

表 3.4 ソンドウ川流域における流出率

Basin ST. No. CA.	Sondou River 1JG1 3260 km ²				Yurith River 1JD3 1570 km ²				Kipsonoi River 1JF8 (1JF1) 1540 (1523) km ²			
	Runoff (m ³ /s)	Runoff (mm)	Rainfall (mm)	Coeff. (%)	Runoff (m ³ /s)	Runoff (mm)	Rainfall (mm)	Coeff. (%)	Runoff (m ³ /s)	Runoff (mm)	Rainfall (mm)	Coeff. (%)
Year												
1947	60.7	587	1816	32%			2125			1507		
1948	19.6	190	1412	13%			1667			1221		
1949	15.4	149	1260	12%			1449			1119		
1950	21.1	204	1394	15%			1672			1185		
1951	51.1	494	1863	27%			2034			1655		
1952	48.1	465	1455	32%			1687			1281		
1953	7.5	73	1210	6%			1382		3.0	62	1080	6%
1954	26.1	252	1442	18%			1637		8.8	182	1285	14%
1955	25.3	245	1497	16%			1649				1388	
1956	48.1	465	1571	30%			1864				1377	
1957	44.2	428	1474	29%			1546		19.5	404	1301	31%
1958	25.2	244	1446	17%			1536		7.1	147	1302	11%
1959	24.4	236	1398	17%			1600		6.1	126	1172	11%
1960	38.1	369	1554	24%			1701		9.1	188	1317	14%
1961	58.3	564	1832	31%			2063		14.8	306	1568	20%
1962	66.2	640	1677	38%			2039				1460	
1963	64.3	622	1685	37%			1853				1494	
1964	60.6	586	1486	39%			1750				1286	
1965	22.0	213	1206	18%			1369				1015	
1966	36.6	354	1408	25%			1575				1250	
1967	36.6	354	1517	23%			1779				1319	
1968	66.3	641	1780	36%			1852				1647	
1969	24.9	241	1202	20%			1241				1118	
1970	60.7	587	1805	33%	39.4	788	1972	40%			1616	
1971	39.4	381	1434	27%	30.5	610	1584	39%			1323	
1972	30.6	296	1373	22%			1596				1239	
1973	37.1	359	1411	25%	27.4	548	1547	35%			1281	
1974	44.0	426	1478	29%			1715				1240	
1975	44.6	431	1521	28%	34.4	688	1715	40%			1391	
1976	26.5	256	1248	21%	21.2	424	1444	29%			1052	
1977	70.2	679	1808	38%	44.5	890	1945	46%			1668	
1978	79.5	769	1892	41%	53.0	1061	2088	51%			1634	
1979	47.0	455	1519	30%			1608				1435	
1980	24.7	239	1296	18%			1387				1179	
1981	47.3	458	1582	29%			1732				1325	
1982	50.8	491	1745	28%			1904				1532	
1983	43.7	423	1582	27%			1731				1441	
1984	17.0	164	1152	14%	11.7	234	1250	19%			892	
1985	47.2	457	1521	30%	25.0	500	1597	31%			1383	
1986	21.0	203	1287	16%	14.1	282	1372	21%	5.6	115	1239	9%
1987	36.4	352	1420	25%			1600		11.8	242	1337	18%
1988	62.2	602	1803	33%	34.0	680	2136	32%	16.5	338	1641	21%
Sample	42	42	42	42	11	11	42	11	10	10	42	10
Mean	41.0	396	1511	26%	30.5	610	1690	36%	10.2	211	1338	16%
Min.	7.5	73	1152	6%	11.7	234	1241	19%	3.0	62	892	7%
Max.	79.5	769	1892	41%	53.0	1061	2136	50%	19.5	404	1668	24%

表 3.5 マグワグワ貯水池における年平均堆砂量

Year	At the 1JG1 Station			Sediment Inflow into Magwagwa Reservoir (1000m3)	Annual Denundate Rate (mm/year)
	Average Discharge (m3/s)	Accum. Sediment Volume (1000m3)	Daily Max Sediment Inflow (1000m3)		
1946	40.69	312.66	-	298.50	0.094
1947	60.71	1082.20	46.58	1033.20	0.327
1948	19.60	181.52	3.31	173.30	0.055
1949	15.36	126.45	2.52	120.72	0.038
1950	21.13	183.41	2.52	175.10	0.055
1951	51.08	725.05	17.67	692.23	0.219
1952	48.10	702.69	18.63	670.88	0.212
1953	7.46	34.28	0.35	32.73	0.010
1954	26.08	268.16	4.54	256.02	0.081
1955	25.27	262.21	4.37	250.34	0.079
1956	48.15	573.30	6.63	547.34	0.173
1957	44.24	615.85	14.18	587.97	0.186
1958	25.19	236.42	7.07	225.72	0.071
1959	24.37	220.14	3.63	210.17	0.067
1960	38.09	413.64	4.68	394.92	0.125
1961	58.33	1148.09	32.24	1096.11	0.347
1962	66.25	985.65	23.61	941.03	0.298
1963	64.29	1138.78	24.59	1087.22	0.344
1964	60.63	972.19	47.80	928.18	0.294
1965	21.96	203.83	6.18	194.60	0.062
1966	36.60	425.29	10.74	406.04	0.128
1967	36.63	425.02	5.78	405.78	0.128
1968	66.25	1007.22	25.89	961.63	0.304
1969	24.90	214.54	7.65	204.82	0.065
1970	60.70	834.07	10.24	796.31	0.252
1971	39.44	483.35	7.57	461.47	0.146
1972	30.58	306.92	4.25	293.03	0.093
1973	37.14	386.72	6.59	369.21	0.117
1974	44.03	559.65	12.55	534.31	0.169
1975	44.61	585.33	9.02	558.83	0.177
1976	26.45	267.00	5.01	254.91	0.081
1977	70.20	1073.45	16.28	1024.85	0.324
1978	79.47	1298.23	33.67	1239.46	0.392
1979	47.04	557.50	6.35	532.26	0.168
1980	24.73	234.08	3.42	223.48	0.071
1981	47.27	638.85	18.02	609.93	0.193
1982	50.83	761.51	24.42	727.04	0.230
1983	43.72	512.79	8.46	489.58	0.155
1984	17.05	122.66	4.00	117.11	0.037
1985	47.18	610.40	8.74	582.77	0.184
1986	21.01	164.67	1.46	157.21	0.050
1987	36.41	431.61	11.37	412.07	0.130
1988	62.18	905.65	14.45	864.65	0.274
1989	50.73	631.52	-	602.93	0.191
1990	79.61	1232.01	-	1166.69	0.369
Average	42.04	556.81	-	531.39	0.168

Note : Estimated sediment volume includes the bedload which is assumed to be 20% of the suspended load.

表 3. 6 調査地域内の地質年代表

AGE	SYMBOL	DESCRIPTION
RECENT	Al	Superficial alluvium Sand, Graves, Silt, Clay
PLEINSTOCENE	Pl	Undifferentiated includes Lake deposits
	Plt	Mau and Londiani Ashes and Tuffs
	Plb	Londiani Matic Basalts and Basanites
TERTIARY	Tv	Tertiary volcanics Kericho phonolite and Nyabondo phonolite
PRE CAMBRIAN	B	(BUKOBAN SYSTEM)
	Ba	Rhyolites and tuffs, porphyritic felsites and Andesites
	Bq	Quartzites with some cherts
	Bb	Basalts and porphyritic basalts
PRE CAMBRIAN	Gn	Nyanzian roof pendant (Hornblende gneiss)
PRE CAMBRIAN	N	(NYANZIAN SYSTEM)
	NR	Rhyolite with intercalated tuffs (NRt and Agglomerates, Basalt,
	Na	Andesites, Dasites and Tuffs
ARCHEAN	M	(BASEMENT SYSTEM) Undifferentiated gneiss, schists and quartzites, includes MN-Nyanzian schists and MK-Kavirondian schists
	GD	INTRUSIVES Granites (G3-Post Kavirondian (G2-Post Nyanzian Miriu Granodiorite (G -Undated

表 3.7 予備的環境調査 (I E E) の結果

Environmental Item	Ecological Region			
	I Catchment	II Inundation	III Reduction	IV Fluctuation
A) Problems due to the Location				
1. Inundation of mineral resources	*	0	*	*
2. Repreciation of forestry	*	0	*	*
3. Historical remains/Assets	*	0	0	0
4. Watershed erosion	*	=	*	*
5. Navigation	*	0	0	0
6. Migrating valuable fish	*	0	0	0
7. Precious ecology	0	0	0	0
8. National park/game reserve	0	0	0	0
9. Disturbance of health facility use	-/B	*	0	0
B) Problems in Construction Stage				
1. Soil erosion	*	-/C	*	*
2. Water quality deterioration	*	*	-/C	=
3. Disturbance of transportation	-/C	-/C	*	*
4. Communicable diseases	0	-/C	0	0
C) Problems in Operation Stage				
1. Micro-climate change	*	=	*	*
2. Change of water temperature	*	*	-/C	-/C
3. Deterioration of water quality	*	0	-/C	-/C
4. Eutrophication	*	-/B	0	0
5. Precious ecology	0	=	=	=
6. Fishery	*	+/B	0	0
7. Downstream erosion	*	*	=	=
8. Aggradation of in riverbed	*	=	*	*
9. Water use conflict	*	*	=	0
10. Vector borne diseases	*	-/A	-/B	0
11. Recreation	*	+/C	=	=

Note:

- (1) 1 : Upper side is the expected effect, and lower side is its magnitude.
- (2) * : No relation considered.
 0 : No effect expected.
 + : Positive effect expected.
 - : Negative effect expected.
 = : Neutral effect expected, i.e. there may be a change but such change will be neither beneficial nor harmful.
- (3) A : Effect which has relatively high level of magnitude,
 B : Effect which has relatively medium level of magnitude,
 C : Effect which has relatively low level of magnitude.
- (4) The following items are to be examined in the Social Environmental Study of the Project.
 - Resettlement, Cultural tribes, Loss of community, Compensation, Land use, and Land value.

表 3. 8 貯水池内の社会・経済概況

Socio-cultural aspects

- Almost all of them belong to two ethnic groups: the Gusii and the Kipsigis,
- Population density is high, especially in the Nyamira side,
- The young and children occupy the largest share in the population,
- The literacy and education level among the household heads is not high,
- Majority of families appears to be nuclear, but polygamous ones still prevail,
- Kinship systems still play an important role in the ordinary life,
- The women's group is the largest socio-economic organization,
- They have little experience in out-migration and living with in-migrants, and
- Almost all of them prefer " land for land " approach in compensation.

Economic aspect

- Majority of them depends on land as either farmers, especially mixed farmers, or agricultural labourers ,
- Earnings from non-agricultural sectors are important as first or secondary income sources,
- The imbalance in income distribution appears larger in the Kericho than in the Nyamira,
- Most of them do not seem to afford to spend for those other than requirements for their daily lives,
- Majority of them does not have debt and has not accustomed to borrow money from formal institutions,
- They have elaborated a sophisticated production system of high productivity and diversity with traditional skills well suited to the specific environment and agro-ecological conditions,
- Land is getting diminished and fragmented,
- Most of all the households sustain self-sufficiency of food,
- Livestock rearing brings a variety of benefits to the farmers, and
- Commercial activities centred around the trading centres are in a small-scale, but provide essential requirements including employment opportunities for their ordinary lives.

表 3. 9 地域内の雇用構造

(Unit: %)

Main Activity	Kericho		Nyamira		All	
	Total Pop	Work Group	Total Pop	Work Group	Total Pop	Work Group
Mixed farmers	25.1	(63.7)	20.4	(57.3)	23.7	(61.9)
Crop farmers	3.5	(8.9)	2.3	(6.5)	3.1	(8.1)
Livestock farmers	0	(0)	0	(0)	0	(0)
Self employed in household business	2.4	(6.1)	2.0	(5.6)	2.3	(6.0)
Employed in household business	0.7	(1.8)	0.9	(2.5)	0.8	(2.1)
Wage employment	6.5	(16.5)	8.4	(23.6)	7.1	(18.5)
Unemployed	0.8	(2.0)	1.2	(3.4)	0.9	(2.4)
Sick/disabled	0.4	(1.0)	0.4	(1.1)	0.4	(1.0)
(Total)		(100.0)		(100.0)		(100.0)
Schooling	38.6		44.1		40.3	
Young Children	21.9		20.3		21.4	
Not Stated	0.1		0		0.1	
Total	100.0		100.0		100.0	
(N=	3,324		1,448		4,772)	

表 3.10 社会・経済影響調査の初期スクリーニング

Major Causes	Major Impacts	Number of People Affected	Intensity of Impacts	Difficulty of Prevention/Alleviation
I. Pre-construction Stage				
1. Land Acquisition	<ul style="list-style-type: none"> Displacement of people Loss of land 	<p>+</p> <p>?</p>	<p>++</p> <p>++</p>	<p>++</p> <p>++</p>
II. Construction Stage				
1. Influx of Labours	<ul style="list-style-type: none"> Social frictions Occurrence of diseases 	? (++)	++	+
(To be assessed in Natural Environmental Study)				
2. Generation of Job Opportunities	<ul style="list-style-type: none"> Improving living standards Influence on farming 	<p>? (++)</p> <p>?</p>	<p>+</p> <p>+</p>	<p>-</p> <p>++</p>
3. Increase in Traffic Volume	<ul style="list-style-type: none"> Disturbance of transportation 	? (++)	+	+
4. Reduction of Flow Downstream	<ul style="list-style-type: none"> Influence on water use 			
(To be assessed in Natural Environmental Study)				
III. Impounding of the Reservoir				
1. Displacement of the People	<ul style="list-style-type: none"> Decrease in living standards Damages on social aspects 	<p>++</p> <p>++</p>	<p>++</p> <p>++</p>	<p>++</p> <p>++</p>
2. Inundation of Land & Structures				
2.1 Roads	<ul style="list-style-type: none"> Disturbance to socio-economic activities 	? (++)	++	+
2.2 Trading Centres	<ul style="list-style-type: none"> - do - 	? (++)	++	++
2.3 Public Facilities	<ul style="list-style-type: none"> - do - 	? (++)	++	+
2.4 Cultural/Historical Sites	<ul style="list-style-type: none"> Spiritual damages on people 	?	++	? (++)
2.5 Lands	<ul style="list-style-type: none"> Rise in land value Shortage of agricultural products 	<p>?</p> <p>? (+)</p>	<p>++</p> <p>+</p>	<p>++</p> <p>+</p>
IV. Operation Stage				
1. Provision of Water Supply	<ul style="list-style-type: none"> Improving living standards 	? (++)	++	-
2. Provision of Electricity	<ul style="list-style-type: none"> - do - 	? (++)	?	-
3. Generation of Job Opportunities	<ul style="list-style-type: none"> - do - 	? (+)	++	-
4. Possibility of Fishery	<ul style="list-style-type: none"> - do - 	? (+)	?	-

Note: ++ = Significant, + = Not significant, - = No need to consider, ? = Unknown
Signs in parentheses stand for inference.

表 3.11 土地収用費の概略算定

1. Estimate of Land Use in Reservoir Area		2. Land within Reservoir Area		
Land Use Type	Area (km ²)	Nyamira Side	Kenicho Side	Total
Total*	26	1) Land Area (km ²) 7.8	18.2	26
River*	1.18	2) River Area (km ²) 0.2	1	1.2
Swamp*	0.66	3) 1) - 2) (km ²) 7.6	17.2	24.8
Scrub*	2.44	Average Land Value (Kshs./acre) 30000	35000	-
Forest*	1.72	Average Land Value (Kshs./ha) 74130	86485	-
Sub-total	6.00	Land Value (Kshs.1000) 56339	148754	205093
Transport network/ 3%**	0.8	3. Land outside Reservoir Area*		
Homestead land/ Hedges		Nyamira Side	Kenicho Side	Total
Arable/pasture land 100%	19.2	Land Area (km ²) 3.1	7.1	10.2
Arable land 56%***	10.8	Average Land Value (Kshs./acre) 30000	35000	-
Cash crops [36%**]	3.9	Average Land Value (Kshs./ha) 74130	86485	-
Staple crops [54%**]	5.8	Land Value (Kshs.1000) 22980	61404	84385
Vegetables [4%**]	0.4	* Excluding severely or injurily affected land		
Others [6%**]	0.6	As average size of each household's land is 5 ha, total land of affected households amounts to some 3,500 ha. The balance between that and reservoir area excluding river is 10.2 km ² .		
Pasture land 42%***	8.1	4. Houses*		
Other (waste land) 2%***	0.4	Nyamira Side	Kenicho Side	Total
		Average Value (Kshs./household) 8130	6940	-
		Number of Households Affected (Reservoir + Other Structures) 430	320	-
		Total value (Kshs.1000) 3496	2221	5717
		* Excluding those which live outside the reservoir, but are forced to move		
		5. Perennial Trees		
		Area (km ²)*	Value (Shs./acre)	Total Value (Kshs.1000)
		Tea 7.5	125000	233100
		* Assuming tea planted in all land for cash crops		
		6. Standing crops		
		Total Value* (Kshs.1000)		23773
		* Estimate from Field Survey		
		7. Total		
		a. Total of 2 through 6 (Kshs.1000)		552068
		b. Compensation for disturbance (15% of 7) (Kshs. 1000)		82810
		9. Total (a + b) (Kshs. 1000)		634878

Notes:

* Obtained from Map (1:5000)

** Based on Integrated Land Use Survey, 1983

*** Based on Household Survey for the Project

表 3.12 現金補償による影響

Negative impacts on the displaced people

The most serious case for the displaced people is that they fail to regain their bases for livelihood even if provided with large amount of money. This failure may partly be attributable to their use of cash not for investment, but for consumption. More often than not, however, most of them cannot obtain their alternative socio-economic bases such as land, employment, communities etc., due to the hardship of living conditions surrounding them.

They often find it difficult to obtain, on an individual basis, the land in the same size and productivity as that of previous one, especially in the vicinity of the reservoir because of rise in land value induced by the projects, and more essentially less availability of such land resulting from high population pressure on land. Those who look for employment in non-agricultural sectors most likely fail to get prospective one since they usually have no requirement of skills and knowledges and often a few employment opportunities.

For social aspects, the evacuees would lose chances to resettle themselves in group without finding land enough to absorb them. The resettlement on an individual basis would negatively affect their efforts to reconstruct their livelihoods, in particular if they have relied on social networks and on their own culture. "Cash for land" approach cannot take into account evacuees' invisible property including the above aspects.

Negative impacts on the Project

The affected people know better than not to anticipate the hardship after the evacuation when provided with cash only. Therefore, "cash for land" approach sometimes brings about their resistance to move, resulting in delay in the schedule of projects and therefore cost over-run.

In the longer term, displaced people's failure to regain the bases for livelihood often results in their influx into urban centres in search for employment or their return to the vicinity of homeland inundated, where there are their relatives and social networks who can take care of them, to some extent. Increase in population density around the reservoir area cause environmental deterioration by accelerating reclamation, encroachment of forest areas, overgrazing etc. As a result, soil erosion, and hence sedimentation is accelerated, so that the economic life of dam is shortened as compared to the designed one.

表 3.13 強制移転における問題点

Preparation for Resettlement	Transfer (Uprooting) Period	Transitional Period	Self-sustenance (Re-rooting) Period
DISPLACED PEOPLE			
ECONOMIC ASPECTS			
<p>(1) Fear of losing property, jobs etc.</p> <p>(2) Uncertainty of establishing economic base</p> <p>(3) Suspicion whether the government accepts their claims</p> <p>(4) Existence of those who would be displaced, but without compensation</p>	<p>(1) Negative impacts on economic activities at home, in the case that they have to prepare living environment at resettlement sites by themselves: high "opportunity cost"</p> <p>(2) Existence of problems involved with the move: such as timing of move, underestimate of properties to be taken with the displaced people etc.</p>	<p>(1) No revenue due to preparation for establishing economic base (immaturity of crops, changes in occupations, etc.)</p> <p>(2) Burden of debts for housing, electricity, etc.</p> <p>(3) Insufficiency of land both quantitatively and qualitatively.</p> <p>(4) Existence of those who were displaced, but without compensation (landless, etc.)</p> <p>(5) Mismanagement/misuses of compensation grant</p> <p>(6) Constraints to economic activities due to insufficient economic structure</p> <p>(7) Government's failure to keep its promises</p> <p>(8) Delay of preparation in new sites</p> <p>(9) More hardship to low income households</p> <p>(10) Existence of those who had to leave from resettlement sites</p>	<p>(1) Insufficiency of land for "Second Generation"</p> <p>(2) Difficulty to live their lives on a self-help basis</p>
SOCIO-CULTURAL ASPECTS			
<p>(1) Sadness of their home land and holy places taking over from ancestors being submerged</p> <p>(2) Fear of destruction of communities</p> <p>(3) Uneasiness of beginning a new life</p> <p>(4) Existence of those who could not move to remote areas due to old age's preference, attachment to family, etc.</p>	<p>(1) Destruction of communities</p>	<p>(1) Difficulty of reconstructing viable communities (leadership, functions, necessity of non-farmers, etc.)</p> <p>(2) Frictions with host populations</p> <p>(3) Government's failure to keep its promises</p> <p>(4) Insufficiency of social infrastructure, including water supply, housing, etc.</p> <p>(5) Increase in stress for various reasons</p> <p>(6) Delay of preparation in new sites</p> <p>(7) Lack of experiences for adapting new environments</p>	
OTHERS RELATED TO DISPLACED PEOPLE			
<p>(1) More difficult situation to obtain land and increase in rent etc., due to rise in land value</p>	<p>(1) Difficulty of finding another job for those who lost their job due to inundation</p> <p>(2) Decrease in labours</p> <p>(3) Destruction of communities</p> <p>(4) Delay of reconstructing lost facilities</p>	<p>(1) Host population's frictions with settlers</p> <p>(2) Host populations' tendency to treat resettlers as unfairly privileged</p>	

表 3.14 可能移転地の予備的調査

Criteria Areas investigated	(1) Displaced people's preference	(2) Vicinity of the reservoir areas	(3) Land conditions	(4) Similarity of agro-ecological zone	(5) Availability of non-farm employment opportunities	(6) Social affinity	(7) Availability of water sources and accessibility	(8) Land ownership	(9) Value of lands	(10) Side-effects of the resettlement	(11) Remarks
1. Settlement schemes in Kericho and Nyamira/Kisii districts	-	-	-	-	-	-	-	Government	-	-	No plans both in Kericho and Nyamira/Kisii districts.
2. Swamp/Marsh areas in Kericho and Nyamira/Kisii districts	?	Δ	X	○	?	○	○	County councils	?	Negative effects on those living around the areas	Soil and topographic conditions are not good.
3. Ngoina and other adjacent tea estates in Kericho and Nyamira districts	○	○	?	○	?	○	○	Private company (Party Govern- ment land)	?	Negative effects on some workers at estate	1,350 ha (Ngoina estate)
4. Simbauti farm in Nyamira district	○	Δ	?	○	?	○	?	A Co-operative union	?	?	The land appears earmarked for other use. 300 ha
5. Government land in Kericho district	?	Δ	?	○	?	○	?	Government	?	?	No investigation was carried out.
6. ADC farms in Trans Nzoia district	Δ	X	?	○	?	Δ	?	Government	?	Possible negative effects on some workers at farms	Some 35,000 ha

Notes : ○ = Excellent
 ○ = Good
 Δ = Fair
 X = Bad
 ? = Unknown
 - = No need to assess

表 4. 1 既設及び実施予定の発電計画 (1 / 2)

(A) EXISTING

(A-1) HYDROPOWER STATION

Name of STN.	River	No. of Unit	Year Installed	Type of Turbine	Station Capa. (MW)	Effect. Capa. (MW)	Ann. Prod. (GWh) in 1989/90
Tana (KPC)	Maragua & Tana	3	1932/52	Francis	14.4	12.4	94.0
Wanjii (KPC)	Maragua	4	1952	Francis	7.4	7.4	55.0
Sagana Falls (KPLC)	Tana	3	1954/55/60	Francis	1.5	1.5	
Mesco (KPLC)	Maragua	1	1933	Francis	0.3	0.3	
Ndula (KPLC)	Thika	2	1925	Francis	2.0	2.0	21.0
Selby Falls (KPLC)	Sosiani	2	1952	Francis	0.4	0.4	
Gogo Falls (KPLC)	Kuja	2	1958	Francis	2.0	2.0	
Masinga (TARDA)	Tana	2	1981	Francis	40.0	40.0	124.0
Kamburu (TRDC)	Tana	3	1974/76	Francis	91.5	84.0	382.0
Gitaru (TRDC)	Tana	2	1978	Francis	145.0	145.0	762.0
Kindaruma (TRDC)	Tana	2	1968	Francis	44.0	44.0	216.0
Kiambere (TRDA)	Tana	2	1988	Francis	144.0	140.0	863.0
Imported from UGANDA						(30.0)	(174.0)
Total Existing Power Station (including Imports)					492.50	479.00 (509.00)	2,517.0 (2,691.0)

(A-2) THERMAL POWER STATION

Name of STN.	River	No. of Unit	Year Installed	Type of Turbine	Station Capa. (MW)	Effect. Capa. (MW)	Ann. Prod. (GWh) in 1989/90
Kipevu (Steam)	Coast	6	1956-1974	Steam	98.00	26.0	97.0
Kipevu	Coast	1	1972/87	Gas	30.00	30.0	10.0
Nairobi South	Nairobi	1	1973	Gas	17.90	13.8	0.0
Total Existing Thermal					145.90	69.8	107.0

(A-3) INTERCONNECTED DIESELS

Name of STN.	River	No. of Unit	Year Installed	Type of Turbine	Station Capa. (MW)	Effect. Capa. (MW)	Ann. Prod. (GWh) in 1989/90
Ruri		2	1948/49	Diesel	3.00		
Mbaraki		2	1947/49	Diesel	1.70	8.0	2.0
Nairobi South	Nairobi	8	1954-57	Diesel	13.58		
Total Existing Diesel Power Station					18.28	8.0	2.0

(A-4) GEOTHERMAL POWER STATION

Name of STN.	River	No. of Unit	Year Installed	Type of Turbine	Station Capa. (MW)	Effect. Capa. (MW)	Ann. Prod. (GWh) in 1989/90
Olkaria Nairobi		3	1981-85		45.00	43.00	336.00
Total Existing Geothermal Power Station					45.00	43.00	336.00

表 4.1 既設及び実施予定の発電計画 (2 / 2)

(A-5) ISOLATED POWER STATION

Name of STN.	River	No. of Unit	Year Installed	Type of Turbine	Station Capa. (MW)	Effect. Capa. (MW)	Ann. Prod. (GWh) in 1989/90
Wajii	Central	3	1982	Diesel	0.640	0.280	
Mandera	N. East	3	1979-84	Diesel	0.340	0.3335	
Garissa	N. East	4	1972-82	Diesel	0.904	0.775	
Lodwar	N. Rift	3	1976-81	Diesel	0.380	0.245	12.0
Moyale	East	2	1986	Diesel	0.400	0.198	
Marsabit	East	3	1978-84	Diesel	0.340	0.330	
Lamu	Coast	4	1977-84	Diesel	0.934	0.720	
Total Existing Isolated Power Station					3.938	2.882	12.0

(B) PLANTS UNDER CONSTRUCTION OR HAVING BEEN STUDIED (PREFEASIBILITY)

Name of STN.	River	No. of Unit	Year Installed	Type of Turbine	Station Capa. (MW)	Effect. Capa. (MW)	Ann. Prod. (GWh) in 1989/90
Turkwel (const.)	Western	2	1991	Hydro	107.00	107.00	309.0 *1
Sondu/Miriu (F/S)	Western			Hydro	49.00	49.00	261.0 *2
Magwagwa (F/S)	Western			Hydro	95.00	73.00	438.0 *2
Mutonga	Tana			Hydro	60.00	60.00	234.0 *2
Low Grand Falls	Tana			Hydro	120.00	88.00	482.0 *2
High Grand Falls	Tana			Hydro	180.00	141.00	802.00
N.E. Olkaria	Rift Valley			Geo	60.00	60.00	
Total					671.00		

Sources : KPLC Annual Report of the year ended 30th June, 1990, Kenya National Power Development Plan 1986-2006 of ACRES and Table 4.6 of this report.

Note : (1) Annual Production of the period of July 1878 to June 1990 from KPLC Annual Report
 (2) *1 : Page 3-90 of Acres Report
 *2 : Table 5.1 of Acres Report

表 4. 2 変電器容量及び総設備容量

(A) EXISTING

Station & Voltage	AS AT 31ST DECEMBER (MVA)								AS AT 30th JUNE (MVA)		
	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
(A-1) Generation Step-up Station											
11/220kV	-	-	-	-	-	-	-	-	-	170.0	170.0
11/132kV	331.0	331.0	397.0	397.0	397.0	397.0	417.0	417.0	417.0	417.0	417.0
11/66kV	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0
11/33kV	137.0	137.0	137.0	137.0	137.0	137.0	137.0	137.0	178.0	217.0	217.0
11/40kV	5.0	-	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
3.3/11/40kV	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0
3.3/33kV	2.3	2.3	2.3	2.3	3.0	3.0	4.0	4.0	4.0	4.0	4.0
3.3/40kV	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
132/220kV	-	-	-	-	270.0	540.0	540.0	540.0	540.0	540.0	540.0
Total	521.3	517.3	583.3	583.3	854.0	1124.0	1145.0	1145.0	1186.0	1395.0	1395.0
(Average Annual Growth Rate: 11.01%)											

(A-2) Distribution Substation

220/132kV	-	-	-	-	180.0	580.0	580.0	580.0	580.0	580.0	580.0
132/66kV	195.0	195.0	195.0	195.0	195.0	195.0	195.0	195.0	210.0	210.0	270.0
132/33kV	180.0	180.0	180.0	180.0	239.0	239.0	285.0	285.0	285.0	285.0	308.0
66/11kV	323.0	323.0	323.0	323.0	323.0	346.0	369.0	369.0	369.0	395.0	441.0
66/40kV	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0
40/11kV	15.5	15.5	15.5	15.5	15.5	16.0	16.0	16.0	16.0	19.0	19.0
33/11kV	223.0	237.0	262.0	270.0	286.0	294.0	302.0	325.0	333.0	358.0	356.0
Total	951.5	965.5	990.5	998.5	1253.5	1684.5	1761.5	1784.5	1807.0	1861.5	1989.0
(Average Annual Growth Rate: 8.07%)											

(A-3) Distribution Transformer

11kV/415V & 33kV/415V	649.0	726.0	789.0	871.0	931.0	1005.0	1056.0	1092.0	1173.0	1300.0	1376.0
(Average Annual Growth Rate: 8.23%)											

(B) UNDER CONSTRUCTION

Turkwel Project: Generation Step-up Station at Turkwel
Step-down at Lessos Substations

11/231kV, 2 units of 59MVA
220/132kV, 2 units of 75MVA

Source : Information from KPLC

表 4.3 既存送電系統

(A) Transmission lines

(EXISTING)

Region	As of:	220kV.1cct	132kV.1cct	132kV.2cct	66kV.1cct	40kV.1cct	33kV (km)			
		(km)	(km)	(km)	(km)	(km)	1 cct	2-wire	SWER	U.G
Nairobi	Dec.1976	-	-	582.96	215.80	107.78	17.99	-	72.92	-
	Dec. 1983	300.00	-	584.65	250.58	113.28	151.12	-	75.22	-
	Jun. 1988	302.00	-	589.85	254.18	113.28	229.05	0.82	75.22	-
Rift Valley	Dec.1976	-	-	-	-	-	302.49	0.47	-	-
	Dec. 1983	-	-	-	-	-	566.24	1.74	-	-
	Jun. 1988	-	-	-	-	-	624.35	11.54	-	-
Western	Dec. 1976	-	-	-	-	-	533.96	-	-	-
	Dec. 1983	-	-	157.26	-	-	888.25	1.16	-	-
	Jun. 1988	-	-	157.26	-	8.00	1147.65	9.31	-	-
Coast	Dec. 1976	-	-	-	-	-	226.15	8.58	-	0.57
	Dec. 1983	128.00	-	78.04	-	-	379.29	9.67	-	1.26
	Jun. 1988	128.00	-	78.40	-	-	486.06	9.67	-	1.40
Mt. Kenya	Dec.1976	-	-	-	-	-	235.83	-	-	-
	Dec. 1983	-	-	137.60	-	-	281.25	-	-	-
	Jun. 1988	-	-	137.60	-	-	358.07	2.95	-	-
K.P.C.	Dec. 1976	-	405.23	-	134.89	-	-	-	-	-
	Dec. 1983	-	405.23	23.11	134.89	-	-	-	-	-
	Jun. 1988	-	405.23	23.11	134.89	-	-	-	-	-
TRDC	Dec.1976	101.88	-	16.84	-	-	-	-	-	-
	Dec. 1983	216.96	7.70	18.38	-	-	-	-	-	-
	Jun. 1988	216.96	7.70	18.38	-	-	-	-	-	-
Whole System	Dec. 1976	101.88	405.23	599.80	350.69	107.78	1316.42	10.15	72.92	0.57
	Dec. 1977	101.88	405.23	600.93	365.79	107.78	1354.52	10.80	72.92	0.76
	Dec. 1978	209.65	412.93	603.03	365.79	107.78	1417.62	10.95	72.92	0.76
	Dec. 1979	209.66	412.93	603.03	365.79	107.78	1444.08	22.09	72.92	0.76
	Dec. 1980	216.96	412.93	608.83	367.27	113.28	1723.25	11.20	72.92	1.26
	Dec. 1981	216.96	412.93	608.83	367.27	113.28	1954.57	11.20	75.22	1.26
	Dec. 1982	216.96	412.93	661.03	367.27	113.28	2128.27	11.20	75.22	1.26
	Dec. 1983	644.96	412.93	681.43	385.47	113.28	2366.15	12.57	75.22	1.26
	Dec. 1984	644.96	412.93	681.43	385.47	113.28	2284.17	12.57	75.22	1.26
	Dec. 1985	-	n.a	n.a	n.a	n.a	n.a	n.a	n.a	n.a
	Jun. 1986	644.96	412.93	681.43	386.90	113.28	2526.47	12.57	75.22	1.26
	Jun 1987	646.96	412.93	683.43	387.07	113.28	2606.20	32.87	75.22	1.26
	Jun.1988	646.96	412.93	686.63	389.07	121.28	2845.18	34.29	75.22	1.40
Average Annual Growth Rate over 11.5 years(%)			0.16	1.18	0.91	0.10	6.93	11.17	0.27	8.13

表 4. 4 既存配電系統

(B) Distribution lines
EXISTING

Region	As of:	11kV (km)							L.V. (km)		
		6-Wires	3-Wires	2-Wires	SWER	U.G. Cable	Arial Cable	Total	O.H.	U.G. Cable	Total
Nairobi	Dec. 1976	3.54	1901.16	133.25	66.70	114.92	0.16	2219.73	941.37	61.82	1003.19
	Dec. 1983	3.54	2424.52	165.29	49.40	138.73	1.89	2783.37	1213.29	156.80	1370.09
	Jun. 1988	3.54	2713.16	220.10	49.60	169.14	2.53	3158.12	1455.99	183.06	1639.05
Ann. Grow.(%)		0	3.14	4.46	-2.61	3.42	27.13	3.11	3.87	9.90	4.36
Rift Valley	Dec. 1976	0.15	484.42	29.95	-	4.48	-	519.00	149.70	2.80	152.50
	Dec. 1983	0.15	625.59	50.24	-	6.61	-	682.59	220.26	5.73	225.99
	Jun. 1988	0.15	733.39	68.88	-	7.91	-	810.33	369.34	6.40	375.74
Ann. Grow.(%)		0	3.67	7.51	-	5.07	-	3.95	8.17	7.45	8.16
Western	Dec. 1976	-	859.27	51.79	-	2.76	-	913.82	287.09	7.49	294.58
	Dec. 1983	-	1091.64	66.29	-	6.09	-	1164.02	399.91	26.71	426.62
	Jun. 1988	-	1187.79	134.15	-	7.30	-	1329.24	683.19	39.54	722.73
Ann. Grow.(%)		0	2.86	8.63	-	8.83	-	3.31	7.83	15.57	8.12
Coast	Dec. 1976	4.04	382.66	53.81	-	30.83	0.43	471.77	329.06	6.38	335.44
	Dec. 1983	4.04	496.78	48.98	-	42.75	0.43	592.98	400.45	12.05	412.50
	Jun. 1988	4.04	535.88	65.54	-	49.06	0.70	655.22	466.59	15.54	482.13
Ann. Grow. (%)		0	2.97	1.73	-	4.12	4.33	2.90	3.08	8.05	3.20
Mt. Kenya & KPC	Dec. 1976	-	594.79	29.59	-	2.86	-	627.24	194.63	1.79	196.42
	Dec. 1983	-	1000.98	70.39	-	3.89	-	1075.26	357.01	15.76	372.77
	Jun. 1988	-	1110.99	112.30	-	4.86	-	1228.15	580.23	18.94	599.17
Ann. Grow. (%)		0	5.56	12.30	-	4.72	-	6.02	9.96	22.77	10.18
Whole Kenya	Dec. 1976	7.73	4222.30	298.39	66.70	155.85	0.59	4759.29	1901.85	80.28	1982.13
	Dec. 1977	7.73	4398.32	304.76	67.50	159.47	0.59	4938.68	1958.97	82.20	2041.17
	Dec. 1978	7.73	4531.49	317.12	74.35	164.38	0.59	5095.66	2007.63	85.97	2093.60
	Dec. 1979	7.73	4705.25	334.81	74.35	168.97	0.59	5291.17	2091.40	98.73	2190.13
	Dec. 1980	7.73	4849.07	358.26	74.35	172.83	1.34	5463.58	2160.09	103.73	2263.82
	Dec. 1981	7.73	5096.22	367.76	49.40	183.33	1.59	5706.03	2306.77	124.96	2431.05
	Dec. 1982	7.73	5388.18	391.98	49.40	188.06	1.59	6026.94	2451.79	128.40	2580.19
	Dec. 1983	7.73	5639.51	401.19	49.40	198.07	2.32	6298.22	2590.92	217.05	2807.97
	Dec. 1984	7.73	5794.06	423.45	49.40	217.38	2.73	6494.75	2756.48	229.09	2985.57
	Dec. 1985	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
	Jun. 1986	7.73	6047.01	489.69	49.60	228.91	3.23	6826.17	3268.76	246.31	3515.07
	Jun. 1987	7.73	6146.31	546.96	49.60	231.94	3.23	6985.77	3321.81	253.95	3575.76
Jun. 1988	7.73	6281.21	600.97	49.60	238.27	3.23	7181.01	3555.34	263.48	3818.82	
Ann. Grow. (%)		0	3.51	6.28	-2.61	3.76	15.84	3.64	5.59	10.89	5.87

表 4.5 総電力供給及びKPLC売電量

Source of Supply (GWh)	Average Growth Rate																				
	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	72-89	72-79	79-89
Hydro	376	383	526	634	563	785	1053	1288	1040	1362	1377	1458	1471	1660	1793	1892	2172	2254	11.11	19.23	5.76
Oil Thermal	256	302	229	242	376	317	252	205	333	283	260	114	174	83	144	207	96	14	-	-	-
Geothermal	-	-	-	-	-	-	-	-	-	260	114	174	83	144	207	96	14	-	-	-	-
Diesel	27	28	21	10	63	20	5	1	22	1	1	-	1	2	9	24	6	1	-	-	-
Gas Turbine	-	4	14	2	40	11	2	1	25	-	-	-	-	4	n.a.	n.a.	n.a.	n.a.	-	-	-
Net Imports	283	302	296	261	240	272	217	160	315	194	212	179	215	269	192	116	163	-	-	-	-
(ratio to total supply)	(30.4)	(29.6)	(27.2)	(22.6)	18.7	(19.4)	(14.2)	(9.7)	(18.2)	(10.3)	(10.9)	(8.9)	(10.3)	(9.3)	(10.8)	(10.1)	(4.3)	(5.9)	-	-	-
Uncounted)	-10	-7	1	7	0	0	0	0	0	0	0	0	0	0	n.a.	n.a.	n.a.	n.a.	-	-	-
Total Supply Generated	932	1021	1087	1156	1282	1405	1529	1655	1735	1879	1946	2013	2094	2300	2494	2674	2713	2748	6.60	8.50	5.20
Station Use	33	24	21	20	32	28	25	22	29	29	31	29	28	27	n.a.	n.a.	n.a.	n.a.	-	-	-
Net Generation	899	988	1066	1136	1250	1377	1504	1633	1706	1850	1915	1984	2066	2273	2494	2674	2713	2748	6.79	8.90	5.34
Growth in Net generation (%)	-	9.9	7.9	6.6	10.0	10.2	9.2	8.6	4.5	8.4	3.5	3.6	4.1	10.0	9.7	7.2	1.5	1.3	-	-	-
T & D Losses (GWh)	104	128	141	135	168	174	203	220	234	255	280	302	282	317	(122)	347	411	455	-	-	-
% of Net Generation	11.6	13.0	13.2	11.9	13.4	12.6	13.5	13.5	13.7	13.8	14.6	15.2	13.6	13.9	(5.1)	13.0	15.1	16.6	-	-	-
% of Sales	13.1	14.9	15.1	13.5	15.5	14.5	15.6	15.6	15.9	16.0	17.1	17.9	15.9	16.2	(12.2)	15.6	17.3	18.5	-	-	-
Total KPLC Sales (GWh)	795	860	925	1001	1082	1203	1301	1409	1468	1590	1631	1677	1775	1944	1035	2205	2332	(2412)	6.75	8.50	5.50
Interconnected KPLC System	-	-	-	-	-	-	-	-	-	1590	1629	1673	1771	1940	-	-	-	-	-	-	-
Isolated KPLC Load Centres	-	-	-	-	-	-	-	-	-	3	2	4	4	4	-	-	-	-	-	-	-
Total Ref Sales (GWh)	-	-	-	-	-	-	-	2	4	6	7	10	15	19	(10)	25	36	49	-	-	-
REF Sales from Interconnected System	-	-	-	-	-	-	-	5	6	5	6	9	13	16	-	-	-	-	-	-	-
REF Sales at Isolated Load Centres	-	-	-	-	-	-	-	1	1	1	1	1	2	3	-	-	-	-	-	-	-
Total Sales (GWh)	795	860	925	1001	1082	1203	1301	1411	1472	1599	1638	1687	1790	1963	(1045)	2230	2373	2461	6.87	8.50	5.71
Growth in Sales (%)	11.2	8.2	7.6	8.2	8.1	11.2	8.1	8.5	4.3	8.6	8.6	2.5	2.9	6.1	9.7	8.9	6.0	3.2	-	-	-
Max. Demand, Generated	146	161	171	184	207	223	256	269	290	313	317	334	349	387	418	430	461	480	7.50	9.10	6.00
Load Factor (%)	72.7	71.8	72.6	71.7	70.5	71.9	68.2	70.2	68.1	68.5	70.1	68.8	69.3	67.8	-	-	-	-	-	-	-

Sources: Acres Report, Appendix Vo. 1 Table B2.1 & KPLC Information.

Note: (1) Maximum demand (MW) is for integrated system only and includes station power use.

(2) Load factor is based on total supply generated for integrated system divided by maximum demand.

表 4.6 発電所ごとの発生エネルギー量 (1/8)

A. Hydro Power Plant

(A-1) WANJII (GWh)

Month	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
JAN	3.5	3.4	3.4	4.2	5.4	5.4	3.4	3.5	3.3	5.4	4.6	3.4
FEB	4.5	2.8	3.4	3.6	3.7	4.8	2.7	3.0	2.6	4.2	3.4	3.2
MAR	5.4	2.8	3.3	3.8	2.9	1.2	2.7	3.2	2.8	3.4	3.6	4.8
APR	4.2	2.5	4.0	2.8	4.5	1.0	2.8	3.3	3.0	4.6	3.5	5.1
MAY	4.9	2.5	4.7	3.5	5.2	0.7	2.7	3.3	3.2	5.3	3.5	5.4
JUN	4.9	2.3	4.6	3.9	5.2	2.7	2.4	2.6	3.3	5.1	5.0	4.7
JUL	2.6	2.7	4.7	3.2	5.5	3.2	2.6	2.7	3.4	5.3	5.3	5.3
AUG	1.5	2.7	4.3	2.8	5.5	3.9	2.5	3.5	4.9	3.5	5.4	4.0
SEP	2.7	2.5	3.7	5.0	5.2	2.6	2.3	3.3	4.1	3.1	5.2	5.2
OCT	3.0	2.7	3.7	4.9	5.4	2.0	3.4	3.4	4.1	3.0	5.5	4.9
NOV	3.1	1.5	4.1	4.4	5.0	1.9	3.3	3.3	4.9	3.2	5.2	3.3
DEC	3.3	3.4	4.2	5.5	5.3	2.3	3.4	3.5	5.0	3.8	4.0	0.0
Total	43.6	31.8	48.1	47.6	58.8	31.7	34.2	38.6	44.6	49.9	54.2	49.3

(A-2) KIAMBERE (GWh)

Month	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
JAN	-	-	-	-	-	-	-	-	-	-	2.96	66.36
FEB	-	-	-	-	-	-	-	-	-	-	15.23	60.89
MAR	-	-	-	-	-	-	-	-	-	-	56.64	68.31
APR	-	-	-	-	-	-	-	-	-	-	37.85	64.58
MAY	-	-	-	-	-	-	-	-	-	-	47.75	68.36
JUN	-	-	-	-	-	-	-	-	-	-	45.58	67.42
JUL	-	-	-	-	-	-	-	-	-	-	71.68	0
AUG	-	-	-	-	-	-	-	-	-	-	0	69.13
SEP	-	-	-	-	-	-	-	-	-	-	63.08	60.93
OCT	-	-	-	-	-	-	-	-	-	-	65.49	56.19
NOV	-	-	-	-	-	-	-	-	-	-	66.92	67.03
DEC	-	-	-	-	-	-	-	-	-	-	0	67.03
Total	-	-	-	-	-	-	-	-	-	-	473.18	716.23

(A-3) KAMBURU (GWh)

Month	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
JAN	44	27	26	29	25	27	29	28	33	37	37	35
FEB	34	23	19	28	24	26	28	27	29	36	36	31
MAR	43	25	13	26	25	29	29	32	30	39	28	30
APR	50	25	13	28	22	25	28	33	28	33	33	33
MAY	52	25	36	28	26	31	28	40	33	34	37	33
JUN	44	30	30	28	28	33	27	42	31	35	37	31
JUL	44	28	28	30	33	33	26	38	35	35	35	34
AUG	28	28	21	27	30	34	25	34	34	38	33	35
SEP	24	26	20	27	29	30	29	32	32	37	34	31
OCT	29	29	19	31	33	29	29	34	34	48	34	36
NOV	32	24	27	29	34	30	31	30	33	39	38	37
DEC	28	26	25	24	27	27	32	27	34	36	38	34
Total	452	316	277	335	336	354	341	397	386	447	420	400

(A-4) NDULA (MWh)

Month	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
JAN	421.2	326.7	199.9	1205.5	229.1	228.3	577.0	686.9	167.6	776.2	148.1	623.8
FEB	676.1	462.1	483.0	750.3	141.2	179.8	99.3	92.4	21.7	177.5	62.9	588.4
MAR	235.0	419.6	480.1	442.3	119.8	261.0	56.9	0	38.8	80.7	171.9	703.5
APR	240.3	413.5	720.2	0	233.7	180.4	114.4	0	368.1	406.6	418.6	606.8
MAY	266.0	449.1	426.9	0	240.5	214.2	66.6	0	517.6	655.8	539.3	370.9
JUN	229.5	302.3	441.5	0	249.8	252.1	22.0	0	273.0	608.8	90.4	648.2
JUL	330.0	498.4	894.6	118.2	246.8	282.1	28.3	234.2	607.8	640.8	540.4	731.0
AUG	305.6	517.0	1124.4	108.0	221.3	416.4	19.4	419.7	606.4	587.8	479.9	750.6
SEP	295.7	477.5	678.2	66.4	261.0	312.0	18.2	421.7	287.0	169.8	556.4	756.4
OCT	257.8	374.9	587.3	248.2	233.0	339.6	310.9	68.7	159.8	64.4	527.4	958.6
NOV	259.0	445.8	1164.4	228.1	257.5	482.0	1211.0	374.2	729.9	580.7	562.2	385.9
DEC	215.3	274.4	12908.0	261.5	437.5	351.1	1253.4	535.8	687.5	550.0	670.4	0
Total	3731.5	4961.3	20108.5	3428.5	2871.2	3499.0	3777.4	2833.6	4465.2	5298.9	4757.9	7124.1

表 4.6 発電所ごとの発生エネルギー量 (2/8)

(A-5) SELBY												(MWh)
Month	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
JAN	262.1	198.9	45.1	1.4	34.3	61.8	64.1	5.6	5.5	6.6	0	47.8
FEB	233.9	198.9	28.7	5.1	25.5	46.1	36.1	4.8	4.8	0.6	0	60.5
MAR	266.8	148.2	17.0	41.8	24.0	22.3	18.1	3.6	2.4	0	0	41.4
APR	254.6	147.1	121.0	245.1	12.9	0	11.6	65.7	6.1	17.5	0	43.8
MAY	209.2	147.7	238.0	127.9	65.8	50.1	10.3	96.1	65.8	61.0	0	50.7
JUN	166.5	141.2	241.3	59.3	58.4	51.4	0	66.0	55.6	83.6	0	82.2
JUL	257.4	143.3	240.0	56.6	61.7	56.9	0	55.7	98.0	96.1	0	55.9
AUG	249.6	142.7	193.6	35.7	62.5	68.9	0	59.2	90.0	97.6	0	110.7
SEP	239.8	167.2	168.4	104.4	63.1	65.9	0	82.9	86.1	40.1	0	86.7
OCT	240.6	86.3	74.9	114.4	99.0	53.6	0	44.5	38.4	1.7	0	64.7
NOV	225.4	165.7	66.2	111.0	39.4	67.8	14.2	41.9	20.9	30.3	0	0
DEC	228.8	0	0	78.3	40.2	51.8	9.8	6.9	12.7	19.1	0	0
Total	2834.7	1687.2	1434.2	981.0	586.8	596.6	164.2	532.9	486.3	454.4	0	644.4

(A-6) MESCO												(GWh)
Month	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
JAN	0.12	0.13	0.13	0.23	0.12	0.12	0.11	0.24	0.04	0.24	0.26	0.23
FEB	0.15	0.12	0.23	0.22	0.11	0.09	0.09	0.13	0.19	0.23	0.22	0.21
MAR	0.09	0.13	0.24	0.22	0.12	0.13	0.10	0.22	0.23	0.24	0.24	0.23
APR	0.10	0.11	0.16	0.10	0.11	0.12	0.09	0.20	0.20	0.22	0.22	0.24
MAY	0.10	0.12	0.13	0.11	0.10	0.13	0.10	0.20	0.20	0.24	0.22	0.25
JUN	0.11	0.12	0.13	0.13	0.13	0.13	0.15	0.09	0.08	0.22	0.23	0.23
JUL	0.12	0.02	0.19	0.14	0.12	0.13	0.21	0.10	0.17	0.24	0.25	0.25
AUG	0.12	0.00	0.23	0.11	0.03	0.15	0.20	0.08	0.22	0.24	0.23	0.25
SEP	0.04	0.00	0.22	0.13	0.13	0.13	0.19	0.22	0.22	0.25	0.21	0.18
OCT	0.12	0.00	0.22	0.13	0.12	0.12	0.22	0.01	0.24	0.25	0.11	0.22
NOV	0.13	0.13	0.23	0.13	0.13	0.13	0.22	0.00	0.23	0.25	0.23	0.22
DEC	0.11	0.12	0.23	0.10	0.12	0.12	0.24	0.00	0.24	0.27	0.25	0.22
Total	1.31	1.00	2.34	1.75	1.34	1.50	1.92	1.49	2.26	2.89	2.67	2.73

(A-7) MASINGA												(GWh)
Month	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
JAN	-	-	-	0.00	11.83	0.11	18.16	14.43	22.42	21.07	19.06	10.48
FEB	-	-	-	0.00	8.57	0.54	16.62	13.15	17.80	22.43	16.04	11.44
MAR	-	-	-	0.00	11.88	7.41	15.80	13.43	12.65	21.72	8.73	15.23
APR	-	-	-	0.00	5.65	10.17	9.74	6.15	13.68	15.65	6.33	7.00
MAY	-	-	-	0.00	2.92	0.34	17.38	13.21	9.48	7.54	6.73	4.67
JUN	-	-	-	0.00	0.17	0.98	16.63	9.12	9.28	11.92	7.73	3.52
JUL	-	-	-	5.74	0.48	0.74	14.27	11.66	11.54	24.16	4.80	6.12
AUG	-	-	-	9.36	0.04	2.11	13.07	17.36	20.34	18.80	11.48	11.47
SEP	-	-	-	12.72	3.84	10.28	12.70	17.20	19.43	19.29	5.76	14.51
OCT	-	-	-	8.24	3.35	14.30	7.74	14.09	18.20	20.48	7.63	13.36
NOV	-	-	-	7.86	1.10	8.94	11.48	12.13	13.16	14.40	11.32	10.04
DEC	-	-	-	14.60	0.15	14.28	12.18	19.46	16.34	17.93	9.98	
Total	-	-	-	58.52	49.98	70.20	165.74	161.39	184.32	215.39	117.59	107.84

(A-8) KINDARUMA												(GWh)
Month	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
JAN	22.1	16.3	13.6	14.0	12.4	17.3	14.2	14.8	16.1	15.7	19.2	20.0
FEB	16.1	17.3	9.4	12.4	11.8	13.3	13.9	13.1	14.5	12.0	17.9	14.8
MAR	22.6	17.6	5.3	13.4	13.0	15.4	16.0	16.2	16.8	14.3	15.4	15.9
APR	15.4	18.4	5.6	13.6	11.3	13.6	14.1	17.5	15.8	17.5	16.3	16.0
MAY	14.8	17.4	12.7	17.0	14.6	18.1	14.9	16.5	19.1	17.6	18.3	15.3
JUN	20.5	13.0	15.5	17.6	13.8	20.9	11.8	19.6	19.8	17.9	19.7	19.4
JUL	21.5	16.0	13.7	15.3	17.1	19.4	13.1	19.9	20.3	18.1	18.1	18.7
AUG	13.0	17.8	9.9	14.2	14.7	15.8	12.8	17.8	17.5	19.5	18.2	17.2
SEP	11.5	13.4	9.8	13.9	15.0	9.3	12.8	17.3	17.1	19.4	16.9	15.8
OCT	12.7	12.3	9.6	15.3	15.7	13.1	14.5	16.7	0.0	20.0	17.9	16.9
NOV	11.9	15.1	12.7	14.8	18.1	16.7	17.4	17.1	13.2	20.0	21.1	19.8
DEC	10.8	13.8	11.1	12.1	16.4	14.2	17.2	15.7	14.8	19.5	20.4	19.9
Total	192.9	188.4	128.9	173.6	173.9	187.1	172.7	202.2	185.0	211.5	219.4	211.7

表 4.6 発電所ごとの発生エネルギー量 (3/8)

(A-9) TANA (GWh)												
Month	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
JAN	8.8	8.5	0.0	8.9	7.1	6.3	5.5	7.2	6.3	6.5	7.4	4.3
FEB	8.3	4.5	0.0	6.3	6.3	4.9	3.2	6.2	4.1	5.5	4.8	4.0
MAR	10.6	8.6	0.0	7.2	5.0	3.9	2.6	6.4	4.5	5.7	6.1	6.4
APR	8.2	7.7	0.0	8.5	8.7	5.2	4.6	5.6	5.7	7.3	6.3	8.3
MAY	8.4	6.9	0.0	6.2	7.3	6.4	4.8	4.3	6.4	8.9	4.8	7.3
JUN	10.1	5.6	0.0	6.4	6.7	5.9	3.9	3.9	6.0	6.3	5.6	7.4
JUL	9.6	5.9	6.9	7.7	6.6	5.7	4.2	4.5	6.3	9.2	6.5	7.3
AUG	7.9	6.0	8.7	6.9	6.5	4.8	3.8	4.6	3.4	8.5	6.2	7.2
SEP	6.9	6.6	6.4	5.3	5.5	5.5	3.7	5.2	5.0	6.3	7.6	6.8
OCT	7.2	8.7	6.9	6.9	5.8	5.6	7.2	6.4	6.0	5.8	7.7	7.6
NOV	7.7	5.6	9.4	6.9	6.0	5.4	7.6	6.4	7.5	8.3	5.9	8.1
DEC	8.1	2.9	9.7	5.7	4.1	5.3	7.6	6.8	6.9	8.7	5.4	8.5
Total	101.8	77.5	48.0	82.9	75.6	64.9	58.7	67.5	68.1	89.0	74.3	83.2

(A-10) GITARU (GWh)												
Month	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
JAN	0	52	53	56	51	54	57	59	65	72	74	67
FEB	0	51	38	52	47	55	57	52	58	70	67	59
MAR	0	36	23	52	52	61	64	66	66	75	57	58
APR	0	54	25	50	45	55	55	69	61	64	64	63
MAY	0	57	53	55	50	59	59	57	74	68	68	68
JUN	0	53	57	55	53	61	47	60	76	68	68	65
JUL	7	58	54	55	63	65	52	75	80	70	59	67
AUG	39	61	40	52	61	67	52	71	70	75	66	64
SEP	46	54	38	52	62	61	51	68	69	73	65	59
OCT	49	52	38	58	65	62	57	67	66	76	69	70
NOV	51	55	50	60	61	68	69	67	65	77	71	63
DEC	49	55	46	48	0	56	65	63	67	74	68	
Total	241	658	515	645	610	724	685	774	817	862	796	703

(A-11) SAGANA (GWh)												
Month	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
JAN	1.05	0.73	0.58	0.54	0.97	1.00	0.85	0.61	0.38	0.77	0.70	1.07
FEB	0.76	0.67	0.45	0.13	0.54	0.80	0.47	0.48	0.24	0.47	0.36	0.87
MAR	0.72	1.00	0.51	0.47	0.40	0.49	0.39	0.57	0.37	0.60	0.78	0.64
APR	0.71	1.03	0.90	1.01	0.98	0.65	0.56	0.84	0.75	0.93	0.98	1.01
MAY	1.01	1.07	1.03	1.06	1.05	0.93	0.46	0.96	1.04	1.08	1.11	1.11
JUN	1.06	1.02	1.02	1.00	1.04	0.96	0.26	0.99	1.05	1.05	1.08	0.98
JUL	1.02	1.11	0.82	1.06	1.06	0.99	0.31	0.97	1.09	0.86	1.04	0.88
AUG	0.85	1.08	0.59	1.08	1.04	0.96	0.21	0.68	1.01	0.75	1.06	0.79
SEP	0.71	0.87	0.40	0.99	0.83	0.97	0.37	0.66	0.91	0.41	1.04	0.94
OCT	0.76	1.00	0.51	0.99	0.85	0.99	0.79	0.86	0.99	0.42	0.80	1.09
NOV	0.71	0.94	1.02	0.99	0.98	0.93	0.84	0.89	1.06	0.95	0.93	1.05
DEC	0.73	1.02	0.90	1.04	1.03	0.92	0.94	0.86	1.10	0.89	1.07	1.11
Total	10.09	11.54	8.73	10.36	10.77	10.59	6.45	9.37	10.39	9.19	10.95	11.54

(A-12) GOGO FALLS (GWh)												
Month	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
JAN	0.00	0.00	0.00	0.36	0.56	0.59	0.50	0.00	0.00	0.00	0.00	N.A
FEB	0.00	0.00	0.00	0.20	0.44	0.55	0.26	0.00	0.00	0.00	0.00	N.A
MAR	0.00	0.00	0.00	0.22	0.27	0.00	0.25	0.00	0.00	0.00	0.00	N.A
APR	0.00	0.00	0.00	0.34	0.00	0.54	0.26	0.23	0.00	0.00	0.00	N.A
MAY	0.00	0.00	0.00	0.41	1.08	1.00	0.28	0.31	0.00	0.00	0.00	N.A
JUN	0.00	0.00	0.00	0.44	0.77	1.02	0.27	0.30	0.00	0.00	0.00	N.A
JUL	0.00	0.00	0.00	0.52	1.01	0.88	0.27	0.36	0.00	0.02	0.00	N.A
AUG	0.00	0.00	0.07	0.00	0.77	0.72	0.27	0.34	0.00	0.83	0.00	N.A
SEP	0.00	0.00	0.45	0.51	0.94	0.62	0.25	0.00	0.00	0.00	0.00	N.A
OCT	0.00	0.00	0.84	0.00	0.88	0.57	0.29	0.00	0.00	0.00	0.00	N.A
NOV	0.00	0.00	0.77	0.00	0.79	0.55	0.29	0.00	0.00	0.00	0.00	N.A
DEC	0.00	0.00	0.67	0.00	0.00	0.60	0.27	0.00	0.00	0.00	0.00	N.A
Total	0.00	0.00	2.80	3.00	7.51	7.64	3.46	1.54	0.00	0.85	0.00	N.A

表 4.6 発電所ごとの発生エネルギー量 (4/8)

B. Thermal Power Plant

(B-1) KIPEVU(Steam)												(GWh)
Month	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
JAN	23.21	14.78	22.71	25.18	24.34	17.28	8.01	12.24	9.91	11.09	25.31	2.74
FEB	26.63	14.52	24.28	24.64	24.16	16.66	4.97	13.62	11.44	15.49	24.25	2.55
MAR	20.92	15.77	32.21	29.51	26.88	17.91	6.10	16.63	9.62	16.37	22.18	2.04
APR	22.06	14.89	36.66	25.18	24.46	17.00	6.45	2.41	15.06	7.85	3.83	1.52
MAY	22.55	16.53	17.37	25.29	25.07	10.57	9.80	2.91	7.86	17.75	4.76	0.86
JUN	22.32	19.15	17.63	22.99	24.53	2.64	24.98	1.12	6.15	15.01	4.60	4.35
JUL	25.35	18.54	22.14	20.98	21.28	3.49	29.28	0.66	6.59	16.87	5.16	4.11
AUG	18.91	17.30	33.53	22.19	19.87	3.23	28.05	0.58	8.11	18.73	1.47	
SEP	16.46	19.08	34.13	22.52	15.82	10.57	26.88	0.71	10.33	19.69	1.13	13.80
OCT	18.43	19.20	32.26	21.49	17.40	6.69	18.47	10.34	22.61	20.66	0.80	
NOV	17.03	16.65	28.71	22.67	13.64	4.46	9.26	13.45	25.23	24.51	1.38	
DEC	18.22	18.46	31.22	22.59	17.38	3.60	4.44	8.39	11.49	22.55	1.34	
Total	252.09	204.87	332.83	285.23	254.81	114.10	173.67	83.06	144.40	206.77	96.21	31.97

(B-2) KIPEVU(Gas)												(GWh)
Month	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
JAN												
FEB												
MAR												
APR												
MAY												
JUN												
JUL												
AUG												
SEP												
OCT												
NOV												
DEC												
Total												

(B-3) NAIROBI SOUTH(Gas)												(GWh)
Month	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
JAN												
FEB												
MAR												
APR												
MAY												
JUN												
JUL												
AUG												
SEP												
OCT												
NOV												
DEC												
Total												

表 4.6 発電所ごとの発生エネルギー量 (5 / 8)

C. Diesel Power Plant

(C-1) RUIRU : (Interconnected)												(MWh)
Month	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
JAN	8.4	4.6	486.8	2.0	18.8	0.5	1.5	68.7	90.1	10.2	46.0	22.5
FEB	322.4	4.6	1430.7	9.1	2.0	0.5	0.6	2.0	76.4	101.9	45.1	16.1
MAR	42.4	2.3	1049.2	2.0	7.5	0	1.5	19.0	46.5	165.4	2.3	4.5
APR	85.6	4.6	376.1	2.0	2.0	0	4.7	18.1	13.0	514.4	23.4	1.0
MAY	149.5	4.6	0	2.0	2.0	0.5	1.1	116.8	52.2	352.9	0.3	2.0
JUN	27.3	4.6	0	2.0	2.0	0.5	1.3	37.9	79.2	26.9	0.5	10.6
JUL	40.9	4.6	1.9	2.0	2.0	0.5	0.9	25.0	45.9	29.1	7.8	14.0
AUG	15.0	4.6	2.0	2.0	2.0	0.5	1.0	11.0	21.5	24.8	1.9	28.7
SEP	4.6	4.6	192.1	0	2.0	9.8	0	4.9	41.3	69.5	0.6	15.4
OCT	2.6	4.6	475.4	2.0	2.0	0.5	0	12.2	55.3	39.1	36.8	41.6
NOV	4.6	4.6	6.3	2.0	2.0	0.5	18.8	23.0	1.0	57.4	74.5	10.6
DEC	4.6	4.6	2.0	2.0	2.0	0.5	0	5.5	309.7	66.5	57.5	20.9
Total	707.9	52.9	4022.5	29.1	46.3	14.3	31.4	344.1	832.1	1458.1	296.7	187.9

(C-2) MBARAKI (Interconnected)												(MWh)
Month	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
JAN	26.9	34.1	15.5	0	52.4		0	68.5	22.2	62.7	30.9	61.7
FEB	52.5	0	18.2	3.5	0	1.8	0	3.7	28.9	0	24.6	13.2
MAR	24.3	21.4	0	1.6	4.5	2.6	0	23.0	26.1	45.8	1.3	12.7
APR	26.9	1.1	2.3	1.8	0	10.1	0	12.7	7.5	2.9	40.9	0
MAY	33.7	16.6	8.4	0.1	0	1.5	0	162.7	20.3	3.5	6.9	0
JUN	9.0	7.4	0	0	0	0	0.8	22.9	22.7	15.4	0.7	0
JUL	13.4	0	1.0	0	0	1.2	0.7	11.3	11.8	77.3	0	3.9
AUG	6.0	44.9	1.1	0	0.5	0	1.1	5.7	4.7	47.0	13.6	-
SEP	2.9	1.2	0	0.6	0	3.6	0	9.9	4.6	51.0	31.9	10.0
OCT	2.0	13.5	0	2.7	8.8	0	33.6	10.6	29.6	57.3	91.3	15.5
NOV	12.5	0	5.4	0.7	11.8	0	8.7	35.2	10.9	79.4	83.2	
DEC	1.1	39.2	5.9	28.0	0	0	4.8	2.7	20.5	62.1	87.7	10.4
Total	211.2	179.4	57.8	39.0	78.0	20.8	49.7	368.9	209.8	504.4	413.0	127.4

(C-3) NAIROBI SOUTH (Interconnected)												(GWh)
Month	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
JAN	0.20	0.15	1.28	0.00	0.16	0.00	0.00	0.80	0.86	0.91	1.67	0.26
FEB	0.71	0.02	7.92	0.06	0.01	0.00	0.00	0.04	1.40	1.41	1.32	0.04
MAR	0.48	0.01	11.92	0.01	0.02	0.00	0.00	0.10	0.52	1.53	0.84	0.01
APR	1.03	0.08	7.21	0.00	0.00	0.00	0.02	0.23	0.03		0.79	0.00
MAY	1.35	0.12	0.04	0.00	0.00	0.00	0.00	1.82	0.51	6.19	0.13	0.31
JUN	0.28	0.04	0.00	0.02	0.00	0.00	0.00	0.47	1.10	1.88	0.04	0.13
JUL	0.37	0.01	0.00	0.01	0.03	0.00	0.00	0.49	0.49	2.21	0.11	
AUG	0.11	0.03	0.00	0.00	0.00	0.00	0.00	0.22	0.11	1.31	0.04	0.35
SEP	0.02	0.84	2.90	0.00	0.01	0.05	0.00	0.07	0.24	1.45	0.11	0.08
OCT	0.02	0.05	7.14	0.01	0.01	0.00	1.05	0.16	1.00	0.88	0.13	
NOV	0.01	0.00	0.07	0.00	0.02	0.00	0.06	0.53	0.68	1.73	0.30	
DEC	0.01	0.09	0.08	0.00	0.00	0.00	0.10	0.29	0.73	2.23	0.10	
Total	4.59	1.44	36.56	0.11	0.26	0.05	1.23	5.22	7.67	21.73	5.58	1.18

表 4. 6 発電所ごとの発生エネルギー量 (6 / 8)

D. Geothermal Power Plant

(D-1) OLKARIA												(GWh)
Month	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
JAN	-	-	-	0.0	11.3	23.3	22.4	22.3	31.8	32.3	31.2	30.3
FEB	-	-	-	0.0	10.5	21.0	20.0	20.8	28.8	29.0	25.1	27.9
MAR	-	-	-	0.0	11.7	22.5	22.9	14.7	30.8	31.8	30.6	30.2
APR	-	-	-	0.0	11.3	22.1	22.3	17.3	30.2	30.3	29.4	27.0
MAY	-	-	-	0.0	11.6	22.4	23.2	33.4	27.7	31.4	29.0	29.9
JUN	-	-	-	0.0	10.4	22.6	22.2	33.0	31.4	30.4	29.3	28.5
JUL	-	-	-	7.0	1.3	18.4	22.5	33.2	32.3	25.9	27.1	30.0
AUG	-	-	-	0.0	0.0	20.3	19.7	33.0	31.1	27.4	23.0	0.0
SEP	-	-	-	5.1	4.1	22.4	22.0	32.1	30.2	26.6	25.5	27.3
OCT	-	-	-	0.0	0.0	22.7	22.8	33.1	31.3	31.4	21.6	27.6
NOV	-	-	-	4.8	2.8	21.4	5.2	30.9	31.6	30.5	22.2	28.0
DEC	-	-	-	11.1	21.3	23.2	7.2	32.1	32.1	31.7	29.1	29.2
Total	-	-	-	28.0	96.3	262.3	232.4	335.9	369.3	358.7	323.1	315.9

E. Imports from UEB

												(GWh)
Month	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
JAN	19.96	14.83	29.09	19.57	17.13	16.40	14.10	23.83	25.75	22.60	12.97	4.59
FEB	22.50	10.97	33.28	19.57	15.74	13.50	16.24	21.10	23.76	11.58	14.54	9.80
MAR	20.60	13.62	47.16	18.75	19.42	16.90	20.98	25.10	30.68	15.85	14.49	16.92
APR	21.20	6.28	43.37	20.31	19.04	12.60	18.20	22.60	24.60	14.05	13.09	14.09
MAY	23.60	9.91	19.19	15.09	17.84	15.00	20.85	14.17	13.07	15.24	9.13	12.94
JUN	19.43	10.52	16.59	15.15	16.63	14.20	21.07	11.91	11.19	16.75	8.28	13.24
JUL	23.72	10.88	0.00	15.68	18.04	17.20	12.90	16.48	21.70	17.07	8.76	14.01
AUG	21.62	9.94	47.62	16.56	17.86	18.20	25.96	18.60	21.90	16.13	9.64	11.91
SEP	17.44	15.35	44.50	15.36	17.87	15.77	16.84	19.00	27.68	19.39	10.04	14.10
OCT	13.66	20.47	43.82	17.55	19.13	12.94	22.20	20.30	25.80	21.22	8.23	13.19
NOV	11.31	19.23	28.29	9.72	17.16	12.10	24.77	19.30	19.58	13.46	3.64	18.62
DEC	11.20	18.54	18.38	14.51	16.42	13.70	26.30	18.80	22.94	8.49	3.33	19.74
Total	226.24	160.54	371.29	197.82	212.28	178.51	240.41	231.19	268.65	191.83	116.14	163.15

表 4.6 発電所ごとの発生エネルギー量 (7/8)

F. Isolated Diesel Power Plant

(F-1) WANJII												(MWh)
Month	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
JAN	0	0	0	0	0	9.3	29.3	65.5	85.6	95.6	117.1	113.7
FEB	0	0	0	0	0	12.5	28.2	65.1	76.0	89.1	110.4	106.9
MAR	0	0	0	0	0	20.0	31.1	78.6	83.9	105.2	116.9	120.4
APR	0	0	0	0	0	19.7	29.4	74.9	75.9	104.2	106.3	110.5
MAY	0	0	0	0	0	0	32.2	72.9	81.2	0	107.9	104.6
JUN	0	0	0	0	0	25.0	84.4	74.1	83.2	103.0	102.9	109.5
JUL	0	0	0	0	0	25.8	57.4	74.3	83.4	110.8		117.9
AUG	0	0	0	0	0	24.0	61.2	74.1	83.8	109.9	117.0	120.1
SEP	0	0	0	0	0.9	25.7	63.8	73.8	90.4	110.5	117.8	121.8
OCT	0	0	0	0	0.9	26.3	67.2	78.3	96.0	115.6	118.8	121.3
NOV	0	0	0	0	2.7	25.6	61.6	74.9	88.0	111.1	113.9	112.8
DEC	0	0	0	0	5.9	26.0	63.4	84.7	90.7	113.3	112.4	89.4
Total	0	0	0	0	10.4	239.9	579.2	891.2	1018.1	1168.3	1241.4	1348.9

(F-2) MANDERA												(MWh)
Month	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
JAN	0	0	11.7	13.4	17.1	19.4	26.0	30.0	74.4	86.1	111.0	113.7
FEB	0	0	11.4	12.8	15.7	19.5	24.8	25.7	69.2	72.4	102.2	109.8
MAR	0	0	12.9	13.4	16.5	22.7	25.8	29.7	73.1	0	103.9	110.7
APR	0	0	12.0	11.6	16.0	21.6	23.8	28.3	78.0	90.9	100.2	110.5
MAY	0	0	12.3	12.3	16.4	23.7	24.7	30.1	85.5	88.5	104.3	103.4
JUN	0	1.7	13.1	13.0	17.5	23.7	25.8	28.8	86.3	83.0	89.6	96.0
JUL	0	6.2	14.4	15.6	19.0	25.3	27.4	31.8	88.7	91.9	117.2	107.5
AUG	0	8.8	14.5	15.7	18.8	24.9	27.2	34.2	85.8	96.0	118.8	
SEP	0	10.6	12.3	14.9	18.5	23.8	22.5	33.6	93.0	99.9	118.9	118.5
OCT	0	10.8	13.2	16.3	16.2	24.6	32.3	33.7	92.8	104.8	121.9	121.8
NOV	0	10.9	12.5	15.7	17.1	24.2	29.0	62.7	88.9	106.4	116.1	114.8
DEC	0	10.6	12.5	16.5	17.7	24.3	30.4	71.6	91.7	109.8	114.7	
Total	0	59.0	152.8	171.2	206.5	277.7	326.7	440.2	1007.4	1029.7	1318.8	1106.7

(F-3) GARISSA												(MWh)
Month	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
JAN	67.5	66.5	89.4	96.5	114.5	107.0	145.0	151.2	186.3	188.4	265.6	270.0
FEB	64.0	63.0	82.5	85.2	104.7	109.7	148.4	146.9	180.1	186.6	293.8	259.2
MAR	66.9	76.8	87.7	95.8	115.5	127.5	159.9	163.6	208.3	220.5	282.5	283.1
APR	63.2	71.5	83.2	79.7	99.6	124.6	146.6	144.8	178.5	208.5	251.6	272.2
MAY	67.5	74.2	93.9	90.2	101.8	136.8	144.6	155.4	180.9	229.7	263.9	303.2
JUN	72.4	73.2	84.4	87.0	103.3	132.8	140.8	162.6	173.3	227.4	262.7	296.0
JUL	71.5	78.1	94.8	79.3	106.1	136.2	145.8	170.5	178.1	235.5	280.5	286.8
AUG	76.2	84.4	98.1	87.4	105.1	133.2	133.8	173.3	181.7	238.7	265.1	291.2
SEP	76.1	84.4	100.4	92.7	105.1	142.8	147.3	169.1	202.5	245.5	270.5	290.7
OCT	77.9	93.3	103.6	93.6	98.7	151.7	161.9	179.8	204.6	264.5	284.5	295.7
NOV	70.0	82.0	84.9	99.4	101.6	143.5	143.5	171.5	201.1	263.6	262.5	
DEC	70.1	81.6	89.9	100.7	104.6	139.7	139.3	170.7	179.6	261.7	258.8	
Total	843.3	929.0	1092.8	1087.5	1260.6	1585.5	1756.9	1959.4	2255.0	2770.6	3242.0	2848.1

(F-4) LODWAR												(MWh)
Month	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
JAN	12.6	11.9	17.3	17.0	26.2	36.3	37.8	54.9	79.6	81.7	87.9	95.3
FEB	11.4	11.4	16.8	17.1	25.0	35.3	39.5	48.9	71.2	77.7	86.5	90.6
MAR	11.6	13.1	18.5	22.2	29.2	37.8	41.6	58.8	74.4	96.3	95.7	104.3
APR	12.4	12.2	18.8	24.1	27.4	34.2	37.2	53.8	78.4	83.4	84.4	90.9
MAY	13.2	11.9	17.9	26.0	30.6	36.7	38.6	65.3	79.4	88.7	90.4	98.1
JUN	12.6	12.3	21.0	24.9	32.4	37.5	38.4	68.1	72.8	83.8		99.6
JUL	13.0	15.0	22.2	26.7	31.9	37.5	44.9	69.9	80.4	92.0	90.6	105.3
AUG	13.8	17.5	21.0	26.8	31.3	38.8	44.0	69.3	80.5	93.8	93.1	109.6
SEP	12.5	17.6	22.4	26.5	32.2	36.9	47.1	71.2	79.8	92.5	91.3	
OCT	14.1	18.5	22.5	28.9	34.6	34.6	51.9	77.4	88.0	95.7	86.5	
NOV	13.8	16.9	19.5	27.2	33.4	37.9	52.7	77.0	85.7	91.1	96.4	
DEC	12.1	16.8	17.3	25.5	0	38.0	51.5	75.0	71.8	86.1	91.4	
Total	153.1	175.1	233.2	292.9	334.2	441.5	525.2	789.6	942.0	1062.8	1004.2	793.7

表 4.6 発電所ごとの発生エネルギー量 (8/8)

(F-5) MOYALE											(MWh)	
Month	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
JAN	0	0	0	0	0	0	0	0	0	19.0		46.8
FEB	0	0	0	0	0	0	0	0	0	24.7		42.4
MAR	0	0	0	0	0	0	0	0	0	25.8		48.2
APR	0	0	0	0	0	0	0	0	0	25.6		46.3
MAY	0	0	0	0	0	0	0	0	0	28.5		46.9
JUN	0	0	0	0	0	0	0	0	14.5	28.1		51.1
JUL	0	0	0	0	0	0	0	0	8.6	31.0	43.3	59.8
AUG	0	0	0	0	0	0	0	0	10.9	32.5	48.3	61.6
SEP	0	0	0	0	0	0	0	0	12.4	34.0	51.3	57.0
OCT	0	0	0	0	0	0	0	0	13.8	38.4	49.6	64.5
NOV	0	0	0	0	0	0	0	0	17.7	36.1	48.7	
DEC	0	0	0	0	0	0	0	0	24.5	38.9	38.4	
Total	0	0	0	0	0	0	0	0	102.4	364.6	279.6	524.6

(F-6) MARSABIT											(MWh)	
Month	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
JAN	0	23.8	25.7	31.0	35.9	42.3	47.5	65.7	70.7	74.1	83.3	87.2
FEB	0	21.1	25.8	28.9	32.8	41.4	51.1	60.1	65.5	68.2	81.0	85.3
MAR	0	23.5	26.4	34.8	37.5	45.3	57.9	66.1	73.7	74.6	86.0	92.8
APR	0	22.9	25.8	32.9	38.0	41.8	56.3	68.3	72.6	73.3	85.2	90.9
MAY	0	24.0	26.1	34.3	38.9	42.7	0	72.7	78.6	78.3	84.9	102.2
JUN	0	23.0	27.5	32.8	37.5	44.0	57.3	72.2	78.0	79.1	87.2	90.5
JUL	0	24.5	29.9	32.6	41.4	49.3	60.3	77.4	78.2	79.3	89.9	96.1
AUG	0	25.5	28.3	31.9	39.0	48.3	63.5	69.8	77.8	82.6	81.1	107.2
SEP	0	24.6	29.6	33.6	39.0	45.5	62.1	67.3	77.1	79.5		89.0
OCT	0	27.3	31.5	37.3	43.8	48.1	67.3	71.9	83.3	83.3	82.9	113.3
NOV	0	26.7	33.5	35.9	42.9	47.6	69.2	73.7	84.3	80.5	91.2	103.3
DEC	0	25.8	30.9	37.2	43.8	48.2	63.7	74.2	79.9	76.8	100.2	101.5
Total	0	292.7	341.0	403.2	470.5	544.5	656.2	839.4	919.7	929.6	952.9	1159.3

(F-7) LAMU											(MWh)	
Month	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
JAN	76.8	81.2	94.8	110.6	120.7	0	138.4	142.8	161.8	179.2	182.3	205.6
FEB	74.2	69.9	91.8	109.3	105.5	117.3	128.2	131.0	147.4	167.0	178.9	196.1
MAR	82.5	77.5	96.4	114.5	119.9	132.1	139.3	129.9	164.3	188.5	196.1	223.7
APR	75.1	80.1	96.2	111.6	55.9	125.4	136.1	143.5	151.6	179.8	179.5	213.3
MAY	70.5	75.9	86.3	95.6	107.6	111.4	121.0	140.9	158.0	180.1	185.2	211.6
JUN	61.0	73.4	89.0	97.5	99.4	119.3	129.9	138.2	145.7	162.2	174.1	197.9
JUL	71.5	0	99.8	111.9	117.5	119.4	134.1	135.1	157.0	177.4	188.4	220.9
AUG	81.9	90.9	105.0	110.3	113.4	125.9	132.7	147.7	168.1	182.2	191.9	231.0
SEP	77.2	83.8	95.2	104.1	110.9	115.4	124.0	142.0	16.2	175.6	191.4	224.2
OCT	81.3	88.0	100.2	109.6	113.8	124.7	132.6	153.1	171.8	186.9	200.5	245.0
NOV	77.5	83.6	105.5	105.4	114.7	124.6	135.6	151.6	171.7	186.1	206.1	238.4
DEC	80.2	92.5	113.4	118.3	122.4	134.2	152.2	164.1	175.1	188.2	204.5	
Total	909.7	896.8	1173.6	1298.7	1301.7	1349.7	1606.1	1719.9	1788.7	2153.2	2276.9	2407.7

表 4.7 消費者別總電力供給及 K P I. C 電量

(MW/h)

Region and Tariff Category	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	(Jan-Jun) 1986	86/87	87/88	88/89
Nairobi Region																		
Group-1	168892	180504	192345	208052	217373	244314	252352	252533	261766	283498	292195	312274	331036	339585	184610	405029	488987	n.a
Group-2	230350	263694	287498	299620	333105	376693	406704	428309	466581	510796	514802	521546	550393	613912	322474	681828	719525	n.a
Group-3	106065	108162	107607	119388	115673	101627	106768	110007	99163	105650	101767	96562	103959	95536	47050	100754	94616	n.a
Subtotal	505307	552360	587450	627060	666151	722634	765824	790849	827510	899944	908764	930382	985388	1049033	554134	1187611	1303128	n.a
Coast Region																		
Group-1	41375	45290	50482	53428	52866	58465	64566	69312	72904	81557	80356	85726	88661	98541	n.a	112950	135251	n.a
Group-2	144352	148861	168649	179650	209879	238451	261680	270020	279373	304322	307778	309967	317821	337312	n.a	382643	405392	n.a
Group-3	4765	5063	4778	5051	4879	4444	4463	4537	4742	4504	4301	4378	4298	3848	n.a	3566	3135	n.a
Subtotal	190492	199214	223909	238192	267624	301360	331609	343869	357019	390383	392435	400071	410780	439710	n.a	499159	543778	n.a
Rift Valley Region																		
Group-1	14154	15042	15913	17700	18655	18700	21706	23515	25118	28337	33639	32338	33113	36423	n.a	37683	47241	n.a
Group-2	20361	22237	23853	27382	34905	43195	46242	44835	44929	48298	50730	50865	56094	62042	n.a	77699	87094	n.a
Group-3	3605	4595	4522	5827	5935	1387	1626	2475	1908	1912	2177	1866	2595	907	n.a	1931	1716	n.a
Subtotal	38320	41874	44288	50909	59495	63282	69574	70825	71955	78547	86546	85069	91802	99372	n.a	117313	136651	n.a
Western Region																		
Group-1	18399	19644	21772	25121	23924	28531	30772	36394	34427	36707	39577	40947	45196	50457	n.a	55656	75290	n.a
Group-2	38821	43165	43849	55925	61427	84244	99109	127399	133839	139304	151927	161277	171931	214926	n.a	247314	267394	n.a
Group-3	3508	3462	3763	4284	3855	3580	5679	3888	3680	3839	3742	3923	3267	3448	n.a	2977	2831	n.a
Subtotal	60728	66271	69384	85330	89206	116355	133560	167681	171946	179850	195246	206147	220394	268831	n.a	305947	345515	n.a
Mt. Kenya Region																		
Group-1								16941	18945	19170	20446	22541	24692	29139	n.a	31684	40735	n.a
Group-2								17507	19256	22822	25758	30407	39556	56033	n.a	61568	61647	n.a
Group-3								1712	1860	1886	2115	1873	2067	1885	n.a	1650	1980	n.a
Subtotal								36160	40061	43878	48319	54821	66315	87057	n.a	94902	104262	n.a
Total of whole Kenya in K.P.I.C. Power Grid																		
Group-1	242820	260480	280512	304301	312818	350010	370296	398695	413160	449269	466213	493826	522698	544145	(184610)	643002	788104	734(KM)
Group-2	434084	477957	523849	562577	639316	472583	813735	888070	943978	1025542	1050995	1074082	1135795	1284234	(322474)	1451052	1541052	1552(KM)
Group-3	117943	121282	120670	134550	130342	111038	116536	122619	113553	117791	114102	108602	116186	105624	(47050)	110878	104178	114(KM)
Grand Total	794847	859719	925031	1001428	1082476	1203631	1300567	1409384	1468491	1592601	1631310	1676490	1774679	1944003	(554134)	2204932	2433334	2401(KM)

included in sales of Nairobi Region

表 4.8 電力消費者数 (1 / 2)

	A0	A1	B0	B1	B2	B3	C1	C2	C3	D0	E0	F1-F9	TOTAL	
<u>NAIROBI AREA</u>														
As in Dec.	1980	60,273	-	-	601	19	1	40	22	4	717	18	857	62,552
	1981	64,226	-	-	660	17	0	43	25	5	778	16	864	66,634
	1982	68,183	-	-	715	19	0	44	28	5	899	16	897	70,806
	1983	72,476	-	115	641	16	0	42	31	5	991	17	935	75,296
	1984													
	1985	68,174	13,488	137	672	17	0	52	39	5	797	19	860	84,260
As in Jun.	1986	69,995	13,872	143	704	17	0	54	39	5	851	18	897	86,595
	1987	73,351	14,789	154	730	17	0	60	42	5	826	30	971	90,975
	1988	76,605	15,639	171	781	14	0	64	47	5	845	31	1,076	95,278
	1989	109,236	19,092	174	844	12	0	72	49	5	1,023	38	1,141	131,686
<u>COAST AREA</u>														
As in Dec.	1980	31,650	-	-	215	5	3	13	8	0	91	8	277	32,270
	1981	33,431	-	-	234	3	0	12	10	1	134	5	294	34,124
	1982	35,123	-	-	251	2	0	14	12	2	123	6	311	35,844
	1983	35,460	-	4	226	1	0	21	12	3	82	5	322	36,136
	1984													
	1985	32,100	5,944	3	239	1	0	29	13	3	53	4	357	38,746
As in Jun.	1986	32,372	6,203	4	271	1	0	28	13	3	54	3	358	39,310
	1987	33,280	6,581	3	277	1	0	30	13	3	46	3	399	40,636
	1988	34,701	6,977	2	270	4	0	42	15	3	51	4	407	42,476
	1989	36,563	7,571	4	278	3	0	42	15	3	54	4	421	44,958
<u>RIFI VALLEY AREA</u>														
As in Dec.	1980	9,318	-	-	109	0	0	6	1	0	50	24	56	9,564
	1981	9,903	-	-	108	0	0	7	1	0	52	24	80	10,175
	1982	10,550	-	-	120	0	0	8	1	0	53	24	92	10,848
	1983	11,040	-	22	106	0	0	8	1	0	54	23	88	11,342
	1984													
	1985	9,116	2,894	39	118	0	0	8	4	0	48	20	120	12,367
As in Jun.	1986	9,602	3,002	48	128	0	0	9	4	0	48	21	128	12,990
	1987	9,839	3,099	53	140	0	0	9	5	0	46	23	157	13,371
	1988	10,652	3,298	68	150	1	0	10	5	0	46	24	234	14,488
	1989	36,563	7,571	4	278	3	0	42	15	3	54	4	421	44,958
<u>WESTERN AREA</u>														
As in Dec.	1980	15,751	-	-	129	5	0	8	7	0	21	19	187	16,127
	1981	16,764	-	-	145	3	0	8	9	0	27	14	185	17,155
	1982	17,791	-	-	155	3	0	9	11	0	30	14	189	18,202
	1983	18,878	-	10	145	4	0	9	11	0	30	14	192	19,293
	1984													
	1985	15,319	5,233	9	176	5	0	8	10	1	25	12	217	21,015
As in Jun.	1986	15,637	5,402	9	178	4	0	10	12	1	20	10	232	21,515
	1987	16,490	5,786	9	190	4	0	11	13	1	26	10	267	22,807
	1988	17,180	6,092	11	177	3	0	24	16	1	18	11	287	23,820
	1989	18,484	6,592	11	182	7	0	30	15	1	19	11	300	25,662

表 4.8 電力消費者数 (2 / 2)

	A0	A1	B0	B1	B2	B3	C1	C2	C3	D0	E0	F1-F9	TOTAL
<u>HT. KENYA AREA</u>													
As in Dec. 1980	3,104	-	-	58	1	0	2	1	0	28	7	83	3,284
1981	8,800	-	-	62	1	0	2	1	0	24	7	84	8,981
1982	9,449	-	-	71	1	0	2	1	0	32	7	99	9,662
1983	10,188	-	3	74	1	0	2	1	0	37	7	117	10,430
1984													
1985	7,791	3,945	4	84	1	0	3	3	0	27	6	183	12,047
As in Jun. 1986	8,085	4,051	6	78	1	0	3	3	0	30	6	199	12,462
1987	8,775	4,350	8	84	0	0	2	4	0	25	7	213	13,468
1988	9,578	4,705	8	87	0	0	8	3	0	27	8	267	14,691
1989	10,617	5,414	12	97	0	0	12	3	0	29	9	295	16,488

TOTAL KPLC NUMBER OF CONSUMERS

As in Dec. 1980	120,096	-	-	1,112	30	4	69	39	4	907	76	1,460	123,797
1981	133,124	-	-	1,209	24	0	72	46	6	1,015	66	1,507	137,069
1982	141,096	-	-	1,312	25	0	77	53	7	1,137	67	1,588	145,362
1983	148,042	-	154	1,192	22	0	82	56	8	1,194	66	1,654	152,470
1984													
1985	132,500	31,504	192	1,289	24	0	100	69	9	950	61	1,737	168,435
As in Jun. 1986	135,691	32,530	210	1,359	23	0	104	71	9	1,003	58	1,814	172,872
1987	141,735	34,605	227	1,421	22	0	112	77	9	969	73	2,007	181,257
1988	148,716	36,711	260	1,465	22	0	148	86	9	987	78	2,271	190,753
1989	186,346	42,378	275	1,562	24	0	166	86	9	1,166	82	2,403	234,497

R.E.F. NUMBER OF CONSUMERS

As in Dec. 1980	1,426	-	-	7	0	0	0	0	0	0	0	1	1,434
1981	2,364	-	-	7	0	0	0	0	0	1	0	6	2,378
1982	3,122	-	-	8	0	0	0	0	0	0	0	9	3,139
1983	4,410	-	-	10	0	0	0	0	0	0	6	10	4,436
1984													
1985	3,730	2,288	0	23	0	0	0	0	0	1	6	21	6,072
As in Jun. 1986	4,018	2,559	0	22	0	0	0	0	0	2	6	24	6,631
1987	5,100	3,531	2	0	0	0	0	0	0	0	6	32	8,673
1988	6,518	4,850	3	38	0	0	0	1	0	0	6	43	11,459
1989	8,799	6,195	4	58	0	0	2	1	0	3	6	64	15,132

COUNTRY-WIDE (KPLC PLUS R.E.F.) NUMBER OF CONSUMERS

As in Dec. 1980	121,522	-	-	1,119	30	4	69	39	4	907	76	1,461	125,231
1981	135,488	-	-	1,216	24	0	72	46	6	1,016	66	1,513	139,447
1982	144,218	-	-	1,320	25	0	77	53	7	1,137	67	1,597	148,501
1983	152,452	-	154	1,202	22	0	82	56	8	1,194	72	1,664	156,906
1984													
1985	136,230	33,792	192	1,312	24	0	100	69	9	951	67	1,758	174,504
As in Jun. 1986	139,709	35,089	210	1,381	23	0	104	71	9	1,005	64	1,838	179,503
1987	146,835	38,136	229	1,421	22	0	112	77	9	969	79	2,039	189,928
1988	155,234	41,561	263	1,503	22	0	148	87	9	987	84	2,314	202,212
1989	195,145	48,573	279	1,620	24	0	168	87	9	1,169	88	2,467	249,629

表 4.9 地区別及び総電力需要予測 (中間成長)

REGIONAL LOAD FORECAST (MW)	YEAR											
	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
NARORI REGION												
Domestic Sales, (GWh)	489	511	529	554	572	600	629	659	676	702	707	707
Commerce & Industrial Sales, (GWh)	715	760	799	845	889	922	968	1015	1054	1117	1239	1298
Off Peak Sales, (GWh)	94	93	91	94	92	94	96	98	101	107	107	112
Total Energy Sales of KPLC, (GWh)	1301	1363	1423	1478	1509	1590	1660	1762	1859	1997	2181	2281
Growth Rate of Energy Sales, (%)	4.8	4.4	4.5	4.2	4.3	4.5	4.5	4.5	4.7	4.7	4.7	4.7
Regional Load Factor, (%)	60	60	60	60	60	60	60	60	60	60	60	60
Peak Load, (MW)	231	254	270	281	291	307	321	336	351	367	384	401
Growth Rate of Peak Load, (%)	12.3	4.4	4.5	4.2	4.3	4.5	4.5	4.5	4.6	4.5	4.7	4.7
COAST REGION												
Domestic Sales, (GWh)	1353	1424	1496	1568	1643	1723	1807	1898	1993	2093	2210	2311
Commerce & Industrial Sales, (GWh)	4054	4333	4572	4737	4914	5093	5284	5484	5694	5914	6133	6352
Off Peak Sales, (GWh)	31	37	37	37	37	38	39	40	41	42	43	43
Total Energy Sales of KPLC, (GWh)	5438	5794	6085	6342	6564	6804	7074	7358	7652	7957	8274	8604
Growth Rate of Energy Sales, (%)	6.6	6.4	5.5	5.9	4.1	4.1	4.1	4.1	4.2	4.2	4.2	4.2
Regional Load Factor, (%)	64	64	64	64	64	64	64	64	64	64	64	64
Peak Load, (MW)	307	354	389	419	449	479	509	539	569	599	629	659
Growth Rate of Peak Load, (%)	3.36	5.4	5.5	5.9	4.1	4.1	4.1	4.1	4.2	4.2	4.2	4.2
RIFT VALLEY REGION												
Domestic Sales, (GWh)	478	510	543	577	612	649	690	734	780	831	886	942
Commerce & Industrial Sales, (GWh)	873	960	1043	1136	1235	1329	1408	1485	1562	1639	1716	1793
Off Peak Sales, (GWh)	17	17	17	17	17	17	17	17	17	17	17	17
Total Energy Sales of KPLC, (GWh)	1367	1487	1603	1685	1785	1851	1943	2043	2143	2243	2343	2443
Growth Rate of Energy Sales, (%)	8.8	7.8	5.1	4.7	5.1	5.1	5.1	5.1	5.1	5.1	5.1	5.1
Regional Load Factor, (%)	50	50	50	50	50	50	50	50	50	50	50	50
Peak Load, (MW)	300	339	366	385	403	423	443	463	483	503	523	543
Growth Rate of Peak Load, (%)	13.2	7.8	3.1	4.7	4.9	5.0	5.1	5.1	5.1	5.1	5.1	5.1
WESTERN REGION												
Domestic Sales, (GWh)	753	803	858	911	968	1028	1094	1164	1239	1320	1407	1500
Commerce & Industrial Sales, (GWh)	2674	2864	3050	3209	3358	3508	3658	3808	3958	4108	4258	4408
Off Peak Sales, (GWh)	28	33	33	33	33	33	33	33	33	33	33	33
Total Energy Sales of KPLC, (GWh)	3455	3702	3941	4213	4504	4821	5165	5537	5937	6350	6783	7233
Growth Rate of Energy Sales, (%)	7.2	6.5	6.9	6.9	6.9	7.0	7.1	7.2	7.3	7.3	7.3	7.3
Regional Load Factor, (%)	52	52	52	52	52	52	52	52	52	52	52	52
Peak Load, (MW)	79	81	86	88	93	98	103	108	113	118	123	128
Growth Rate of Peak Load, (%)	2.9	6.5	6.9	6.9	6.9	7.0	7.1	7.2	7.3	7.3	7.3	7.3
MT. KENYA REGION												
Domestic Sales, (GWh)	407	442	478	516	554	597	645	696	752	812	880	951
Commerce & Industrial Sales, (GWh)	614	678	741	805	870	936	1004	1074	1146	1220	1296	1374
Off Peak Sales, (GWh)	19	19	19	19	19	19	19	19	19	19	19	19
Total Energy Sales of KPLC, (GWh)	1043	1099	1116	1134	1153	1173	1194	1216	1239	1263	1287	1312
Growth Rate of Energy Sales, (%)	0.3	7.6	8.7	8.7	8.7	8.7	8.7	8.7	8.7	8.7	8.7	8.7
Regional Load Factor, (%)	45	45	45	45	45	45	45	45	45	45	45	45
Peak Load, (MW)	22	24	26	28	30	33	36	40	43	47	51	55
Growth Rate of Peak Load, (%)	19.9	7.6	8.7	8.7	8.7	8.7	8.7	8.7	8.7	8.7	8.7	8.7
NATIONAL TOTAL												
Domestic Sales, (GWh)	781	8294	8705	9123	9548	10006	10493	11011	11559	12142	12765	13411
Commerce & Industrial Sales, (GWh)	13410	14334	15279	16239	17214	18204	19209	20229	21254	22294	23349	24419
Off Peak Sales, (GWh)	104	107	107	107	107	107	107	107	107	107	107	107
Total Energy Sales of KPLC, (GWh)	2034	23655	27004	30433	33953	37564	41273	45084	48995	52906	56817	60728
Growth Rate of Energy Sales, (%)	54	53	53	53	53	53	53	53	53	53	53	53
Regional Load Factor, (%)	54	54	54	54	54	54	54	54	54	54	54	54
Peak Load, (MW)	469	504	531	559	587	616	646	676	706	736	766	796
Growth Rate of Peak Load, (%)	11.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5
Network Losses, (GWh): 142.8												
Station Use Energy, (GWh): 1.4%												
Green Generation Requirement, (GWh):												

表 4.10 地区別及び総電力需要予測 (低成長)

REASON FOR FORECAST (LOW)	1971/8	1972/3	1973/4	1974/5	1975/6	1976/7	1977/8	1978/9	1979/0	2000/1	2010/2	2020/3	2030/4	2040/5	2050/6	2060/7	2070/8	2080/9	2090/0	2100/1	2110/2	2120/3	2130/4	2140/5				
	(Actual)																											
NABURI REGION																												
Domestic Sales, (QWh)	489.0	509.4	530.3	551.6	574.4	598.6	617.8	643.2	668.0	694.8	723.3	754.4	784.1	817.5	852.3	888.5	925.3	962.7	1,001.5	1,041.9	1,084.0	1,127.7	1,173.2	1,220.5	1,269.8	1,321.0	1,374.3	1,429.8
Commercial & Industrial Sales, (QWh)	719.5	727.1	723.3	699.8	669.9	642.8	620.8	604.6	594.2	588.8	594.8	601.4	608.6	616.4	624.8	633.7	643.1	652.9	663.2	673.9	685.1	696.8	709.0	721.7	734.9	748.6	762.8	777.5
Off-Peak Sales, (QWh)	94.6	92.1	91.4	91.4	91.9	92.8	94.2	96.2	98.2	101.0	103.3	106.0	109.1	112.1	115.6	119.7	124.5	129.9	135.9	142.6	149.9	157.8	166.2	175.1	184.5	194.4	204.8	215.7
Total Energy Sales of KPLC, (QWh)	1,303.1	1,326.5	1,314.8	1,278.1	1,238.1	1,207.3	1,184.3	1,168.9	1,159.3	1,154.8	1,155.8	1,159.4	1,165.4	1,173.1	1,182.4	1,193.3	1,204.8	1,217.9	1,231.6	1,246.1	1,261.4	1,277.4	1,294.1	1,311.4	1,329.4	1,348.2	1,367.8	1,388.1
Overhead Rate of Energy Sales, (%)	4.3	4.1	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	
Regional Load Factor, (%)	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0	80.0
Peak Load, (MW)	231.8	239.3	239.8	240.2	240.4	241.3	242.8	244.9	247.6	250.8	254.5	258.7	263.4	268.6	274.3	280.5	287.2	294.4	302.1	310.3	319.0	328.3	338.1	348.4	359.2	370.5	382.3	394.6
Growth Rate of Peak Load, (%)	11.9	4.1	4.2	3.6	3.8	3.8	3.9	3.9	3.9	3.9	4.0	4.0	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2	4.2
COAST REGION																												
Domestic Sales, (QWh)	135.3	147.2	162.2	176.6	191.6	198.9	189.8	205.1	215.1	225.3	236.6	248.6	261.3	274.2	287.8	301.6	316.0	331.2	347.0	363.6	381.1	399.3	418.4	438.5	459.5	481.5	504.5	
Commercial & Industrial Sales, (QWh)	485.4	491.9	494.0	470.1	443.8	424.5	414.8	406.8	400.8	395.5	390.6	386.1	382.0	378.3	374.9	371.6	368.4	365.4	362.4	359.4	356.4	353.4	350.4	347.4	344.4	341.4	338.4	
Off-Peak Sales, (QWh)	3.1	3.7	3.7	3.7	3.7	3.8	3.9	4.0	4.1	4.2	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	4.3	
Total Energy Sales of KPLC, (QWh)	503.8	517.8	520.9	507.9	489.7	473.9	458.1	443.6	430.3	418.6	408.5	399.4	391.1	383.8	377.4	371.3	365.4	360.0	355.0	350.0	345.0	340.0	335.0	330.0	325.0	320.0	315.0	
Overhead Rate of Energy Sales, (%)	6.5	5.0	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2	
Regional Load Factor, (%)	64.8	64.9	64.8	64.8	64.8	64.8	64.8	64.8	64.8	64.8	64.8	64.8	64.8	64.8	64.8	64.8	64.8	64.8	64.8	64.8	64.8	64.8	64.8	64.8	64.8	64.8	64.8	
Peak Load, (MW)	107.8	103.1	108.3	112.4	116.1	120.0	124.2	128.5	133.1	137.9	142.9	148.0	153.5	159.3	165.2	171.3	177.6	184.0	190.9	198.0	205.4	213.1	221.0	229.1	237.3	245.7		
Growth Rate of Peak Load, (%)	-3.7	5.0	3.8	3.3	3.4	3.5	3.6	3.7	3.8	3.7	3.7	3.6	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5		
RIFT VALLEY REGION																												
Domestic Sales, (QWh)	47.8	51.0	54.1	57.4	60.7	64.2	68.0	72.0	76.4	81.0	86.0	91.4	97.2	103.4	110.1	117.2	124.7	132.3	140.3	148.6	157.4	166.6	176.2	186.2	196.6	207.4	218.6	
Commercial & Industrial Sales, (QWh)	87.1	89.6	103.5	107.8	111.3	115.2	119.2	123.5	128.0	132.6	137.5	142.5	147.5	152.0	157.0	162.6	168.6	174.9	181.5	188.4	195.4	202.6	210.0	217.7	225.5	233.5	241.7	
Off-Peak Sales, (QWh)	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7		
Total Energy Sales of KPLC, (QWh)	136.7	144.3	159.3	165.9	172.7	181.1	189.9	197.2	206.0	215.4	225.4	236.4	248.4	261.4	275.4	290.4	306.4	323.4	341.4	360.4	380.4	401.4	423.4	446.4	470.4	495.4		
Overhead Rate of Energy Sales, (%)	8.6	7.4	7.4	7.4	7.4	7.4	7.4	7.4	7.4	7.4	7.4	7.4	7.4	7.4	7.4	7.4	7.4	7.4	7.4	7.4	7.4	7.4	7.4	7.4	7.4	7.4		
Regional Load Factor, (%)	39.0	39.0	39.0	39.0	39.0	39.0	39.0	39.0	39.0	39.0	39.0	39.0	39.0	39.0	39.0	39.0	39.0	39.0	39.0	39.0	39.0	39.0	39.0	39.0	39.0	39.0		
Peak Load, (MW)	30.0	33.9	36.4	38.1	39.7	41.3	43.1	45.0	47.0	49.2	51.4	53.7	56.3	59.0	61.8	64.7	67.8	71.0	74.3	77.5	81.1	84.8	88.8	93.0	97.4	102.0		
Growth Rate of Peak Load, (%)	12.9	7.4	4.7	4.1	4.3	4.3	4.3	4.4	4.5	4.5	4.5	4.6	4.6	4.7	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8		
WESTERN REGION																												
Domestic Sales, (QWh)	73.3	80.3	87.3	94.3	101.3	108.3	115.3	122.3	129.3	136.3	143.3	150.3	157.3	164.3	171.3	178.3	185.3	192.3	199.3	206.3	213.3	220.3	227.3	234.3	241.3	248.3		
Commercial & Industrial Sales, (QWh)	267.4	268.8	268.2	268.6	269.0	269.4	269.8	270.2	270.6	271.0	271.4	271.8	272.2	272.6	273.0	273.4	273.8	274.2	274.6	275.0	275.4	275.8	276.2	276.6	277.0	277.4		
Off-Peak Sales, (QWh)	3.8	3.5	3.3	3.4	3.5	3.6	3.7	3.8	3.9	4.0	4.1	4.2	4.3	4.4	4.5	4.6	4.7	4.8	4.9	5.0	5.1	5.2	5.3	5.4	5.5	5.6		
Total Energy Sales of KPLC, (QWh)	345.5	348.4	349.8	349.4	349.3	349.4	349.5	349.6	349.7	349.8	349.9	350.0	350.1	350.2	350.3	350.4	350.5	350.6	350.7	350.8	350.9	351.0	351.1	351.2	351.3	351.4		
Overhead Rate of Energy Sales, (%)	6.6	5.8	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7			
Regional Load Factor, (%)	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0			
Peak Load, (MW)	79.8	80.9	83.6	86.9	91.1	95.8	101.0	107.8	114.4	121.4	128.9	137.0	145.4	154.8	164.7	175.3	186.4	198.0	210.0	222.3	235.1	248.4	262.1	276.4	291.2			
Growth Rate of Peak Load, (%)	2.4	5.3	6.5	5.7	5.9	6.0	6.1	6.2	6.3	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4			
MT. KENYA REGION																												
Domestic Sales, (QWh)	40.7	44.1	47.5	51.1	54.7	58.7	63.0	67.8	72.9	78.6	84.6	91.2	98.5	106.4	115.2	124.5	134.5	145.0	156.2	168.2	181.2	195.3	210.3	226.4	243.0			
Commercial & Industrial Sales, (QWh)	61.6	57.4	60.9	64.2	71.5	77.5	84.0	91.3	99.2	107.8	117.3	127.5	138.0	149.0	160.5	172.5	185.0	198.0	211.5	225.5	240.0	255.0	270.5	287.5	305.0			
Off-Peak Sales, (QWh)	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.0	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1			
Total Energy Sales of KPLC, (QWh)	184.3	189.6	190.3	193.2	198.1	204.0	210.0	216.0	222.0	228.0	234.0	240.0	246.0	252.0	258.0	264.0	270.0	276.0	282.0	288.0	294.0	300.0	306.0	312.0	318.0			
Overhead Rate of Energy Sales, (%)	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8			
Regional Load Factor, (%)	45.0	45.0	45.0	45.0	45.0	45.0	45.0	45.0	45.0	45.0	45.0	45.0	45.0	45.0	45.0	45.0	45.0	45.0	45.0	45.0	45.0	45.0	45.0	45.0				
Peak Load, (MW)	23.8	24.3	24.9	25.5	26.1	26.7	27.3	27.9	28.5	29.1	29.7	30.3	30.9	31.5	32.1	32.7	33.3	33.9	34.5	35.1	35.7	36.3	36.9	37.5	38.1			
Growth Rate of Peak Load, (%)	19.3	6.6	6.1	7.5	7.8	7.9	8.0	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.2				
NATIONAL TOTAL																												
Domestic Sales, (QWh)	781.1	827.0	866.5	906.9	948.8	994.8	1,049.3	1,104.2	1,161.1	1,219.3	1,279.6	1,341.1	1,404.4	1,470.6	1,539.6	1,611.6												

表 4.11 地区別及び総電力需要予測 (高成長)

REGIONAL LOAD FORECAST	1977/78	1978/79	1979/80	1980/81	1981/82	1982/83	1983/84	1984/85	1985/86	1986/87	1987/88	1988/89	1989/90	1990/91	2001/02	2011/12	2021/23	2031/34	2041/43
NAIROBI REGION																			
Dominant Sales (GWh)	489.0	506.7	514.4	521.0	527.3	533.2	539.2	545.1	550.9	556.7	562.5	568.3	574.1	579.9	585.7	591.5	597.3	603.1	608.9
Commerce & Industrial Sales (GWh)	719.5	761.1	804.1	851.4	900.9	954.0	1010.3	1070.5	1135.9	1208.0	1287.0	1374.5	1468.0	1568.0	1674.0	1788.0	1908.0	2034.0	2166.0
Off-Peak Sales (GWh)	94.6	97.1	97.4	97.8	98.1	98.4	98.7	99.0	99.3	99.6	99.9	100.2	100.5	100.8	101.1	101.4	101.7	102.0	102.3
Total Energy Sales of KPLC (GWh)	1,284.1	1,379.8	1,425.5	1,499.2	1,558.9	1,625.9	1,699.9	1,780.0	1,868.2	1,965.2	2,071.9	2,189.2	2,318.3	2,458.8	2,611.8	2,778.0	2,958.0	3,152.0	3,360.0
Growth Rate of Energy Sales (%)	4.4	4.8	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9
Regional Load Factor (%)	60.8	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0	60.0
Peak Load (MW)	231.0	237.7	241.5	245.3	249.1	252.9	256.7	260.5	264.3	268.1	271.9	275.7	279.5	283.3	287.1	290.9	294.7	298.5	302.3
Growth Rate of Peak Load (%)	12.8	4.9	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8
COAST REGION																			
Dominant Sales (GWh)	113.3	142.9	187.7	232.5	287.3	352.1	426.9	511.7	606.5	711.3	826.9	953.5	1091.1	1239.7	1400.3	1573.1	1758.3	1955.3	2164.3
Commerce & Industrial Sales (GWh)	405.4	435.9	464.0	490.3	515.6	541.8	567.9	594.0	620.1	646.2	672.3	698.4	724.5	750.6	776.7	802.8	828.9	855.0	881.1
Off-Peak Sales (GWh)	51.7	53.7	55.7	57.7	59.7	61.7	63.7	65.7	67.7	69.7	71.7	73.7	75.7	77.7	79.7	81.7	83.7	85.7	87.7
Total Energy Sales of KPLC (GWh)	567.1	585.5	607.4	629.3	651.2	673.1	695.0	716.9	738.8	760.7	782.6	804.5	826.4	848.3	870.2	892.1	914.0	935.9	957.8
Growth Rate of Energy Sales (%)	7.1	5.5	5.4	5.3	5.2	5.1	5.0	4.9	4.8	4.7	4.6	4.5	4.4	4.3	4.2	4.1	4.0	3.9	3.8
Regional Load Factor (%)	44.0	44.0	44.0	44.0	44.0	44.0	44.0	44.0	44.0	44.0	44.0	44.0	44.0	44.0	44.0	44.0	44.0	44.0	44.0
Peak Load (MW)	107.0	103.8	100.5	97.2	93.9	90.6	87.3	84.0	80.7	77.4	74.1	70.8	67.5	64.2	60.9	57.6	54.3	51.0	47.7
Growth Rate of Peak Load (%)	-3.9	-3.1	-3.2	-3.3	-3.4	-3.5	-3.6	-3.7	-3.8	-3.9	-4.0	-4.1	-4.2	-4.3	-4.4	-4.5	-4.6	-4.7	-4.8
MT. KENYA REGION																			
Dominant Sales (GWh)	47.8	51.2	54.8	58.4	62.0	65.6	69.2	72.8	76.4	80.0	83.6	87.2	90.8	94.4	98.0	101.6	105.2	108.8	112.4
Commerce & Industrial Sales (GWh)	267.4	289.4	313.3	338.2	364.1	391.0	417.9	444.8	471.7	498.6	525.5	552.4	579.3	606.2	633.1	660.0	686.9	713.8	740.7
Off-Peak Sales (GWh)	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
Total Energy Sales of KPLC (GWh)	1,367.7	1,494.3	1,623.3	1,754.9	1,890.7	2,030.7	2,174.9	2,323.4	2,476.3	2,633.6	2,795.4	2,961.7	3,132.0	3,307.3	3,487.6	3,672.9	3,863.2	4,058.5	4,258.8
Growth Rate of Energy Sales (%)	2.8	8.7	8.7	8.7	8.7	8.7	8.7	8.7	8.7	8.7	8.7	8.7	8.7	8.7	8.7	8.7	8.7	8.7	8.7
Regional Load Factor (%)	30.0	30.1	31.1	31.8	32.5	33.2	33.9	34.6	35.3	36.0	36.7	37.4	38.1	38.8	39.5	40.2	40.9	41.6	42.3
Peak Load (MW)	117.7	87.3	79.8	73.5	68.2	63.9	60.6	57.3	54.0	50.7	47.4	44.1	40.8	37.5	34.2	30.9	27.6	24.3	21.0
Growth Rate of Peak Load (%)	-17.7	-8.7	-9.5	-9.2	-9.1	-9.0	-8.9	-8.8	-8.7	-8.6	-8.5	-8.4	-8.3	-8.2	-8.1	-8.0	-7.9	-7.8	-7.7
WESTERN REGION																			
Dominant Sales (GWh)	75.3	80.9	86.5	92.1	97.7	103.3	108.9	114.5	120.1	125.7	131.3	136.9	142.5	148.1	153.7	159.3	164.9	170.5	176.1
Commerce & Industrial Sales (GWh)	267.4	289.4	313.3	338.2	364.1	391.0	417.9	444.8	471.7	498.6	525.5	552.4	579.3	606.2	633.1	660.0	686.9	713.8	740.7
Off-Peak Sales (GWh)	2.8	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3
Total Energy Sales of KPLC (GWh)	345.5	378.8	407.1	431.3	451.3	467.3	480.3	491.3	501.3	511.3	521.3	531.3	541.3	551.3	561.3	571.3	581.3	591.3	601.3
Growth Rate of Energy Sales (%)	8.2	7.9	8.5	9.1	9.3	9.4	9.4	9.4	9.4	9.4	9.4	9.4	9.4	9.4	9.4	9.4	9.4	9.4	9.4
Regional Load Factor (%)	22.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0
Peak Load (MW)	79.0	82.1	84.5	86.9	89.3	91.7	94.1	96.5	98.9	101.3	103.7	106.1	108.5	110.9	113.3	115.7	118.1	120.5	122.9
Growth Rate of Peak Load (%)	3.9	7.9	8.5	9.1	9.3	9.4	9.4	9.4	9.4	9.4	9.4	9.4	9.4	9.4	9.4	9.4	9.4	9.4	9.4
MT. KENYA REGION																			
Dominant Sales (GWh)	40.7	44.6	48.4	52.4	56.4	60.4	64.4	68.4	72.4	76.4	80.4	84.4	88.4	92.4	96.4	100.4	104.4	108.4	112.4
Commerce & Industrial Sales (GWh)	41.4	58.8	64.4	70.0	75.6	81.2	86.8	92.4	98.0	103.6	109.2	114.8	120.4	126.0	131.6	137.2	142.8	148.4	154.0
Off-Peak Sales (GWh)	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.9
Total Energy Sales of KPLC (GWh)	104.3	102.2	114.7	126.6	141.0	157.4	175.9	195.9	216.4	238.4	262.9	289.0	316.7	346.1	377.3	410.3	445.9	494.3	545.5
Growth Rate of Energy Sales (%)	9.9	9.0	10.4	11.4	11.6	11.8	11.9	12.0	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1
Regional Load Factor (%)	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0
Peak Load (MW)	23.0	24.7	26.1	27.5	28.9	30.3	31.7	33.1	34.5	35.9	37.3	38.7	40.1	41.5	42.9	44.3	45.7	47.1	48.5
Growth Rate of Peak Load (%)	31.3	9.0	10.4	11.4	11.6	11.8	11.9	12.0	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1	12.1
NATIONAL TOTAL																			
Dominant Sales (GWh)	784.1	828.3	871.3	915.2	960.8	1,009.9	1,061.9	1,117.8	1,177.1	1,240.5	1,308.2	1,380.2	1,456.7	1,536.8	1,620.8	1,709.0	1,800.8	1,896.0	1,994.6
Commerce & Industrial Sales (GWh)	1,541.1	1,641.7	1,751.3	1,871.3	1,991.8	2,123.3	2,266.7	2,424.7	2,597.7	2,786.7	2,991.7	3,214.7	3,456.7	3,718.7	4,001.7	4,306.7	4,634.7	5,000.7	5,406.7
Off-Peak Sales (GWh)	164.2	162.7	162.0	161.0	160.3	159.3	158.3	157.3	156.3	155.3	154.3	153.3	152.3	151.3	150.3	149.3	148.3	147.3	146.3
Total Energy Sales of KPLC (GWh)	2,433.5	2,570.8	2,725.3	2,889.4	3,060.3	3,249.9	3,466.4	3,694.7	3,944.1	4,219.7	4,525.2	4,860.2	5,227.3	5,629.7	6,069.7	6,548.7	7,069.7	7,636.7	8,253.7
Growth Rate of Energy Sales (%)	5.1	6.0	6.0	5.9	5.9	5.9	5.9	5.9	5.9	5.9	5.9	5.9	5.9	5.9	5.9	5.9	5.9	5.9	5.9
Regional Load Factor (%)	28.1	28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0	28.0
Peak Load (MW)	469.0	502.5	528.4	556.3	585.2	615.1	646.0	677.9	710.8	744.7	779.6	815.5	852.4	890.3	929.2	969.1	1,010.0	1,051.9	1,094.8
Growth Rate of Peak Load (%)	7.8	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1
Newest Loads (GWh): 165.8																			
Station Use Energy (GWh): 1,148																			
Great Generation Requirement (GWh):																			
	3,029.1	3,211.2	3,408.5	3,620.8	3,849.4	4,095.3	4,368.2	4,660.4	4,972.9	5,306.9	5,672.8	6,071.7	6,504.7	6,973.6	7,479.5	8,024.4	8,609.3	9,236.2	9,908.1

表 5.1 開発代替案の概要

No.	Item	Unit	Alt-1	Alt-2	Alt-3	Alt-4.1	Alt-4.2	Alt-5	Alt-6	Alt-7
1	Annual Mean Discharge	m ³ /s	41.6	41.6	41.6	41.6	41.6	41.6	41.6	41.6
2	Firm Discharge	m ³ /s	24.1	24.1	24.1	24.1	24.1	24.1	24.1	24.1
3	Full Supply Level	El.m	1662.9	1662.9	1662.9	1662.9	1662.9	1662.9	1662.9	1662.9
4	Minimum Operation Level	El.m	1606.3	1606.3	1606.3	1606.3	1606.3	1606.3	1606.3	1606.3
5	Rated Water Level	El.m	1644.0	1644.0	1644.0	1644.0	1644.0	1644.0	1644.0	1644.0
6	Tailrace Water Level	El.m	1546.0	1518.0	1458.0	1443.0	1435.0	1435.0	1399.0	1374.0
7	Length of Headrace Tunnel	m	2400	4550	7200	6900	7000	4750	4600	4450
8	Length of Penstock Tunnel	m	1160	135	1610	235	245	245	290	325
9	Length of Tailrace Tunnel	m	0	1950	0	4470	6030	5930	13450	16350
10	Headrace Tunnel Diameter	m	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8
11	Tailrace Tunnel Diameter	m	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8
12	Penstock Tunnel Diameter	m	4.5	4.4	4.2	4.1	4.1	4.1	4.0	4.0
13	Gross Head	m	98.0	126.0	186.0	201.0	209.0	209.0	245.0	270.0
14	Loss Head of Headrace Tunnel	m	4.1	7.9	12.4	11.9	12.1	8.2	7.9	7.7
15	Loss Head of Tailrace Tunnel	m	0.0	3.4	0.0	7.7	10.4	10.2	23.2	28.2
16	The Other Loss Head	m	2.0	2.5	3.7	4.0	4.2	4.2	4.9	5.4
17	Total Loss Head	m	6.1	13.7	16.2	23.7	26.7	22.6	36.0	41.3
18	Effective Head	m	91.9	112.3	169.9	177.4	182.4	186.5	209.0	228.7
19	Peak Power Output	MW	54.7	66.8	101.1	105.6	108.5	111.0	124.4	136.1
20	Firm Energy Output	GWh/Year	159.8	195.1	295.2	308.3	316.9	324.0	363.2	397.5
21	Secondary Energy Output	GWh/Year	33.6	41.0	62.0	64.7	66.6	68.0	76.3	83.5
22	Total Energy Output	GWh/Year	193.3	236.1	357.2	373.0	383.5	392.0	439.4	481.0

Notes : Annual mean discharge and firm discharge are referred to the Sondu River Multipurpose Development Project.

表 5. 2 開発代替案の比較

	Unit: 1,000 US\$							
	Alt-1	Alt-2	Alt-3	Alt-4.1	Alt-4.2	Alt-5	Alt-6	Alt-7
1. PREPARATORY WORKS	5645	8579	8001	10501	11210	10987	13925	15087
2. CIVIL WORKS	88512	147679	131387	183496	197387	192802	250531	272867
2.1 River Diversion Works	2368	2368	2368	2368	2368	2368	2368	2368
2.2 Dam and Spillway	57374	57374	57374	57374	57374	57374	57374	57374
2.3 Waterway	26252	61023	71645	92192	104877	94086	145780	165300
2.4 Power House	2518	26915	6825	31562	32769	38974	45010	47825
3. METAL WORKS	4441	3236	6227	3537	3569	3560	3713	3848
4. GENERATING AND SUBSTATION EQUIPMENT	13570	14460	16460	16880	17050	17180	17890	18490
5. TRANSMISSION LINE	6370	6200	5940	6110	6200	6200	6370	6540
6. TOTAL OF DIRECT COST	118537	180153	175181	220525	235416	230728	292429	316832
7. ENGINEERING SERVICE & ADMINISTRATION	11854	18015	17518	22052	23542	23073	29243	31683
8. RELOCATION COST	37560	37560	37560	37560	37560	37560	37560	37560
8.1 Farm Land	30000	30000	30000	30000	30000	30000	30000	30000
8.2 Road	7560	7560	7560	7560	7560	7560	7560	7560
9. PHYSICAL CONTINGENCY	25193	35359	34539	42020	44478	43704	53885	57911
10. TOTAL OF CONSTRUCTION COST	155584	235528	227238	284598	303435	297505	375556	406426
ECONOMIC EVALUATION (without Sondu/Minu Incremental Energy Output)								
ANNUAL ENERGY OUTPUT (GWh/year)	193.3	236.1	357.2	373.0	383.5	392.0	439.4	481.0
ANNUAL ECONOMIC COST (Mil. US\$)	12.91	19.39	18.86	23.61	25.19	24.70	31.17	33.73
UNIT PRICE (US cent/KWh)	6.68	8.21	5.28	6.33	6.57	6.30	7.09	70.09
EIRR (%)	10.33	8.44	12.77	10.85	10.49	10.91	9.75	9.86
B-C (Mil. US\$)	2.26	-15.55	29.55	10.93	6.69	12.17	-4.07	-2.49

Note: The base year to estimate present worth of benefits and costs is set at the first year of construction.

表 5.3 各開発代替案におけるマグワグワ計画の最適開発規模

Items	Unit	Development priority	
		Irrigation	Power
1 Magwagwa Hydropower Project			
1.1 Dam Crest Elevation	El.m	1,670.0	1,670.0
1.2 Full Supply Level	El.m	1,665.0	1,665.0
1.3 Economic Cost	mil.\$	246.1	246.1
1.4 Installed Capacity	MW	100.0	100.0
1.5 Max. Plant Discharge *1	m3/s	64.0	64.0
1.6 Dependable Capacity	MW	87.4	88.2
1.7 Firm Energy	GWh/year	255.1	257.5
1.8 Average Energy *2	GWh/year	452.6	447.3
2 Sondu/Miriu Hydropower Project			
2.1 Economic Cost	mil.\$		
2.2 Installed Capacity	MW	60.0	60.0
2.3 Dependable Capacity	MW	51.2	51.4
2.4 Firm Energy	GWh/year	269.0	270.3
2.5 Average Energy	GWh/year	368.4	360.2
3 Kano Plain Irrigation Project			
3.1 Max. Irrigable Area	ha	25,640	21,940
3.2 Irrigation Economic Cost	mil.\$	191.7	165.0
3.3 Annual Net Benefit	mil.\$	33.7	29.0
4 Economic Comparison			
4.1 Magwagwa Hydropower Scheme			
B-C	mil.\$	26.34	25.16
EIRR	%	11.9%	11.8%
4.2 Sondu River Basin Multipurpose Scheme (Magwaagwa + Sondu/Miriu +Kano)			
B-C	mil.\$	82.48	79.43
EIRR	%	12.6%	12.6%

Note: *1 Maximum plant discharge is based on 8-hour peak operation.

*2 Incremental energy generation accrued from the multi-reservoir operation, which is discussed in subsequent Section 5.4, is not included.

表 5.4 費用便益流れ図の一例

No.	Year	Capital Cost			OM cost			Benefit			SONDU		KANO		S+M		Unit : million US\$	
		SONDU	MAGWA	KANO	SONDU	MAGWA	KANO	Total	SONDU	MAGWA	KANO	B-C	Total	B-C	B-C	B-C	MAHK	B-C
0	1993	14.70			0			14.70	0	0	0	0.00	-14.70	0.00	-14.70	0.00	-14.70	0.00
1	1994	34.30	0	0	0	0	0	34.30	0	0	0	0.00	-34.30	0.00	-34.30	0.00	-34.30	0.00
2	1995	39.20	0.00	0.00	0	0	0	39.20	0	0	0	0.00	-39.20	0.00	-39.20	0.00	-39.20	0.00
3	1996	9.80	0.00	0.00	0	0	0	9.80	0	0	0	0.00	-9.80	0.00	-9.80	0.00	-9.80	0.00
4	1997		0.00	5.75	0.98	0	0.00	6.73	16.01	0.00	0.00	16.01	15.03	0.00	15.03	15.03	15.03	9.28
5	1998		36.92	13.42	0.98	0	0.00	51.31	16.01	0.00	0.00	16.01	15.03	-36.92	-13.42	-5.75	-5.75	-35.30
6	1999		61.53	28.76	0.98	0	0.00	91.26	16.01	0.00	0.00	16.01	15.03	-61.53	-28.76	-46.49	-46.49	-90.28
7	2000		73.83	38.34	0.98	0.00	113.15	16.01	16.01	0.00	0.00	16.01	15.03	-73.83	-38.34	-58.80	-58.80	-97.14
8	2001		49.22	38.34	0.98	0.00	88.54	16.01	16.01	0.00	0.00	16.01	15.03	-49.22	-29.91	-34.19	-34.19	-64.10
9	2002		24.61	28.76	0.98	0.00	65.13	16.01	16.01	0.00	16.85	32.86	15.03	-24.61	-22.69	-9.58	-9.58	-32.27
10	2003				0.98	2.46	34.59	7.04	16.01	43.91	25.28	85.20	15.03	41.45	5.88	56.48	56.48	50.61
11	2004				0.98	2.46	3.59	7.04	16.01	43.91	33.70	93.62	15.03	41.45	30.11	56.48	56.48	86.59
12	2005				0.98	2.46	4.79	8.23	16.01	43.91	33.70	93.62	15.03	41.45	28.91	56.48	56.48	85.39
13	2006				0.98	2.46	4.79	8.23	16.01	43.91	33.70	93.62	15.03	41.45	28.91	56.48	56.48	85.39
14	2007				0.98	2.46	4.79	8.23	16.01	43.91	33.70	93.62	15.03	41.45	28.91	56.48	56.48	85.39
15	2008				0.98	2.46	4.79	8.23	16.01	43.91	33.70	93.62	15.03	41.45	28.91	56.48	56.48	85.39
16	2009				0.98	2.46	4.79	8.23	16.01	43.91	33.70	93.62	15.03	41.45	28.91	56.48	56.48	85.39
17	2010				0.98	2.46	4.79	8.23	16.01	43.91	33.70	93.62	15.03	41.45	28.91	56.48	56.48	85.39
18	2011				0.98	2.46	4.79	8.23	16.01	43.91	33.70	93.62	15.03	41.45	28.91	56.48	56.48	85.39
19	2012				0.98	2.46	4.79	8.23	16.01	43.91	33.70	93.62	15.03	41.45	28.91	56.48	56.48	85.39
20	2013				0.98	2.46	4.79	8.23	16.01	43.91	33.70	93.62	15.03	41.45	28.91	56.48	56.48	85.39
21	2014				0.98	2.46	4.79	8.23	16.01	43.91	33.70	93.62	15.03	41.45	28.91	56.48	56.48	85.39
22	2015				0.98	2.46	4.79	8.23	16.01	43.91	33.70	93.62	15.03	41.45	28.91	56.48	56.48	85.39
23	2016				0.98	2.46	4.79	8.23	16.01	43.91	33.70	93.62	15.03	41.45	28.91	56.48	56.48	85.39
24	2017				0.98	2.46	4.79	8.23	16.01	43.91	33.70	93.62	15.03	41.45	28.91	56.48	56.48	85.39
25	2018				0.98	2.46	4.79	8.23	16.01	43.91	33.70	93.62	15.03	41.45	28.91	56.48	56.48	85.39
26	2019				0.98	2.46	4.79	8.23	16.01	43.91	33.70	93.62	15.03	41.45	28.91	56.48	56.48	85.39
27	2020				0.98	2.46	4.79	8.23	16.01	43.91	33.70	93.62	15.03	41.45	28.91	56.48	56.48	85.39
28	2021				0.98	2.46	4.79	8.23	16.01	43.91	33.70	93.62	15.03	41.45	28.91	56.48	56.48	85.39
29	2022				0.98	2.46	4.79	8.23	16.01	43.91	33.70	93.62	15.03	41.45	28.91	56.48	56.48	85.39
30	2023				0.98	2.46	4.79	8.23	16.01	43.91	33.70	93.62	15.03	41.45	28.91	56.48	56.48	85.39
31	2024				0.98	2.46	4.79	8.23	16.01	43.91	33.70	93.62	15.03	41.45	28.91	56.48	56.48	85.39
32	2025				0.98	2.46	4.79	8.23	16.01	43.91	33.70	93.62	15.03	41.45	28.91	56.48	56.48	85.39
33	2026				0.98	2.46	4.79	8.23	16.01	43.91	33.70	93.62	15.03	41.45	28.91	56.48	56.48	85.39
34	2027				0.98	2.46	4.79	8.23	16.01	43.91	33.70	93.62	15.03	41.45	28.91	56.48	56.48	85.39
35	2028				0.98	2.46	4.79	8.23	16.01	43.91	33.70	93.62	15.03	41.45	28.91	56.48	56.48	85.39
36	2029				0.98	2.46	4.79	8.23	16.01	43.91	33.70	93.62	15.03	41.45	28.91	56.48	56.48	85.39
37	2030				0.98	2.46	4.79	8.23	16.01	43.91	33.70	93.62	15.03	41.45	28.91	56.48	56.48	85.39
38	2031				0.98	2.46	4.79	8.23	16.01	43.91	33.70	93.62	15.03	41.45	28.91	56.48	56.48	85.39
39	2032				0.98	2.46	4.79	8.23	16.01	43.91	33.70	93.62	15.03	41.45	28.91	56.48	56.48	85.39
40	2033				0.98	2.46	4.79	8.23	16.01	43.91	33.70	93.62	15.03	41.45	28.91	56.48	56.48	85.39
41	2034				0.98	2.46	4.79	8.23	16.01	43.91	33.70	93.62	15.03	41.45	28.91	56.48	56.48	85.39
42	2035				0.98	2.46	4.79	8.23	16.01	43.91	33.70	93.62	15.03	41.45	28.91	56.48	56.48	85.39
43	2036				0.98	2.46	4.79	8.23	16.01	43.91	33.70	93.62	15.03	41.45	28.91	56.48	56.48	85.39
44	2037				0.98	2.46	4.79	8.23	16.01	43.91	33.70	93.62	15.03	41.45	28.91	56.48	56.48	85.39
45	2038				0.98	2.46	4.79	8.23	16.01	43.91	33.70	93.62	15.03	41.45	28.91	56.48	56.48	85.39
46	2039				0.98	2.46	4.79	8.23	16.01	43.91	33.70	93.62	15.03	41.45	28.91	56.48	56.48	85.39
47	2040				0.98	2.46	4.79	8.23	16.01	43.91	33.70	93.62	15.03	41.45	28.91	56.48	56.48	85.39
48	2041				0.98	2.46	4.79	8.23	16.01	43.91	33.70	93.62	15.03	41.45	28.91	56.48	56.48	85.39
49	2042				0.98	2.46	4.79	8.23	16.01	43.91	33.70	93.62	15.03	41.45	28.91	56.48	56.48	85.39
50	2043				0.98	2.46	4.79	8.23	16.01	43.91	33.70	93.62	15.03	41.45	28.91	56.48	56.48	85.39
51	2044				0.98	2.46	4.79	8.23	16.01	43.91	33.70	93.62	15.03	41.45	28.91	56.48	56.48	85.39

表 5.5 マグワグワ水力開発計画の建設費

		ALT-1	ALT-2	ALT-3	ALT-4	ALT-5	ALT-6	ALT-7	ALT-8
	Dam Crest Elevation (El.m)	1675.0	1672.5	1670.0	1667.5	1665.0	1660.0	1655.0	1650.0
I	PREPARATORY WORKS	19.62	18.30	16.76	15.80	14.77	13.39	12.10	11.05
II	CIVIL WORKS	196.22	182.96	167.59	157.95	147.71	133.93	120.99	110.46
	2.1 Diversion Tunnel	10.17	10.08	9.99	9.88	9.79	9.61	9.41	9.20
	2.2 Cofferdam	2.64	2.64	2.64	2.64	2.64	2.64	2.64	2.64
	2.3 Main Dam	103.66	95.43	85.21	80.42	75.30	66.39	59.10	52.87
	2.4 Spillway	15.49	13.78	12.07	10.36	9.91	9.47	9.12	8.79
	2.5 Waterway	38.03	36.62	35.20	33.89	30.99	28.58	25.12	22.69
	2.6 Surge Tank	7.16	6.73	6.31	5.88	5.25	4.53	3.72	3.14
	2.7 Open Penstock Line	4.81	4.63	4.45	4.20	4.08	3.92	3.77	3.62
	2.8 Powerhouse	5.62	5.31	4.95	4.63	4.35	4.07	3.80	3.53
	2.9 Tailrace	6.33	6.03	5.67	5.33	4.99	4.65	4.31	3.98
	2.10 Saddle dam	2.31	1.71	1.10	0.72	0.41	0.07	0.00	0.00
III	METAL WORKS	5.04	4.81	4.52	4.30	4.09	3.76	3.40	3.14
IV	GENERATION AND SUBSTATION EQUIPMENT	27.70	26.20	24.43	23.47	22.50	20.96	19.15	17.83
V	TRANSMISSION LINE	5.94	5.94	5.94	5.94	5.94	5.94	5.94	5.94
VI	TOTAL OF DIRECT COST	254.52	238.21	219.24	207.46	195.01	177.98	161.58	148.42
VII	ENGINEERING SERVICE & ADMINISTRATION	25.45	23.82	21.92	20.75	19.50	17.80	16.16	14.84
VIII	RELOCATION COST	46.31	43.81	40.06	37.56	36.56	33.44	27.56	25.06
	8.1 Farm Land	38.75	36.25	32.50	30.00	29.00	25.88	20.00	17.50
	8.2 Road	7.56	7.56	7.56	7.56	7.56	7.56	7.56	7.56
IX	PHYSICAL CONTINGENCY	43.13	40.44	37.31	35.36	33.31	30.50	27.79	25.62
X	TOTAL OF CONSTRUCTION COST	369.41	346.27	318.53	301.12	284.38	259.72	233.09	213.94
XI	TOTAL OF ECONOMIC COST	284.78	266.98	246.06	233.01	219.69	200.97	182.15	167.66

表 5. 6 電力系統内の水力発電所

Name of Plant	Commissioning Year	Installed Capacity (MW)	Maximum Output (MW)	Minimum Output (MW)	Annual Energy (GWh/yr)	
					Firm	Average
(1) Small Hydro	1958	28.3	28.0	16.8	126	153
(2) Masinga	1981	40.0	40.0	26.0	119	166
(3) Kamburu	1976	94.2	84.0	81.5	285	351
(4) Gitaru	1978	145.0	145.0	144.0	562	688
(5) Kindaruma	1968	44.0	44.0	44.0	132	163
(6) Kiambere	1988	144.0	144.0	129.3	626	735
(7) Turkwel	1991	106.0	106.0	99.8	268	372
(8) Sondu/Miriu	1997	60.0	60.0	21.5	188	337
Total		601.5	591.0	541.4	2118	2628

Note : (1) The data source for the hydropower plants of (1) to (7) is the Feasibility Study for A Geothermal Power Plant at Olkaria North East (Tables 3.5 and 6.2).

表 5. 7 既存及び実施予定の火力発電所

Name of Plant	Fuel Type	Commissioning Year	Retirement Year	Gross Output (MW)	Net Output (MW)	Heat Rate (Btu/kWh)	Fixed O & M (\$/kWh/month)	Variable O & M (\$/kWh)	Forced Outage Rate (%)	Schedule Maintenance (days)
1 Kipevu Steam Unit Nos.4 and 5 Unit No.6 Unit No.7	HFO		2004		20.0	15,173	1.43	1.60	25.0	56
	HFO		2004		25.0	13,255	1.00	1.20	15.0	56
	HFO		2004		25.0	13,255	1.00	1.20	15.0	56
2 Kipevu G.T.	IDO		2010	30.0	30.0	12,187	1.17	2.27	15.0	28
3 Nairobi South	Gas oil		1994	12.0	12.0	15,697	1.17	2.27	15.0	28
4 Olkaria Geothermal		1985		45.0	44.0	-	1.35	-	5.0	35
5 Diesel Plant at Rabai	HFO	1992		75.0	75.0	9,220	1.20	3.8	6.0	30
6 Olkaria N.E. Geothermal		1993		32.0	31.0	-	1.35	-	5.0	35
		1993		32.0	31.0	-	1.35	-	5.0	35

Data Source: Additional Plant Study in May 1990, Table 2.4 and Feasibility Study for A Geothermal Power Plant at North East Olkaria.

表 5.8 長期投入計画における有望な火力発電計画

Name of Plant	Specific Cost (\$/kW)	Total Cost for 1 unit (\$ millions)	Economic Life (Years)	Fixed O & M (\$/kW/year)	Variable O & M (\$/MWh)	Heat Rate (kJ/kWh)	Phasing of Costs (Percent in year)			Fuel Price		Remarks
							-2	-1	Comm. 1	(US\$/MWh)	(US\$/bbt)	
1. Geothermal 30 MW 60 MW	2,139	64.17	25	41.2	-	-	10	70	4			
	1,862	111.72	25	35.9	-	-	10	70	4			
2. Coal 30 MW 60 MW	1,157	34.71	25	21	1.8	12,050	20	40	35	19	44US\$/MT	
	928	55.68	25	21	1.8	12,050	20	40	35	19	44US\$/MT	
3. Oil 30 MW 60 MW	965	28.95	25	12	1.2	11,900	15	35	45	29.3	US\$/bbt(HFO)	
	771	46.26	25	12	1.2	11,900	15	35	45	29.3	US\$/bbt(HFO)	(80% of crude)
4. C.T. 30 MW 60 MW	401	12.03	20	14	2.27	15,000	50	50	45	69	US\$/bbt(G.O)	
	346	20.76	20	14	2.27	15,000	50	50	45	69	US\$/bbt(G.O)	(150% of crude)

Data Source: Feasibility Study for A Geothermal Power Station at North East Oikaria, Table 6.3

表 5.9 長期投入計画における有望な水力発電計画

Name of Plant	Type	Installed Capacity, MW	Maximum Output, MW	Firm Capacity, MW	Annual Energy GWh/yr		Total Cost 106US\$	Economic Cost 106 US\$	Disbursement of Economic Cost, %	Lead Time year
					Firm	Average				
1. Low Grand Falls	Reservoir	120.0	120.0	88.8	402.0	594.0	361.07	291.98	15,25,30,20,10	6
2. Mutonga	Reservoir	60.0	60.0	40.8	202.0	234.0	174.98	144.97	15,35,30,20	6
3. Magwagwa	Reservoir	200.0	200.0	127.0	243.9	553.8	354.11	281.90	15,25,30,20,10	4
		140.0	140.0	88.7	243.9	472.7	303.79	240.35	-do-	
		133.0	133.0	84.8	243.9	493.2	298.64	236.10	-do-	
		120.0	120.0	76.0	243.9	457.0	288.58	227.80	-do-	
		100.0	100.0	63.5	243.9	434.5	269.85	212.36	-do-	
		67.0	67.0	43.6	243.9	345.0	240.45	188.15	-do-	
				(24.2)	(91.2)	(23.4)				

Notes : (1) Annual operation and maintenance cost is assumed to be 1% of total cost.

(2) Figures in the parentheses show the firm-up capacity and energy of the Sondu/Miriu by building the Magwagwa reservoir.

(3) Economic costs for Magwagwa HPP presented above are the allocated cost for Hydropower purpose.

表 5.10 マグワフ計画のコスト・アロケーション

	(Unit : million US\$)											
	Case-1 (67 MW) (Power)	Case-1 (67 MW) (Irr.)	Case-2 (100 MW) (Power)	Case-2 (100 MW) (Irr.)	Case-3 (120 MW) (Power)	Case-3 (120 MW) (Irr.)	Case-4 (133 MW) (Power)	Case-4 (133 MW) (Irr.)	Case-5 (140 MW) (Power)	Case-5 (140 MW) (Irr.)	Case-6 (200 MW) (Power)	Case-6 (200 MW) (Irr.)
Construction Cost (Power plus Irr.)	195,579		219,247		234,426		242,645		246,708		287,688	
Cost with Purpose Excluded	126,293	195,579	127,781	219,247	128,803	234,426	129,314	242,645	129,565	246,708	132,326	287,688
Separable Cost of Purpose	69,286	0	91,466	0	105,623	0	113,331	0	117,143	0	155,362	0
Alternative Cost or Justifiable Expenditure	195,579	27,274	219,247	27,274	234,426	27,274	242,645	27,274	246,708	27,274	287,688	27,274
Remaining Justifiable Expenditure	126,293	27,274	127,781	27,274	128,803	27,274	129,314	27,274	129,565	27,274	132,326	27,274
Percent Distribution	82.2%	17.8%	82.4%	17.6%	82.5%	17.5%	82.6%	17.4%	82.6%	17.4%	82.9%	17.1%
Remaining Joint Cost	103,863	22,430	105,304	22,477	106,295	22,508	106,790	22,523	107,034	22,531	109,713	22,613
Total Allocated Cost	173,149	22,430	196,770	22,477	211,918	22,508	220,121	22,523	224,177	22,531	265,075	22,613
Percent Distribution	88.5%	11.5%	89.7%	10.3%	90.4%	9.6%	90.7%	9.3%	90.9%	9.1%	92.1%	7.9%

表 5.11 マグワグワ水力発電計画の費用配分後の経済費用

(million US\$)

Item	(67 MW) Case-1	(100 MW) Case-2	(120 MW) Case-3	(133 MW) Case-4	(140 MW) Case-5	(200 MW) Case-6
1 Preparatory Work	7.636	8.380	8.891	9.146	9.272	10.653
2 Diversion Tunnel	9.992	9.992	9.992	9.992	9.992	9.992
3 Coffor Dam	2.644	2.644	2.644	2.644	2.644	2.644
4 Main Dam	85.208	85.208	85.208	85.208	85.208	85.208
5 Spillway	12.074	12.074	12.074	12.074	12.074	12.074
6 Waterway	24.675	35.204	42.397	45.547	47.210	67.011
7 Surge Tank	4.317	6.309	8.000	9.200	9.750	13.629
8 Open Penstock Line	3.780	4.446	4.850	5.010	5.025	6.600
9 Power House	4.031	4.947	5.400	5.698	5.830	6.988
10 Tailrace	4.900	5.670	6.150	6.450	6.600	7.800
11 Saddle Dam	1.103	1.103	1.103	1.103	1.103	1.103
12 Metal Works	3.692	4.520	4.951	5.214	5.348	6.394
13 GE & SS	17.951	24.430	27.935	30.272	31.440	41.000
14 T/L Line	5.940	5.940	5.940	5.940	5.940	5.940
Total Direct Cost	187.943	210.867	225.535	233.498	237.436	277.036
15 Construction Costs	187.943	210.867	225.535	233.498	237.436	277.036
16 Allocated Cost to Irrigation	22.268	22.306	22.350	22.443	22.364	22.540
17 Allocated Direct Cost to Hydropower	165.675	188.561	203.185	211.055	215.072	254.496
18 E/S & Administration Borne by Hydropower	16.568	18.856	20.319	21.106	21.507	25.450
17 Relocation Cost Borne by Hydropower	26.843	27.230	27.434	27.526	27.583	27.973
18 Physical Contingency Borne by Hydropower	31.363	35.197	37.641	38.953	39.624	46.188
19 Allocated Cost to Hydropower	240.449	269.844	288.579	298.640	303.786	354.107
20 Economic Cost of Relocation	12.559	12.559	12.559	12.559	12.559	12.559
21 Economic Cost of Relocation on Hydropower	11.071	11.230	11.314	11.352	11.376	11.537
22 Economic Cost of Hydropower	188.150	212.357	227.803	236.106	240.348	281.902

* (22) = [(19) - (17)] x 0.829 + (21)

表 5.12 長期電力開発計画における電力需給バランス
(マダグワグワ 2003年に 120MW の規模で投入)

Beginning of Operation	Name	Type	Installed Capacity (MW)	Permissible Peak (MW)																				
				1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Existing	Small Hydro	Hydro	28.00	16.80	16.80	16.80	16.80	16.80	16.80	16.80	16.80	16.80	16.80	16.80	16.80	16.80	16.80	16.80	16.80	16.80	16.80	16.80	16.80	16.80
Existing	Masinga	Hydro	40.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00
Existing	Kambuu	Hydro	84.00	81.50	81.50	81.50	81.50	81.50	81.50	81.50	81.50	81.50	81.50	81.50	81.50	81.50	81.50	81.50	81.50	81.50	81.50	81.50	81.50	81.50
Existing	Gituu	Hydro	145.00	144.00	144.00	144.00	144.00	144.00	144.00	144.00	144.00	144.00	144.00	144.00	144.00	144.00	144.00	144.00	144.00	144.00	144.00	144.00	144.00	144.00
Existing	Kindevua	Hydro	44.00	44.00	44.00	44.00	44.00	44.00	44.00	44.00	44.00	44.00	44.00	44.00	44.00	44.00	44.00	44.00	44.00	44.00	44.00	44.00	44.00	44.00
Existing	Kimbere	Hydro	144.00	129.30	129.30	129.30	129.30	129.30	129.30	129.30	129.30	129.30	129.30	129.30	129.30	129.30	129.30	129.30	129.30	129.30	129.30	129.30	129.30	129.30
Committed	Turkvel	Hydro	106.00	99.80	99.80	99.80	99.80	99.80	99.80	99.80	99.80	99.80	99.80	99.80	99.80	99.80	99.80	99.80	99.80	99.80	99.80	99.80	99.80	99.80
Existing	Kipevu No. 4 & 5	Hydro	20.00	14.30	13.98	13.65	13.33	13.00	12.68	12.35	12.03	11.70	11.38	11.05	10.73	10.40	10.08	Retired	Retired	Retired	Retired	Retired	Retired	Retired
Existing	Kipevu No. 6	Hydro	44.00	17.88	17.47	17.07	16.66	16.25	15.85	15.44	15.04	14.63	14.22	13.82	13.41	13.00	12.60	Retired	Retired	Retired	Retired	Retired	Retired	Retired
Existing	Kipevu G.T.	Hydro	25.00	17.88	17.47	17.07	16.66	16.25	15.85	15.44	15.04	14.63	14.22	13.82	13.41	13.00	12.60	Retired	Retired	Retired	Retired	Retired	Retired	Retired
Existing	Kipevu G.T.	Hydro	30.00	26.59	26.59	26.59	26.59	26.59	26.59	26.59	26.59	26.59	26.59	26.59	26.59	26.59	26.59	26.59	26.59	26.59	26.59	26.59	26.59	26.59
Existing	Nairobi south	Gas oil	12.00	10.64	10.64	10.64	10.64	10.64	10.64	10.64	10.64	10.64	10.64	10.64	10.64	10.64	10.64	10.64	10.64	10.64	10.64	10.64	10.64	10.64
Existing	Oharna Geo Thermal	Geo	44.00	39.78	39.78	39.78	39.78	39.78	39.78	39.78	39.78	39.78	39.78	39.78	39.78	39.78	39.78	39.78	39.78	39.78	39.78	39.78	39.78	39.78
Committed	Raha Diesel	Geo	75.00	66.08	64.76	63.44	62.12	60.80	59.47	58.15	56.83	55.51	54.19	52.87	51.54	50.22	48.90	47.58	46.26	44.94	43.61	42.29	40.97	39.64
Committed	Oharia N.E. Geo	Geo	60.00	54.24	54.24	54.24	54.24	54.24	54.24	54.24	54.24	54.24	54.24	54.24	54.24	54.24	54.24	54.24	54.24	54.24	54.24	54.24	54.24	54.24
1994	C.T. 02	Gas oil	60.00	53.18	53.18	53.18	53.18	53.18	53.18	53.18	53.18	53.18	53.18	53.18	53.18	53.18	53.18	53.18	53.18	53.18	53.18	53.18	53.18	53.18
1995	Geo Thermal 02	Geo	60.00	54.25	54.25	54.25	54.25	54.25	54.25	54.25	54.25	54.25	54.25	54.25	54.25	54.25	54.25	54.25	54.25	54.25	54.25	54.25	54.25	54.25
1997	Sonoh/Mgini	Hydro	60.00	35.80	35.80	35.80	35.80	35.80	35.80	35.80	35.80	35.80	35.80	35.80	35.80	35.80	35.80	35.80	35.80	35.80	35.80	35.80	35.80	35.80
*	C.T. 01	Gas oil	30.00	26.59	26.59	26.59	26.59	26.59	26.59	26.59	26.59	26.59	26.59	26.59	26.59	26.59	26.59	26.59	26.59	26.59	26.59	26.59	26.59	26.59
1998	Geo Thermal 02	Geo	60.00	54.25	54.25	54.25	54.25	54.25	54.25	54.25	54.25	54.25	54.25	54.25	54.25	54.25	54.25	54.25	54.25	54.25	54.25	54.25	54.25	54.25
1999	C.T. 02	Gas oil	60.00	53.18	53.18	53.18	53.18	53.18	53.18	53.18	53.18	53.18	53.18	53.18	53.18	53.18	53.18	53.18	53.18	53.18	53.18	53.18	53.18	53.18
2000	Geo Thermal 02	Geo	60.00	54.25	54.25	54.25	54.25	54.25	54.25	54.25	54.25	54.25	54.25	54.25	54.25	54.25	54.25	54.25	54.25	54.25	54.25	54.25	54.25	54.25
2001	C.T. 02	Gas oil	60.00	53.18	53.18	53.18	53.18	53.18	53.18	53.18	53.18	53.18	53.18	53.18	53.18	53.18	53.18	53.18	53.18	53.18	53.18	53.18	53.18	53.18
2002	Geo Thermal 02	Geo	60.00	54.25	54.25	54.25	54.25	54.25	54.25	54.25	54.25	54.25	54.25	54.25	54.25	54.25	54.25	54.25	54.25	54.25	54.25	54.25	54.25	54.25
2003	Magwaya	Hydro	120.00	60.00	60.00	60.00	60.00	60.00	60.00	60.00	60.00	60.00	60.00	60.00	60.00	60.00	60.00	60.00	60.00	60.00	60.00	60.00	60.00	60.00
2004	Coal 03	Coal	90.00	72.82	72.82	72.82	72.82	72.82	72.82	72.82	72.82	72.82	72.82	72.82	72.82	72.82	72.82	72.82	72.82	72.82	72.82	72.82	72.82	72.82
2005	C.T. 02	Coal	30.00	26.59	26.59	26.59	26.59	26.59	26.59	26.59	26.59	26.59	26.59	26.59	26.59	26.59	26.59	26.59	26.59	26.59	26.59	26.59	26.59	26.59
2006	Coal 01	Coal	30.00	26.59	26.59	26.59	26.59	26.59	26.59	26.59	26.59	26.59	26.59	26.59	26.59	26.59	26.59	26.59	26.59	26.59	26.59	26.59	26.59	26.59
*	C.T. 02	Gas oil	60.00	53.18	53.18	53.18	53.18	53.18	53.18	53.18	53.18	53.18	53.18	53.18	53.18	53.18	53.18	53.18	53.18	53.18	53.18	53.18	53.18	53.18
2007	Coal 02	Coal	60.00	53.18	53.18	53.18	53.18	53.18	53.18	53.18	53.18	53.18	53.18	53.18	53.18	53.18	53.18	53.18	53.18	53.18	53.18	53.18	53.18	53.18
*	C.T. 01	Gas oil	30.00	26.59	26.59	26.59	26.59	26.59	26.59	26.59	26.59	26.59	26.59	26.59	26.59	26.59	26.59	26.59	26.59	26.59	26.59	26.59	26.59	26.59
2008	Coal 02	Coal	60.00	53.18	53.18	53.18	53.18	53.18	53.18	53.18	53.18	53.18	53.18	53.18	53.18	53.18	53.18	53.18	53.18	53.18	53.18	53.18	53.18	53.18
*	C.T. 01	Gas oil	60.00	26.59	26.59	26.59	26.59	26.59	26.59	26.59	26.59	26.59	26.59	26.59	26.59	26.59	26.59	26.59	26.59	26.59	26.59	26.59	26.59	26.59
2009	Coal 01	Coal	30.00	26.59	26.59	26.59	26.59	26.59	26.59	26.59	26.59	26.59	26.59	26.59	26.59	26.59	26.59	26.59	26.59	26.59	26.59	26.59	26.59	26.59
*	C.T. 02	Coal	60.00	53.18	53.18	53.18	53.18	53.18	53.18	53.18	53.18	53.18	53.18	53.18	53.18	53.18	53.18	53.18	53.18	53.18	53.18	53.18	53.18	53.18
2010	Coal 03	Coal	90.00	72.82	72.82	72.82	72.82	72.82	72.82	72.82	72.82	72.82	72.82	72.82	72.82	72.82	72.82	72.82	72.82	72.82	72.82	72.82	72.82	72.82
*	C.T. 02	Gas oil	60.00	53.18	53.18	53.18	53.18	53.18	53.18	53.18	53.18	53.18	53.18	53.18	53.18	53.18	53.18	53.18	53.18	53.18	53.18	53.18	53.18	53.18
	Total Disbursed Cost			568.67	667.33	732.28	784.06	824.13	875.94	933.41	985.19	1035.91	1087.71	1138.43	1190.20	1287.95	1324.18	1376.04	1452.17	1525.99	1626.40	1726.80	1824.89	
	Forecasted Peak Load			538.00	589.00	620.00	653.00	687.00	724.00	762.00	803.00	846.00	893.00	942.00	994.00	1049.00	1105.00	1163.00	1225.00	1290.00	1358.00	1430.00	1506.00	
	Power Balance			10.67	78.33	112.28	131.06	137.13	151.94	111.47	130.41	239.19	142.91	145.71	144.43	141.20	182.95	161.18	151.04	162.17	167.99	196.40	238.89	

表5.13 長期電力開発計画における電力量需給バランス
(マダグワ2003年に120MWの規模で投入)

Beginning of Operation	Name	Type	Installed Capacity (MW)	Year																				
				1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Existing	Small Hydro	Hydro	28.00	126.00	126.00	126.00	126.00	126.00	126.00	126.00	126.00	126.00	126.00	126.00	126.00	126.00	126.00	126.00	126.00	126.00	126.00	126.00	126.00	
Existing	Masingu	Hydro	40.00	119.00	119.00	119.00	119.00	119.00	119.00	119.00	119.00	119.00	119.00	119.00	119.00	119.00	119.00	119.00	119.00	119.00	119.00	119.00	119.00	
Existing	Kumburu	Hydro	84.00	285.00	285.00	285.00	285.00	285.00	285.00	285.00	285.00	285.00	285.00	285.00	285.00	285.00	285.00	285.00	285.00	285.00	285.00	285.00	285.00	
Existing	Gitara	Hydro	145.00	562.00	562.00	562.00	562.00	562.00	562.00	562.00	562.00	562.00	562.00	562.00	562.00	562.00	562.00	562.00	562.00	562.00	562.00	562.00	562.00	
Existing	Kindarua	Hydro	44.00	132.00	132.00	132.00	132.00	132.00	132.00	132.00	132.00	132.00	132.00	132.00	132.00	132.00	132.00	132.00	132.00	132.00	132.00	132.00	132.00	
Existing	Kiambere	Hydro	144.00	626.00	626.00	626.00	626.00	626.00	626.00	626.00	626.00	626.00	626.00	626.00	626.00	626.00	626.00	626.00	626.00	626.00	626.00	626.00	626.00	
Committed	Turtweel	Hydro	106.00	268.00	268.00	268.00	268.00	268.00	268.00	268.00	268.00	268.00	268.00	268.00	268.00	268.00	268.00	268.00	268.00	268.00	268.00	268.00	268.00	
Existing	Kipevu No. 4 & 5	Hydro	20.00	123.34	120.54	117.73	114.93	112.13	109.32	106.52	103.72	100.92	98.11	95.31	92.51	89.70	86.90	84.10	81.30	78.50	75.70	72.90	70.10	
Existing	Kipevu No. 6	Hydro	44.00	154.18	150.67	147.17	143.66	140.16	136.66	133.15	129.65	126.14	122.64	119.14	115.63	112.13	108.62	105.12	101.62	98.12	94.62	91.12	87.62	
Existing	Kipevu No. 7	Hydro	25.00	154.18	150.67	147.17	143.66	140.16	136.66	133.15	129.65	126.14	122.64	119.14	115.63	112.13	108.62	105.12	101.62	98.12	94.62	91.12	87.62	
Existing	Kipevu C.T.	Hydro	30.00	65.70	65.70	65.70	65.70	65.70	65.70	65.70	65.70	65.70	65.70	65.70	65.70	65.70	65.70	65.70	65.70	65.70	65.70	65.70	65.70	
Existing	Nairobi south	Gas oil	12.00	366.17	366.17	366.17	366.17	366.17	366.17	366.17	366.17	366.17	366.17	366.17	366.17	366.17	366.17	366.17	366.17	366.17	366.17	366.17	366.17	
Existing	Oharia Geo Thermal	Geo	44.00	366.17	366.17	366.17	366.17	366.17	366.17	366.17	366.17	366.17	366.17	366.17	366.17	366.17	366.17	366.17	366.17	366.17	366.17	366.17	366.17	
Committed	Rabat Diesel	Hydro	75.00	366.17	366.17	366.17	366.17	366.17	366.17	366.17	366.17	366.17	366.17	366.17	366.17	366.17	366.17	366.17	366.17	366.17	366.17	366.17	366.17	
Committed	Oharia N.E. Geo	Geo	60.00	366.17	366.17	366.17	366.17	366.17	366.17	366.17	366.17	366.17	366.17	366.17	366.17	366.17	366.17	366.17	366.17	366.17	366.17	366.17	366.17	
1994	C.T. 02	Gas oil	60.00					131.40	131.40	131.40	131.40	131.40	131.40	131.40	131.40	131.40	131.40	131.40	131.40	131.40	131.40	131.40	131.40	
1995	Geo Thermal 02	Geo	60.00					499.32	499.32	499.32	499.32	499.32	499.32	499.32	499.32	499.32	499.32	499.32	499.32	499.32	499.32	499.32	499.32	
1997	Soodu/Muru	Hydro	60.00					188.00	188.00	188.00	188.00	188.00	188.00	188.00	188.00	188.00	188.00	188.00	188.00	188.00	188.00	188.00	188.00	
•	C.T. 01	Gas oil	30.00					65.70	65.70	65.70	65.70	65.70	65.70	65.70	65.70	65.70	65.70	65.70	65.70	65.70	65.70	65.70	65.70	
1998	Geo Thermal 02	Geo	60.00																					
1999	C.T. 02	Gas oil	60.00																					
2000	Geo Thermal 02	Geo	60.00																					
2001	C.T. 02	Gas oil	60.00																					
2002	Geo Thermal 02	Geo	60.00																					
2003	Magwaya	Hydro	120.00																					
2004	Coal 03	Coal	90.00																					
2005	C.T. 02	Gas oil	60.00																					
2006	Coal 01	Coal	30.00																					
•	C.T. 02	Gas oil	60.00																					
2007	Coal 02	Coal	60.00																					
•	C.T. 01	Gas oil	30.00																					
2008	Coal 02	Coal	60.00																					
•	C.T. 01	Gas oil	30.00																					
2009	Coal 01	Coal	60.00																					
•	C.T. 02	Gas oil	60.00																					
2010	Coal 03	Coal	90.00																					
•	C.T. 02	Gas oil	60.00																					
Energy Requirement				2739.85	2998.03	3513.82	3992.81	4077.62	4556.61	4536.28	4769.67	5248.66	5359.74	5838.74	5949.81	6428.81	6743.58	7059.65	7180.53	7511.66	7987.33	8528.70	8859.83	9545.73
Energy Demand				3306.00	3483.00	3662.00	3852.00	4051.00	4261.00	4484.00	4718.00	4970.00	5242.00	5528.00	5829.00	6142.00	6464.00	6801.00	7157.00	7530.00	7921.00	8333.00	8760.00	9200.00
Energy Balance				-566.15	-484.97	-148.18	-140.81	-28.62	295.61	52.28	51.67	278.66	117.74	310.74	120.81	286.81	279.58	258.65	23.53	-18.34	66.33	192.70	99.83	325.73

表 6.1 ダム軸代替案の建設費比較

(Unit : US\$)

Work Items	Dam Axis-A	Dam Axis-B	Dam Axis-C
Diversion Tunnel	10,256,600	9,687,600	9,159,100
Cofferdam	2,644,100	2,750,600	2,853,810
Main Dam	85,208,450	79,119,575	82,030,100
Spillway	12,073,650	13,728,600	14,248,350
Total	110,182,800	105,286,375	108,291,360
	104.65%	100%	102.85%

表 6.2 ダム型式代替案の建設費比較

(Unit : US\$)

Work Items	Concrete Gravity Dam	Concrete-facing Dam	RCC Dam	Rockfill Dam
Diversion Tunnel	2,620,950	9,687,600	2,620,950	9,850,100
Cofferdam	1,391,100	2,750,600	1,391,100	3,117,600
Main Dam	136,484,550	79,119,575	130,459,950	117,437,400
Spillway	6,627,000	13,728,600	6,627,000	13,728,600
Total	147,123,600 139.74%	105,286,375 100%	141,099,000 134.01%	144,133,700 136.90%

表 7. 1 主要建設機械 (1 / 3)

Item No.	Description	Specification	Total Required Number
1	Bulldozer with ripper	32 ton	3
2	Bulldozer with ripper	21 ton	3
3	Bulldozer	21 ton	4
4	Bulldozer	11 ton	6
5	Wheel loader	5 m ³	10
6	Tractor shovel	2.3 m ³	12
7	Tractor shovel	1.2 m ³	3
8	Backhoe	0.6 m ³	3
9	Backhoe	0.3 m ³	2
10	Dump truck	32 ton	33
11	Dump truck	11 ton	34
12	Dump truck	8 ton	18
13	Dump truck	4 ton	4
14	Crawler drill	7 m ³ /min	2
15	Crawler drill	10 m ³ /min	9
16	Crawler drill	15 m ³ /min	12
17	Air compressor	10 m ³ /min	2
18	Air compressor	13.5 m ³ /min	11
19	Air compressor	17 m ³ /min	10
20	Vibrating roller	15 ton	2
21	Vibrating roller	10 ton	1
22	Vibrating roller	4 ton	2
23	Vibrating roller	1 ton	2
24	Tire roller	20 ton	1
25	Tamping roller	13.5 ton	2
26	Tractor	15 ton	2
27	Crushing plant	100 ton/hr	2
28	Concrete plant	0.75m ³ x 2	2
29	Concrete plant	1.0 m ³ x 2	1
30	Agitator truck	4.5 m ³	4
31	Agitator truck	3.2 m ³	19
32	Concrete bucket	1.0 m ³	6

表 7.1 主要建設機械 (2 / 3)

Item No.	Description	Specification	Total Required Number
33	Concrete pump car	60 m ³ /hr	5
34	Truck crane	30 ton	2
35	Truck crane	20 ton	2
36	Crawler crane	30 ton	1
37	Motor grader	3.7 m	1
38	Water sprinkler	5.5 klit	2
39	Trailer	20 ton	2
40	Rammer	80 kg	10
41	Compactor	100 kg	10
42	Concrete vibrator	55 mm	20
43	Boring machine	5.5 kW	14
44	Grout pump	7.5 kW	19
45	Grout pump	11 kW	10
46	Grout pump, low pressure	11 kW	3
47	Grout mixer	200 lit x 2	19
48	Grout mixer	300 lit x 2	4
49	Reinforcement trolley		1
50	Transfer trolley, reinforcement		1
51	Slipforming equipment	15 m wide	1
52	Slipforming equipment	7.5 m wide	1
53	Transfer trolley, slipform		1
54	Winch with 8 ton truck	22 kw	1
55	Ancillary trolley		2
56	Winch with 6 ton truck	22 kw	2
57	Truck, flat body	11 ton	2
58	Distributor	1000 lit	1
59	Drill jumbo, 7 boom-drifter		4
60	Drill jumbo, 9 boom-drifter		2
61	Drill jumbo, 7 boom-drifter, Truck		1
62	Muck loader	0.4 m ³	8
63	Muck loader, slide	0.6 m ³	6
64	Muck car	6 m ³	32
65	Battery locomotive	10 ton	8
66	Air compressor	22 m ³ /min	12

表 7. 1 主要建設機械 (3 / 3)

Item No.	Description	Specification	Total Required Number
67	Vent fan	300 m ³ /min	48
68	Vent fan	100 m ³ /min	14
69	Leg hammer	2.7 m ³ /min	20
70	Pick hammer	7 kg	30
71	Jack hammer	2.4 m ³ /min	20
72	Stopper drill	2.7 m ³ /min	4
73	Raise climber		1
74	Shotcrete spray gun		8
75	Presscrete	6 m ³	8
76	Battery locomotive	8 ton	8
77	Concrete vibrator	55 mm	50
78	Form vibrator	0.2 kW	40
79	Full-circular sliding form with needle beam, 5.4 m dia.	10.5 m	4
80	Arch sliding form, 6 m dia.	10.5 m	2
81	Muck loader, inclined	0.2 m ³	1
82	Side-dump tractor shovel	1.4 m ³	1
83	Muck car	3 m ³	2
84	Winch	100 kW	1
85	Winch	200 kW	1
86	Agitator car	3 m ³	2
87	Concrete pump	45 m ³ /h	1
88	Overhead crane	10 ton	1

表 7. 2 勞働賃金

Description	Unit	Foreign Currency (US\$)	Local Currency (KShs.)
Foremen, foreign	M.D.	215	—
Foremen	M.D.	—	190
Mechanic	M.D.	—	190
Electrician	M.D.	—	190
Operator	M.D.	—	180
Assistant operator	M.D.	—	120
Driver	M.D.	—	160
Rigger	M.D.	—	140
Carpenter	M.D.	—	150
Formworker	M.D.	—	150
Concrete worker	M.D.	—	110
Driller	M.D.	—	150
Tunnel worker	M.D.	—	160
Mason	M.D.	—	150
Powderman	M.D.	—	160
Reinforcing worker	M.D.	—	150
Boring worker	M.D.	—	160
Grout worker	M.D.	—	160
Pavement worker	M.D.	—	120
Skilled worker	M.D.	—	150
Semi skilled worker	M.D.	—	120
Common labour	M.D.	—	90

Note: M.D. means man-day.

表 7.3 建設材料費

Description	Unit	Foreign Currency (US\$)	Local Currency (KShs.)
Gasoline	litre	0.38	5.10
Light oil	litre	0.35	2.64
Lubricant	litre	2.02	7.53
Grease	kg	3.67	22.10
Heavy oil	litre	0.33	0.68
Portland cement	ton	53.51	1,152.30
Bitumen 80/100	kg	0.31	0.99
Bitumen MC30	litre	0.51	2.94
Emulsion	litre	0.39	2.28
Reinforcement	ton	418.26	8,584.00
Annealed wire	kg	0.99	20.30
H-shape steel	ton	642.86	0.00
Channel steel	ton	565.22	11,600.00
Steel plate	ton	565.22	11,600.00
Nail	kg	0.57	11.60
Dynamite	kg	5.22	73.28
ANFO	kg	0.70	0.80
Detonator	No	2.88	40.40
Timber, plank	m ³	0.00	5,120.00
Timber, square	m ³	0.00	6,182.00
Timber, log	m ³	0.00	5,120.00
Plywood	m ³	416.09	12,850.00
Bit, 65 mm	No	196.43	297.56
Rod	No	275.00	416.59
Sleeve	No	70.71	107.12
Shank rod	No	204.29	309.47
Bit, 36 mm	No	47.14	71.42
Taper rod, 2 m	No	70.71	107.12
Taper rod, 1.5 m	No	58.14	88.08
Insert bit, 36 mm, 1.7 m	No	102.93	155.92
Air entrain agent	kg	1.41	14.08
Water reduced agent	kg	2.36	23.47
Metal form, 300*1500	No	19.25	191.68
Metal form, 150*1500	No	15.32	152.57
Metal form, 100*1500	No	12.96	129.10
Pipe support	m	19.25	191.68
Portal frame	No	28.13	280.09
Metal bit	No	27.11	41.06
Diamond bit	carat	78.57	119.03
Boring rod, 40 mm	No	86.43	130.93
Scaffolding pipe	m	2.36	23.47
Air bubble agent	kg	5.50	54.77
Lozenge shape net	m ²	3.77	37.55
Waterstop, 200 mm	m	9.43	14.28
Waterstop, 300 mm	m	16.50	25.00
Jont filler, 20 mm	m ²	12.57	19.04
PVC pipe, 75 mm	m	4.56	45.38
Rock bolt	m	6.29	9.52
Wire mesh	m ²	1.96	19.56

表 7.4 建設機械費 (1 / 2)

Description	Unit	Foreign Currency (US\$)	Local Currency (KShs.)
Bulldozer, 32 t	Hr	47.6	277.0
Bulldozer, 21 t	Hr	33.5	195.0
Bulldozer, 11 t	Hr	16.7	98.0
Bulldozer w/ripper, 32 t	Hr	52.9	319.0
Tractor, 15 t	Hr	19.8	116.0
Backhoe, 0.6 m ³	Hr	19.7	115.0
Backhoe, 0.2 m ³	Hr	10.1	57.0
Wheel loader, 5 m ³	Hr	68.3	399.0
Tractor shovel, 2.2 m ³	Hr	25.0	146.0
Tractor shovel, 1.2 m ³	Hr	13.4	75.0
Dump truck, 32 t	Hr	47.7	269.0
Dump truck, 11 t	Hr	11.4	64.0
Dump, truck, 8 t	Hr	8.0	45.0
Truck crane, 20 t	Hr	28.0	141.0
Truck crane, 30 t	Hr	41.1	208.0
Crawler drill, 10 m ³ /min	Hr	18.4	95.0
Crawler drill, 15 m ³ /min	Hr	20.7	107.0
Jack hammer, 20 kg	Day	6.2	20.0
Leg hammer, 30 kg	Day	8.3	26.0
Pick hammer, 7 kg	Day	1.1	4.0
Motor grader, 3.7 m	Hr	18.0	101.0
Tire roller, 20 t	Hr	11.6	59.0
Tamping roller, 13 t	Hr	15.0	76.0
Vibrating roller, 1 t	Hr	4.3	20.0
Vibrating roller, 4 t	Hr	9.1	51.0
Vibrating roller, 8-10 t	Hr	26.2	145.0
Vibrating roller, 15 t	Hr	40.5	224.0
Rammer, tamper, 90 kg	Day	6.3	27.0
Concrete plant, 0.75 m ³ *2	Hr	75.0	388.0
Concrete plant, 1.0 m ³ *2	Hr	87.1	451.0
Agitator truck, 3.2 m ³	Hr	12.2	72.0
Agitator truck, 4.4 m ³	Hr	14.6	82.0
Concrete pump, 45 m ³ /hr	Hr	32.2	181.0
Air compressor, 7 m ³ /min	Hr	83.8	423.0
Air compressor, 13.5 m ³ /min	Hr	93.7	473.0
Air compressor, 17 m ³ /min	Hr	95.2	481.0
Diesel generator, 100 kVA	Day	24.7	114.0
Diesel generator, 125 kVA	Day	32.9	152.0
Diesel generator, 250 kVA	Day	38.9	289.0
Concrete bucket, 1 m ³	Day	15.0	71.0
Concrete vibrator	Day	4.7	18.0
Form vibrator, 0.2 kW	Day	1.2	5.0
Concrete spray gun, 5 m ³ /hr	Hr	8.1	40.0
Water sprinkler, 5.5 kl	Hr	7.6	43.0
Raise climber	m	166.0	859.0
Boring machine, 5.5 kW	Day	33.3	168.0
Boring machine, 11 kW	Day	62.3	314.0
Grout pump, 7.5 kW	Day	28.7	149.0
Grout pump, 11 kW	Day	35.8	185.0

表 7. 4 建設機械費 (2 / 2)

Description	Unit	Foreign Currency (US\$)	Local Currency (KShs.)
Grout mixer, 200*2, 2.2 kW	Day	14.8	77.0
Grout mixer, 300*2, 3.7 kW	Day	17.3	90.0
Drifter	Day	8.5	27.0
Leg drill,	Day	8.3	26.0
Guide shell	Day	16.6	52.0
Muck loader, side, 0.6 m ³	Hr	42.6	227.0
Vent fan, 3 kW	Day	2.4	11.0
Air compressor, 27 m ³ /min ³	Hr	11.0	53.0
Muck loader, 0.4 m ³	Hr	36.6	194.0
Train loader	Day	68.5	371.0
Muck car, 6 m ³	Day	26.2	142.0
Muck car, 3 m ³	Day	18.5	100.0
Battery locomotive, 10 t	Hr	57.5	393.0
Battery locomotive, 8 t	Hr	41.1	281.0
Vent fan, 150 m ³ /min	Day	14.7	66.0
Air compressor, 12 m ³ /min	Hr	5.3	25.0
Air compressor, 16 m ³ /min	Hr	8.6	41.0
Spray machine, 5-10 m ³ /hr	Hr	28.0	145.0
Concrete placer, 3 m ³	Hr	26.2	125.0
Concrete placer, 6 m ³	Hr	40.9	195.0
Air compressor, 22 m ³ /min	Hr	11.0	53.0
Muck car, 6 m ³	Day	26.2	142.0
Stoper drill, 2.7 m ³ /min	Day	12.3	39.0
Jaw crusher, 25 t/hr	Hr	19.3	115.0
Impact crusher, 20 t/hr	Hr	8.9	53.0
Cone crusher, 20 t/hr	Hr	22.3	132.0
Rod mill, 20 t/hr	Hr	25.7	133.0
Screen, 20/5 mm	Hr	5.5	35.0
Classifier	Hr	5.6	32.0
Screen, 40 mm	Hr	4.1	26.0
Jaw crusher, 100 t/hr	Hr	29.7	176.0
Screen, 100 mm	Hr	4.9	31.0
Impact crusher, 100 t/hr	Hr	26.8	159.0
Cone crusher, 50 t/hr	Hr	34.2	203.0
Screen, 40/20 mm	Hr	5.7	36.0
Screen, 5 mm	Hr	4.9	31.0
Muck loader, inclined 0.2 m ³	Hr	33.1	176.0
Muck car, 3 m ³	Day	18.5	100.0
Winch, 100 kW	Day	259.4	1,668.0
Winch, 200 kW	Day	503.6	3,237.0
Agitator car, 3 m ³	Hr	21.6	103.0

表 7. 5 土地利用及び補償費

Description	Amount (1,000 KShs)
1. Reservoir	
(a) Farm land	635,000
(b) Schools and health facilities	5,000
Subtotal	640,000
2. Transmission line	4,000
3. Road	160,000
Total	804,000

Note: Detailed discussions on land acquisition are referred to in Appendix VI, Social Environmental Aspect.

表 7. 6 建 設 費

Description	Foreign Currency (1,000 US\$)	Local Currency (1,000 KShs.)	Total (1,000 KShs.)
1. Preparatory works	11,473.31	123,432	387,318
2. Civil works	114,733.12	1,234,319	3,873,181
3. Metal works	3,109.33	18,799	90,314
4. Generating equipment	36,727.63	80,259	924,994
5. Transmission line and substation equipment	10,955.85	85,904	337,889
Total (1 to 5)	176,999.24	1,542,713	5,613,696
6. Land aquisition and compensation	0.00	804,000	804,000
7. Administration expenses	0.00	28,068	28,068
8. Engineering services	21,477.00	63,048	557,019
Total (1 to 8)	198,476.24	2,437,829	7,002,783
9. Physical contingency	17,307.98	154,135	552,219
Total (1 to 9)	215,784.22	2,591,964	7,555,001
10. Price escalation	41,662.07	2,964,499	3,922,727
Grand total	257,446.29	5,556,463	11,477,728

表 7.7 詳細建設費 (1 / 3)

Description	Foreign Currency (1,000 US\$)	Local Currency (1,000 KShs.)	Total (1,000 KShs)
1. Preparatory works	11,473.31	123,432	387,318
2. Civil works			
2.1 Diversion tunnel	4,331.62	52,915	152,542
2.2 Cofferdam	2,089.89	16,139	64,206
2.3 Main dam	46,479.53	419,115	1,488,144
2.4 Saddle dam	2,465.56	21,549	78,257
2.5 Spillway	9,942.62	100,412	329,092
2.6 River outlet	198.37	3,230	7,793
2.7 Waterway			
Intake & intake tunnel	2,175.53	26,697	76,734
Headrace tunnel	21,836.98	266,493	768,744
Intake gate shaft	720.98	10,609	27,192
Surge tank	3,154.84	38,745	111,306
Work adits	1,320.73	17,105	47,482
Penstock	506.49	6,931	18,580
Tailrace tunnel	6,216.33	75,149	218,125
Subtotal (2.7)	35,931.88	441,729	1,268,162
2.8 Power station			
Access tunnel	2,811.44	36,205	100,868
Cable tunnel	274.76	3,455	9,774
Underground powerhouse	2,772.58	41,819	105,588
Gate chamber	75.22	1,180	2,910
Tailrace surge tank	775.97	10,070	27,917
Outdoor switchyard	289.40	4,227	10,883
Subtotal (2.8)	6,999.37	96,956	257,942
2.9 Outlet channel	1,257.78	11,818	40,747
2.10 Architectural building	1,936.50	29,736	74,276
2.11 Access road	1,400.00	14,720	46,920
2.12 Base camp	1,700.00	26,000	65,100
Total (2)	114,733.12	1,234,319	3,873,181

表 7. 7 詳細建設費 (2 / 3)

Description	Foreign Currency (1,000 US\$)	Local Currency (1,000 KShs.)	Total (1,000 KShs)
3. Metal works			
Diversion gate	189.32	1,050	5,404
River outlet valve	658.93	1,108	16,263
River outlet trashracks	37.50	287	1,150
Intake trashracks	97.50	747	2,990
Intake gate	566.53	2,970	16,000
Drain valve	214.83	332	5,273
Steel penstock	1,140.00	11,232	37,452
Draft tube gate	141.36	790	4,041
Tailrace gate	63.36	283	1,740
Total (3)	3,109.33	18,799	90,314
4. Generating equipment			
Turbines	9,363.90	19,880	235,250
Generators	8,916.70	23,664	228,748
Transformers	2,603.48	3,927	63,807
Switchgear & control equipment	5,199.20	14,278	133,860
Supervisory equipment	5,978.00	9,016	146,510
Ancillary equipment	1,265.04	2,540	31,636
Miscellaneous equipment	1,659.31	3,872	42,036
Transmission line protective relays	585.00	1,035	14,490
PLC communication	1,157.00	2,047	28,658
Total (4)	36,727.63	80,259	924,994

表 7. 7 詳細建設費 (3 / 3)

Description	Foreign Currency (1,000 US\$)	Local Currency (1,000 KShs.)	Total (1,000 KShs)
5. Transmission line and substation equipment			
5.1 Transmission line			
Magwagwa-Sondu/Miriu	924.30	9,650	30,909
Magwagwa-Chemosit	948.60	14,812	36,630
Magwagwa-Muhoroni	1,324.10	19,079	49,533
Muhoroni-Lessos	2,416.60	34,825	90,407
Subtotal (5.1)	5,613.60	78,366	207,479
5.2 Substation equipment			
Chemosit substation	1,507.75	2,122	36,800
Muhoroni substation	2,554.25	3,582	62,330
Lessos substation	1,280.25	1,834	31,280
Subtotal (5.2)	5,342.25	7,538	130,410
Total (5)	10,955.85	85,904	337,889
Total (1 to 5)	176,999.24	1,542,713	5,613,695
6. Land aquisition and compensation	0.00	804,000	804,000
7. Administration expenses	0.00	28,068	28,068
8. Engineering services			
8.1 Detailed design	6,955.00	4,105	164,070
8.2 Construction supervision	14,522.00	58,943	392,949
Total (8)	21,477.00	63,048	557,019
Total (1 to 8)	198,476.24	2,437,829	7,002,782
9. Physical contingency	17,307.98	154,135	552,219
Total (1 to 9)	215,784.22	2,591,964	7,555,001
10. Price escalation	41,662.07	2,964,499	3,922,727
Grand total	257,446.29	5,556,463	11,477,728

表 7.8 年次別工事費支出

Unit: 1,000US\$
1,000K\$

Work items	Construction Cost		1997		1997		1998		1997		1998	
	FC (US\$)	LC (K\$)	FC (US\$)	LC (K\$)	FC (US\$)	LC (K\$)	FC (US\$)	LC (K\$)	FC (US\$)	LC (K\$)	FC (US\$)	LC (K\$)
1. Preparatory works	11,473.31	123,433	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0
2. Civil works	114,733.12	1,234,319	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0
3. Metal works	3,109.33	18,799	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0
4. Generating equipment	36,727.63	80,259	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0
5. Transmission line and substation equipment	10,955.85	85,904	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0
Total of (1 - 5)	176,999.24	1,542,713	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0
6. Land acquisition and compensation	0.00	804,000	0.00	0	0.00	0	0.00	0	0.00	321,600	0.00	482,400
7. Administration expenses	0.00	28,068	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0
8. Engineering services	21,477.00	63,048	696.00	411	3,477.00	2,052	2,782.00	1,642	0.00	0	0.00	0
1) Detailed design	6,955.00	4,103	696.00	411	3,477.00	2,052	2,782.00	1,642	0.00	0	0.00	0
2) Supervision	14,522.00	58,945	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0
Total of (1 - 8)	198,476.24	2,417,829	696.00	411	3,477.00	2,052	2,782.00	1,642	0.00	321,600	0.00	482,400
9. Physical contingency	17,207.98	134,135	69.60	41	347.70	205	278.20	164	0.00	0	0.00	0
10% of (1+2+7+8)	14,768.24	144,887	69.60	41	347.70	205	278.20	164	0.00	0	0.00	0
5% of (3+4+5)	2,539.64	9,248	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0
Total of (1 - 9)	215,784.22	2,591,964	765.60	452	3,824.70	2,257	3,060.20	1,806	0.00	321,600	0.00	482,400
10. Price escalation	41,662.07	2,964,499	23.12	70	194.29	611	219.72	718	0.00	172,796	0.00	333,338
Grand Total	257,446.29	5,556,463	788.72	522	4,018.99	2,868	3,279.92	2,524	0.00	494,396	0.00	815,738

Work items	1997		1998		1999		2000		2001		2002	
	FC (US\$)	LC (K\$)	FC (US\$)	LC (K\$)	FC (US\$)	LC (K\$)	FC (US\$)	LC (K\$)	FC (US\$)	LC (K\$)	FC (US\$)	LC (K\$)
1. Preparatory works	7,342.92	78,996	4,130.39	44,436	0.00	0	0.00	0	0.00	0	0.00	0
2. Civil works	13,112.16	144,157	13,483.37	161,934	31,891.27	287,531	34,469.32	339,102	18,749.73	237,373	3,077.25	44,199
3. Metal works	0.00	0	0.00	0	621.87	0	0.00	0	2,176.53	13,159	310.93	5,640
4. Generating equipment	0.00	0	0.00	0	6,274.93	0	3,672.71	16,052	21,501.28	40,129	5,278.65	24,078
5. Transmission line and substation equipment	0.00	0	0.00	0	1,544.52	0	1,627.26	15,673	3,648.54	41,444	2,135.53	28,787
Total of (1 - 5)	20,455.08	223,154	17,613.78	206,390	40,332.59	287,531	39,769.35	370,827	44,076.08	352,107	10,752.36	102,704
6. Land acquisition and compensation	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0
7. Administration expenses	0.00	3,469	0.00	3,057	0.00	6,077	0.00	6,427	0.00	7,289	0.00	1,749
8. Engineering services	1,794.92	7,286	1,581.44	6,419	3,144.01	12,761	3,325.54	13,498	3,771.37	15,307	904.72	3,672
1) Detailed design	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0
2) Supervision	1,794.92	7,286	1,581.44	6,419	3,144.01	12,761	3,325.54	13,498	3,771.37	15,307	904.72	3,672
Total of (1 - 8)	22,250.00	233,909	19,195.22	215,866	43,476.60	306,369	43,094.89	390,752	51,847.45	374,703	11,657.08	108,125
9. Physical contingency	2,225.00	23,391	1,919.52	21,587	3,925.59	30,637	4,044.49	37,489	3,718.43	32,734	779.43	7,887
10% of (1+2+7+8)	2,225.00	23,391	1,919.52	21,587	3,925.59	30,637	3,779.49	35,903	2,252.11	27,997	393.20	4,962
5% of (3+4+5)	0.00	0	0.00	0	422.07	0	265.00	1,586	1,466.32	4,737	386.26	2,925
Total of (1 - 9)	24,475.00	257,300	21,114.74	237,453	47,402.19	337,006	47,139.38	428,241	55,565.88	407,437	12,436.53	116,012
10. Price escalation	3,362.86	221,304	3,382.58	248,423	8,693.56	421,327	9,757.85	631,998	12,846.83	702,177	3,181.26	231,537
Grand Total	27,837.86	478,604	24,497.32	485,876	56,095.75	738,533	56,897.23	1,060,239	68,412.71	1,109,614	15,617.79	347,549

表 7.9 建設費内訳 (1 / 1 1)

Item No.	Work	Unit	Quantity	Foreign Currency (US\$)		Local Currency (KSh)	
				Unit Price	Amount	Unit Price	Amount
1.	Preparatory works (General)	L.S.			11,473,312		123,431,957
2.	Civil works						
2.1	Diversion tunnel						
	Site clearance	m2	9,700	0.04	388	0.36	3,492
	Excavation, common	m3	25,300	2.73	69,069	22.01	556,853
	Excavation, weathered rock	m3	19,700	3.90	76,830	30.53	601,441
	Excavation, rock	m3	7,100	9.47	67,237	68.76	488,196
	Excavation, tunnel	m3	38,800	51.81	2,010,228	684.47	26,557,436
	Fill and backfill	m3	6,400	2.93	18,752	23.92	153,088
	Steel support	ton	75	1384.54	103,841	3138.57	235,393
	Rock bolt	m	11,100	20.11	223,221	126.67	1,406,037
	Anchor bar	m	1,600	8.93	14,288	65.95	105,520
	Shotcrete for tunnel	m2	5,400	16.50	89,100	135.01	729,054
	Shotcrete for slope protect	m2	120	12.73	1,528	155.45	18,654
	Concrete, structure	m3	2,300	49.51	113,873	680.33	1,564,759
	Concrete, tunnel	m3	8,900	54.05	481,045	763.10	6,791,590
	Concrete, plug	m3	2,500	54.05	135,125	763.10	1,907,750
	Formwork, structure	m2	3,100	2.17	6,727	328.06	1,016,986
	Formwork, tunnel	m2	27,200	14.01	381,072	94.29	2,564,688
	Reinforcement	ton	130	590.75	76,798	14768.73	1,919,935
	Consolidation grout	m	2,600	72.11	187,486	1064.73	2,768,298
	Curtain grout	m	500	115.18	57,590	1733.77	866,885
	Backfill grout	m3	160	69.73	11,157	868.56	138,970
	Others(5%)	L.S.			206,268		2,519,751
	Subtotal of item 2.1				4,331,621		52,914,775
2.2	Cofferdam						
	Site clearance	m2	19,000	0.04	760	0.36	6,840
	Excavation, common	m3	69,000	2.41	166,290	19.33	1,333,770
	Excavation, weathered rock	m3	24,000	3.51	84,240	27.45	658,800
	Excavation, rock	m3	0	9.01	0	65.07	0
	Embankment, core	m3	22,900	4.75	108,775	37.48	858,292
	Embankment, filter	m3	7,600	11.08	84,208	93.19	708,244
	Embankment, random, stockpile	m3	0	3.68	0	25.86	0
	Embankment, rock	m3	178,600	7.67	1,369,862	52.38	9,355,068
	Embankment, riprap	m3	15,500	11.37	176,235	158.05	2,449,775
	Others(5%)	L.S.			99,519		768,539
	Subtotal of item 2.2				2,089,889		16,139,328

表 7.9 建設費内訳 (2 / 1 1)

Item No.	Work	Unit	Quantity	Foreign Currency (US\$)		Local Currency (KShs)	
				Unit Price	Amount	Unit Price	Amount
2.3	Main dam						
	Site clearance	m2	148,000	0.04	5,920	0.36	53,280
	Excavation, common	m3	593,000	3.34	1,980,620	19.48	11,551,640
	Excavation, weathered rock	m3	57,000	4.79	273,030	32.48	1,851,360
	Excavation, rock	m3	0	9.41	0	64.70	0
	Excavation, trench, toe slab	m3	43,100	10.28	443,068	198.25	8,544,575
	Embankment, rock from quarry	m3	3,611,000	7.27	26,251,970	49.79	179,791,690
	Embankment, rock, stockpile	m3	300,000	4.13	1,239,000	28.63	8,589,000
	Embankment, transition	m3	143,600	8.77	1,259,372	92.04	13,216,944
	Embankment, riprap	m3	51,200	10.96	561,152	155.46	7,959,552
	Impervious fill	m3	68,600	4.36	299,096	34.47	2,364,642
	Fill and backfill	m3	232,000	2.93	679,760	23.92	5,549,440
	Concrete, structure	m3	2,700	50.05	135,135	703.36	1,899,072
	Pad concrete	m3	400	76.66	30,664	1529.96	611,984
	Concrete facing, toe slab	m3	3,300	51.35	169,455	710.46	2,344,518
	Conc. facing, filler/main slabs	m3	34,100	84.04	2,865,764	897.25	30,596,225
	Slope protect for transition	m2	71,800	3.41	244,838	26.44	1,898,392
	Formwork, structure, parapet	m2	5,200	2.17	11,284	328.06	1,705,912
	Formwork, toe slab	m2	5,300	2.17	11,501	328.06	1,738,718
	Reinforcement, structure	ton	90	562.62	50,636	14065.45	1,265,891
	Reinforcement, concrete facing	ton	3,740	590.75	2,209,405	14768.73	55,235,050
	Waterstop, PVC	m	2,400	25.49	61,176	77.17	185,208
	Waterstop, copper	m	7,800	89.49	698,022	205.83	1,605,474
	Anchor bar for toe slab	m	14,000	9.99	139,860	87.14	1,219,960
	Consolidation grout	m	2,800	55.38	155,064	690.04	1,932,112
	Curtain grout	m	41,200	92.44	3,808,528	1252.06	51,584,872
	Road pavement	m2	6,300	11.56	72,828	83.81	528,003
	Measuring apparatus(1%)	L.S.			436,571		3,938,235
	Quarry site, site clearance	m2	150,000	0.04	6,000	0.36	54,000
	Quarry site, spoil overburden	m3	75,000	2.22	166,500	17.89	1,341,750
	Others(5%)	L.S.			2,213,311		19,957,875
	Subtotal of item 2.3				46,479,530		419,115,374
2.4	Saddle dam						
	Site clearance	m2	125,900	0.04	5,036	0.36	45,324
	Excavation, common	m3	128,100	3.43	439,383	27.61	3,536,841
	Excavation, weathered rock	m3	14,300	4.70	67,210	37.06	529,958
	Excavation, rock	m3	0	10.36	0	75.98	0
	Embankment, impervious fill	m3	379,900	3.60	1,367,640	28.55	10,846,145
	Embankment, filter	m3	2,700	11.08	29,916	93.19	251,613
	Embankment, riprap	m3	27,300	11.37	310,401	158.05	4,314,765
	Fill and backfill	m3	6,500	2.93	19,045	23.92	155,480
	Road pavement	m2	4,500	11.56	52,020	83.81	377,145
	Borrow area, site clearance	m2	50,000	0.04	2,000	0.36	18,000
	Borrow area, spoil overburden	m3	25,000	2.22	55,500	17.89	447,250
	Others(5%)	L.S.			117,408		1,026,126
	Subtotal of item 2.4				2,465,559		21,548,647

表 7.9 建設費内訳 (3 / 1 1)

Item No.	Work	Unit	Quantity	Foreign Currency (US\$)		Local Currency (KShs)	
				Unit Price	Amount	Unit Price	Amount
2.5	Spillway						
	Site clearance	m2	80,000	0.04	3,200	0.36	28,800
	Excavation, common	m3	431,400	3.74	1,613,436	22.02	9,499,428
	Excavation, weathered rock	m3	229,100	5.25	1,202,775	35.39	8,107,849
	Excavation, rock	m3	322,200	10.99	3,540,978	74.16	23,894,352
	Fill and backfill	m3	3,500	2.93	10,255	23.92	83,720
	Concrete, structure	m3	44,500	50.38	2,241,910	685.88	30,521,660
	Backfill concrete	m3	1,800	48.56	87,408	673.23	1,211,814
	Formwork, structure	m2	23,000	2.17	49,910	328.06	7,545,380
	Reinforcement	ton	850	562.62	478,227	14065.45	11,955,633
	Consolidation grout	m	1,400	55.38	77,532	690.04	966,056
	Anchor bar	m	4,200	8.93	37,506	65.95	276,990
	Shotcrete for slope protect	m2	9,900	12.73	126,027	155.45	1,538,955
	Others(5%)	L.S.			473,458		4,781,532
	Subtotal of item 2.5				9,942,622		100,412,168
2.6	River outlet						
	Excavation, tunnel, chamber	m3	550	57.18	31,449	820.37	451,204
	Backfill in tunnel	m3	2,800	11.78	32,984	233.91	654,948
	Steel support	ton	10	1384.54	13,845	3138.57	31,386
	Rock bolt	m	350	20.11	7,039	126.67	44,335
	Anchor bar	m	300	8.93	2,679	65.95	19,785
	Shotcrete for tunnel	m2	250	16.50	4,125	135.01	33,753
	Concrete, structure	m3	420	50.96	21,403	710.40	298,368
	Concrete, tunnel, chamber	m3	210	59.46	12,487	839.41	176,276
	Concrete, plug	m3	500	54.05	27,025	763.10	381,550
	Formwork, structure	m2	1,300	2.17	2,821	328.06	426,478
	Formwork, tunnel	m2	400	11.82	4,728	150.70	60,280
	Reinforcement	ton	15	590.75	8,861	14768.73	221,531
	Consolidation grout	m	160	72.11	11,538	1064.73	170,357
	Backfill grout	m3	20	69.73	1,395	868.56	17,371
	Shotcrete for slope	m2	200	12.73	2,546	155.45	31,090
	Concrete removal	m3	70	57.18	4,003	820.37	57,426
	Others(5%)	L.S.			9,446		153,807
	Subtotal of item 2.6				198,373		3,229,943

表 7.9 建設費内訳 (4 / 1 1)

Item No.	Work	Unit	Quantity	Foreign Currency (US\$)		Local Currency (K\$hs)	
				Unit Price	Amount	Unit Price	Amount
2.7	Waterway						
2.7.1	Intake and intake tunnel						
	Site clearance	m2	1,500	0.04	60	0.36	540
	Excavation, common	m3	4,700	2.73	12,831	22.01	103,447
	Excavation, weathered rock	m3	9,400	3.90	36,660	30.53	286,982
	Excavation, rock	m3	5,300	9.47	50,191	68.76	364,428
	Excavation, tunnel	m3	16,600	54.77	909,182	660.19	10,959,154
	Fill and backfill	m3	18,800	2.93	55,084	23.92	449,696
	Steel support	ton	90	1384.54	124,609	3138.57	282,471
	Rock bolt	m	0	20.11	0	126.67	0
	Shotcrete for tunnel	m2	0	16.50	0	135.01	0
	Concrete, structure	m3	1,600	49.51	79,216	680.33	1,088,528
	Concrete, tunnel	m3	5,100	63.75	325,125	828.16	4,223,616
	Reinforcement	ton	100	590.75	59,075	14768.73	1,476,873
	Formwork, structure	m2	2,100	2.17	4,557	328.06	688,926
	Formwork, tunnel	m2	9,400	11.00	103,400	104.38	981,172
	Anchor bar	m	670	8.93	5,983	65.95	44,187
	Shotcrete for slope protect	m2	500	12.73	6,365	155.45	77,725
	Consolidation grout	m	4,000	72.11	288,440	1064.73	4,258,920
	Curtain grout	m	0	115.18	0	1733.77	0
	Backfill grout	m3	160	69.73	11,157	868.56	138,970
	Others(5%)	L.S.			103,597		1,271,282
	Subtotal of item 2.7.1				2,175,531		26,696,916
2.7.2	Headrace tunnel						
	Excavation, tunnel	m3	208,700	54.77	11,430,499	660.19	137,781,653
	Steel support	ton	350	1384.54	484,589	3138.57	1,098,500
	Rock bolt	m	22,200	20.11	446,442	126.67	2,812,074
	Shotcrete for tunnel	m2	13,500	16.50	222,750	135.01	1,822,635
	Concrete, tunnel	m3	55,500	63.75	3,538,125	828.16	45,962,880
	Formwork, tunnel	m2	120,500	11.00	1,325,500	104.38	12,577,790
	Reinforcement	ton	430	590.75	254,023	14768.73	6,350,554
	Consolidation grout	m	38,400	72.11	2,769,024	1064.73	40,885,632
	Curtain grout	m	1,500	115.18	172,770	1733.77	2,600,655
	Backfill grout	m3	2,200	69.73	153,406	868.56	1,910,832
	Others(5%)	L.S.			1,039,856		12,690,160
	Subtotal of item 2.7.2				21,836,984		266,493,365

表 7.9 建設費内訳 (5 / 1 1)

Item No.	Work	Unit	Quantity	Foreign Currency (US\$)		Local Currency (KShs)	
				Unit Price	Amount	Unit Price	Amount
2.7.3	Intake gate shaft						
	Site clearance	m2	500	0.04	20	0.36	180
	Excavation,common	m3	1,000	3.08	3,080	24.82	24,820
	Excavation,weathered rock	m3	1,300	4.31	5,603	33.90	44,070
	Excavation,rock	m3	1,000	9.92	9,920	72.38	72,380
	Excavation,shaft	m3	3,900	65.34	254,826	865.10	3,373,890
	Excavation,tunnel	m3	1,200	54.77	65,724	660.19	792,228
	Fill and backfill	m3	0	2.93	0	23.92	0
	Steel support	ton	20	1384.54	27,691	3138.57	62,771
	Rock bolt	m	750	20.11	15,083	126.67	95,003
	Shotcrete for shaft,tunnel	m2	450	16.50	7,425	135.01	60,755
	Concrete,structure	m3	400	49.51	19,804	680.33	272,132
	Concrete,shaft	m3	2,200	53.36	117,392	735.78	1,618,716
	Concrete,tunnel	m3	650	63.75	41,438	828.16	538,304
	Formwork,structure	m2	400	2.17	868	328.06	131,224
	Formwork,shaft	m2	2,200	2.60	5,720	379.98	835,956
	Formwork,tunnel	m2	600	11.82	7,092	150.70	90,420
	Reinforcement	ton	100	590.75	59,075	14768.73	1,476,873
	Consolidation grout	m	450	72.11	32,450	1064.73	479,129
	Backfill grout	m3	30	69.73	2,092	868.56	26,057
	Anchor bar	m	700	8.93	6,251	65.95	46,165
	Shotcrete for slope protect	m2	400	12.73	5,092	155.45	62,180
	Others(5%)	L.S.			34,332		505,163
	Subtotal of item 2.7.3				720,976		10,608,414
2.7.4	Surge tank						
	Site clearance	m2	2,300	0.04	92	0.36	828
	Excavation,common	m3	1,200	3.77	4,524	30.32	36,384
	Excavation,weathered rock	m3	5,300	5.11	27,083	40.39	214,067
	Excavation,rock	m3	11,600	10.81	125,396	79.59	923,244
	Excavation,shaft	m3	30,400	60.46	1,837,984	679.25	20,649,200
	Excavation,tunnel	m3	1,900	54.77	104,063	660.19	1,254,361
	Fill and backfill	m3	100	2.93	293	23.92	2,392
	Steel support	ton	60	1384.54	83,072	3138.57	188,314
	Rock bolt	m	3,800	20.11	76,418	126.67	481,346
	Shotcrete for shaft,tunnel	m2	2,150	16.50	35,475	135.01	290,272
	Concrete,structure	m3	150	50.82	7,623	690.09	103,514
	Concrete,shaft	m3	6,400	54.66	349,824	745.54	4,771,456
	Concrete,tunnel	m3	160	63.75	10,200	828.16	132,506
	Plug concrete	m3	1,300	54.05	70,265	763.10	992,030
	Formwork,structure	m2	300	2.17	651	328.06	98,418
	Formwork,shaft	m2	5,300	2.60	13,780	379.98	2,013,894
	Formwork,tunnel	m2	100	11.82	1,182	150.70	15,070
	Reinforcement	ton	160	590.75	94,520	14768.73	2,362,997
	Consolidation grout	m	2,150	72.11	155,037	1064.73	2,289,170
	Backfill grout	m3	10	69.73	697	868.56	8,686
	Anchor bar	m	150	8.93	1,340	65.95	9,893
	Shotcrete for slope protect	m2	400	12.73	5,092	155.45	62,180
	Others(5%)	L.S.			150,231		1,845,011
	Subtotal of item 2.7.4				3,154,841		38,745,230

表 7.9 建設費内訳 (6 / 1 1)

Item No.	Work	Unit	Quantity	Foreign Currency (US\$)		Local Currency (KSh)	
				Unit Price	Amount	Unit Price	Amount
2.7.5	Work adits						
	Site clearance	m2	400	0.04	16	0.36	144
	Excavation,common	m3	2,300	3.08	7,084	24.82	57,086
	Excavation,weathered rock	m3	1,400	4.31	6,034	33.90	47,460
	Excavation,rock	m3	900	9.92	8,928	72.38	65,142
	Excavation,tunnel	m3	7,100	51.81	367,851	684.47	4,859,737
	Excavation,inclined tunnel	m3	3,500	57.48	201,180	756.99	2,649,465
	Fill and backfill	m3	1,400	2.93	4,102	23.92	33,488
	Steel support	ton	20	1384.54	27,691	3138.57	62,771
	Rock bolt	m	3,900	20.11	78,429	126.67	494,013
	Shotcrete for tunnel	m2	2,340	16.50	38,610	135.01	315,923
	Concrete,structure	m3	900	50.16	45,144	685.40	616,860
	Concrete,tunnel	m3	1,530	57.66	88,220	774.89	1,185,582
	Concrete,inclined tunnel	m3	1,570	63.75	100,088	828.16	1,300,211
	Concrete,plug	m3	1,800	54.05	97,290	763.10	1,373,580
	Formwork,structure	m2	1,100	2.17	2,387	328.06	360,866
	Formwork,tunnel	m2	4,600	11.82	54,372	150.70	693,220
	Formwork,inclined tunnel	m2	1,200	11.82	14,184	150.70	180,840
	Reinforcement	ton	50	590.75	29,538	14768.73	738,437
	Consolidation grout	m	1,100	72.11	79,321	1064.73	1,171,203
	Backfill grout	m3	50	69.73	3,487	868.56	43,428
	Anchor bar	m	150	8.93	1,340	65.95	9,893
	Shotcrete for slope protect	m2	200	12.73	2,546	155.45	31,090
	Others(5%)	L.S.			62,892		814,522
	Subtotal of item 2.7.5				1,320,732		17,104,961
2.7.6	Penstock						
	Excavation,shaft	m3	2,800	67.12	187,936	925.41	2,591,148
	Excavation,tunnel	m3	760	55.88	42,469	766.81	582,776
	Shotcrete	m2	900	16.50	14,850	135.01	121,509
	Rock bolt	m	1,300	20.11	26,143	126.67	164,671
	Steel support	ton	15	1384.54	20,768	3138.57	47,079
	Concrete,tunnel	m3	250	54.05	13,513	763.10	190,775
	Backfill concrete,shaft	m3	1,150	59.46	68,379	839.41	965,322
	Backfill concrete,tunnel	m3	400	59.46	23,784	839.41	335,764
	Slab concrete,tunnel	m3	40	54.05	2,162	763.10	30,524
	Formwork,tunnel	m2	250	11.82	2,955	150.70	37,675
	Reinforcement	ton	60	590.75	35,445	14768.73	886,124
	Consolidation grout	m	600	72.11	43,266	1064.73	638,838
	Backfill grout	m3	10	69.73	697	868.56	8,686
	Others(5%)	L.S.			24,118		330,044
	Subtotal of item 2.7.6				506,485		6,930,934

表 7.9 建設費内訳 (7 / 1 1)

Item No.	Work	Unit	Quantity	Foreign Currency (US\$)		Local Currency (KShs)	
				Unit Price	Amount	Unit Price	Amount
2.7.7	Tailrace tunnel						
	Site clearance	m2	400	0.04	16	0.36	144
	Excavation, common	m3	800	3.08	2,464	24.82	19,856
	Excavation, weathered rock	m3	2,600	4.31	11,206	53.90	140,140
	Excavation, rock	m3	4,600	9.92	45,632	72.38	332,948
	Excavation, tunnel	m3	57,800	54.77	3,165,706	660.19	38,158,982
	Steel support	ton	160	1384.54	221,526	3138.57	502,171
	Rock bolt	m	4,500	20.11	90,495	126.67	570,015
	Shotcrete for tunnel	m2	2,900	16.50	47,850	135.01	391,529
	Concrete, structure	m3	700	50.16	35,112	685.40	479,780
	Concrete, tunnel	m3	16,100	63.08	1,015,588	822.20	13,237,420
	Formwork, structure	m2	550	2.17	1,194	328.06	180,433
	Formwork, tunnel	m2	32,500	11.00	357,500	104.38	3,392,350
	Reinforcement	ton	100	590.75	59,075	14768.73	1,476,873
	Consolidation grout	m	11,400	72.11	822,054	1064.73	12,137,922
	Backfill grout	m3	600	69.73	41,838	868.56	521,136
	Anchor bar	m	200	8.93	1,786	65.95	13,190
	Shotcrete, slope protection	m2	100	12.73	1,273	155.45	15,545
	Others(5%)	L.S.			296,016		3,578,522
	Subtotal of item 2.7.7				6,216,331		75,148,956
	Subtotal of item 2.7				35,931,880		441,728,775
2.8	Power station						
2.8.1	Access tunnel						
	Site clearance	m2	600	0.04	24	0.36	216
	Excavation, common	m3	500	3.08	1,540	24.82	12,410
	Excavation, weathered rock	m3	700	4.31	3,017	33.90	23,730
	Excavation, rock	m3	800	9.92	7,936	72.38	57,904
	Excavation, tunnel	m3	41,000	56.99	2,336,590	752.92	30,869,720
	Steel support	ton	35	1384.54	48,459	3138.57	109,850
	Rockbolt	m	3,000	20.11	60,330	126.67	380,010
	Shotcrete for tunnel	m2	2,400	16.50	39,600	135.01	324,024
	Concrete, structure	m3	200	50.16	10,032	685.40	137,080
	Concrete, tunnel	m3	1,450	59.46	86,217	839.41	1,217,145
	Formwork, structure	m2	400	2.17	868	328.06	131,224
	Formwork, tunnel	m2	2,600	14.01	36,426	94.29	245,154
	Reinforcement	ton	50	590.75	29,538	14768.73	738,437
	Consolidation grout	m	180	72.11	12,980	1064.73	191,651
	Backfill grout	m3	20	69.73	1,395	868.56	17,371
	Anchor bar	m	150	8.93	1,340	65.95	9,893
	Shotcrete, slope protection	m2	100	12.73	1,273	155.45	15,545
	Others(5%)	L.S.			133,878		1,724,068
	Subtotal of item 2.8.1				2,811,441		36,205,431

表 7.9 建設費内訳 (8 / 1 1)

Item No.	Work	Unit	Quantity	Foreign Currency (US\$)		Local Currency (KShs)	
				Unit Price	Amount	Unit Price	Amount
2.8.2	Cable tunnel						
	Site clearance	m2	250	0.04	10	0.36	90
	Excavation, common	m3	300	3.08	924	24.82	7,446
	Excavation, weathered rock	m3	500	4.31	2,155	33.90	16,950
	Excavation, rock	m3	400	9.92	3,968	72.38	28,952
	Excavation, tunnel	m3	3,000	57.48	172,440	756.99	2,270,970
	Steel support	ton	10	1384.54	13,845	3138.57	31,386
	Rockbolt	m	300	20.11	6,033	126.67	38,001
	Shotcrete for tunnel	m2	1,100	16.50	18,150	135.01	148,511
	Concrete, structure	m3	150	50.16	7,524	685.40	102,810
	Concrete, tunnel	m3	230	63.75	14,663	828.16	190,477
	Formwork, structure	m2	300	2.17	651	328.06	98,418
	Formwork, tunnel	m2	550	11.82	6,501	150.70	82,885
	Reinforcement	ton	10	590.75	5,908	14768.73	147,687
	Consolidation grout	m	100	72.11	7,211	1064.73	106,473
	Backfill grout	m3	10	69.73	697	868.56	8,686
	Anchor bar	m	40	8.93	357	65.95	2,638
	Shotcrete, slope protection	m2	50	12.73	637	155.45	7,773
	Others(5%)	L.S.			13,084		164,508
	Subtotal of item 2.8.2				274,757		3,454,659
2.8.3	Underground powerhouse						
	Excavation, underground	m3	34,000	36.06	1,226,040	407.38	13,850,920
	Shotcrete	m2	4,800	16.50	79,200	135.01	648,048
	Rock bolt	m	6,000	22.12	132,720	139.34	836,040
	PC anchor	m	6,400	35.01	224,064	208.34	1,333,376
	Concrete, underground	m3	9,700	56.75	550,475	801.26	7,772,222
	Second stage concrete	m3	2,700	56.75	153,225	801.26	2,163,402
	Formwork, underground	m2	23,200	2.17	50,344	328.06	7,610,992
	Reinforcement	ton	380	590.75	224,485	14768.73	5,612,117
	Others(5%)	L.S.			132,028		1,991,356
	Subtotal of item 2.8.3				2,772,581		41,818,473
2.8.4	Gate chamber						
	Excavation, tunnel	m3	200	55.88	11,176	766.81	153,362
	Excavation, shaft	m3	120	111.52	13,382	2424.33	290,920
	Steel support	ton	5	1384.54	6,923	3138.57	15,693
	Rock bolt	m	150	20.11	3,017	126.67	19,001
	Shotcrete for tunnel	m2	200	16.50	3,300	135.01	27,002
	Concrete, tunnel	m3	70	59.46	4,162	839.41	58,759
	Concrete, shaft	m3	60	59.46	3,568	839.41	50,365
	Formwork, tunnel	m2	250	11.82	2,955	150.70	37,675
	Formwork, shaft	m2	300	2.60	780	379.98	113,994
	Reinforcement	ton	5	590.75	2,954	14768.73	73,844
	Consolidation grout	m	250	72.11	18,028	1064.73	266,183
	Backfill grout	m3	20	69.73	1,395	868.56	17,371
	Others(5%)	L.S.			3,582		56,208
	Subtotal of item 2.8.4				75,220		1,180,375

表 7.9 建設費内訳 (9 / 1 1)

Item No.	Work	Unit	Quantity	Foreign Currency (US\$)		Local Currency (KShs)	
				Unit Price	Amount	Unit Price	Amount
2.8.5	Tailrace surge tank						
	Excavation, underground	m3	10,300	56.62	583,186	678.53	6,988,859
	Steel support	ton	6	1384.54	8,307	3138.57	18,831
	Rock bolt	m	50	20.11	1,006	126.67	6,334
	Shotcrete for tunnel	m2	1,000	16.50	16,500	135.01	135,010
	Concrete, underground	m3	1,600	59.46	95,136	839.41	1,343,056
	Formwork, underground	m2	1,000	2.60	2,600	379.98	379,980
	Reinforcement	ton	40	590.75	23,630	14768.73	590,749
	Consolidation grout	m	120	72.11	8,653	1064.73	127,768
	Others(5%)	L.S.			36,951		479,529
	Subtotal of item 2.8.5				775,969		10,070,116
2.8.6	Outdoor switchyard						
	Site clearance	m2	11,500	0.04	460	0.36	4,140
	Excavation, common	m3	7,500	2.41	18,075	19.33	144,975
	Excavation, weathered rock	m3	16,500	3.51	57,915	27.45	452,925
	Excavation, rock	m3	6,000	9.01	54,060	65.07	390,420
	Embankment	m3	2,400	3.60	8,640	28.55	68,520
	Fill and backfill	m3	700	2.93	2,051	23.92	16,744
	Rockbolt	m	200	20.11	4,022	126.67	25,334
	Anchor bar	m	300	8.93	2,679	65.95	19,785
	Concrete, structure	m3	1,400	48.56	67,984	673.23	942,522
	Formwork, structure	m2	2,500	2.17	5,425	328.06	820,150
	Reinforcement	ton	30	562.62	16,879	14065.45	421,964
	Shotcrete for slope protect	m2	250	12.73	3,183	155.45	38,863
	Wet rubble masonry	m2	300	17.38	5,214	324.86	97,458
	Gravel bedding	m3	450	11.78	5,301	233.91	105,260
	Road pavement	m2	400	11.56	4,624	83.81	33,524
	Fence	m	500	35.03	17,515	812.10	406,050
	Gate	L.S.			1,590		36,900
	Others(5%)	L.S.			13,781		201,277
	Subtotal of item 2.8.6				289,397		4,226,809
	Subtotal of item 2.8				6,999,365		96,955,864
2.9	Outlet channel						
	Site clearance	m2	19,000	0.04	760	0.36	6,840
	Excavation, common	m3	35,600	2.41	85,796	19.33	688,148
	Excavation, weathered rock	m3	47,200	3.51	165,672	27.45	1,295,640
	Excavation, rock	m3	78,700	9.01	709,087	65.07	5,121,009
	Fill and backfill	m3	7,000	2.93	20,510	23.92	167,440
	Concrete, structure	m3	1,400	50.00	70,000	703.30	984,620
	Formwork, structure	m2	800	2.17	1,736	328.06	262,448
	Reinforcement	ton	50	562.62	28,131	14065.45	703,273
	Shotcrete for slope protect	m2	1,000	12.73	12,730	155.45	155,450
	Wet rubble masonry	m2	3,000	17.34	52,020	324.86	974,580
	Anchor bar	m	2,100	8.93	18,753	65.95	138,495
	Fence	m	1400	23.35	32,690	541.40	757,960
	Others(5%)	L.S.			59,894		562,795
	Subtotal of item 2.9				1,257,779		11,818,698

表 7.9 建設費内訳 (10 / 11)

Item No.	Work	Unit	Quantity	Foreign Currency (US\$)		Local Currency (KShs)	
				Unit Price	Amount	Unit Price	Amount
2.10	Architectural building						
	Powerhouse	m2	1,200	700.00	840,000	10700.00	12,840,000
	Diesel generator house	m2	100	440.00	44,000	7000.00	700,000
	Guard house,dam site	m2	100	650.00	65,000	10000.00	1,000,000
	Guard house,powerhouse	m2	120	650.00	78,000	10000.00	1,200,000
	Intake gate shaft house	m2	80	400.00	32,000	6200.00	496,000
	Control house	m2	1,350	650.00	877,500	10000.00	13,500,000
	Subtotal of item 2.10				1,936,500		29,736,000
2.11	Access road						
	Access to main dam	m	3,000	170.00	510,000	1980.00	5,940,000
	Access to powerhouse	m	200	170.00	34,000	1980.00	396,000
	Access to surge tank	m	800	170.00	136,000	1980.00	1,584,000
	Improvement of existing road	m	8,000	90.00	720,000	850.00	6,800,000
	Subtotal of item 2.11				1,400,000		14,720,000
2.12	Base camp	L.S.			1,700,000		26,000,000
	Total (2)				114,733,118		1,234,319,573
3.	Metal works						
	Diversion gate	L.S.			189,321		1,050,000
	River outlet valve	L.S.			658,929		1,108,000
	River outlet trashracks	L.S.			37,500		287,000
	Intake trashracks	L.S.			97,500		747,000
	Intake gate	L.S.			566,536		2,970,000
	Drain valve(headrace tunnel)	L.S.			214,829		332,000
	Steel penstock	L.S.			1,140,000		11,232,000
	Draft tube gate	L.S.			141,357		790,000
	Tailrace gate	L.S.			63,357		283,000
	Total (3)				3,109,329		18,799,000
4.	Generating equipment						
	Turbines	L.S.			9,363,900		19,880,280
	Generators	L.S.			8,916,700		23,663,550
	Transformers	L.S.			2,603,480		3,926,560
	Switchgear & control equipment	L.S.			5,199,200		14,278,400
	Supervisory equipment	L.S.			5,978,000		9,016,000
	Ancillary equipment	L.S.			1,265,040		2,540,120
	Miscellaneous materials	L.S.			1,659,312		3,871,728
	Transmission line protective relays	L.S.			585,000		1,035,000
	PLC communication	L.S.			1,157,000		2,047,000
	Total (4)				36,727,632		80,258,638

表 7.9 建設費内訳 (11/11)

Item No.	Work	Unit	Quantity	Foreign Currency (US\$)		Local Currency (KShs)	
				Unit Price	Amount	Unit Price	Amount
5	Transmission line and Substation equipment						
5.1	Transmission line						
	Magwagwa-Sondu/Miriu	L.S.			924,300		9,650,500
	Magwagwa-Chemosit	L.S.			948,600		14,811,700
	Magwagwa-Muhoroni	L.S.			1,324,100		19,078,800
	Muhoroni-Lessos	L.S.			2,416,600		34,825,000
	Subtotal of item 5.1				5,613,600		78,366,000
5.2	Substation equipment						
	Chemosit substation	L.S.			1,507,750		2,121,750
	Muhoroni substation	L.S.			2,554,250		3,582,250
	Lessos substation	L.S.			1,280,250		1,834,250
	Subtotal of item 5.2				5,342,250		7,538,250
	Total (5)				10,955,850		85,904,250
	Total(1 to 5)				176,999,241		1,542,713,418
6.	Land aquisition and compensation	L.S.			0		804,000,000
7.	Administration expenses	L.S.			0		28,068,000
8.	Engineering services						
8.1	Detailed design	L.S.			6,955,000		4,105,000
8.2	Construction supervision	L.S.			14,522,000		58,943,000
	Total (8)				21,477,000		63,048,000
	Total(1 to 8)				198,476,241		2,437,829,418
9.	Physical contingency	L.S.			17,307,980		154,135,000
	Total(1 to 9)				215,784,221		2,591,964,418
10.	Price escalation	L.S.			41,662,070		2,964,499,000
	Grand Total				257,446,291		5,556,463,418

表 8.1 経済評価のためのキャッシュ流れ図

No.	Year	Capital Cost			OM cost			Benefit			SONDU			MAGWA			KANO			S+M			M+K			S+H+K		
		SONDU	MAGWA	KANO	SONDU	MAGWA	KANO	Total	SONDU	MAGWA	KANO	Total	B-C	B-C	B-C	B-C	B-C	B-C	B-C	B-C	B-C	B-C	B-C	B-C	B-C	B-C		
0	1992	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1	1993	14.70	0	0	0	0	17.95	0	0	0	17.95	-14.70	0	0	0	0	0	0	0	0	0	0	0	-17.95	-3.25	-17.95	-3.25	-17.95
2	1994	34.30	0	0	0	0	36.90	0	0	0	36.90	-34.30	0	0	0	0	0	0	0	0	0	0	0	-36.90	-2.60	-36.90	-2.60	-36.90
3	1995	39.20	0	0	0	0	50.79	0	0	0	50.79	-39.20	0	0	0	0	0	0	0	0	0	0	0	-50.79	-11.59	-50.79	-11.59	-50.79
4	1996	9.80	0	0	0	0	27.19	0	0	0	27.19	0	0	0	0	0	0	0	0	0	0	0	-17.39	-9.80	-17.39	-9.80	-17.39	
5	1997	0	0	0	0.98	0	0	36.29	0	0	36.29	16.01	0.00	0.00	0.00	16.01	15.03	0	0	0	0	0	-29.56	-5.75	-34.53	-5.75	-39.48	
6	1998	0	0	0	0.98	0	0	40.46	0	0	40.46	16.01	0.00	0.00	16.01	15.03	-13.42	-26.06	-13.42	-11.03	-39.48	-24.45	-36.41	-36.41	-80.20	-65.16	-77.82	
7	1999	0	0	0	0.98	0	0	81.18	0	0	81.18	16.01	0.00	0.00	16.01	15.03	-51.44	-28.76	-51.44	-36.41	-80.20	-65.16	-92.85	-92.85	-185.65	-130.49	-221.15	
8	2000	0	0	0	0.98	0	0	93.83	0	0	93.83	16.01	0.00	0.00	16.01	15.03	-60.75	-38.34	-60.75	-45.72	-90.67	-75.65	-102.37	-102.37	-204.72	-159.07	-268.79	
9	2001	0	0	0	0.98	0	100.07	0	0	0	100.07	16.01	0.00	0.00	16.01	15.03	-75.65	-51.44	-75.65	-58.43	-113.01	-97.58	-129.01	-129.01	-258.01	-200.43	-327.46	
10	2002	0	0	0	0.98	0	0	55.03	0	0	55.03	16.01	0.00	0.00	16.01	15.03	-45.72	-29.91	-45.72	-34.53	-53.98	-42.45	-76.43	-76.43	-152.86	-110.41	-172.27	
11	2003	0	0	0	0.98	0	0	35.41	0	0	35.41	16.01	0.00	0.00	16.01	15.03	-28.76	-18.11	-28.76	-22.69	-29.91	-22.69	-42.45	-42.45	-84.90	-62.45	-97.35	
12	2004	0	0	0	0.98	0	0	7.85	0	0	7.85	16.01	0.00	0.00	16.01	15.03	-11.42	-7.85	-11.42	-9.05	-11.42	-9.05	-15.03	-15.03	-30.08	-22.23	-37.31	
13	2005	0	0	0	0.98	0	0	9.05	0	0	9.05	16.01	0.00	0.00	16.01	15.03	-9.05	-9.05	-9.05	-9.05	-9.05	-9.05	-13.01	-13.01	-26.02	-19.01	-32.03	
14	2006	0	0	0	0.98	0	0	9.05	0	0	9.05	16.01	0.00	0.00	16.01	15.03	-9.05	-9.05	-9.05	-9.05	-9.05	-9.05	-13.01	-13.01	-26.02	-19.01	-32.03	
15	2007	0	0	0	0.98	0	0	9.05	0	0	9.05	16.01	0.00	0.00	16.01	15.03	-9.05	-9.05	-9.05	-9.05	-9.05	-9.05	-13.01	-13.01	-26.02	-19.01	-32.03	
16	2008	0	0	0	0.98	0	0	9.05	0	0	9.05	16.01	0.00	0.00	16.01	15.03	-9.05	-9.05	-9.05	-9.05	-9.05	-9.05	-13.01	-13.01	-26.02	-19.01	-32.03	
17	2009	0	0	0	0.98	0	0	9.05	0	0	9.05	16.01	0.00	0.00	16.01	15.03	-9.05	-9.05	-9.05	-9.05	-9.05	-9.05	-13.01	-13.01	-26.02	-19.01	-32.03	
18	2010	0	0	0	0.98	0	0	9.05	0	0	9.05	16.01	0.00	0.00	16.01	15.03	-9.05	-9.05	-9.05	-9.05	-9.05	-9.05	-13.01	-13.01	-26.02	-19.01	-32.03	
19	2011	0	0	0	0.98	0	0	9.05	0	0	9.05	16.01	0.00	0.00	16.01	15.03	-9.05	-9.05	-9.05	-9.05	-9.05	-9.05	-13.01	-13.01	-26.02	-19.01	-32.03	
20	2012	0	0	0	0.98	0	0	9.05	0	0	9.05	16.01	0.00	0.00	16.01	15.03	-9.05	-9.05	-9.05	-9.05	-9.05	-9.05	-13.01	-13.01	-26.02	-19.01	-32.03	
21	2013	0	0	0	0.98	0	0	9.05	0	0	9.05	16.01	0.00	0.00	16.01	15.03	-9.05	-9.05	-9.05	-9.05	-9.05	-9.05	-13.01	-13.01	-26.02	-19.01	-32.03	
22	2014	0	0	0	0.98	0	0	9.05	0	0	9.05	16.01	0.00	0.00	16.01	15.03	-9.05	-9.05	-9.05	-9.05	-9.05	-9.05	-13.01	-13.01	-26.02	-19.01	-32.03	
23	2015	0	0	0	0.98	0	0	9.05	0	0	9.05	16.01	0.00	0.00	16.01	15.03	-9.05	-9.05	-9.05	-9.05	-9.05	-9.05	-13.01	-13.01	-26.02	-19.01	-32.03	
24	2016	0	0	0	0.98	0	0	9.05	0	0	9.05	16.01	0.00	0.00	16.01	15.03	-9.05	-9.05	-9.05	-9.05	-9.05	-9.05	-13.01	-13.01	-26.02	-19.01	-32.03	
25	2017	0	0	0	0.98	0	0	9.05	0	0	9.05	16.01	0.00	0.00	16.01	15.03	-9.05	-9.05	-9.05	-9.05	-9.05	-9.05	-13.01	-13.01	-26.02	-19.01	-32.03	
26	2018	0	0	0	0.98	0	0	9.05	0	0	9.05	16.01	0.00	0.00	16.01	15.03	-9.05	-9.05	-9.05	-9.05	-9.05	-9.05	-13.01	-13.01	-26.02	-19.01	-32.03	
27	2019	0	0	0	0.98	0	0	9.05	0	0	9.05	16.01	0.00	0.00	16.01	15.03	-9.05	-9.05	-9.05	-9.05	-9.05	-9.05	-13.01	-13.01	-26.02	-19.01	-32.03	
28	2020	0	0	0	0.98	0	0	9.05	0	0	9.05	16.01	0.00	0.00	16.01	15.03	-9.05	-9.05	-9.05	-9.05	-9.05	-9.05	-13.01	-13.01	-26.02	-19.01	-32.03	
29	2021	0	0	0	0.98	0	0	9.05	0	0	9.05	16.01	0.00	0.00	16.01	15.03	-9.05	-9.05	-9.05	-9.05	-9.05	-9.05	-13.01	-13.01	-26.02	-19.01	-32.03	
30	2022	0	0	0	0.98	0	0	9.05	0	0	9.05	16.01	0.00	0.00	16.01	15.03	-9.05	-9.05	-9.05	-9.05	-9.05	-9.05	-13.01	-13.01	-26.02	-19.01	-32.03	
31	2023	0	0	0	0.98	0	0	9.05	0	0	9.05	16.01	0.00	0.00	16.01	15.03	-9.05	-9.05	-9.05	-9.05	-9.05	-9.05	-13.01	-13.01	-26.02	-19.01	-32.03	
32	2024	0	0	0	0.98	0	0	9.05	0	0	9.05	16.01	0.00	0.00	16.01	15.03	-9.05	-9.05	-9.05	-9.05	-9.05	-9.05	-13.01	-13.01	-26.02	-19.01	-32.03	
33	2025	0	0	0	0.98	0	0	9.05	0	0	9.05	16.01	0.00	0.00	16.01	15.03	-9.05	-9.05	-9.05	-9.05	-9.05	-9.05	-13.01	-13.01	-26.02	-19.01	-32.03	
34	2026	0	0	0	0.98	0	0	9.05	0	0	9.05	16.01	0.00	0.00	16.01	15.03	-9.05	-9.05	-9.05	-9.05	-9.05	-9.05	-13.01	-13.01	-26.02	-19.01	-32.03	
35	2027	0	0	0	0.98	0	0	9.05	0	0	9.05	16.01	0.00	0.00	16.01	15.03	-9.05	-9.05	-9.05	-9.05	-9.05	-9.05	-13.01	-13.01	-26.02	-19.01	-32.03	
36	2028	0	0	0	0.98	0	0	9.05	0	0	9.05	16.01	0.00	0.00	16.01	15.03	-9.05	-9.05	-9.05	-9.05	-9.05	-9.05	-13.01	-13.01	-26.02	-19.01	-32.03	
37	2029	0	0	0	0.98	0	0	9.05	0	0	9.05	16.01	0.00	0.00	16.01	15.03	-9.05	-9.05	-9.05	-9.05	-9.05	-9.05	-13.01	-13.01	-26.02	-19.01	-32.03	
38	2030	0	0	0	0.98	0	0	9.05	0	0	9.05	16.01	0.00	0.00	16.01	15.03	-9.05	-9.05	-9.05	-9.05	-9.05	-9.05	-13.01	-13.01	-26.02	-19.01	-32.03	
39	2031	0	0	0	0.98	0	0	9.05	0	0	9.05	16.01	0.00	0.00	16.01	15.03	-9.05	-9.05	-9.05	-9.05	-9.05	-9.05	-13.01	-13.01	-26.02	-19.01	-32.03	
40	2032	0	0	0	0.98	0	0	9.05	0	0	9.05	16.01	0.00	0.00	16.01	15.03	-9.05	-9.05	-9.05	-9.05	-9.05	-9.05	-13.01	-13.01	-26.02	-19.01	-32.03	
41	2033	0	0	0	0.98	0	0	9.05	0	0	9.05	16.01	0.00	0.00	16.01	15.03	-9.05	-9.05	-9.05	-9.05	-9.05	-9.05	-13.01	-13.01	-26.02	-19.01	-32.03	
42	2034	0	0	0	0.98	0	0	9.05	0	0	9.05	16.01	0.00	0.00	16.01	15.03	-9.05	-9.05	-9.05	-9.05	-9.05	-9.05	-13.01	-13.01	-26.02	-19.01	-32.03	
43	2035	0	0	0	0.98	0	0	9.05	0	0	9.05	16.01	0.00	0.00	16.01	15.03	-9.05	-9.05	-9.05	-9.05	-9.05	-9.05	-13.01	-13.01	-26.02	-19.01	-32.03	
44	2036	0	0	0	0.98	0	0	9.05	0	0	9.05	16.01	0.00	0.00	16.01	15.03	-9.05	-9.05	-9.05	-9.05	-9.05	-9.05	-13.01	-13.01	-26.02	-19.01	-32.03	
45	2037	0	0	0	0.98	0	0	9.05	0	0	9.05	16.01	0.00	0.00	16.01	15.03	-9.05	-9.05	-9.05	-9.05	-9.05	-9.05	-13.01	-13.01	-26.02	-19.01	-32.03	
46	2038	0	0	0	0.98	0	0	9.05	0	0	9.05	16.01	0.00	0.00	16.01	15.03	-9.05	-9.05	-9.05	-9.05	-9.05	-9.05	-13.01	-13.01	-26.02	-19.01	-32.03	
47	2039	6.31	0	0	0.98	0	15.36	0	0	0	15.36	16.01	0.00	0.00	16.01	15.03	-11.42	-52.12	-11.42	-9.05	-11.42	-9.05	-15.03	-15.03	-30.08	-22.23	-37.31	
48	2040	3.96	0	0	0.98	0	13.01	0	0	0	13.01	16.01	0.00	0.00	16.01	15.03	-9.05	-47.57	-9.05	-9.05	-9.05	-9.05	-13.01	-13.01	-26.02	-19.01	-32.03	
49	2041	21.91	0	0	0.98	0	30.96	0	0	0	30.96	16.01	0.00	0.00	16.01	15.03	-9.05	-52.66	-9.05	-9.05	-9.05	-9.05	-13.01	-13.01	-26.			

表 8.2 財務キャッシュ流れ図

Unit : million US\$

No.	Year	CAPITAL COST	O & M COST	INCREMENT REVENUE (*)	NET FINANCIAL REVENUE
1	1992	0.79			-0.79
2	1993	3.92			-3.92
3	1994	3.14			-3.14
4	1995	13.98			-13.98
5	1996	20.97			-20.97
6	1997	35.67			-35.67
7	1998	31.43			-31.43
8	1999	62.05			-62.05
9	2000	65.76			-65.76
10	2001	73.29			-73.29
11	2002	17.48			-17.48
12	2003		4.99	40.16	35.17
13	2004		4.99	40.16	35.17
14	2005		4.99	40.16	35.17
15	2006		4.99	40.16	35.17
16	2007		4.99	40.16	35.17
17	2008		4.99	40.16	35.17
18	2009		4.99	40.16	35.17
19	2010		4.99	40.16	35.17
20	2011		4.99	40.16	35.17
21	2012		4.99	40.16	35.17
22	2013		4.99	40.16	35.17
23	2014		4.99	40.16	35.17
24	2015		4.99	40.16	35.17
25	2016		4.99	40.16	35.17
26	2017		4.99	40.16	35.17
27	2018		4.99	40.16	35.17
28	2019		4.99	40.16	35.17
29	2020		4.99	40.16	35.17
30	2021		4.99	40.16	35.17
31	2022		4.99	40.16	35.17
32	2023		4.99	40.16	35.17
33	2024		4.99	40.16	35.17
34	2025		4.99	40.16	35.17
35	2026		4.99	40.16	35.17
36	2027		4.99	40.16	35.17
37	2028		4.99	40.16	35.17
38	2029		4.99	40.16	35.17
39	2030		4.99	40.16	35.17
40	2031		4.99	40.16	35.17
41	2032		4.99	40.16	35.17
42	2033		4.99	40.16	35.17
43	2034		4.99	40.16	35.17
44	2035		4.99	40.16	35.17
45	2036		4.99	40.16	35.17
46	2037		4.99	40.16	35.17
47	2038		4.99	40.16	35.17
48	2039	7.60	4.99	40.16	27.57
49	2040	4.77	4.99	40.16	30.40
50	2041	26.40	4.99	40.16	8.77
51	2042	6.95	4.99	40.16	28.22
52	2043		4.99	40.16	35.17
53	2044		4.99	40.16	35.17
54	2045		4.99	40.16	35.17
55	2046		4.99	40.16	35.17
56	2047		4.99	40.16	35.17
57	2048		4.99	40.16	35.17
58	2049		4.99	40.16	35.17
59	2050		4.99	40.16	35.17
60	2051		4.99	40.16	35.17
61	2052		4.99	40.16	35.17

FIRR : 11.14%

*) The average tariff as of November, 1990 is US\$0.060/KWh

表 8.3 借 款 返 济

(Unit : million US\$)

Year	FOREIGN LOAN				EXPENDITURE BY GOVERNMENT		TOTAL EXPENDITURE	ANNUAL REVENUE	SURPLUS OR DEFICIT	CUMULATIVE SURPLUS (DEFICIT)
	Loan Disbursement		Repayment		Capital Costs	OMR* Costs				
	Capital	IDC*	Cumulative Debt	Interest						
1	0.81	0.02	0.83			0.01	0.01	0.00	-0.01	-0.01
2	4.09	0.12	5.04			0.04	0.04	0.00	-0.04	-0.05
3	3.35	0.21	8.60			0.04	0.04	0.00	-0.04	-0.09
4	0.00	0.22	8.82			21.50	21.50	0.00	-21.50	-21.59
5	0.00	0.22	9.04			35.50	35.50	0.00	-35.50	-57.09
6	41.65	1.28	51.97			7.00	7.00	0.00	-7.00	-64.09
7	38.51	2.29	92.77			7.11	7.11	0.00	-7.11	-71.20
8	77.97	4.32	175.06			11.09	11.09	0.00	-11.09	-82.29
9	87.49	6.64	269.19			15.51	15.51	0.00	-15.51	-97.80
10	100.43	9.35	378.98			16.23	16.23	0.00	-16.23	-114.03
11	25.65	10.24	414.87	10.37	16.24	26.61	31.70	0.00	-31.70	-145.73
12			398.63	9.97	16.65	26.61	31.60	40.16	8.56	-137.17
13			381.98	9.55	17.06	26.61	31.60	40.16	8.56	-128.61
14			364.92	9.12	17.49	26.61	31.60	40.16	8.56	-120.05
15			247.43	8.69	17.93	26.61	31.60	40.16	8.56	-111.49
16			329.50	8.24	18.37	26.61	31.60	40.16	8.56	-102.93
17			311.12	7.78	18.83	26.61	31.60	40.16	8.56	-94.37
18			202.20	7.31	19.31	26.61	31.60	40.16	8.56	-85.81
19			272.98	6.82	19.79	26.61	31.60	40.16	8.56	-77.25
20			253.20	6.33	20.28	26.61	31.60	40.16	8.56	-68.69
21			232.91	5.82	20.79	26.61	31.60	40.16	8.56	-60.13
22			212.12	5.30	21.31	26.61	31.60	40.16	8.56	-51.57
23			190.82	4.77	21.84	26.61	31.60	40.16	8.56	-43.01
24			168.97	4.22	22.39	26.61	31.60	40.16	8.56	-34.45
25			146.58	3.66	22.95	26.61	31.60	40.16	8.56	-25.89
26			123.64	3.09	23.52	26.61	31.60	40.16	8.56	-17.33
27			100.12	2.50	24.11	26.61	31.60	40.16	8.56	-8.77
28			76.01	1.90	24.71	26.61	31.60	40.16	8.56	-0.21
29			51.29	1.28	25.33	26.61	31.60	40.16	8.56	8.35
30			25.96	0.65	25.96	26.61	31.60	40.16	8.56	16.91
31			0.00				4.99	40.16	35.17	52.08
32							4.99	40.16	35.17	87.25
33							4.99	40.16	35.17	122.42
34							4.99	40.16	35.17	157.59
35							4.99	40.16	35.17	192.76
36							4.99	40.16	35.17	227.93
37							4.99	40.16	35.17	263.10
38							4.99	40.16	35.17	298.27
39							4.99	40.16	35.17	333.44
40							4.99	40.16	35.17	368.61
41							4.99	40.16	35.17	403.78
42							4.99	40.16	35.17	438.95
43							4.99	40.16	35.17	474.12
44							4.99	40.16	35.17	509.29
45							4.99	40.16	35.17	544.46
46							4.99	40.16	35.17	579.63
47							4.99	40.16	35.17	614.80
48							12.59	40.16	27.57	642.37
49							9.76	40.16	30.40	672.77
50							31.39	40.16	8.77	681.54
51							11.94	40.16	28.22	709.76
52							4.99	40.16	35.17	744.93
53							4.99	40.16	35.17	780.10
54							4.99	40.16	35.17	815.27
55							4.99	40.16	35.17	850.44
56							4.99	40.16	35.17	885.61
57							4.99	40.16	35.17	920.78
58							4.99	40.16	35.17	955.95
59							4.99	40.16	35.17	991.12
60							4.99	40.16	35.17	1,026.29
61							4.99	40.16	35.17	1,061.46

Notes: * Interest during construction
 ** O & M cost and Replacement cost.