

## 9-4 Financial Analysis

### 9-4-1 Financial Internal Rate of Return

The financial internal rate of return (FIRR) means the value of discount rate with which the total present worth of revenues and expenses of a project becomes equal.

The annual electric power supplied by this Project (at receiving end), the total power cost and the revenue are presented in Table 9-3.

Table 9-3 Annual Power Supply Cost and Revenue

Year	Power Supplied (MW)	Energy Supplied (10 <sup>6</sup> kWh)	Supply Cost (Million US\$)	Revenue (Million US\$)
1992	20	105.1	2.88	5.32
1993	23	121.9	3.34	6.15
1994	27	141.9	3.89	7.16
1995	30	157.7	4.32	7.95
1996	34	178.7	4.90	9.01
1997	38	199.7	5.42	10.07
1998	40	210.2	5.76	10.60
1999	42	220.8	6.05	11.13
2000	42	220.8	6.05	11.13
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2026	42	220.8	6.05	11.13

Using the same construction cost and O&M cost as in the economic analysis, we can calculate the FIRR as given in Table 9-4.

According to this calculation results, the FIRR of this Project is 9.1%. Therefore, it can be said that this Project is sufficiently economical in terms of financial internal rate of return.

Table 9-4 Calculation Table of Financial Internal Rate of Return

(in million US\$)

No.	Year	Revenue	Expense			Total
			Construc- tion Cost	O&M	Power Supply Cost	
	1989		0.57			0.57
	90		4.25			4.25
	91		26.57			26.57
1	92	5.30	3.49	0.87	2.88	7.25
2	93	6.15		0.87	3.34	4.22
3	94	7.16		0.87	3.89	4.76
4	95	7.95		0.87	4.32	5.19
5	96	9.01		0.87	4.90	5.77
6	97	10.07		0.87	5.47	6.35
7	98	10.60		0.87	5.76	6.63
8	99	11.13		0.87	6.05	6.93
9	2000	11.13		0.87	6.05	6.93
10	01	11.13		0.87	6.05	6.93
11	02	11.13		0.87	6.05	6.93
12	03	11.13		0.87	6.05	6.93
13	04	11.13		0.87	6.05	6.93
14	05	11.13		0.87	6.05	6.93
15	06	11.13		0.87	6.05	6.93
16	07	11.13		0.87	6.05	6.93
17	08	11.13		0.87	6.05	6.93
18	09	11.13		0.87	6.05	6.93
19	10	11.13		0.87	6.05	6.93
20	11	11.13		0.87	6.05	6.93
21	12	11.13		0.87	6.05	6.93
22	13	11.13		0.87	6.05	6.93
23	14	11.13		0.87	6.05	6.93
24	15	11.13		0.87	6.05	6.93
25	16	11.13		0.87	6.05	6.93
26	17	11.13		0.87	6.05	6.93
27	18	11.13		0.87	6.05	6.93
28	19	11.13		0.87	6.05	6.93
29	20	11.13		0.87	6.05	6.93
30	21	11.13		0.87	6.05	6.93
31	22	11.13		0.87	6.05	6.93
32	23	11.13		0.87	6.05	6.93
33	24	11.13		0.87	6.05	6.93
34	25	11.13		0.87	6.05	6.93
35	26	11.13		0.87	6.05	6.93

Total present worth with discount rate of:

	Revenue	- Expense				
9%	77.57	27.10	7.13	42.17	77.43	+0.15
10%	68.07	26.38	6.33	37.00	69.71	-1.64

$$FIRR = 9 + 0.15 / (0.15 + 1.64) = 9.1\%$$

Note: Construction cost is excluding interest during construction

9-4-2 Some Financial Tables

The loan repayment program of this Project is presented in Table 9-5. All project fund is to be borrowed by the following terms.

Interest rate : 1%  
Reimbursement term : 35 years (with a 10 year grace period)  
Reimbursement method : Equal installment of principal and interest

The statement of profit and loss for this Project is given in Table 9-6. The gross construction cost of 35.10 million US\$ (93.69 million M.Kw), which is the sum of the net construction cost of 34.89 million US\$ (93.13 million M.Kw) and the interest during construction of 0.21 million US\$ (0.56 million M.Kw), is to be depreciated in 35 years by a straight line method (no salvation).

According to this program, the interest during construction of 0.21 million US\$ for the construction period of 3 years is incurred as loss, but we judge that this can be financed by ESCOM itself. The profit increases satisfactorily after commissioning as the sales revenue increases. The interest rate with which the total net profit becomes zero is  $95.885/6.42 = 14.9\%$ .

The debt/service ratio is given in Table 9-7. This is the ratio of the payable amount which is the repayment of interest and principal to the internal financing which is operating revenue plus depreciation, and is 3.32 in the final year, being well over 1, thereby indicating the financial soundness of this Project.

Table 9-5 Loan Repayment Program

(in million US\$)

<u>No.</u>	<u>Year</u>	<u>Construction Cost</u>	<u>Interest</u>	<u>Principal</u>	<u>Principal &amp; Interest</u>	<u>Loan Balance</u>
	1989	0.57	0.002		0.002	0.57
	90	4.25	0.027		0.027	4.82
	91	26.57	0.181		0.181	31.39
1	92	3.49	0.349		0.349	34.89
2	93		0.349		0.349	34.89
3	94		0.349		0.349	34.89
4	95		0.349		0.349	34.89
5	96		0.349		0.349	34.89
6	97		0.349		0.349	34.89
7	98		0.349		0.349	34.89
8	99		0.349	1.58	1.93	33.30
9	2000		0.333	1.60	1.93	31.70
10	01		0.317	1.62	1.93	30.09
11	02		0.300	1.68	1.93	28.45
12	03		0.284	1.65	1.93	26.81
13	04		0.268	1.67	1.93	25.14
14	05		0.251	1.68	1.93	23.46
15	06		0.234	1.70	1.93	21.76
16	07		0.217	1.72	1.93	20.04
17	08		0.200	1.73	1.93	18.31
18	09		0.183	1.75	1.93	16.56
19	10		0.165	1.77	1.93	14.79
20	11		0.148	1.78	1.93	13.01
21	12		0.129	1.80	1.93	11.20
22	13		0.111	1.82	1.93	9.38
23	14		0.094	1.84	1.93	7.54
24	15		0.075	1.86	1.93	5.69
25	16		0.056	1.88	1.93	3.81
26	17		0.038	1.89	1.93	1.81
27	18		0.019	1.91	1.93	0
<b>Total</b>		<b>34.87</b>	<b>6.42</b>	<b>34.89</b>	<b>41.31</b>	

Table 9-6 Statement of Profit and Loss

(in million US\$)

No.	Year	Operating Revenue	Operating Expense			Total	Operating Income	Interest	Net Income
			O&M	Power Cost	Depreciation				
	1989						0	0	
	90						0.03	-0.03	
	91						0.18	-0.18	
1	92	5.30	0.87	2.88	1.00	4.76	0.54	0.35	0.19
2	93	6.15	0.87	3.34	1.00	5.22	0.93	0.35	0.58
3	94	7.16	0.87	3.89	1.00	5.77	1.39	0.35	1.04
4	95	7.95	0.87	4.32	1.00	6.20	1.75	0.35	1.40
5	96	9.01	0.87	4.90	1.00	6.78	2.34	0.35	1.89
6	97	10.07	0.87	5.47	1.00	7.35	2.92	0.35	2.37
7	98	10.60	0.87	5.76	1.00	7.63	2.97	0.35	2.62
8	99	11.13	0.87	6.05	1.00	7.93	3.21	0.35	2.86
9	2000	11.13	0.87	6.05	1.00	7.93	3.21	0.33	2.87
10	01	11.13	0.87	6.05	1.00	7.93	3.21	0.32	2.85
11	02	11.13	0.87	6.05	1.00	7.93	3.21	0.30	2.91
12	03	11.13	0.87	6.05	1.00	7.93	3.21	0.28	2.92
13	04	11.13	0.87	6.05	1.00	7.93	3.21	0.27	2.94
14	05	11.13	0.87	6.05	1.00	7.93	3.21	0.25	2.96
15	06	11.13	0.87	6.05	1.00	7.93	3.21	0.23	2.97
16	07	11.13	0.87	6.05	1.00	7.93	3.21	0.22	2.99
17	08	11.13	0.87	6.05	1.00	7.93	3.21	0.20	3.01
18	09	11.13	0.87	6.05	1.00	7.93	3.21	0.18	3.02
19	10	11.13	0.87	6.05	1.00	7.93	3.21	0.17	3.04
20	11	11.13	0.87	6.05	1.00	7.93	3.21	0.15	3.06
21	12	11.13	0.87	6.05	1.00	7.93	3.21	0.13	3.08
22	13	11.13	0.87	6.05	1.00	7.93	3.21	0.11	3.09
23	14	11.13	0.87	6.05	1.00	7.93	3.21	0.09	3.11
24	15	11.13	0.87	6.05	1.00	7.93	3.21	0.08	3.13
25	16	11.13	0.87	6.05	1.00	7.93	3.21	0.06	3.15
26	17	11.13	0.87	6.05	1.00	7.93	3.21	0.04	3.17
27	18	11.13	0.87	6.05	1.00	7.93	3.21	0.02	3.21
28	19	11.13	0.87	6.05	1.00	7.93	3.21		3.21
29	20	11.13	0.87	6.05	1.00	7.93	3.21		3.21
30	21	11.13	0.87	6.05	1.00	7.93	3.21		3.21
31	22	11.13	0.87	6.05	1.00	7.93	3.21		3.21
32	23	11.13	0.87	6.05	1.00	7.93	3.21		3.21
33	24	11.13	0.87	6.05	1.00	7.93	3.21		3.21
34	25	11.13	0.87	6.05	1.00	7.93	3.21		3.21
35	26	11.13	0.87	6.05	1.00	7.93	3.21		3.21
Total		367.99	30.57	200.01	35.10	265.68	102.31	6.42	95.89

Table 9-7 Debt/Service Ratio

(in million US\$)

No.	Year	Internal Financing				Repayment				Debt/ Service Ratio (A)/(B)
		Operating Income	Depre- ciation	Total	Cumula- tive (A)	Interest	Princi- pal	Total	Cumulative (B)	
	1989					0		0	0	
	90					0.03		0.03	0.03	
	91					0.18		0.13	0.21	
1	92	0.54	1.00	1.54	1.54	0.35		0.35	0.56	
2	93	0.93	1.00	1.98	3.47	0.35		0.35	0.71	
3	94	1.39	1.00	2.39	5.86	0.35		0.35	1.26	
4	95	1.75	1.00	2.76	8.62	0.35		0.35	1.60	
5	96	2.24	1.00	3.24	11.88	0.35		0.35	1.95	6.07
6	97	2.72	1.00	3.72	15.58	0.35		0.35	2.30	
7	98	2.97	1.00	3.97	19.55	0.35		0.35	2.65	
8	99	3.21	1.00	4.21	23.76	0.35	1.58	1.93	4.58	
9	2000	3.21	1.00	4.21	27.97	0.33	1.60	1.93	6.52	
10	01	3.21	1.00	4.21	32.18	0.32	1.62	1.93	8.45	3.81
11	02	3.21	1.00	4.21	36.39	0.30	1.63	1.93	10.38	
12	03	3.21	1.00	4.21	40.52	0.28	1.65	1.93	12.31	
13	04	3.21	1.00	4.21	44.73	0.27	1.67	1.93	14.25	
14	05	3.21	1.00	4.21	52.51	0.25	1.68	1.93	16.18	
15	06	3.21	1.00	4.21	53.14	0.23	1.70	1.93	18.11	2.93
16	07	3.21	1.00	4.21	57.35	0.22	1.72	1.93	20.05	
17	08	3.21	1.00	4.21	61.56	0.20	1.73	1.93	21.98	
18	09	3.21	1.00	4.21	65.77	0.18	1.75	1.93	23.91	
19	10	3.21	1.00	4.21	69.78	0.17	1.77	1.93	25.85	
20	11	3.21	1.00	4.21	74.19	0.15	1.79	1.93	27.78	2.67
21	12	3.21	1.00	4.21	78.40	0.13	1.80	1.93	29.81	
22	13	3.21	1.00	4.21	82.61	0.11	1.82	1.93	31.64	
23	14	3.21	1.00	4.21	86.82	0.09	1.84	1.93	33.58	
24	15	3.21	1.00	4.21	91.03	0.08	1.86	1.93	35.51	
25	16	3.21	1.00	4.21	95.24	0.06	1.88	1.93	37.44	2.54
26	17	3.21	1.00	4.21	99.44	0.04	1.89	1.93	39.38	
27	18	3.21	1.00	4.21	103.65	0.02	1.91	1.93	41.30	
28	19	3.21	1.00	4.21	107.86				41.30	
29	20	3.21	1.00	4.21	112.07				41.30	
30	21	3.21	1.00	4.21	116.28				41.30	2.81
31	22	3.21	1.00	4.21	120.49				41.30	
32	23	3.21	1.00	4.21	124.70				41.30	
33	24	3.21	1.00	4.21	128.91				41.30	
34	25	3.21	1.00	4.21	133.12				41.30	
35	26	3.21	1.00	4.21	137.32				41.30	3.32









