

- Interest:

8% for foreign currency, 12% for domestic currency
Commitment charge is not considered.

- Terms of repayment:

Repayment is deferred during the construction period both for foreign and domestic funds.

Repayment of principal and interest in equal installment for 10 years.

Other conditions are as follows:

- Depreciation:

Straight line method with no residual value.

The service life for each equipment is to be as follows:

Civil structures	50 years
Hydraulic equipment	25 years
Electro-mechanical equipment	25 years

- Operation and Maintenance Cost:

To be obtained by multiplying a certain ratio by the construction cost of the Project.

Civil structures	0.5%
Hydraulic equipment	1.5%
Electro-mechanical equipment	1.5%

- Price hikes:

All costs are estimated on the basis of 1992 with no escalation taken into account.

- Income:

Income is estimated based on power demand forecast by ENEC (low case) and using incremental electricity price of US\$ 0.0924/kWh which corresponds to the case of 5% of price increase from the current level.

(See Table 14-6)

Loan Repayment Schedule is shown in Table 14-8, Profit and Loss Statement in Table 14-9, and Cash Flow Sheet in Table 14-10.

Table 14-1 Construction Cost of the Project (at Market Price)

(Unit: 1,000 US\$)

No.	Year	Civil		Hydro		Electro		Total	
		LC	FC	LC	FC	LC	FC	LC	FC
-4	1998	1,868	4,279	84	1,039			1,953	5,318
-3	1999	5,784	13,240	437	5,389	439	5,407	6,660	24,036
-2	2000	1,157	2,650			877	10,816	2,033	13,466
-1	2001	62	140			877	10,816	939	10,957
1	2002								
2	2003								
3	2004	271	620			1,316	16,224	1,587	16,844
4	2005	62	140			877	10,816	939	10,957
5	2006								
:									
21	2022								
22	2023			84	1,039			1,953	5,318
23	2024			437	5,384	439	5,407	6,660	24,036
24	2025					877	10,816	2,033	13,466
25	2026					877	10,816	939	10,957
26	2027								
27	2028								
28	2029					1,316	16,224	1,587	16,844
29	2030					877	10,816	939	10,957
30	2031								
Total		9,204	21,070	1,044	12,856	8,770	108,158	19,018	142,084

Table 14 -2 Economic Cost of the Project

(Unit: 1,000 US\$)

No.	Year	Civil		Hydro		Electro		Total		Total
		LC	FC	LC	FC	LC	FC	LC	FC	LC+F C
-4	1998	1,495	4,279	68	1,039			1,562	5,318	6,880
-3	1999	4,627	13,240	350	5,384	351	5,407	5,328	24,036	29,364
-2	2000	925	2,650			701	10,816	1,627	13,466	15,092
-1	2001	50	140			701	10,816	751	10,957	11,708
1	2002									
2	2003									
3	2004	217	620			1,053	16,224	1,269	16,844	18,113
4	2005	50	140			701	10,816	751	10,957	11,708
5	2006									
:										
21	2022									
22	2023			68	1,039			68	1,039	1,106
23	2024			350	5,389	351	5,407	701	10,796	11,497
24	2025					701	10,816	701	10,816	11,517
25	2026					701	10,816	701	10,816	11,517
26	2027									
27	2028									
28	2029					1,053	16,224	1,053	16,224	17,276
29	2030					701	10,816	701	10,816	11,517
30	2031									
:										
Total		7,363	21,070	834	12,856	7,016	108,158	15,213	142,084	157,297

Table 14-3 Economic Evaluation

EL CAJON PROJECT

(unit: 1000 US dollar)

EL CAJON PROJECT		C O S T						B E N E F I T				B - C
No.	Year	EL CAJON		BASE LOAD THERMAL			TOTAL(C)	GAS TURBINE			TOTAL(B)	
		INVEST	O & M	INVEST	O & M	FUEL		INVEST	O & M	FUEL		
-4	1998	6,880					6,880				0	-6,880
-3	1999	29,364					29,364				0	-29,364
-2	2000	15,092		11,826			26,918	35,320			35,320	8,402
-1	2001	11,708		7,884			19,592	15,137			15,137	-4,454
1	2002	0	672		899	2,731	4,301		2,301	5,622	7,923	3,621
2	2003	0	672		899	2,731	4,301		2,301	5,622	7,923	3,621
3	2004	18,113	672	11,826	899	2,731	34,241	35,320	2,301	5,622	43,243	9,003
4	2005	11,708	672	7,884	899	2,731	23,893	15,137	2,301	5,622	23,060	-833
5	2006		1,109		1,798	5,462	8,368		4,602	11,244	15,846	7,478
6	2007		1,109		1,798	5,462	8,368		4,602	11,244	15,846	7,478
7	2008		1,109		1,798	5,462	8,368		4,602	11,244	15,846	7,478
8	2009		1,109		1,798	5,462	8,368		4,602	11,244	15,846	7,478
9	2010		1,109		1,798	5,462	8,368		4,602	11,244	15,846	7,478
10	2011		1,109		1,798	5,462	8,368		4,602	11,244	15,846	7,478
11	2012		1,109		1,798	5,462	8,368		4,602	11,244	15,846	7,478
12	2013		1,109		1,798	5,462	8,368		4,602	11,244	15,846	7,478
13	2014		1,109		1,798	5,462	8,368		4,602	11,244	15,846	7,478
14	2015		1,109		1,798	5,462	8,368	35,320	4,602	11,244	51,166	42,798
15	2016		1,109		1,798	5,462	8,368	15,137	4,602	11,244	30,983	22,615
16	2017		1,109		1,798	5,462	8,368		4,602	11,244	15,846	7,478
17	2018		1,109		1,798	5,462	8,368		4,602	11,244	15,846	7,478
18	2019		1,109		1,798	5,462	8,368	35,320	4,602	11,244	51,166	42,798
19	2020		1,109		1,798	5,462	8,368	15,137	4,602	11,244	30,983	22,615
20	2021		1,109		1,798	5,462	8,368		4,602	11,244	15,846	7,478
21	2022		1,109		1,798	5,462	8,368		4,602	11,244	15,846	7,478
22	2023	1,106	1,109		1,798	5,462	9,475		4,602	11,244	15,846	6,371
23	2024	11,497	1,109		1,798	5,462	31,692		4,602	11,244	15,846	-15,846
24	2025	11,517	1,109	11,826	1,798	5,462	27,770		4,602	11,244	15,846	-11,924
25	2026	11,517	1,109	7,884	1,798	5,462	19,886		4,602	11,244	15,846	-4,040
26	2027	0	1,109		1,798	5,462	8,368		4,602	11,244	15,846	7,478
27	2028	0	1,109		1,798	5,462	8,368		4,602	11,244	15,846	7,478
28	2029	17,276	1,109	11,826	1,798	5,462	37,470		4,602	11,244	15,846	-21,625
29	2030	11,517	1,109	7,884	1,798	5,462	27,770	35,320	4,602	11,244	51,166	23,396
30	2031		1,109		1,798	5,462	8,368	15,137	4,602	11,244	30,983	22,615
31	2032		1,109		1,798	5,462	8,368		4,602	11,244	15,846	7,478
32	2033		1,109		1,798	5,462	8,368		4,602	11,244	15,846	7,478
33	2034		1,109		1,798	5,462	8,368	35,320	4,602	11,244	51,166	42,798
34	2035		1,109		1,798	5,462	8,368	15,137	4,602	11,244	30,983	22,615
35	2036		1,109		1,798	5,462	8,368		4,602	11,244	15,846	7,478
36	2037		1,109		1,798	5,462	8,368		4,602	11,244	15,846	7,478
37	2038		1,109		1,798	5,462	8,368		4,602	11,244	15,846	7,478
38	2039		1,109		1,798	5,462	8,368		4,602	11,244	15,846	7,478
39	2040		1,109		1,798	5,462	8,368		4,602	11,244	15,846	7,478
40	2041		1,109		1,798	5,462	8,368		4,602	11,244	15,846	7,478
41	2042		1,109		1,798	5,462	8,368		4,602	11,244	15,846	7,478
42	2043		1,109		1,798	5,462	8,368		4,602	11,244	15,846	7,478
43	2044		1,109		1,798	5,462	8,368		4,602	11,244	15,846	7,478
44	2045		1,109		1,798	5,462	8,368	35,320	4,602	11,244	51,166	42,798
45	2046		1,109		1,798	5,462	8,368	15,137	4,602	11,244	30,983	22,615
46	2047		1,109		1,798	5,462	8,368		4,602	11,244	15,846	7,478
47	2048		1,109		1,798	5,462	8,368		4,602	11,244	15,846	7,478
48	2049		1,109		1,798	5,462	8,368	35,320	4,602	11,244	51,166	42,798
49	2050		1,109		1,798	5,462	8,368	15,137	4,602	11,244	30,983	22,615
50	2051		1,109		1,798	5,462	8,368	-80,731	4,602	11,244	-64,885	-73,254
TOTAL		157,297	53,684	78,840	86,282	262,187	638,290	322,930	220,883	539,721	1,083,534	445,244
[NPV i=12%]							122,564				137,640	15,076

Discount rate 12%

B-C

15,076

B/C

1.12

IRR

16%

Table 14-4 Construction Cost of the Project (at Financial Price)

(Unit: 1,000 US\$)

No.	Year	Civil LC+FC	Hydro/electro LC+FC	Total LC+FC
-4	1998	7,109	1,504	8,613
-3	1999	21,999	15,631	37,630
-2	2000	4,402	15,659	20,060
-1	2001	234	15,659	15,893
1	2002			
2	2003			
3	2004	1,031	23,488	24,519
4	2005	234	15,659	15,893
5	2006			
⋮				
21	2022			
22	2023		1,504	1,504
23	2024		15,631	15,631
24	2025		15,659	15,659
25	2026		15,659	15,659
26	2027			
27	2028			
28	2029			
29	2030		23,488	23,488
30	2031		15,659	15,659
⋮				
Total		35,009	175,198	210,207

Table 14-5 Average Tariff

Tariff	(A) Monthly Escalation	(B) Total Escalation (Sept.- Jan.)	(C) Average Tariff (Sept./92)	(D)=(B)x(C) Final Average Tariff (Jan./93)	(E) Energy Sold (Sept=Jan.)	(F)=(D)x(E) Income (Jan./93)
	(%)	(%)	(L/kWh)	(L/kWh)	(kWh)	(Lempiras)
A (Minimum)	0	0	0.1939	0.1939	964,400	186,997.16
A (21-60 kWh)	1.0	1.051	0.1887	0.1983	2,616,119	518,843.36
A (61-100 kWh)	1.0	1.051	0.2350	0.2470	3,211,275	793,144.34
A (101-300 kWh)	3.2	1.171	0.3095	0.3623	17,369,746	6,292,925.75
A (301-500 kWh)	3.0	1.159	0.3690	0.4278	9,239,246	3,952,291.97
A (501 kWh-)	0.6	1.030	0.4703	0.4846	15,041,246	7,288,676.86
B (monofasico)	1.5	1.077	0.5978	0.6440	13,325,303	8,581,500.16
B (trifasico)	1.5	1.077	0.5966	0.6427	34,622,042	22,251,850.79
C	1.5	1.077	0.4415	0.4756	14,593,128	6,940,796.49
Ch	1.0	1.051	0.4130	0.4341	25,686,509	11,149,669.77
D	2.5	1.131	0.6005	0.6794	11,910,242	8,091,945.04
Total				0.5118	148,579,256	76,048,641.74

Average Tariff as of January 1993: L 0.5118/kWh = 0.088 US\$/kWh

Table 14-6 Financial Benefit

(Unit: 1,000 US\$)

Year	Energy Demand* (GWh)	Total Income	Incremental Income			
			3%	4%	5%	6%
2002	3,184.7	280,254	8,408	11,210	14,013	16,815
2003	3,358.6	295,557	8,867	11,822	14,778	17,733
2004	3,541.6	311,661	9,350	12,466	15,583	18,700
2005	3,736.2	328,786	9,864	13,151	16,439	19,727
2006	3,941.2	346,826	10,405	13,873	17,341	20,810
2007	4,157.9	365,895	10,977	14,636	18,295	21,954
2008	4,386.6	386,021	11,581	15,441	19,301	23,161
2009	4,627.8	407,246	12,217	16,290	20,362	24,435
2010	4,882.3	429,642	12,889	17,186	21,482	25,779
f	f	f	f	f	f	f
2051	4,882.3	429,642	12,889	17,186	21,482	25,779

*) Note: Energy demand forecast by ENEC (low case), See Table 5-2.

Table 14-7 Financial Evaluation

(Unit: 1000US\$)

No	Year	C O S T			BENEFIT	B - C
		Invest	O & M	Total		
-4	1998	8,613		8,613		-8,613
-3	1999	37,630		37,630		-37,630
-2	2000	20,060		20,060		-20,060
-1	2001	15,893		15,893		-15,893
1	2002	0	2,002	2,002	14,013	12,011
2	2003	0	2,002	2,002	14,778	12,776
3	2004	24,519	2,002	26,520	15,583	-10,937
4	2005	15,893	2,002	17,894	16,439	-1,455
5	2006		2,495	2,495	17,341	14,846
6	2007		2,495	2,495	18,295	15,800
7	2008		2,495	2,495	19,301	16,806
8	2009		2,495	2,495	20,362	17,867
9	2010		2,495	2,495	21,482	18,987
10	2011		2,495	2,495	21,482	18,987
11	2012		2,495	2,495	21,482	18,987
12	2013		2,495	2,495	21,482	18,987
13	2014		2,495	2,495	21,482	18,987
14	2015		2,495	2,495	21,482	18,987
15	2016		2,495	2,495	21,482	18,987
16	2017		2,495	2,495	21,482	18,987
17	2018		2,495	2,495	21,482	18,987
18	2019		2,495	2,495	21,482	18,987
19	2020		2,495	2,495	21,482	18,987
20	2021		2,495	2,495	21,482	18,987
21	2022		2,495	2,495	21,482	18,987
22	2023	1,504	2,495	3,999	21,482	17,483
23	2024	15,631	2,495	18,126	21,482	3,356
24	2025	15,659	2,495	18,153	21,482	3,329
25	2026	15,659	2,495	18,153	21,482	3,329
26	2027	0	2,495	2,495	21,482	18,987
27	2028	0	2,495	2,495	21,482	18,987
28	2029	23,488	2,495	25,983	21,482	-4,501
29	2030	15,659	2,495	18,153	21,482	3,329
30	2031		2,495	2,495	21,482	18,987
31	2032		2,495	2,495	21,482	18,987
32	2033		2,495	2,495	21,482	18,987
33	2034		2,495	2,495	21,482	18,987
34	2035		2,495	2,495	21,482	18,987
35	2036		2,495	2,495	21,482	18,987
36	2037		2,495	2,495	21,482	18,987
37	2038		2,495	2,495	21,482	18,987
38	2039		2,495	2,495	21,482	18,987
39	2040		2,495	2,495	21,482	18,987
40	2041		2,495	2,495	21,482	18,987
41	2042		2,495	2,495	21,482	18,987
42	2043		2,495	2,495	21,482	18,987
43	2044		2,495	2,495	21,482	18,987
44	2045		2,495	2,495	21,482	18,987
45	2046		2,495	2,495	21,482	18,987
46	2047		2,495	2,495	21,482	18,987
47	2048		2,495	2,495	21,482	18,987
48	2049		2,495	2,495	21,482	18,987
49	2050		2,495	2,495	21,482	18,987
50	2051		2,495	2,495	21,482	18,987
Total		210,207	122,772	332,979	1,038,361	705,383

FIRR: 12.4%

Table 14-8 Fund Requirement and Repayment Schedule

(unit: 10³ US\$)

No.	Year	FUND REQUIREMENT			REPAYMENT			SCHEDULE		
		Foreign	Domestic	Total	Interest	Principal	Total	Balance	Interest	Principal
1	1998	6,340	2,249	8,589	(254)				(135)	
2	1999	29,960	7,721	37,681	(1,706)				(733)	
3	2000	17,803	2,411	20,214	(3,615)				(1,341)	
4	2001	14,917	1,155	16,072	(4,925)				(1,555)	
5	2002	0	0	0	5,522	4,764	10,286	64,256	9,907	4,704
6	2003	0	0	0	5,140	5,146	10,286	59,110	9,342	5,269
7	2004	22,845	1,938	24,783	(914)	5,557	10,286	53,553	(116)	5,901
8	2005	14917	1155	16,072	(2,424)	6,002	10,286	47,551	(302)	6,609
9	2006				4,284	9,089	15,914	76,224	7,580	7,579
10	2007				6,825	9,816	15,914	66,409	6,670	8,488
11	2008				6,098	10,601	15,914	55,808	5,652	9,507
12	2009				5,313	11,449	15,914	44,359	4,511	10,648
13	2010				4,465	12,365	15,914	31,994	3,238	11,925
14	2011				3,549	13,354	15,914	18,639	1,802	13,356
15	2012				2,559	4,136	5,628	14,503	200	348
16	2013				1,491	4,467	5,628	10,036	158	390
17	2014				1,160	4,825	5,628	5,211	111	436
18	2015				803	5,211	5,628	0	59	489
19	2016				417					
20	2017									
21	2018									
22	2019									
23	2020									
24	2021									
25	2022									
Total		106,782	16,629	123,411	66,133	106,782	159,137		70,118	85,649
										151,585

Note: Figures in parentheses are I.D.C.

Remarks: Repayment condition - Foreign currency: 8.0% annum

Local currency : 12.0% annum

Grace Period : 4 & 2 years (construction period)

Repayment method : 10 years with principal and interest in equal installment

Table 14-9 Profit and Loss Statement

(unit: 10³ US\$)

No.	Year	Operating Revenue (A)	Operating Expenses		Total (B)	Operating Income (C)=A-B	Financial Expenses*		Total* (D)	Net Income (E)=C-D
			O & M	Depreciation			F.C.	D.C.		
1	1988						254	135	389	
2	1989						1,706	733	2,439	
3	2000						3,616	1,341	4,957	
4	2001						4,925	1,555	6,480	
5	2002	14,013	1,943	2,242	4,185	9,828	5,522	9,907	15,428	-5,600
6	2003	14,778	1,943	2,242	4,185	10,593	5,140	9,342	14,483	-3,890
7	2004	15,583	1,943	2,242	4,185	0	914	116	1,030	-2,041
8	2005					0	4,729	8,710	13,439	
							2,424	302	2,726	
9	2006	16,439	1,943	2,242	4,185	12,254	4,284	8,002	12,286	-32
10	2007	17,341	2,434	3,796	6,230	11,111	6,825	7,580	14,405	-3,294
11	2008	18,295	2,434	3,796	6,230	12,065	6,098	6,670	12,768	-704
12	2009	19,301	2,434	3,796	6,230	13,071	5,313	5,652	10,964	2,106
13	2010	20,362	2,434	3,796	6,230	14,132	4,465	4,511	8,976	5,156
14	2011	21,482	2,434	3,796	6,230	15,252	3,549	3,233	6,782	8,470
15	2012	21,482	2,434	3,796	6,230	15,252	2,559	1,802	4,362	10,890
16	2013	21,482	2,434	3,796	6,230	15,252	1,491	200	1,691	13,561
17	2014	21,482	2,434	3,796	6,230	15,252	1,160	158	1,318	13,934
18	2015	21,482	2,434	3,796	6,230	15,252	803	111	914	14,338
19	2016	21,482	2,434	3,796	6,230	15,252	417	59	476	14,776
20	2017	21,482	2,434	3,796	6,230	15,252			0	15,252
21	2018	21,482	2,434	3,796	6,230	15,252			0	15,252
22	2019	21,482	2,434	3,796	6,230	15,252			0	15,252
23	2020	21,482	2,434	3,796	6,230	15,252			0	15,252
24	2021	21,482	2,434	3,796	6,230	15,252			0	15,252
25	2022	21,482	2,434	3,796	6,230	15,252			0	15,252
Total		415,378	49,150	73,503	122,653	292,725	66,193	70,118	136,311	174,434

*Note: Figures in parentheses are I.D.C.

Remarks: Operating revenue : GWh x 0.0924US\$/kWh (see Table 14-6)

Operation and Maintenance: see 14.2.2

Depreciation: construction cost including I.D.C.

Table 14-10 Cash Flow Sheet

(unit: 10³ US\$)

No.	Year	C a s h I n f l o w				C a s h O u t f l o w				B a l a n c e			
		Fund Re- quirement	Net Income	Depreci- ation	Total (A)	Construc- tion cost	Principal Repayment		I.D.C.	Total (B)	Yearly (A)-(B)	Accumu- lation	
							F.C.	D.C.					Subtotal
1	1995	8,589	0	0	8,589	8,589	0	0	0	389	8,978	-389	-389
2	1996	37,681	0	0	37,681	37,681	0	0	0	2,439	40,120	-2,439	-2,827
3	1997	20,214	0	0	20,214	20,214	0	0	0	4,957	25,171	-4,957	-7,784
4	1998	16,072	0	0	16,072	16,072	0	0	0	6,480	22,552	-6,480	-14,264
5	1999	0	-5,600	2,242	-3,358	0	4,764	4,704	9,469	0	9,469	-12,827	-27,092
6	2000	0	-3,890	2,242	-1,648	0	5,146	5,269	10,414	0	10,414	-12,062	-39,154
7	2001	24,783	0	0	24,783	24,783	0	0	0	1,030	25,813	-1,030	-40,184
8	2002	16,072	-2,041	2,242	201	0	5,557	5,901	11,458	0	11,458	-11,257	-51,441
			0	0	16,072	16,072	0	0	0	2,726	18,798	-2,726	-54,167
9	2003	0	-32	2,242	2,210	0	6,002	6,609	12,611	0	12,611	-10,401	-64,568
10	2004	0	-3,294	3,796	502	0	9,089	7,579	16,667	0	16,667	-16,165	-80,733
11	2005	0	-704	3,796	3,093	0	9,816	8,488	18,304	0	18,304	-15,211	-95,944
12	2006	0	2,106	3,796	5,903	0	10,601	9,507	20,108	0	20,108	-14,205	-110,150
13	2007	0	5,156	3,796	8,952	0	11,449	10,648	22,097	0	22,097	-13,144	-123,294
14	2008	0	8,470	3,796	12,266	0	12,365	11,925	24,290	0	24,290	-12,024	-135,318
15	2009	0	10,890	3,796	14,686	0	13,354	13,356	26,710	0	26,710	-12,024	-147,342
16	2010	0	13,561	3,796	17,357	0	4,136	348	4,484	0	4,484	12,873	-134,469
17	2011	0	13,934	3,796	17,730	0	4,467	390	4,857	0	4,857	12,873	-121,596
18	2012	0	14,338	3,796	18,134	0	4,825	436	5,261	0	5,261	12,873	-108,723
19	2013	0	14,776	3,796	18,572	0	5,211	489	5,700	0	5,700	12,873	-95,850
20	2014		15,252	3,796	19,048							19,048	-76,802
21	2015		15,252	3,796	19,048							19,048	-57,754
22	2016		15,252	3,796	19,048							19,048	-38,706
23	2017		15,252	3,796	19,048							19,048	-19,658
24	2018		15,252	3,796	19,048							19,048	-610
25	2019		15,252	3,796	19,048							19,048	18,438
Total		123,411	174,434	73,503	371,348	123,411	106,782	85,649	192,431	18,021	333,853	19,048	37,486

Chapter 15 FURTHER INVESTIGATIONS

Chapter 15

FURTHER INVESTIGATIONS

Contents

	<u>Page</u>
15.1 Further Investigations	15 - 1

Chapter 15 FURTHER INVESTIGATIONS

15.1 Further Investigations

This project will be implemented after 2002, however, preparation works for construction shall be started in 1996 assuming that it takes approx. 2.5 years for detail design etc. prior to start of construction works and approx. 3.5 years for construction.

Meteorological, hydrological and geological investigations are stated as items of future works.

(1) Meteorology and Hydrology

It is recommended that telemetering system be attached to meteorological and hydrological gauging stations and that statistical analysis and arrangement of observed data be continued as before.

(2) Geology

Amplified powerhouse is to be constructed adjacent to the existing powerhouse, so additional boring is not necessary.

Test boring will be necessary to confirm geological characteristics of each structure to every detail.

Geological investigation records shall be kept in custody not to be scattered and lost because they are important data for the future construction work.

Water leakage around the dam body shall be watched and observed from now on.

