CHAPTER 8

FINANCIAL SUSTAINABILITY ANALYSIS

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8.1 Introduction

1. Sustainable development is development that lasts. Economic viability of a water supply project (WSP) depends on its financial viability, i.e., sustainability of the project's financial returns. The economic analysis of projects should include an analysis of the financial viability of project agencies and environmental sustainability of project inputs and outputs. Unless such factors are taken into account, economic benefits may not be sustained at the level necessary to generate an acceptable EIRR over the useful life of the project.

2. This chapter focuses on the relationship between financial sustainability and economic viability of WSPs. Environmental sustainability is not explicitly defined or discussed in this handbook; to the extent possible, environmental costs and benefits should be internalized into the economic cost and benefit estimation of the WSP per se.

3. There are other dimensions of sustainability—institutional sustainability and technical sustainability. With regard to institutional sustainability, the financial impact of the project on the concerned institutions needs to be evaluated and the question to be asked is whether or not these institutions are able to pay the financial subsidies that may be needed for the WSP to survive. Economic analysis may also suggest institutional changes or policy measures needed to sustain the financial and economic benefits generated by the project. Technical sustainability is looked after as part of the analysis of alternatives and determination of the least-cost option, which is done in the early project preparation or feasibility stage.

8.2 Financial Sustainability

4. There are mainly three aspects of financial sustainability in connection with a given WSP:

(i) First, project funding and fiscal impact on government budget. WSPs are frequently funded by the government and full cost recovery especially from poor water users may not be possible even for their basic minimum needs.

(ii) Second, full or partial cost recovery of project costs from project beneficiaries. WSPs, like projects in other sectors, can hardly be sustained on government subsidy alone, without the revenue generation

from the sector itself. Cost recovery and proper design of water tariff based on the costs of supply are required.

(iii) Third, financial incentives are necessary to ensure participation in the project of all stakeholders. In the context of a WSP, the participants include:

- lenders who lend money for capital investment;
- guarantors who guarantee the loan (In public projects like WSPs, the government is often the guarantor.);
- suppliers of inputs to the project;
- users of project output (households/industries); and
- the organization which sponsors and runs the project (water enterprise).

5. Each of these participants must have sufficient incentives to participate, i.e., must have sufficient returns from the project.

- lenders must have their original loan amount and interests paid back in time as per the debt-repayment schedule agreed between the project entity and the lenders;
- the guarantor should have profit-tax paid by the project especially when the project is run by a corporate entity so that there is an incentive to guarantee;
- suppliers of project inputs should have their payments in time by the project entity;
- users must be willing to pay and pay on time the charges levied for their use of water outputs.

6. The above items are dealt with in two financial statements—income statement and cash flow statement which are an essential part of the financial analysis of the project. The incentive for the project entity to participate is reflected by the "return to equity", which has to be worked out from the cash flow statement of the financial

analysis of the project. Equity funding also includes the shareholders who contribute to the project. An example is shown in section 8.6.

8.2.1 Project Funding and Fiscal Impact

7. A financial plan at constant prices is necessary to assess the need for funds to finance project expenditures, both during the construction or implementation phase and the period of operation. If the project does not generate sufficient funds to cover all operating expenditures, then steps should be taken to ensure that the utility or government commits adequate funds for operational purposes (fiscal impact).

8. Similarly, through tax revenues and concession fees, projects can impact positively on the utility or government budget. Consequently, a fiscal impact assessment is an important consideration when structuring user charges, operator fees and taxes.

9. Where the funds required to operate the project are not covered through budgetary reallocation or efficiency improvements, they will have to be met through extra taxation or from borrowing. The economic effects of extra taxes and borrowing by government can be assessed at the national level. In either case, it is important to consider the effects of extra taxation or borrowing on the groups who are the principal project beneficiaries, especially the poor.

10. Assessing the fiscal impact is particularly important for projects where subsidies are involved and for undertakings (e.g., rural WSPs) where the government is the main project sponsor.

8.2.2 Cost Recovery from Beneficiaries

11. User charges from the beneficiaries to finance operational expenditures involve several issues, such as:

(i) economic effect of water charges;

(ii) charges for existing and new users in the case of expansion of the supply network;

(iii) affordability of tariff by different users; and

(iv) cost recovery.

8.2.3 User Charges

8.2.3.1 Economic Effect of Charges

12. The basic principle behind user charges is that users should pay the economic cost of the water services as the economic price of water should ensure the optimum "economic efficiency" of water charges. Theoretically, this ensures the optimum use of water—neither over-use (i.e., waste) nor under-use (below the minimum quantity to sustain adequate health and other criteria).

13. The appropriate cost for users to pay is the "Long-Run Marginal Economic Cost" (LRMEC) which includes both the investment and O&M costs. This is approximated by the Average Incremental Economic Cost (AIEC) derived from the least-cost method of supplying the water. This cost should be taken as the appropriate target for charging water users where a project stands alone.

8.2.3.2 Case of Expansion of Supply Network

14. Where a project extends an existing network, the tariff should be related to the AIEC of the water supply but spread over existing as well as new users.

8.3 Issue of Subsidy

15. Financial "adequacy" will be achieved only if the average financial cost can be recovered from users. As mentioned in paragraph 13, AIEC should be the appropriate target for charging water users. AIEC can, however, be more than or less than AIFC. First, if the AIEC is less than the AIFC, charges based on AIEC will create financial deficiency and financial sustainability will not be achieved based on user's charges alone. Second case, if AIEC is more than the AIFC, which may happen especially in the later years of the project, there is no difficulty in achieving the financial sustainability if water charges are based on AIEC. The first case requires governmental intervention in the form of "subsidy".

16. The difference between the average financial price of water charged and the AIFC is referred to as the AFS (average financial subsidy). Similarly, the difference

between the AIEC and the economic price of water charged is referred to as the AES (average economic subsidy). AFS and AES may not coincide due to market distortions, magnitude of nontechnical losses in the water supply system and externalities like environmental costs and benefits. Bank's policy is to eliminate "subsidy" over time where they are not justified. However, in projects like WSPs particularly in the rural areas, the subsidy arises in most cases.

8.3.1 Subsidy and its Justification

17. Generally, subsidies should be progressively reduced or phased out to the extent feasible because they may lead to macro-economic pressures via the budget and inefficient resource allocation. However, in certain conditions, subsidies may be justified. The ADB's document "Criteria for Subsidies" identifies conditions under which subsidies could be justified.

(i) Situations exist in which positive externalities occur where social returns from a project exceed private returns, like when health benefits to beneficiaries or environmental improvements due to the water supply projects are not reflected in the flow of financial benefits.

(ii) In industries with decreasing costs (due to e.g. economies of scale), say water industries, the cost of producing the marginal unit of output does not cover the full average costs. This would entail a loss for producers. Producers need to be subsidized to attain the economically (and socially) optimal levels of output.

(iii) There may be a need to compensate for the effects of market distortions which may have to be offset through subsidies. For example, a government may have a very high tax on imported machinery but may consider it appropriate to provide a general subsidy for the purchase of equipment for water supply.

(iv) A fourth situation is the case of redistribution, where subsidies are targeted at the poor; it is often considered desirable to provide subsidies for basic minimum water consumption to these groups.

(v) In case of positive environmental effects generated by the project which would not directly benefit the users, it may be justifiable to subsidize at least part of the costs made to generate these benefits.

(vi) There are special considerations that may require subsidies, such as in the context of transitional economies where the market institutions are yet to develop fully.

8.4 Affordability and Income Transfers

18. Although subsidies may be justifiable on the basis of the above considerations, it will be preferable as a first step to take recourse to "income transfer". For example, a cross-subsidy from the rich household users to poor household users is built into the water tariff structure. This may eliminate the need for subsidizing the water supply operations as a whole.

19. Tariff structures can be designed to ensure that those who use more water per capita (high income group) pay more than the single average tariff for all the groups and compensate for the lower than average tariff paid by the low income and poor households.

20. Subsidy from the central exchequer should be avoided as much as possible in an effort to avoid transfers from other sectors to water supply sector as this hampers the self-sufficiency of the water supply sector, which is needed to ensure financial sustainability of WSPs.

8.4.1 Affordability of Charges Paid by Users at Different Levels of Income

21. For any project to be financially sustainable, consumers must be able to afford to pay the price charged and the total monthly or annual bill. Affordability analysis typically compares the household cost of water consumption with a measure of household income.

22. Household consumption varies with several factors as discussed in Chapter 3. These factors may include household size, income, quantities used for basic uses such as drinking, cooking, and cleaning associated with the low-income group and non-basic uses such as watering lawn or washing cars etc. associated with the middle or high-income groups.

23. Affordability analyses are mainly meant for the low-income group in the project area and the poor households, i.e., those below the poverty line. A monthly bill based on the designed water tariff and projected average water consumption is worked out for an average household of the low-income group and compared with the average monthly income of the household in that group. A typical analysis of affordability for the town of Mysore in India is shown in Table 8.1 on the next page.

Table 8.1 Mysore Water Supply and Sanitation Component Affordability Analysis

Item	Estimated						Projected						
	FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999	FY 2000	FY 2001	FY 2002	FY 2003	FY 2004	FY 2005
Tariffs and Monthly Bill													
Domestic Water and Sewerage Tariff(Rs/m^3)	0.76	1.23	1.47	1.99	3.36	4.20	4.62	5.08	7.62	8.38	9.22	10.14	11.16
Monthly Water Consumption - LIG Household (m^3)	18.0	18.0	18.0	18.0	18.0	18.0	18.0	18.0	18.0	18.0	18.0	18.0	18.0
Monthly Bill - LIG Household (Rs)	14	22	26	36	60	76	83	91	137	151	166	183	201
Monthly Water Consumption - EWS Household (m^3)	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0
Monthly Bill - EWS Household (Rs)	11	18	22	30	50	63	69	76	114	126	138	152	167
Household Incomes													
Upper Limit of LIG (Rs/month)	2,650	2,891	3,153	3,439	3,752	4,092	4,464	4,869	5,311	5,794	6,320	6,894	7,519
Upper Limit of EWS (Rs/month)	1,250	1,364	1,487	1,622	1,770	1,930	2,106	2,297	2,505	2,733	2,981	3,252	3,547
Percent of Household Income Devoted to Water and Sewerage													
Upper Limit of LIG	0.5	0.8	0.8	1	1.6	1.8	1.9	1.9	2.6	2.6	2.6	2.6	2.7
Upper Limit of EWS	0.9	1.4	1.5	1.8	2.8	3.3	3.3	3.3	4.6	4.6	4.6	4.7	4.7

LIG - Low-income Group
EWS – Economically weaker section

24. It can be seen from the Box that a household at the upper limit of the low-income group with only Rs2,650/month in 1993 would pay approximately 2.7 percent of income (i.e., a monthly bill of Rs201 as a percentage of a household income of Rs7,519) for water and sanitation upon the full implementation of tariff (increased from Rs0.76/m^3 to Rs11.16/m^3) in ten years' time in 2005. Even the household earning as low as only Rs1,250/month in 1993 would pay only 4.7 percent of income for water and sanitation in the year 2005. Cost recovery was thus justified for the project loan as the household expenditure on water supply and sanitation facilities did not exceed 5 percent of the household income, which is generally accepted as norm by international development banks and financial institutions.

25. However, affordability indicators of this nature are somewhat arbitrary and crude and, therefore, must be used with great care allowing for variation of circumstances in different locations and different countries. The Box 8.1 below shows an example where households from some Moroccan towns were willing to pay more than 5 percent of their income if house connections were given.

Box 8.1 The "Five Percent Rule" for Improved Water Services: *Can Households Afford More?*

Results of a household-willingness-to-pay survey in five small Moroccan cities revealed that respondents would pay 7 to 10 percent of total household income for individual water connections, and subsequent commodity charges despite already having a reliable and free standpost service.

Source: McPhail, Alexander A. 1993. Quoted from: *The "Five Percent Rule" For Improved Water Service: Can Households Afford More?* The World Bank, World Development, Vol. 21, No 6, pp. 963-973.

26. If the result of the affordability analysis is that the low-income households would have to spend a relatively high proportion of their income to cover their basic needs for water, the following actions may be appropriate:

- comparison is to be made between the predicted expenditures on water with-project and expenditures without-project. If users are actually paying the same or higher costs without-project, they may be expected to spend at least a similar portion of their income for future water consumption provided by the project.

- consideration should be given as to whether or not users will still be interested to obtain lower service levels in which case cost to households can be reduced and brought within the affordable level; and

- consideration is to be given as to whether cross-subsidization from higher income groups to the low-income group can be incorporated in the tariff design so that the average cost recovery is almost equal to AIFC.

8.4.2 Cost Recovery and Tariff Design *(based on Affordability Considerations and Cross-subsidization)*

27. The annex to this chapter has an illustration of a tariff design for a town in India showing an increasing water consumption from low (with 40 liters per capita per day, lcd) to middle (80 lcd) to high income groups (150 lcd), incorporating cross subsidization from the higher income groups to lower income groups. The AIFC is Rs6.96/m^3 and the AIEC is Rs6.71/m^3,using domestic price numeraire for arriving at economic costs. The AIEC is lower because of the high value of non-technical losses (water consumed but not paid for) which represent a benefit in the economic analysis. The charges are, therefore, based on AIFC for ensuring financial sustainability.

8.5 Demand Management

28. The economic cost of subsidies to the water industry may be quite large. The sustainability of WSPs may be adversely affected if the subsidy required is very large. In such a situation, successful demand management can yield economic savings which may be greater than economic benefits from supply expansions. Depending on the price elasticity of demand, the result of an increase in the price of water may be:

- a decrease in the quantity of water demanded;
- an increase in sales revenue; and
- a reduction in capital costs.

29. This is best explained through the following illustration relating to a WSP in India, the Channapatna/Ramanagaran WSP. Tables 8.2 and 8.3 –Water Supply Expansion with Financial Price below AIFC and Water Supply Expansion with Demand

Management Option with Financial Price equal to AIFC – contain the data and calculations for two cases. The results are summarized as follows:

A. Supply expansion with Financial Price below AIFC: (See Table 8.2)

AIFC = Rs6.96 per m^3
Financial Price = Rs5.00 per m^3
Present Value at 12% Discount Rate
- Financial Benefit = Rs151.25 x 10^6
- Quantity Demanded = 30250 m3
- Financial Costs = Rs210.4 x 10^6
- Net Financial Cost = Rs.59.15 x 10^6
  = Rs (210.4-151.25) x 10^6

B. Supply expansion and Demand Management with Financial Price equal to AIFC: (See Table 8.3)

AIFC = Rs6.96/m^3
Financial Price = Rs.6.96/m^3
Present Values @ 12% Discount Rate:
- Financial Benefit = Rs184.4 x 10^6
- Quantity Demanded with application of price
  = 26529.25 m^3
- Price Elasticity of demand = -0.4
- Value of Financial Costs = Rs184.5 x 10^6
- Net Financial Costs = 0

30. Without demand management, the financial subsidy (the difference between the average price and the AIFC) is equal to Rs1.96/m^3 (= Rs6.96 – Rs5.0). This subsidy represents 28.16 percent of the costs. With demand management, higher charge for water and lower demand (but also lower investment costs), the final subsidy is reduced to zero as the full financial cost is being met.

Table 8.2 Supply Expansion with Financial Price Below AIFC

Year	Financial Price (Rs/m^3) (A)	Quantity Demanded ($000m^3$) (B)	Financial Benefit ($Rs\ 10^6$) (AxB = C)	Financial Costs ($Rs\ 10^6$) (D1)	Financial Costs ($Rs\ 10^6$) (D2)	Total Financial Costs ($Rs\ 10^6$) (D= D1+D2)	Net Financial Benefits ($Rs\ 10^6$) (E=C-D)
0		0	0	39.4	0	39.4	-39.4
1	5	82	0.41	90.0	0	90.0	(89.59)
2	5	130	0.65	73.1	0	73.1	(72.45)
3	5	179	0.895	22.5	0	22.5	(21.61)
4	5	3,500	17.50		3.7	3.7	13.80
5	5	4,885	24.43		2.7	2.7	21.73
6	5	5,204	28.02		2.9	2.9	25.12
7	5	5,807	26.54		2.9	2.9	23.64
8	5	5,412	27.06		3.5	3.5	23.56
9	5	5,896	29.48		7.8	7.8	21.68
10	5	6,059	30.30		8.1	8.1	22.20
11	5	6,226	31.13		8.3	8.3	22.83
12	5	6,397	31.98		8.5	8.5	23.48
13	5	6,812	34.06		9.0	9.0	25.06
14	5	6,948	34.76		9.3	9.3	25.46
15	5	7,086	35.43		9.5	9.5	25.93
16	5	7,112	35.56		10.0	10.0	25.56
17	5	7,112	35.56		10.0	10.0	25.56
18	5	7,112	35.56		10.0	10.0	25.56
19	5	7,112	35.56	33.7	10.0	10.0	(8.14)
20-34	5	7,112	35.56		10.0	10.0	25.56
Present value @12%		30,250	151.25			210.4	(59.15)
Average cost in Rs. Per m^3			5			AIFC=6.955	(1.96)

Table 8.3 Supply Expansion and Demand Management
with Financial Price Equal to AIEC

Year	Financial Price *(Rs/m³)* (A)	Quantity Demanded *('000m³)* (B)	Financial Benefit *(Rs 10⁶)* (C = AxB)	Financial Costs *(Rs 10⁶)* (D1)	O&M Costs *(Rs 10⁶)* (D2)	Financial Costs *(Rs 10⁶)* (D= D1+D2)	Net Financial Costs *(Rs 10⁶)* (E=C-D)
0	-	0	0	34.55	0	34.55	(34.55)
1	6.96	71.91	0.500	78.9	0	78.93	(78.93)
2	6.96	114.01	0.794	64.11	0	64.11	(64.11)
3	6.96	156.98	1.092	19.73	0	19.73	(19.73)
4	6.96	3,069.50	21.36		3.25	3.25	18.11
5	6.96	4,284.15	29.82		2.37	2.37	27.45
6	6.96	4,563.91	31.76		2.54	2.54	29.22
7	6.96	4,654.24	32.39		2.54	2.54	29.85
8	6.96	4,746.32	33.03		3.07	3.07	29.96
9	6.96	5,170.79	35.99		6.84	6.84	29.15
10	6.96	5,313.74	36.98		7.10	7.10	29.88
11	6.96	5,460.20	38.00		7.28	7.28	30.72
12	6.96	5,610.17	39.05		7.45	7.45	31.60
13	6.96	5,974.12	41.58		7.89	7.89	33.69
14	6.96	6,093.40	42.41		8.16	8.16	34.25
15	6.96	6,214.42	43.25		8.33	8.33	34.92
16	6.96	6,237.22	43.41		8.77	8.77	34.64
17	6.96	6,237.22	43.41		8.77	8.77	34.64
18	6.96	6,237.22	43.41		8.77	8.77	34.64
19	6.96	6,237.22	43.41	29.55	8.77	8.77	34.64
20	6.96	6,237.22	43.41		8.77	8.77	34.64
21	6.96	6,237.22	43.41		8.77	8.77	34.64
22	6.96	6,237.22	43.41		8.77	8.77	34.64
23	6.96	6,237.22	43.41		8.77	8.77	34.64
24	6.96	6,237.22	43.41		8.86	8.86	34.55
25-33	6.96	6,237.22	43.41		9.91	9.91	33.50
34	6.96	6,237.22	43.41		10.00	10.00	33.41
Present value @12%		26,529.25	184.40			184.5	-0.1
Average cost in Rs. per m³			6.96			AIFC = 6.96	

Notes:

$Q_2 = Q_1 \times \{ (1 + e \times A/2) / (1 - e \times A/2) \}$

Where: Q_2 = Quantity demanded as a result of price increase to Rs 6.95/m^3 = P_2

Q_1 = Quantity demanded at the original price of Rs 5.00/m^3 = P_1

e = Price elasticity of demand = -0.4 assumed

and $A \frac{(P_2 - P_1)/ (P_2 + P_1)}{2} = \frac{(6.95 - 5.0)/ (6.96 + 5.0)}{2} = 0.3278$

Hence, $Q_2 = Q_1 \times \frac{\{1 + (-.4) \times 0.3278/2\}}{\{1 - (-.4) \times 0.3278/2\}} = Q_1 \times 0.877$

8.6 Financial Returns to the Project Participants

31. In cases where the main project participant is a corporation, either public or private, the income statement and cash flow statement built up in the project's financial analysis show the net income generated by the project investment after allowing for loan flows, loan payments and taxation of profit. After meeting all these financial obligations and financing the need for working capital where applicable, the residual money is the return to the project sponsor's own contribution and contribution to shareholders who have also a stake in the project investment. This return to equity is to be worked out and it should be high enough to attract their participation in the project.

8.6.1 Return to Equity

32. The following illustration relates to the Channapatna/Ramanagaran WSP in Karnataka State of India which is to be implemented through a corporate entity. The income and cash flow statements of the project have been worked out based on the following basic features:

1) Initial investment is spread over four years.

2) The loan from the Bank which covers 80 percent of the total investment has a grace period of 5 years and is then repayable over a 20-year period at an interest rate of 6.9 percent. However, consistent with government policy, this is re-lent to the water entity by the government at a nominal interest of 12 percent. The anticipated inflation is 3.2 percent per annum. Thus, the real rate of interest amounts to 8.5 percent. The calculation is shown in Box 8.2 below.

Box 8.2 Real Rate of Interest Calculation

The relationship between inflation, nominal interest rate and real interest rate is stated in the following equation:

$$(1 + i)(1 + r_r) = (1 + r_n)$$

or $r_r = \{(1 + r_n)/(1 + i)\} - 1$

where i = annual rate of inflation
r_r = real rate of interest
r_n = nominal rate of interest

In this case,

$i = 0.032$
$r_n = 0.12$

hence,

$$(1 + .032)(1 + r_r) = (1 + 0.12)$$

or $r_r = 8.5$ percent

3) The remaining 20 percent of the investment comes from a government grant to the water entity for which no payment of interest or principal is to be made.

4) Project assets are operated for 31 years, after which there is no residual value.

5) O&M costs increase gradually with increasing supply of water.

6) The average price of water rises over the 35-year project period from Rs1.72 per m^3 to Rs6.18 per m^3 in real terms.

7) Water sales on the basis of project supplies increase over the first 12 years of the project, then remain at a constant level.

8) Twenty percent of UFW are nontechnical losses and do not generate any revenue.

9) The water entity would become liable for profit tax (remuneration

to the guarantor—the government) at the rate of 46 percent of gross profit from the year onward when accumulated profit is no more negative.

33. The cash flow statement is shown in Annex 3 (Table 8.3) of this chapter. The "return to equity" works out to be 4.3 percent.

8.6.2 Assessment of "Return to Equity" of 4.3 percent

34. The return to equity of 4.3 percent is generally considered to be low. The following key questions are:

(i) will this low return induce foreign investment funds, or private domestic investment, or even government investment?

(ii) does a 4.3 percent return to equity provide sufficient incentive to the project owner to undertake and maintain the investment?

(iii) is the return to equity as low as 4.3 percent sufficient to justify an operation of the water supply project on a corporate basis?

Case of Foreign Investment

35. Most private foreign investors in many countries would be looking for returns of 16 to 20 percent in real financial prices. Hence, a return of only 4.3 percent per annum would not appear to be acceptable to foreign investors.

Case of Private Domestic Investment

36. Private domestic investors are likely to have alternative investment opportunities that yield much higher than 4.3 percent in real terms. They will, therefore, also be excluded in such an investment with low return to equity.

Case of Government Investment

37. Government investment, again, depends on the cost of investment funds. What is the opportunity cost of investment funds for most of the member countries? Combining estimates of returns to savers and investors and allowing for the elasticity of demand and supply of investment funds suggest that the cost of investment in real financial prices is between 10 percent and 12 percent. Government may wish to

achieve these rates of interest in project investments in financial terms. Hence, it is unlikely that government funds will be available for a WSP generating a low return of 4.3 percent. However, governments may still support this WSP, considering the economic and environmental benefits not captured in the financial benefit calculation.

Project Implementation Risk

38. A return of 4.3 percent to equity is too low to justify the project. The risk is high as the small return may quickly become zero, or negative in case there is a high cost-overrun in implementing the project and/or if the projected level of demand for water does not materialize. This will then require an undesirable level of subsidy to be sustained over the life of the project.

39. However, if instead of relending the loan (with Bank's rate of 6.9 percent) to the domestic water entity at a high rate of 12 percent (resulting in a real rate of 8.6 percent, see Box 8.3) , the government sets the relending equal to the Bank's terms (such as, five years of grace period at 6.9 percent interest rate), the return to equity improves considerably and becomes 11.9 percent. This rate of return would then be sufficient for a water authority to be set up on a corporate basis.

40. A change in onlending rate (refer to para. 39 above) raises the issue of who carries the foreign exchange risk. The issues of foreign exchange movements and risk sharing are important in cases where the water enterprise uses external finance but gets its main revenue from the domestic household and industrial/commercial sector. In the example presented in section 8.6.2, the lowering of the relending rate from 12 percent to 6.9 percent means that the government has to shoulder the foreign exchange risk. Any adverse foreign exchange movements may then have an impact on fiscal sustainability .

Table 8.4 Cash Flow Statement																		
Items	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
Cash Inflows																		
Water Sales	0.0	0.1	0.2	0.6	11.8	25.1	27.2	28.3	29.4	32.2	33.3	34.3	35.5	37.9	38.9	39.8	40.2	40.4
Loan	31.5	72.1	58.5	18.0														
Total Cash Inflows	31.5	72.2	58.7	18.6	11.8	25.1	27.2	28.3	29.4	32.2	33.3	34.3	35.5	37.9	38.9	39.8	40.2	40.4
Cash Outflows																		
Capital Costs	39.4	89.9	72.9	21.9														
O&M Costs					2.2	4.6	5.1	5.3	5.9	6.2	6.4	6.6	6.8	7.2	7.4	8.0	8.0	8.0
Loan Repayments						5.0	5.4	5.9	6.4	6.9	7.5	8.2	8.9	9.6	10.5	11.4	12.4	13.4
Interest Payments						21.0	20.5	20.1	19.6	19.0	18.4	17.8	17.1	16.3	15.5	14.6	13.6	12.5
Tax Payments																5.4	6.1	6.8
Total Cash Outflows	39.4	89.9	72.9	21.9	2.2	30.6	31.1	31.3	31.9	32.2	32.4	32.6	32.8	33.2	33.4	39.4	40.1	40.8
Net Cash Flows	-7.9	- 17 .7	-14.2	-3.3	9.6	-5.5	-3.9	-3.0	-2.5	0.0	0.9	1.7	2.7	4.7	5.5	0.4	0.1	-0.4

Note: Loan inflow is calculated as 80 percent of capital investment cost over the four years of project implementation.

Table 8.4 Cash Flow Statement (continuation)																	
Items	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35
Cash Inflows																	
Water Sales	40.6	40.8	41.0	41.2	41.5	41.6	41.9	42.1	42.2	42.5	42.7	42.9	43.1	43.3	43.6	43.8	44.0
Loan																	
Total Cash Inflows	40.6	40.8	41.0	41.2	41.5	41.6	41.9	42.1	42.2	42.5	42.7	42.9	43.1	43.3	43.6	43.8	44.0
Cash Outflows																	
Capital Costs		33.6															
O&M Costs	8.0	8.0	8.1	8.1	8.1	8.1	8.1	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0
Loan Repayments	14.6	15.9	17.2	18.7	20.3	22.1	24.0										
Interest Payments	11.4	10.1	8.8	7.3	5.7	3.9	2.1										
Tax Payments	7.5	8.2	9.0	9.8	10.7	11.7	12.7	13.4	13.6	13.7	13.8	14.0	14.1	14.3	14.4	14.6	14.7
Total Cash Outflows	41.5	75.8	43.0	43.9	44.8	45.8	46.9	22.4	22.6	22.7	22.8	23.0	23.1	23.3	23.4	23.6	23.7
Net Cash Flows	-0.9	-35.0	-2.0	-2.7	-3.3	-4.2	-5.0	19.7	19.6	19.8	19.9	19.9	20.0	20.0	20.2	20.2	20.3
IRR = 4.3% ≈ return to equity																	

8.7 Financial Analysis at the Enterprise Level

41. Project sustainability is also contingent upon the overall financial performance of the enterprise, either public or private, undertaking the project and the enterprise's incentive to invest in the project. That is, in addition to the project generating sufficient incentive (i.e., profitability and/or return to investment) to the project sponsor undertaking and maintaining the investment, the financial performance of the enterprise must also be sufficient to attract capital to the project and the forecasted cash flow of the enterprise must be sufficient to finance the project.

42. The financial performance of the enterprise prior to the project investment must be sound in order to attract capital to the project. This analysis is undertaken as part of the financial analysis for each project in accordance with the Bank's *Guidelines for the Financial Analysis of Projects,* in three financial statements—income statement, cash flow statement and balance sheet.

43. Assuming that requisite financial analysis has been performed and the project has been found to be financially viable, an analysis of the projected financial statements of the enterprise will identify any cash flow implications on the financial sustainability at both the project and the enterprise level.

Annex
Tariff Design for Financial Sustainability
(an Illustration)
Based on data from Karnataka Urban Infrastructure Development Project

(1) Population in year 5 of the project = 80,000

(2) Household size = 4

(3) No. of households = 20,000

(4) High income group = 0.15 x 20,000 = 3,000 nos. households
(Rs5,000 to Rs7,000 per month)

(5) Middle income group = 0.65 x 20,000 = 13,000 nos. households
(Rs2,400 to Rs5,000 per month)

(6) Low income group households = 0.20 x 20,000 = 4,000 nos.
(Rs1,250.00 per month to Rs2,400 per month)

(7) Consumption per capita per day: (liters per capita per day = lcd)
- one connection outside house = 40.00 lcd (for low income group)
- one connection inside house = 80.0 lcd (for middle income group)
- two connections inside house = 150.0 lcd (for high income group)

(8) Total consumption per day: (in m^3)

$$\frac{1}{1000}(3{,}000 \times 4 \times 150) + (13{,}000 \times 4 \times 80) + (4{,}000 \times 4 \times 40) = 6{,}600 m^3$$

(9) Consumption per day by commercial and small industrial plants
= ten percent of total consumption = $660 m^3$

(10) Quantity of water sold per day = (6,600 + 660) m^3 = 7,260 m^3

(11) AIFC = Rs6.96/m^3
AIEC = Rs.6.71/m^3 (using domestic price numeraire)

(12) Total financial cost to be met per day
= 7260 x 6.96 = Rs50,529.60

(13) Provision for uncollected water charges = six percent of total water sales.

(14) Charges for commercial businesses and industrial plants = Rs10.00/m^3
As AIFC < Rs10/m^3, the commercial/industrial sector cross-subsidizes the household sector.

(15) Payments (per day) by commercial houses and industrial plants
= (660) x (10) = Rs6,600.00

(16) Remaining financial costs (per day) are to be met by the households
= Rs50,529.6 – Rs660.00
= Rs43,929.60

(17) Charges for different income groups

- low income group = Rs5.00/m^3 < AIFC (40 for lcd)
- middle income group
  first 40 Lcd = Rs5.00/m^3 < AIFC
  next 40 Lcd = Rs8.00/m^3 > AIFC
- high income group
  first 40 Lcd = Rs5.00/m^3 < AIFC
  next 40 Lcd = Rs8.00/m^3 > AIFC
  next 70 Lcd = Rs13.00/m^3 > AIFC

(18) Total charges from households per day:

from low income group

$$= 4{,}000 \times \frac{(4 \times 40 \times 5)}{1{,}000} = \text{Rs}3{,}200.00$$

from middle income group

$$= 13{,}000 \times \frac{(4 \times 40 \times 5) + (4 \times 40 \times 8)}{1{,}000} = \text{Rs}27{,}040$$

for high income group

$$= 3{,}000 \times \frac{(4 \times 40 \times 5) + (4 \times 40 \times 8.0) + (70 \times 4 \times 13.00)}{1{,}000}$$

$$= \text{Rs}17{,}160.00$$

TOTAL CHARGES FROM ALL HOUSEHOLDS (PER DAY)
= Rs3,200.00 + Rs27,040 + Rs17,160 = Rs47,400.00

Total water sales (per day) from commercial/industrial sector and households
= Rs47,400.00 + Rs6,600.00 = Rs54,000.00

(19) Provision for uncollected water sales value (per day) as a percentage of total sales

$$= 100 \times \frac{(54{,}000.00 - 50{,}529.60)}{(54{,}000.00)} = 6.4\%$$

(20) Test for "affordability":

Lowest income group

Monthly payment from each household = (3,200.00/4,000) x 30 = Rs24.00

Lowest monthly income of low income group = Rs1,250.00

Water charges as a percentage of monthly income $= \frac{24.00}{1{,}250.00} \times 100 = 1.92\%$

Middle income group

Monthly payment from each household = (27,040/13,000) x 30 = Rs62.4

Lowest monthly income of middle income group = Rs2,400.00

Water charges as a percentage of monthly income $= \frac{62.4}{2{,}400} \times 100 = 2.6\%$

High income group

Monthly payments from each household = (17,160/3,000) x 30 = Rs171.60

Lowest monthly income of high income group = Rs5,000.00

Water charges as a percentage of monthly income $= \frac{171.60}{5{,}000} \times 100 = 3.43\%$

Remarks:

Key questions to be asked for the tariff design are:

- Have we got adequate finance to ensure financial sustainability?
- Are the water charges "affordable" to the consumers, especially to the poorer section of the community?
- Is the economic price covered by the water charges?

The answers to these questions are "yes".

- Is there any "subsidy" involved?
  There is no general subsidy, either financial or economic. However, there is cross-subsidy from the high-income group to the low-income group, as can be seen below:

  Low-income group: -
  (100% @ Rs5.00/m^3)
  This is less than AIFC = Rs6.96/m^3
  Middle income group : -
  (50% @ Rs5.00/m^3 and 50% @ 8.00/m^3)
  Weighted average rate = 0.5 x 5 + 0.5 x 8 = Rs6.5/m^3
  This is slightly less than AIFC = Rs6.96/m^3
  High-income group: -
  (0.267 @ Rs5.00/m^3, 0.267 @ Rs8.0/m^3 and 0.466 @ Rs 13.0/m^3)
  Weighted average rate = 0.267 x 5.0 + 0.267 x 8 + 0.466 x 13
  = Rs9.53
  This is higher than AIFC = Rs6.96/m^3

- Weighted average price of water

$$= \left[\frac{660}{7{,}260} \times 10\right] + \left[\frac{640}{7{,}260} \times 5\right] + \left[\frac{4{,}160}{7{,}260} \times 6.5\right] + \left[\frac{1{,}800}{7{,}260} \times 9.53\right]$$

$$= \text{Rs}7.44/m^3$$