506,666	1,443,529	
2016				2,063,137	2,063,137	3,506,666	1,443,529	
2017				2,063,137	2,063,137	3,506,666	1,443,529	
2018				2,063,137	2,063,137	3,506,666	1,443,529	
2019				2,063,137	2,063,137	3,506,666	1,443,529	
2020				2,063,137	2,063,137	3,506,666	1,443,529	
2021				2,063,137	2,063,137	3,506,666	1,443,529	
2022				2,063,137	2,063,137	3,506,666	1,443,529	
2023			498,556	2,063,137	2,561,693	3,506,666	944,973	
2024			8,304,577	2,063,137	10,367,714	3,506,666	(6,861,048)	
2025			2,697,308	2,063,137	4,760,445	3,506,666	(1,253,779)	
2026			94,586	2,063,137	2,157,723	3,506,666	1,348,943	
2027				2,063,137	2,063,137	3,506,666	1,443,529	
2028				2,063,137	2,063,137	3,506,666	1,443,529	
2029				2,063,137	2,063,137	3,506,666	1,443,529	
2030				2,063,137	2,063,137	3,506,666	1,443,529	
2031				2,063,137	2,063,137	3,506,666	1,443,529	
2032				2,063,137	2,063,137	3,506,666	1,443,529	
2033				2,063,137	2,063,137	3,506,666	1,443,529	
2034				2,063,137	2,063,137	3,506,666	1,443,529	
2035				2,063,137	2,063,137	3,506,666	1,443,529	
2036				2,063,137	2,063,137	3,506,666	1,443,529	
2037				2,063,137	2,063,137	3,506,666	1,443,529	
2038				2,063,137	2,063,137	3,506,666	1,443,529	
2039				2,063,137	2,063,137	3,506,666	1,443,529	
2040				2,063,137	2,063,137	3,506,666	1,443,529	
2041				2,063,137	2,063,137	3,506,666	1,443,529	
2042				2,063,137	2,063,137	3,506,666	1,443,529	2.15%

Note: O&M will increase at 70 percent of the growth of per capita GDP.

Table 8 FIRR Estimate for ACSB (Case 2 of 2008 Case)

(2002 USD)

Year	Land	Civil Works	M&E	OM&GA	Total Outflow	Revenue	Net Cashflow	FIRR
2003	140	25,014	495,986		521,140		(521,140)	
2004	0	270,971	8,210,029		8,481,000		(8,481,000)	
2005	0	271,893	2,554,107		2,826,000		(2,826,000)	
2006	0	0	0	1,240,027	1,240,027	1,870,556	630,529	
2007				1,378,163	1,378,163	2,125,217	747,054	
2008				1,578,510	1,578,510	2,492,122	913,612	
2009				1,638,032	1,638,032	2,616,728	978,696	
2010				1,700,530	1,700,530	2,747,564	1,047,034	
2011				1,766,153	1,766,153	2,884,943	1,118,790	
2012				1,835,057	1,835,057	3,029,190	1,194,133	
2013				1,907,406	1,907,406	3,180,649	1,273,244	
2014				1,983,372	1,983,372	3,339,682	1,356,309	
2015				2,063,137	2,063,137	3,506,666	1,443,529	
2016				2,063,137	2,063,137	3,506,666	1,443,529	
2017				2,063,137	2,063,137	3,506,666	1,443,529	
2018				2,063,137	2,063,137	3,506,666	1,443,529	
2019				2,063,137	2,063,137	3,506,666	1,443,529	
2020				2,063,137	2,063,137	3,506,666	1,443,529	
2021				2,063,137	2,063,137	3,506,666	1,443,529	
2022				2,063,137	2,063,137	3,506,666	1,443,529	
2023			446,387	2,063,137	2,509,525	3,506,666	997,141	
2024			7,389,026	2,063,137	9,452,163	3,506,666	(5,945,497)	
2025			2,298,696	2,063,137	4,361,833	3,506,666	(855,167)	
2026			0	2,063,137	2,063,137	3,506,666	1,443,529	
2027				2,063,137	2,063,137	3,506,666	1,443,529	
2028				2,063,137	2,063,137	3,506,666	1,443,529	
2029				2,063,137	2,063,137	3,506,666	1,443,529	
2030				2,063,137	2,063,137	3,506,666	1,443,529	
2031				2,063,137	2,063,137	3,506,666	1,443,529	
2032				2,063,137	2,063,137	3,506,666	1,443,529	
2033				2,063,137	2,063,137	3,506,666	1,443,529	
2034				2,063,137	2,063,137	3,506,666	1,443,529	
2035				2,063,137	2,063,137	3,506,666	1,443,529	
2036				2,063,137	2,063,137	3,506,666	1,443,529	
2037				2,063,137	2,063,137	3,506,666	1,443,529	
2038				2,063,137	2,063,137	3,506,666	1,443,529	
2039				2,063,137	2,063,137	3,506,666	1,443,529	
2040				2,063,137	2,063,137	3,506,666	1,443,529	
2041				2,063,137	2,063,137	3,506,666	1,443,529	
2042				2,063,137	2,063,137	3,506,666	1,443,529	7.45%

Note: O&M will increase at 70 percent of the growth of per capita GDP.

Table 9 FIRR Estimate for ACSB (Case 3 of 2008 Case)

(2002 USD)

Year	Land	Civil Works	M&E	OM&GA	Total Outflow	Revenue	Net Cashflow	FIRR
2003	140	25,014	495,986		521,140		(521,140)	
2004	0	270,971	8,210,029		8,481,000		(8,481,000)	
2005	0	271,893	2,554,107		2,826,000		(2,826,000)	
2006	0	0	0	1,233,219	1,233,219	1,870,556	637,337	
2007				1,308,753	1,308,753	2,025,053	716,300	
2008				1,383,268	1,383,268	2,185,751	802,483	
2009				1,435,428	1,435,428	2,295,039	859,611	
2010				1,490,196	1,490,196	2,409,791	919,595	
2011				1,547,702	1,547,702	2,530,280	982,578	
2012				1,608,083	1,608,083	2,656,794	1,048,711	
2013				1,671,484	1,671,484	2,789,634	1,118,150	
2014				1,738,054	1,738,054	2,929,115	1,191,061	
2015				1,807,953	1,807,953	3,075,571	1,267,618	
2016				1,807,953	1,807,953	3,075,571	1,267,618	
2017				1,807,953	1,807,953	3,075,571	1,267,618	
2018				1,807,953	1,807,953	3,075,571	1,267,618	
2019				1,807,953	1,807,953	3,075,571	1,267,618	
2020				1,807,953	1,807,953	3,075,571	1,267,618	
2021				1,807,953	1,807,953	3,075,571	1,267,618	
2022				1,807,953	1,807,953	3,075,571	1,267,618	
2023			446,387	1,807,953	2,254,340	3,075,571	821,231	
2024			7,389,026	1,807,953	9,196,979	3,075,571	(6,121,408)	
2025			2,298,696	1,807,953	4,106,649	3,075,571	(1,031,078)	
2026			0	1,807,953	1,807,953	3,075,571	1,267,618	
2027				1,807,953	1,807,953	3,075,571	1,267,618	
2028				1,807,953	1,807,953	3,075,571	1,267,618	
2029				1,807,953	1,807,953	3,075,571	1,267,618	
2030				1,807,953	1,807,953	3,075,571	1,267,618	
2031				1,807,953	1,807,953	3,075,571	1,267,618	
2032				1,807,953	1,807,953	3,075,571	1,267,618	
2033				1,807,953	1,807,953	3,075,571	1,267,618	
2034				1,807,953	1,807,953	3,075,571	1,267,618	
2035				1,807,953	1,807,953	3,075,571	1,267,618	
2036				1,807,953	1,807,953	3,075,571	1,267,618	
2037				1,807,953	1,807,953	3,075,571	1,267,618	
2038				1,807,953	1,807,953	3,075,571	1,267,618	
2039				1,807,953	1,807,953	3,075,571	1,267,618	
2040				1,807,953	1,807,953	3,075,571	1,267,618	
2041				1,807,953	1,807,953	3,075,571	1,267,618	
2042				1,807,953	1,807,953	3,075,571	1,267,618	6.26%

Note: O&M will increase at 70 percent of the growth of per capita GDP.

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