

CHAPTER 10

COST ESTIMATION

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10.1 Basic Technique to Estimate Project Cost

In Tanzania, a series of transmission/substation projects have been carried out by the Japanese government (see Table 10.1). Concerning the costs calculation of those projects, detailed data have been accumulated and the accuracy of cost estimation has been confirmed at the time of settlement of the actual project costs. Therefore, in the present cost estimation too, we used the same technique as used in the detail design of the Dar es Salaam Power Supply Expansion Project that is the most recent project similar to the projects included in the present master plan in terms of the voltage class and scale of equipment.

Table 10.1 Transmission/substation projects carried out in Tanzania

No.	Period	Name of Projects	Remark
1	1983-1984	Kilimanjaro Region Transmission and Distribution Network Project (OECF Loan)	
2	1986	The Project for the Reinforcement of Electric Power Distribution Network in Dar es Salaam (Grant Aid)	Supply of Equipment and Materials
3	1987	The Project for the Reinforcement of Electric Power Distribution Network in Dar es Salaam (Grant Aid)	Phase 1, Phase 2
4	1991	The Project for the Reinforcement of Electric Power Distribution Network in Dar es Salaam (Grant Aid)	Phase 3
5	1996-1997	Kilimanjaro Electrification Project(Grant Aid)	
6	1997-1998	Dar es Salaam Power Supply Expansion Project (Grant Aid)	Japanese Portion Phase 1 Expansion of Ilala S/S, Construction of Kariakoo S/S Mbagala S/S 132kV Ubungo-IlalaT/L
7	1998-1999	Dar es Salaam Power Supply Expansion Project (Grant Aid)	Japanese Portion Phase 2 Construction of 132kV Ubungo-FZ III T/L, Expansion of F.Z.III S/S

In the present study too, project costs were estimated twice—at the stage of review of the master plan (during estimation of project costs in Case-A and Case-B) and at the stage of detail design (during estimation of project costs in Case-B'). The techniques used to estimate the project costs are basically the same.

10.2 Conditions for Cost Estimation

10.2.1 Work Type/Period and Terms of Payment

For the purpose of cost estimation, it was assumed that the contents and periods of the works planned in the present master plan were as shown below, that the cost of the 132

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kV transmission line construction work was to be paid in annual installments by piecework, and that the cost of each of the other works was to be paid in lump sum upon completion.

Table 10.2 Work Type/Period

Type	Period
Substation construction / expansion / rehabilitation work (Primary Substation)	18 months (24 month)
132 kV T/L construction / expansion work (Construction of Njiro-Kiyungi 132kVT/L)	12 months (24 months)
33kV T/L construction / expansion work	12 months
Distribution line work	6 months

10.2.2 Methods of Work Execution

Method of each construction work is assumed as below.

Table 10.3 Methods of Construction Work

Type	Method
T/L Construction	132kV T/L Constructed by Contractors 33kV T/L Constructed by TANESCO
S/S Construction	Constructed by Contractors
Distribution Construction	Constructed by TANESCO

10.2.3 Point of Reference Time of Cost Estimation

The unit costs of materials, labor, etc. used for the present project cost estimation shall be those as of September 30, 2001 when the 3rd field investigation was completed.

10.2.4 Exchange Rates

The currency used in the Republic of Tanzania is Tanzania shilling (Tsh). During the period of the present study too, the exchange rate of Tsh to the U.S. dollar has been declining as shown in Table 10.4.

Table 10.4 Change in exchange rate of Tsh to the U.S. dollar

Date	Exchange Rate Tshts/US \$
2001 Jan 2	803.28
2001 Jul 2	887.76
2002 Jan 2	916.04
2002 Jul 2	946.04

Source: Bank of Tanzania Web Site

The exchange rates between Tsh, US\$, and Japanese yen in the present cost estimation are those which were prevailing during the 3rd field investigation. Thus,

$$\text{Tsh/US\$} = 900.00; \text{JPY/US\$} = 130.00; \text{Tsh/JPY} = 6.92$$

10.2.5 Inflation Rates

In the present project cost estimation, inflation rates in Japan and Tanzania were left

out of consideration.

10.3 Project Cost Composition

10.3.1 Composition

The project cost composition in the present cost estimation was assumed to be the same as used in the previous detail design, and the individual cost items were estimated in both domestic currency and foreign currency. Emergency expenses were left out of consideration.

Table 10.5 Project Cost Composition

Item	Contents
Equipment & Materials	Cost of equipment and materials
Construction & Installation	Construction works, installation works, architectural works, civil works
Construction Equipment and Tools	Hiring cost of constructional machinery vehicle, temporary facilities
Packing & Shipping	Export packing, shipment, oversea/domestic transportation, port charge, insurance cost
Supervising & Administration	Dispatching cost of engineers, field expense, administration
Engineering	Detailed design, tender documents preparation

10.3.2 Concept of Each Individual Cost Estimation Item

(1) Equipment and Materials Cost

From the results of the detail design, quantities of devices and materials required for transmission line, substation, and distribution line, respectively, were obtained. The total cost of equipment and materials was calculated by using those quantities and unit prices.

(2) Construction and Installation Work Cost

From the results of the detail design, the amount of construction work required was obtained. Then, the cost of construction work was calculated based on the results of cost estimation in the previous detail design.

(3) Construction Equipment and Tools Cost

The total cost of construction equipment and tools was calculated by using the ratio of the cost of construction equipment/tools to the cost of materials/construction work in the previous detail design. Namely, the ratio was 4% for transmission/distribution line work and 5% for substation work.

(4) Packing & Shipping Cost

The cost of packing and shipping was calculated by using the ratio of the cost of packing and shipping to the cost of materials/construction work in the previous detail design. Namely, the ratio was 15% for transmission line work, substation work, and distribution line work, respectively.

(5) Supervising & Administration Cost

The supervising and administration cost was calculated by using the ratio of the supervising and administration cost to the cost of materials/construction work in the previous detail design. Namely, the ratio was 20% for transmission line work, substation work, and distribution line work, respectively.

(6) Engineering Cost

The engineering cost was assumed to be 7% of the materials/construction work cost that ratio is used for cost estimation of other transmission line, substation, and distribution line projects overseas as the engineering portion to direct construction cost in general.

10.3.3 O & M Cost

In economic evaluation of the project, consideration must be given not only to the project cost but also to the cost of O & M required of the transmission line, substation, and distribution line constructed. The concept of O & M cost of each individual facility is as follows.

(1) Transmission Lines

It was assumed that the cost of O & M equivalent to 0.7% of the cost of construction in both domestic currency and foreign currency would be incurred in each of the years following the year in which the equipment is put into operation.

(2) Substations

It was assumed that the cost of O & M equivalent to 1.0% of the cost of construction in both domestic currency and foreign currency would be incurred in each of the years following the year in which the equipment is put into operation.

(3) Distribution

It was assumed that the cost of O & M equivalent to 1.5% of the cost of construction in both domestic currency and foreign currency would be incurred in each of the years in which the equipment is put into operation. Besides O & M, 1.0% of administration cost and 1.0% of repair cost are considered. All costs are classified into local currency portion.

10.4 Results of Cost Estimation

10.4.1 Dar es Salaam

The master plan project costs in the Dar es Salaam region are shown in Table 10.6 - 9.

(1) Transmission Lines

Table 10.6 Project Cost - Transmission Lines (Dar es Salaam Case-B') Unit:1,000UD\$

Transmission Line	2002	2003	2004	2005	2006	2007	2008	2009	2010	Total	
Equipment, Material											
Foreign Currency	957	474	6933	6743	786	31	0	264	41	16229	
Local Currency	0	0	0	0	0	0	0	0	0	0	
Construction, Installation											
Foreign Currency	0	0	0	0	0	0	0	0	0	0	
Local Currency	89	48	906	2272	109	3	0	28	4	3459	
Packing, Shipping											
Foreign Currency		71	1040	1011	118	5	0	40	6	2291	
Local Currency		7	136	341	16	0	0	4	1	506	
SV and Administration											
Foreign Currency		95	1387	1349	157	6	0	53	8	3054	
Local Currency		10	181	454	22	1	0	6	1	674	
Construction Equipment and Tools											
Foreign Currency		19	277	270	31	1	0	11	2	611	
Local Currency		2	36	91	4	0	0	1	0	135	
Engineering											
Foreign Currency		33	485	472	55	2	0	18	3	1069	
Local Currency		3	63	159	8	0	0	2	0	236	
Sub Total (w/o O & M)											
Foreign Currency	957	692	10122	9845	1148	45	0	385	60	23254	
Local Currency	89	70	1323	3317	159	4	0	41	6	5009	
O & M											
Foreign Currency		7	10	59	106	111	111	111	113	629	114
Local Currency		1	1	7	23	24	24	24	24	128	24
Sub Total (w/ O & M)											
Foreign Currency	957	699	10132	9903	1253	157	111	497	173	23883	
Local Currency	89	71	1324	3324	182	28	24	65	30	5137	

O & M
after
2011

(2) Substations

Table 10.7 Project Cost - Substations (Dar es Salaam Case-B') Unit:1,000UD\$

Substation	2002	2003	2004	2005	2006	2007	2008	2009	2010	Total	
Equipment, Material											
Foreign Currency	1290	3304	23584	17735	5546	3247	801	875	2109	58491	
Local Currency	0	0	0	0	0	0	0	0	0	0	
Construction, Installation											
Foreign Currency	0	0	0	0	0	0	0	0	0	0	
Local Currency	194	496	3538	2660	832	487	120	131	316	8774	
Packing, Shipping											
Foreign Currency		496	3538	2660	832	487	120	131	316	8580	
Local Currency		74	531	399	125	73	18	20	47	1287	
SV and Administration											
Foreign Currency		661	4717	3547	1109	649	160	175	422	11440	
Local Currency		99	708	532	166	97	24	26	63	1716	
Construction Equipment and Tools											
Foreign Currency		165	1179	887	277	162	40	44	105	2860	
Local Currency		25	177	133	42	24	6	7	16	429	
Engineering											
Foreign Currency		231	1651	1241	388	227	56	61	148	4004	
Local Currency		35	248	186	58	34	8	9	22	601	
Sub Total (w/o O & M)											
Foreign Currency	1290	4857	34668	26070	8153	4773	1177	1286	3100	85375	
Local Currency	194	729	5201	3910	1223	716	176	193	465	12807	
O & M											
Foreign Currency		13	46	282	459	515	547	555	564	2980	585
Local Currency		2	7	42	69	77	82	83	85	447	85
Sub Total (w/ O & M)											
Foreign Currency	1290	4870	34714	26352	8612	5288	1725	1841	3664	88356	
Local Currency	194	731	5208	3952	1292	793	258	276	549	13254	

O & M
after
2011

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(3) Distribution System

Table 10.8 Project Cost - Distribution System(Dar es Salaam Case-B') Unit:1,000UD\$

Distribution	2002	2003	2004	2005	2006	2007	2008	2009	2010	Total	
Equipment, Material											
Foreign Currency	596	1292	2945	5178	1902	2182	187	920	228	15430	
Local Currency	0	0	0	0	0	0	0	0	0	0	
Construction, Installation											
Foreign Currency	175	380	866	1522	560	642	55	270	67	4537	
Local Currency	4	8	18	31	11	13	1	6	1	93	
Packing, Shipping											
Foreign Currency	116	251	572	1005	369	424	36	179	44	2995	
Local Currency	1	1	3	5	2	2	0	1	0	14	
SV and Administration											
Foreign Currency	154	334	762	1340	492	565	48	238	59	3993	
Local Currency	1	2	4	6	2	3	0	1	0	19	
Construction Equipment and Tools											
Foreign Currency	31	67	152	268	98	113	10	48	12	799	
Local Currency	0	0	1	1	0	1	0	0	0	4	
Engineering											
Foreign Currency	54	117	267	469	172	198	17	83	21	1398	
Local Currency	0	1	1	2	1	1	0	0	0	7	
Sub Total (w/o O & M)											
Foreign Currency	1126	2441	5564	9782	3595	4123	353	1737	431	29152	
Local Currency	6	12	26	45	16	19	1	9	1	136	O & M after 2011
O & M											
Foreign Currency	0	0	0	0	0	0	0	0	0	0	0
Local Currency	27	86	219	453	540	638	647	689	699	3997	699
Sub Total (w/ O & M)											
Foreign Currency	1126	2441	5564	9782	3595	4123	353	1737	431	29152	
Local Currency	33	97	245	499	556	657	648	697	700	4133	

(4) Total Cost in Dar es Salaam

Table 10.9 Project Cost - Total(Dar es Salaam Case-B') Unit:1,000UD\$

Summary	2002	2003	2004	2005	2006	2007	2008	2009	2010	Total	
Grand Total (w/o O & M)											
Foreign Currency	3373	7990	50355	45697	12895	8941	1531	3409	3591	137781	
Local Currency	289	811	6550	7273	1398	739	178	242	472	17952	O & M after 2011
O & M											
Foreign Currency	0	20	56	340	565	626	659	667	677	3609	699
Local Currency	27	88	227	503	632	740	753	796	808	4572	808
Grand Total (w/ O & M)											
Foreign Currency	3373	8010	50411	46038	13460	9567	2189	4076	4268	141390	
Local Currency	316	899	6777	7776	2030	1479	931	1038	1279	22524	

10.4.2 Arusha, Kilimanjaro

The master plan project costs in the Arusha, Kilimanjaro are shown in Table 10.10 - 13.

(1) Transmission Lines

Table 10.10 Project Cost - Transmission Lines (Arusha, Kilimanjaro Case-B') Unit:1,000UD\$

Transmission Line	2002	2003	2004	2005	2006	2007	2008	2009	2010	Total	
Equipment, Material											
Foreign Currency	1215	0	3120	5267	5451	154	0	0	0	15207	
Local Currency	0	0	0	0	0	0	0	0	0	0	
Construction, Installation											
Foreign Currency	0	0	0	0	0	0	0	0	0	0	
Local Currency	126	0	325	1694	1713	16	0	0	0	3874	
Packing, Shipping											
Foreign Currency			468	790	818	23	0	0	0	2099	
Local Currency			49	254	257	2	0	0	0	562	
SV and Administration											
Foreign Currency			624	1053	1090	31	0	0	0	2798	
Local Currency			65	339	343	3	0	0	0	750	
Construction Equipment and Tools											
Foreign Currency			125	211	218	6	0	0	0	560	
Local Currency			13	68	69	1	0	0	0	150	
Engineering											
Foreign Currency			218	369	382	11	0	0	0	979	
Local Currency			23	119	120	1	0	0	0	262	
Sub Total (w/o O & M)											
Foreign Currency	1215	0	4555	7690	7958	225	0	0	0	21643	
Local Currency	126	0	475	2473	2501	23	0	0	0	5598	
O & M											
Foreign Currency		9	9	30	37	105	106	106	106	509	O & M after 2011 106
Local Currency		1	1	3	4	27	27	27	27	117	27
Sub Total (w/ O & M)											
Foreign Currency	1215	9	4564	7720	7995	330	106	106	106	22152	
Local Currency	126	1	475	2476	2505	50	27	27	27	5715	

(2) Substations

Table 10.11 Project Cost - Substations (Arusha, Kilimanjaro Case-B') Unit:1,000UD\$

Substation	2002	2003	2004	2005	2006	2007	2008	2009	2010	Total	
Equipment, Material											
Foreign Currency		1252	15292	3060	5310	846	1136	138	0	27034	
Local Currency		0	0	0	0	0	0	0	0	0	
Construction, Installation											
Foreign Currency		0	0	0	0	0	0	0	0	0	
Local Currency		188	2203	459	797	126	169	21	0	3963	
Packing, Shipping											
Foreign Currency		188	2294	459	797	127	170	21	0	4055	
Local Currency		28	330	69	120	19	25	3	0	594	
SV and Administration											
Foreign Currency		250	3058	612	1062	169	227	28	0	5407	
Local Currency		38	441	92	159	25	34	4	0	793	
Construction Equipment and Tools											
Foreign Currency		63	765	153	266	42	57	7	0	1352	
Local Currency		9	110	23	40	6	8	1	0	198	
Engineering											
Foreign Currency		88	1070	214	372	59	80	10	0	1892	
Local Currency		13	154	32	56	9	12	1	0	277	
Sub Total (w/o O & M)											
Foreign Currency	0	1840	22479	4498	7806	1244	1670	203	0	39740	
Local Currency	0	276	3238	675	1172	185	248	31	0	5826	
O & M											
Foreign Currency			13	165	196	249	258	269	270	1420	O & M after 2011 270
Local Currency			2	24	29	36	38	39	40	208	40
Sub Total (w/ O & M)											
Foreign Currency	0	1840	22492	4664	8002	1493	1928	472	270	41160	
Local Currency	0	276	3240	699	1200	222	286	70	40	6033	

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(3) Distribution System

Table 10.12 Project Cost - Distribution System(Arusha, Kilimanjaro Case-B') Unit:1,000UD\$

Distribution	2002	2003	2004	2005	2006	2007	2008	2009	2010	Total	
Equipment, Material											
Foreign Currency	265	3351	743	1365	279	808	808	480	0	8099	
Local Currency	0	0	0	0	0	0	0	0	0	0	
Construction, Installation											
Foreign Currency	77	986	219	401	82	237	237	141	0	2380	
Local Currency	2	20	4	8	2	5	5	3	0	49	
Packing, Shipping											
Foreign Currency	51	651	144	265	54	157	157	93	0	1572	
Local Currency	0	3	1	1	0	1	1	0	0	7	
SV and Administration											
Foreign Currency	68	867	192	353	72	209	209	124	0	2096	
Local Currency	0	4	1	2	0	1	1	1	0	10	
Construction Equipment and Tools											
Foreign Currency	14	173	38	71	14	42	42	25	0	419	
Local Currency	0	1	0	0	0	0	0	0	0	2	
Engineering											
Foreign Currency	24	304	67	124	25	73	73	43	0	734	
Local Currency	0	1	0	1	0	0	0	0	0	3	
Sub Total (w/o O & M)											
Foreign Currency	499	6332	1405	2578	527	1526	1526	907	0	15299	
Local Currency	3	29	6	12	3	7	7	4	0	72	
O & M											
Foreign Currency	0	0	0	0	0	0	0	0	0	0	O & M after 2011
Local Currency	12	164	197	259	272	308	345	367	2291	367	
Sub Total (w/ O & M)											
Foreign Currency	499	6332	1405	2578	527	1526	1526	907	0	15299	
Local Currency	15	193	203	271	275	316	352	371	367	2363	

(4) Total Cost in Arusha, Kilimanjaro

Table 10.13 Project Cost - Total(Arusha, Kilimanjaro Case-B') Unit:1,000UD\$

Summary	2002	2003	2004	2005	2006	2007	2008	2009	2010	Total	
Grand Total (w/o O & M)											
Foreign Currency	1714	8172	28439	14766	16291	2994	3196	1110	0	76683	
Local Currency	129	306	3719	3160	3675	216	256	35	0	11495	
O & M											
Foreign Currency	0	9	21	196	233	355	364	375	377	1929	O & M after 2011
Local Currency	12	165	200	286	304	372	410	433	434	2616	434
Grand Total (w/ O & M)											
Foreign Currency	1714	8181	28460	14962	16524	3349	3560	1485	377	78611	
Local Currency	141	470	3919	3446	3980	588	666	469	434	14111	

(The cost of Mbezi S/S rehabilitation carried out by TANESCO, construction of Tandika S/S and Magomeni S/S supported by KfW, rehabilitation of Ubungu S/S financed by Sida, construction of Monduli S/S financed by AfDB are included in the Project Cost)

CHAPTER 11

**FINANCIAL SITUATION
AND
PROBLEMS OF TANESCO**

CHAPTER 11 FINANCIAL SITUATION AND PROBLEMS OF TANESCO

The Study Team assigned Deloitte & Touche Ltd., a local consulting firm, for the detail study of financial situation and problems of TANESCO, and the local consulting firm conducted the study under wholehearted cooperation of TANESCO. The results of study are summarized below.

11.1 Analysis of Financial Situation of TANESCO

The electric utility industry, which is a typical capital-intensive industry, requires large amounts of funds for construction of various types of facilities, including power stations. In many of the developing countries, the funds required for construction of those facilities are mostly borrowed from industrialized countries. In many cases, therefore, the repayment of principal and interest of the loan is a great financial burden on the management of the electric utility business. Besides, since the electricity charges are paid in domestic currency, whereas the loans are repaid in foreign currency, the exchange loss has a significant effect on the profitability. On the other hand, since electricity is a part of the fundamental social infrastructure, the tariff rates are normally kept low to promote the improvement of national welfare, development of economy, etc. Therefore, in many countries, the government is providing subsidies to electric utility industry, or the electric utility business is owned by the government. State-owned enterprises are often criticized as holding superfluous personnel and lacking in strong cost consciousness. In many of the countries in Southeast Africa, hydropower is the principal source of electricity. This means that in the dry years, hydroelectric power is undersupplied, making it necessary to increase the operating hours of thermal power stations, which generate electricity at higher cost than hydropower stations. TANESCO have abovementioned situation and/or problems, except that the Tanzanian government does not grant any direct subsidies to TANESCO. The following section describes current situation and problems of TANESCO analyzed from its financial statements.

11.1.1 Income Statements

Table 11.1 shows income statements of TANESCO from 1994 to 2000 (figures for 2000 are unaudited ones). As is evident from the table, operating profit of TANESCO widely varies from year to year. One reason for this is that since TANESCO depends on hydropower plants much more than on thermal power plants, which are higher in operating expense, the generation cost fluctuated markedly according to hydrological conditions. In comparing generation costs in good hydrological year (1998) and in bad hydrological year (1997), generation cost in 1998 was less than half of that in 1997. Looking at gross profit ratio and EBITDA (earning before interest, tax, depreciation and amortization)—the indexes of profit, they are much larger in 1998 than in 1997.

Concerning profit before tax, it was negative in all the years under review, except 1997. The major reason for the above situation is that an increase in tariff has not kept pace with increase in generation cost caused by the change of fuel price, the depreciation of the Tanzanian shilling, etc. The last major tariff increase preceding the May 2002 revision was took place in November 1995, and financial situation in 1996 was improved significantly compared with previous year. Despite the fact that it was a dry year, financial profitability

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in 1997 was positive because tariff increase took place in 1995 effected favorably and the exchange loss was not accounted.

Table 11.1 Profit and Loss Statement of TANESCO (Unit: TSch. Bn)

	1994	1995	1996	1997	1998	1999	2000
Sales of Energy	63.69	85.14	110.02	106.77	117.57	124.20	130.77
Cost of sales							
Generation & Transmission	20.01	25.85	21.84	38.05	17.00	28.33	51.35
Distribution	3.83	4.60	4.02	4.21	4.97	9.28	10.41
Depreciation	10.94	25.25	32.94	35.19	39.93	41.62	38.78
Total	34.79	55.70	58.80	77.45	61.90	79.24	100.54
Gross Profit	28.90	29.44	51.23	29.32	55.67	44.96	30.23
Operating Expenses	30.56	57.90	55.77	31.47	70.65	72.06	41.38
Operating Profit	▲1.66	▲28.46	▲4.51	▲2.14	▲14.98	▲27.10	▲11.16
Non-operating Income	0.86	2.02	1.16	5.24	1.25	1.93	1.92
Profit before abnormal items	▲0.80	▲26.44	▲3.38	3.09	▲13.73	▲25.17	▲9.24
Items of Abnormal Size	4.3	--	--	--	--	--	--
Profit before tax	▲5.13	▲26.44	▲3.38	3.09	▲13.73	▲25.17	▲9.24
Provision for Tax	1.5	0.21	0.31	--	0.54	0.58	--
Profit after Tax	▲6.63	26.65	▲3.69	3.09	▲14.23	▲25.68	▲9.24
EBITDA	20.58	33.50	56.08	44.48	58.63	56.91	30.80
Ratios							
Gross Profit Ratio	45.37%	34.57%	46.56%	27.47%	47.35%	36.20%	23.11%
Operating Profit Ratio	--	--	--	--	--	--	--
PBT/Sales (%)	--	--	--	2.90%	--	--	--
PAT/Sales (%)	--	--	--	2.90%	--	--	--
EBITDA/sales	32.31%	39.35%	50.97	41.66%	49.87%	47.43%	23.55%

Source: Deloitte & Touche

11.1.2 Balance Sheets

Table 11.2 shows TANESCO's balance sheets from 1994 to 2000. These balance sheets reveal three important facts: TANESCO has huge amounts of account receivable; TANESCO's paid up capital was increased dramatically in 1999; and TANESCO has large amounts of debts.

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Table 11.2 Balance Sheet of TANESCO

(Unit: TSch. Bn)

	1994	1995	1996	1997	1998	1999	2000
ASSETS							
Current Assets							
Cash and Bank Balance	5.48	5.10	8.15	9.59	20.95	13.32	12.89
Prepayments and Deposits	2.01	0.83	1.63	0.52	0.93	2.19	1.75
Debtors and Advances	39.80	62.53	86.71	93.46	113.27	142.94	170.55
Stock and Stores	10.21	8.69	11.00	13.78	17.96	30.32	24.36
Taxation	0.47	0.69	1.34	3.34	5.20	8.68	11.26
Total	57.97	77.84	108.84	120.69	158.31	197.45	220.80
Less: Current Liabilities							
Bank Overdraft	6.59	7.07	3.21	5.43	3.21	5.11	8.50
Creditors	73.97	85.54	92.98	33.30	46.73	74.17	100.08
Deferred Long-term Loans	55.78	70.25	83.28	16.94	34.23	57.07	68.29
Current Maturity of L/T Loans	11.37	9.24	8.98	14.14	15.93	17.59	19.10
Total	147.72	172.09	188.45	69.81	100.20	152.94	195.98
Net Current Assets	▲89.75	▲94.25	▲79.61	50.88	58.10	44.52	24.83
Investment	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Fixed Assets	253.35	777.16	875.40	931.28	975.58	1,003.62	1,162.98
Capital Work in Progress	87.30	64.64	90.44	119.85	182.43	232.34	66.81
TOTAL	250.92	741.57	886.25	1,102.02	1,216.13	1,280.49	1,254.63
SOURCES OF FUNDS							
Shareholders' Funds							
Share Capital	1.03	1.03	1.03	1.03	1.03	293.91	293.91
Advance Towards Share Capital	12.58	15.99	15.99	292.88	292.89	0.39	0.39
Reserves & Surplus	▲30.18	403.80	498.33	589.84	649.41	624.34	617.30
Total	▲16.57	420.82	515.34	883.76	943.35	918.64	911.60
Grants	63.33	77.61	81.97	6.05	10.84	37.46	42.03
Development Funds	78.52	85.25	87.17	--	--	--	--
Borrowed Funds							
Long-term Loans Payable	125.63	157.89	201.76	212.22	261.95	324.39	301.00
Total	250.92	741.57	886.25	1,102.02	1,216.13	1,280.49	1,254.63

Source: Deloitte & Touche

(1) Huge amounts of account receivable

On the balance sheet, account receivables are shown under the item "Debtors and Advances." It can be seen from the balance sheets that TANESCO's account receivable have been rapidly increasing year by year. Since "Debtors and Advances" includes

liabilities too, the actual amount of account receivable is larger than the amount shown under this item. Table 11.3 shows the change in amount of account receivable.

Table 11.3 Trends of Receivables by Customer Type (Unit: TSch. Million)

Year	1995	1996	1997	1998	1999	2000
Governments	n.a.	n.a.	8,212	10,230	24,889	34,722
Zanzibar	n.a.	n.a.	4,022	8,443	14,251	22,792
Parastatal	n.a.	n.a.	10,422	12,397	11,557	14,773
Embassies	n.a.	n.a.	1,202	1,335	1,516	1,268
Private Accounts, Individuals	n.a.	n.a.	92,211	118,686	126,130	109,603
Industrial & Commercial	n.a.	n.a.	5,999	6,961	7,711	18,338
Others	n.a.	n.a.	1,326	654	1,457	1,822
Total	81,442	118,247	123,396	158,707	187,512	204,002
Sales Amount	85,139	110,028	106,771	117,573	124,199	130,767

Source: Deloitte & Touche

Due in part to the fact that TANESCO does not write off uncollectible account receivable, the amount of it has been expanding year by year, to Tsh 204 billion (\$230 million) as of the end of 2000. This amount corresponds to 156% of the 2000 sales of electricity (Tsh 130.8 billion). As for account receivable by user, the account receivables from the governments (central and local) and public corporations have continued increasing, although the account receivable from individuals are decreasing. It is for political, not economical, reasons that the governments and public corporations do not pay electricity charges. Although they say that they will be sure to pay them after privatization of TANESCO, a large amount of account receivable from governments and public corporations is one of the major problems TANESCO now faces. As of the end of 2000, account receivables are broken down by user into the governments (17%), public corporations (7%), Zanzibar (11%), and private companies, individuals, etc. (65%). By region, they are broken down into Dar es Salaam (Tsh 101.6 billion, or about 50% of the total amount of account receivable), Kilimanjaro (Moshi) (Tsh 21.9 billion), and Arusha (Tsh 19.5 billion).

It is said that the reasons for the arrearage on the part of the government and public corporations are given below. However, both the Tanzanian government (excluding the government of Zanzibar) and TANESCO are making a movement to settle the problem of arrearage before commencement of restructuring of TANESCO. Namely, with the aim of improving the rate of collection from the government and public corporations, they are preparing for installation of LUKU meters in the offices of the government and public corporations.

- Since the foundation of TANESCO, the Tanzanian government has provided the company with equipment, funds, etc. it needed. Because of this, the government may well think that the outstanding electricity charge should be offset by the funds it supplied to TANESCO. Besides, in view of the relationship between the Tanzanian government and TANESCO, which are analogous to parent and child, the government might think that the parent will not have to pay any money to the child.
- Many of the bills issued by TANESCO contain a lot of miscalculations, causing

some trouble frequently. There are government offices that cite inaccurate bills as the reason for their arrearage.

Table 11.4 Details of Receivable by Customer Type at the end of year 2000
(Unit: TSch. Million)

Year	Over 120 days	90 – 120 days	60 – 90 days	30 – 60 days	Less than 30 days	Total
Governments	24,849	2,029	1,809	3,814	2,222	34,722
Zanzibar	20,293	589	623	641	644	22,792
Parastatal	5,598	626	735	713	7,099	14,773
Embassies	1,027	44	36	56	104	1,268
Private Accounts, Individuals	92,327	3,032	3,687	4,942	5,615	109,603
Industrial & Commercial	12,185	782	755	2,524	2,090	18,338
Others	1,589	77	68	45	42	1,822
Total	158,583	7,155	7,690	12,690	17,882	204,002

Source: Deloitte & Touche

(2) Dramatic capital increase

TANESCO is a corporation, which is wholly owned by the government. Until 1998, TANESCO's paid-in capital was mere Tsh 1.03 billion (about \$1.14 million). In 1999, TANESCO issued new shares worth Tsh 292.82 billion (about \$325 million). As a result, the paid-in capital of TANESCO came to Tsh 293.91 billion (about \$326.5 million). The uses and breakdown of the dramatic capital increase are as shown in the following table.

Table 11.5 Application of Additionally Issued Share Capital (Unit: TSch. Billion)

Particulars	
Discharge of overdue long-term loan payable to the Government	70.25
Discharge of interest payable on long-term loan to the Government	68.02
Discharge of long-term loan payable to the Government	2.08
Total	140.35
Less: Unpaid Electricity Bill by Government	24.23
Net Discharge liabilities by the Government	116.12
Grant received from donor community till 1995	77.61
Development Fund received till 1995	85.24
Amount received from the Government during the previous year	13.91
Total	292.88

Source: Deloitte & Touche

As is evident from the above table, TANESCO's debts (long-term loans) decreased by Tsh 116.1 billion thanks to the capital increase. This decrease in long-term loans reduced the burden of annual interest payment by about Tsh 5 billion. In Tanzania, it is considered that the above reduction of long-term loans is a sort of the government's compensation for its failure to pay its electricity charges.

(3) Large amounts of long-term loans

Because of Tanzania's immature financial market and TANESCO's poor financial

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condition, TANESCO has been dependent on soft loans from foreign aid organizations for much of the fund for capital investments. Normally, the terms of those soft loans are generous—low interest rates and long periods of repayment. In many cases, however, lending of soft loans was made through the government and the terms of loans made by the government to TANESCO were not especially favorable. For example, the Nordic Development Fund (NDF) lends to the Tanzanian government on these terms: interest rate, 0.75% per annum; grace period, 10 years; and repayment period, about 30 years. The terms of loans of the African Development Fund are nearly the same as those of the NDF, except that the interest rate is 1% per annum. On the other hand, the Tanzanian government typically lends to TANESCO at an interest rate of 8% per annum with 3 to 5 years' grace period and repayment period of about 20 years. Besides, TANESCO is required to bear the exchange risk involved in the loans. Table 11.6 shows the breakdown of loans to TANESCO by currency type, and Table 11.7 shows the breakdown of long-term debts of TANESCO.

Table 11.6 Details of Long-term Debt by Type of Currency

Currency		Outstanding Amount		% of Total
		Foreign	Tanzania Shilling	
SDR	SDR	127,551,06	136,016,875,806	49.92
Norway Kroner	NOK	5	37,290,713,029	13.69
Units of Accounts	UA	404,222,79	35,138,874,105	12.89
Swedish Kroner	SEK	5	29,291,053,821	10.76
European Currency Unit	ECU	32,951,799	23,751,988,923	8.73
French Franc	FF	340,847,26	4,716,664,864	1.74
Kuwait Dinar	KD	3	3,417,298,672	1.25
Pound Starring	GBP	31,205,585	1,710,311,022	0.62
US Dollars	USD	40,646,117	1,061,201,838	0.39
Tanzania Shilling	TSch.	1,286,395	21,827,816	0.01
Total		1,418,913	272,416,809,896	100.00
		1,309,673		
		21,827,816		

Source: Deloitte & Touche

Table 11.7 Details of Long-term Debt (1/2)

Sr.	Lenders	Project	Currency	Amount in Currency of Origin	Payment Period	Interest Rate	Outs. In Currency of Original as at 31.12.2000	Outstanding as at 31.12.2000 in Tshs.
1	European Economic Community Through the Government of Tanzania Unsecured	Kidatu Hydro Project - Phase 2	Tshs.	58,100,000	1982 - 2001	8.50%	9,683,360	9,683,360
2	IBRD Loan 1306 Through the Government of Tanzania Unsecured	Kidatu Hydro Project - Phase 2	US \$	30,000,000	1986 - 2001	8.85%	1,309,673	1,061,201,838
3	Commonwealth Development Corporation Loan	Kidatu / Mufindi Power Transmission	Tshs.	31,571,715		8.00%	11,839,392	11,839,392
4	Kreditanstalt Fur Wiederaufbau Frankfurt IBRD Loan 1405 Through the Government of Tanzania Unsecured	Mtera Power Plant (Unsecured)	SDR	82,500,000	1988 - 2003	11.00%	4,837,030	5,158,073,315
5	African Development Fund Through the Government of Tanzania - Unsecured	Rural Electrification Project	UA	13,000,000	1994 - 2023	1.00%	9,748,044	10,395,040,633
6	IBRD Loan 1687	National Power Rehabilitation	SDR	32,357,750	1986 - 2006	9.00%	2,728,823	2,909,940,665
7	NORAD Loan Government of Kingdom of Norway	National Power Rehabilitation	NOK	36,700,000		0.00%	62,446,476	5,760,866,667
8	International Development Association 2330		SDR	7,500,000	1985 - 2009	7.73%	4,500,000	4,798,673,685
9	International Development Association 2439		SDR	144,200,000	1988 - 2017	7.43%	95,445,233	101,780,117,494
10	Tanzania Investment Bank	Equipment and Generators for Mwanza Power Station Project	Tshs.	7,500,000		9.00%	305,064	305,064
11	French Bank Coop. Asst	National Power Rehabilitation	FF	70,600,000			40,646,117	4,716,664,864
12	Instituto De Credito Oficial of the Kingdom of Spain Spanish Loan	Agro-based Ind.	ECU	10,000,000		3.00%	787,611	5,994,871,516
13	Medio Credito Centrale SPA through BOT Through the Bank of Tanzania	Masaki / Bukoba Project	ECU	24,999,916			535,622	4,076,863,944

Source: Deloitte & Touche

Table 11.7 Details of Long-term Debt (2/2)

Sr.	Lenders	Project	Currency	Amount in Currency of Origin	Payment Period	Interest Rate	Outs. In Currency of Original as at 31.12.2000	Outstanding as at 31.12.2000 in Tshs.
14	ODA Loan - United Kingdom	Mufindi Electrification	GBP	2,067,000		9.00%	1,418,913	1,710,311,022
15	Nordic Development Fund (Government of Tanzania Through Ministry of Finance)	Power VI Project	SDR	5,000,000	2002 - 2021	7.43%	4,964,511	5,294,014,697
16	SADCC Financing	Mbozi / Tanduma	NOK				7,779,724	717,701,903
17	Kuwait Fund for Arab Economic Development No.382	Mbeya / Tabora / Dodoma	KD	1,900,000	1995 - 2014	9.00%	1,286,395	3,417,298,672
18	SIDA Through the Government of Tanzania Unsecured	Ubungo Gas Turbines	SEK	200,000,000	1997 - 2016	7.73%	151,483,133	13,017,856,032
19	Nigeria Trust Fund (NTF) NTF - N/TAN/ELC/92/1	220 KV Singida / Arusha Project	UA	6,000,000	1992 - 2032	4.00%	3,563,472	3,799,986,514
20	SIDA	Lower Kihansi Power Project	SEK	200,000,000	2001 - 2020	7.43%	189,364,130	16,273,197,769
21	NORAD - The Government of Kingdom of Norway Through the Government of Tanzania	Lower Kihansi Power Project	NOK	380,000,000	2001 - 2020	7.43%	333,996,595	30,812,144,459
22	Government of European Investment Bank (EIB) IBRD Loan No.1405 TA	Lower Kihansi Power Project	ECU	23,000,000	2001 - 2015	5.00%	17,973,245	13,680,253,463
23	ADF - F - TAN - ELC - 92 - 26	Singida / Arusha	UA	25,000,000	1992 - 2030	4.00%	19,640,283	20,943,846,958
24	NDF 60 - Nordic Development Project	Power IV Project	SDR	4,000,000	2004 - 2033	0.75%	3,878,064	4,135,458,592
25	International Development Association - IDA 2202 TA Through the Government of Tanzania	Kihansi Hydro Electric Plant	SDR	11,130,000		7.43%	11,197,404	11,940,597,378
	Total							270,706,498,874

Source: Deloitte & Touche

11.1.3 Cash Flow Table

As is evident from "Net Cash Flow from Operating Activities" in Table 11.8, TANESCO has secured the funds required for power generation, transmission, and distribution by the revenue from the sale of electricity. However, it has not been enough for the repayment of loans. As a result, the repayment of loans has been deferred (see Table 11.9). As can be seen in the table 11.9, the amount of deferred loan payable decreased markedly in 1997. This is due to the fact that TANESCO was exempted from payment of Tsh 70.2 billion (about \$78 million) (this amount was converted into own capital). Naturally, TANESCO has not enough funds for the capital investment to meet the ever-increasing demand of electricity and the renewal of obsolescent facilities. It may be considered that the dependence of fund for construction of new facilities and expansion/renewal of the existing facilities on foreign donors and financial institutions and repayments of these loans are worsening the financial situation of TANESCO.

Table 11.8 Cash Flow Table of TANESCO

(Unit: TSch. Million)

Year	1995	1996	1997	1998	1999	2000
Cash flow from Operating Activities						
Net Profit before tax	▲26.44	▲3.38	3.09	▲13.73	▲25.17	▲9.24
Add: Depreciation	25.25	32.93	35.19	39.93	41.62	38.78
Add: Foreign Exchange Loss	20.59	12.23	▲3.52	15.70	21.29	▲9.63
Add: Loss on sales of fixed assets	▲0.07	▲0.10	▲0.02	0.50	▲0.11	▲0.01
Decrease in Working Capital	▲8.46	▲19.85	▲6.17	▲10.98	▲16.86	5.71
Cash from operating activities	10.86	21.83	28.57	31.43	20.77	25.61
Corporate tax paid	▲0.43	▲0.96	▲2.00	▲2.36	▲3.99	▲2.58
Net Cash flow from operating activities	10.43	20.87	26.56	29.07	16.78	23.03
Cash from Investing Activities	▲59.71	▲62.72	▲34.86	▲59.12	▲91.37	▲49.43
Cash from Financing Activities	48.42	48.76	7.51	43.52	65.17	22.57
Net Increase in Cash	▲0.85	6.91	▲0.97	13.47	▲9.42	▲3.82
Cash at the beginning of the year	▲1.11	▲1.97	4.94	4.16	17.63	8.21
Cash at the end of the year	▲1.97	4.94	4.16	17.63	8.21	4.38

Source: Deloitte & Touche

Table 11.9 Details of Deferred Long-term Loan Payable (Unit: TSch. Bn)

Year	1995	1996	1997	1998	1999	2000
Opening Balance	55.78	70.25	83.28	16.94	34.22	57.07
Add: Exchange fluctuation losses for the year	3.78	4.17	0.00	2.47	6.84	▲2.92
Add: L/T loan transferred to overdue category	10.69	8.86	8.08	14.81	16.86	16.53
Less: Offset against unpaid Government Electricity Bills						
Less: Transfer to Share Capital			70.24			
Less: Currency Fluctuation charged for 1996			4.17			
Less: Paid during the year					0.86	2.39
Closing Balance	70.25	83.28	16.94	34.22	57.07	68.29

Source: Deloitte & Touche

11.1.4 Foreign Donor Assistance

The World Bank has been most deeply involved in the development of power sector of Tanzania since 1969. To date, the International Development Association (IDA) has financed a total amount of \$437 million for 13 energy-related projects. Of those 13 projects, eight were electric power development projects worth \$364 million. This assistance has helped to transform the electric power system from one dependent almost entirely on small thermal (diesel) power to one that uses hydropower resources as the basic source of power. One of the other five projects is the Songo Songo Gas Field Development Project in which TANESCO is deeply involved. For this project, the IDA has a plan to grant an additional loan of \$183 million.

A number of bi-lateral and multilateral organizations have also involved in the development of power sector in Tanzania, either loans or grants. Table 11.10 shows the grant aids extended to TANESCO (excludes Japanese aids). The loans to TANESCO are as shown in Table 11.7.

As can be seen from Table 11.10, the grant aids to TANESCO have been given largely by European organizations, including NORAD (Norway), KFW (Germany), FINNIDA (Finland), SIDA (Sweden), and ADF (France). USAID (United States) and CIDA (Canada) have not funded any project in the power sector but have funded a number of health, governance and democracy, education and other poverty reduction initiatives.

Concerning their assistances in the future, it is said that their emphasis on power sector will shift to rural energy program such as rural electrification, after privatization of TANESCO. The donors in Europe intend to provide aids to Tanzania as those of the EU, not as the aids of the individual countries.

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Table 11.10 Details of Grants to TANESCO

Donor	Project	Currency	Amount Received	
			Foreign Currency	T'Sch
Year 1995				
SIDA	Capacitor installation at Ubungo	SEK	4,433,939	231,622,736
KFW	220kV Kidatu / Morogoro	DEM	8,146	3,133,483
NORAD	132kV Hale / Chalinze Rehabilitation	NOK	1,342,799	127,368,760
NORAD	Rehabilitation of Kunduchi substation	NOK	24,463,430	1,649,734,846
NORAD	Rehabilitation of Mogomeni substation	NOK	12,958,258	1,130,299,910
NORAD	Redevelopment of Pangani falls	NOK	10,997,357	892,588,364
FINNIDA	Redevelopment of Pangani falls	NOK	63,003,886	5,609,379,480
SIDA	Redevelopment of Pangani falls	NOK	1,516,682	133,806,829
KFW	2 nd 220kV Kidatu / Morogoro / Dar	DEM	25,724,669	4,148,037,214
KFW	Rehabilitation of grid control center network	DEM	602,494	286,674,175
SIDA	Environmental Study – Kihansi	SEK	601,806	64,233,868
TOTAL				14,276,879,665
Year 1996				
NORAD	Const. of substation at Kihansi and Kidatu	NOK	43,030	3,914,010
NORAD	Redevelopment of Pangani falls	NOK	108,351	9,245,503
NORAD	Redevelopment of Pangani falls	NOK	53,761	5,032,321
FINNIDA	Const. of substation at Kihansi and Kidatu	NOK	9,662,823	850,121,414
SIDA	Redevelopment of Pangani falls	NOK	5,369,969	489,405,711
KFW	Redevelopment of Pangani falls	DEM	4,584,074	1,862,468,922
KFW	Const. of substation at Kihansi and Kidatu	DEM	743,765	294,951,060
SIDA	Redevelopment of Pangani falls	SEK	250,531	23,850,075
NORAD	Redevelopment of Pangani falls	NOK	7,779,724	414,616,736
SIDA	Const. of substation at Kihansi and Kidatu	SEK	8,841,411	407,457,365
TOTAL				4,361,063,117
Year 1997				
KFW	Const. of substation at Kihansi and Kidatu	DEM	3,860,478	1,522,264,223
KFW	Redevelopment of Pangani falls	NOK	1,615,895	133,741,005
NORAD	Redevelopment of Pangani falls	NOK	824,361	73,650,785
TOTAL				1,729,656,013
Year 1998				
KFW	Construction of substation at Kihansi	DEM	12,350,680	4,777,416,955
KFW	Rehabilitation of grid control network	DEM	38,000	14,317,685
TOTAL				4,791,734,640

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	Year 1999			
KFW	Construction of substation at Kihansi	DEM	7,379,071	3,100,349,038
KFW	Rehabilitation of grid control center network	DEM	71,518	30,722,188
NORAD	Rehabilitation of Changombe substation	NOK	13,975,436	1,234,952,019
NORAD	Construction of 229kV Singida – Arusha	NOK	226,130,000	22,252,887,975
	TOTAL			26,618,911,220
	Year 2000			
KFW	Construction of substation at Kihansi	DEM	2,268,775	878,684,927
KFW	Rehabilitation of grid control center network	DEM	182,402	77,256,617
NORAD	Construction of 132 kV Mbala / Sumbawanga	NOK	28,438,930	2,702,397,125
AFD	Rehabilitation of Morogoro substation	EURO	1,078,685	783,366,840
SIDA	Rehabilitation of Ubugo power station	SEK	590,000	55,034,693
KFW	Energy efficiency improvement program	DEM	183,984	74,293,677
	TOTAL			4,571,062,879

Source: Deloitte & Touche

11.1.5 Administration

(1) Energy loss

The large amount of energy loss is one of the major problems of TANESCO. As is evident from Fig. 11.1, in the period from 1995 to 2000, the loss of energy increased 2.8 times from 246 GWh to 679 GWh, whereas the amount of electricity generation grew only about 40%.

The breakdown of the energy loss is as shown in Fig. 11.2. In recent years, the non-technical energy loss has been increasing rapidly, whereas the loss of energy in transmission and distribution has been almost proportional to the change in amount of electricity generation. The amount of non-technical energy loss in 2000 was 355 GWh, or Tsh 25 billion (about \$27 million). Non-technical energy loss is otherwise called unexplainable energy loss. Although the reason why it occurs can hardly be clarified completely, some of the reasons for increased non-technical losses are:

- Inaccurate reading of meters
- Defective meters
- Billing based on inaccurate estimate
- Illegal acts, such as stealing of electricity, tampering with meters, and bypassing

Needless to say, such illegal acts as stealing of electricity are prohibited by the Electricity Ordinance. However, even though it has been amended several times in the past, the Ordinance is such an old one (enacted in 1957) that it does not go well with the present situation. For example, person caught stealing electricity can only be fined Tsh 500 (about 55 cents).

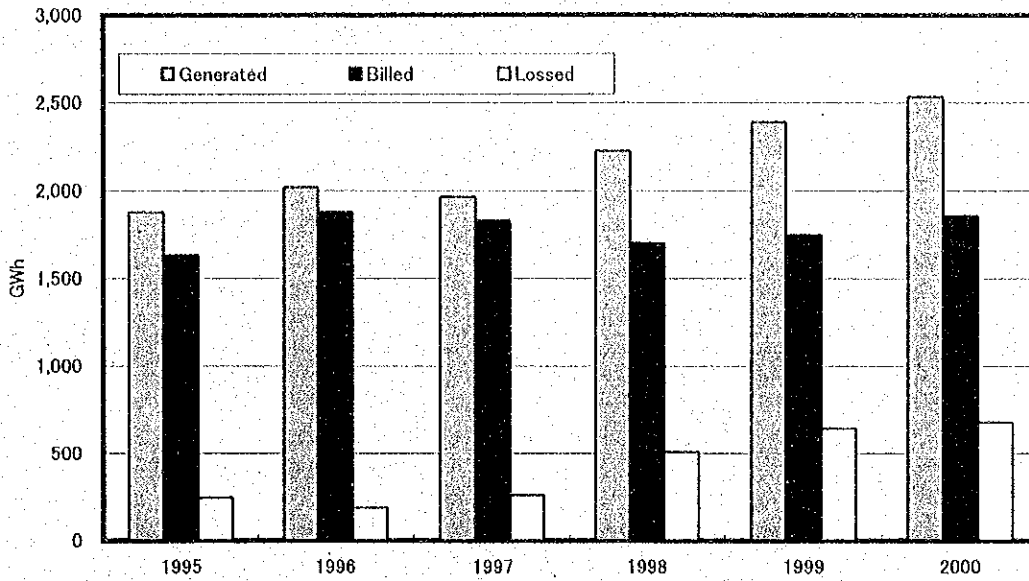


Fig. 11.1 Trends of Generated, Billed and Lost Energy

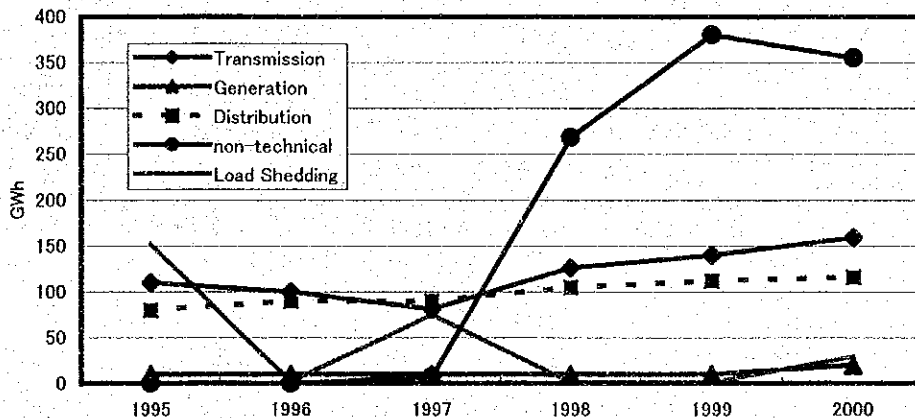


Fig. 11.2 Details of Lost Energy

(2) Personnel expense

Total personnel expense (salary and allowances) of TANESCO, which was Tsh 11.1 billion in 1995, rose to Tsh 33 billion in 1999 and Tsh 38.9 billion in 2000. In 2000, it was the largest expense of TANESCO, almost equal to depreciation (Tsh 38.7 billion) and fuel costs (Tsh 37.4 billion). The ratio of personnel expense to sales that was 13% in 1995 has been increasing year by year, to 27% in 1999 and 30% in 2000. Due in part to the government's policy of reducing the number of public servants, the employees of TANESCO have been decreasing year by year as shown in Table 11.11. This continual decrease in the number of employees is due to the suspension of recruitment and the natural decrease (retirements, etc.). The fact that the size of headquarters staff has decreased most reflects TANESCO's earnest effort to reduce its administrative personnel. The levels of wages have been set on the high side to attract and retain the best staff.

Table 11.11 Manpower Position of TANESCO

	1996	1997	1998	1999	2000	Decrease
Head Office	1,593	1,551	1,527	1,402	1,095	498
Hydro Power Plant	809	779	744	717	767	42
Zonal and Regional Office	4,979	5,034	4,809	4,739	4,823	156
Total	7,381	7,364	7,080	6,858	6,685	696

Source: Deloitte & Touche

Table 11.12 compares a number of leading indicators of the power sector between Tanzania and its neighboring countries. From the table, the following observation can be made.

- In terms of electric power sales per employee, TANESCO ranks lowest.
- In terms of monthly power consumption per user, Tanzania ranks lowest.
- At TANESCO, the number of customers per employee is 65, which ranks standard among the electric utility companies compared.

On the basis of the above, it can be said that extremely small power consumption per user is the characteristics of electricity market of Tanzania. In other words, in Tanzania, the costs of distributing electricity and collecting electricity charges are high in comparing with sales amount, and utility company can hardly secure a respectable profit. Although the above problem is structural and cannot be solved by TANESCO, it is necessary for TANESCO to further enhance its productivity with a clear recognition that the business climate in Tanzania is severer than in any of its neighboring countries. In this context, it is an important task for TANESCO to reduce its personnel expenses—the highest cost item of the company.

(3) Other consideration

Since many of the parts, tools, etc. required for maintenance and repair of power stations, transmission and distribution lines, etc are not available locally at good terms, TANESCO keeps huge stocks. It is estimated that the total amount of stocks at the end of 2000 was Tsh 28.9 billion, Tsh 4.5 billion of which is regarded as obsolete and slow-moving stock. It is desirable to reduce the huge stock with careful and reasonable procurement plan.

Table 11.12 Manpower Comparisons with Neighboring Countries

Name of the Company	Country	Gross Staffing Drivers						Employees		Benchmarks				
		Total Sales (GWh)	Peak Demand (MW)	Total Capacity (MW)	Circuit Length		No. of Customer	Total	Admin	Sales / Total Empl.	Cust / Total Empl.	Cust / Admin Empl.	Circuit km. / Empl.	KWh / Cust. / month
					Trans. (km)	Dist. (km)								
Electricidade de Mozambique	Mozambique	885	235				186,208	2,700		0.33	69			396
ESKOM	South Africa	171,454	27,803	39,405		281,010	2,564,000	37,311		4.60	69		7.53	5,572
Kenya Power & Lighting	Kenya	3,879	753	808	2,605	10,000	472,871	7,167	2,655	0.54	66	178	1.76	684
ZESA	Zimbabwe	10,150	1,950	1,960			451,615	7,462		1.36	61			1,873
Tanesco	Tanzania	1,856	368	803	4,420	21,528	431,205	6,685	3,954	0.28	65	109	3.88	359
Swaziland Electricity Board	Swaziland	695	145				33,316	728		0.95	46			1,738
ZESCO	Zambia	6,430	1,126	1,768	6,159		170,924	4,097		1.57	42			3,135
Botswana Power Corp.	Botswana	1,479	257	132	2,454		67,397	1,670	552	0.89	40	122		1,829
ESCOM	Malawi	802	190				71,990	2,218		0.36	32			928
National Electricity Co.	Angola	1,009	209	598			79,556	3,319		0.30	24			1,057
Egyptian Electricity Authority	Egypt	56,982	10,500	13,300	26,304	264,511	1,219,432	109,285		0.52	11		2.66	3,894
Namibian Power Corp.	Namibia	1,812	292	393			2,219	789		2.30	3			68,049

Source: Deloitte & Touche

11.2 Problems in Revenue Collection

11.2.1 Revenue Collection System

By the end of 1999, all regions excluding some remote district has introduced a centralized billing and control system, called Custima, and all operations excluding meter reading, input of read data, sending of bills to the customers, and cash receipt were computerized. However, there are many problems that remain to be solved. Concerning the hardware, many of the machines (computers, printers, etc.) are out dated and take long time to process data, print out bills, etc. Ironically, power failure occurs frequently has adverse effects on the computer system. (Although uninterruptible power supplies, UPS, are installed, they are not functioning properly.) In terms of the software and system operation, there are several problems as follows.

- Regional staffs do not have sufficient understanding of the system.
- Because of inadequate numbers of meter readers, all the meters cannot be read once a month.
- Meter readers are not trained so well that incorrect reading of meters is frequent.
- Data input takes too much time.
- Custima has no good system (routine) to estimate and correct bill amount based on suitable assumptions whenever meters cannot be read or read incorrectly.

Under those conditions, many of the users suspect the accuracy of billing by TANESCO. Besides, it is not infrequent that the time interval between the reading of a meter and the issuance of a bill is as long as three months. The lack of users' confidence in accuracy and timeliness of billing process is an important factor compounding the receivable problems. In Dar es Salaam, many of the above problems have been eased since a new meter of prepaid card type, called LUKU, was introduced in the Kinondoni district, etc. (described in more detail later).

The poor collection performance and the continual increase in account receivable are critically important problems of TANESCO. The major reasons are as follows.

(1) Lack of confidence in billing system

As mentioned above, many of the users have no confidence in the accuracy of billed amount. TANESCO itself also has no confidence in the accuracy. This severely limits TANESCO to impose customer sanction including disconnection.

(2) Lack of metering standards

Since there are no standards for meters in Tanzania, various types of meters of different makers are used. Meter readers also have troubles including lack of sufficient knowledge of all those meters. Besides, the meters are installed at different heights. There are not a few meters which are installed at too high place to be read correctly.

(3) Problems with staff

Several problems of meter readers have been pointed out—inadequate technical background, low level of morale, shortage of number, incorrect reading.

(4) Illegal acts and lack of understanding on the part of users

There are not a few users who have no intention to pay their bills, tamper with the meter in such a way that it indicates smaller values, or bypass the meter. There are also

users who do not understand the tariff system (the unit price rises with the increase in consumption). There are many users unwilling to give TANESCO staff to read meters due to mainly reason of security. It is said that there are burglars pose as TANESCO meter readers.

11.2.2 Revenue Collection Performance

The revenue condition performance in the entire area of Tanzania, Dar es Salaam, Arusha, Moshi, and Zanzibar is described below.

(1) Entire area of Tanzania

Due to the efforts of TANESCO on collection and introduction of prepayment meters, collection performance has been improved marginally from 63% in 1995 to 87% in 2000. It should be noted, however, that a collection performance less than 100% means that the total amount of account receivable has been ever increasing.

(2) Dar es Salaam

Dar es Salaam region can be split into four regions—Ilala, Temeke, Kinondoni North, and Kinondoni South. The numbers of customers in these regions are as shown in Table 11.13.

Table 11.13 Numbers of Customers in Dar es Salaam

Region	Number of Customers		
	Conventional Meters	LUKU Meters	Total
Ilala	46,279	12,396	58,675
Temeke	34,359	7,234	41,593
Kinondoni North	39,662	32,438	72,100
Kinondoni South	40,940	1,191	42,131
Total	161,240	5,3259	214,499

Source : Deloitte & Touche

Formerly, the collection performances for all four regions were very bad. Since 2000, however, they have improved markedly. One reason of poor collection performance in Dar es Salaam is the nonpayment of bills by the governments and public corporations.

Table 11.14 Collection Performance in Dar es Salaam

	1996	1997	1998	1999	2000	2001*
Kinondoni North	14%	12%	79%	6%	37%	66%
Kinondoni South	10%	9%	9%	33%	32%	41%
Temeke	8%	7%	8%	19%	54%	95%
Ilala	27%	25%	51%	18%	34%	60%
Total Dar Es Salaam	13%	12%	23%	18%	37%	61%

Source: Deloitte & Touche

Note): * Figure for half year up to June 2001

(3) Arusha

Arusha is not only an attractive place for tourists but also a center of commerce and industry. There are about 40,000 customers in this region. About 80% of the customers including large users are in the city of Arusha. Table 11.15 shows the changes in amount billed, amount collected, and collection rate. A major problem in Arusha on revenue collection is that the amount billed has been decreasing markedly since 1999. This is

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ascribable largely to the following facts.

- The new bill collection system (Custima) that was introduced in 1999 is not functioning properly.
- There are shortages of meter readers and means of transit (automobile, motor cycle, bicycle, etc.).
- Inappropriate address indications make it hard to identify customers.
- Not a few customers are unwilling to let in the meter reader because there are burglars who pretend to be meter readers.

Table 11.15 Collection Performance in Arusha

	1996	1997	1998	1999	2000	2001*
Billings (MMUS\$)	22.6	20.7	22.2	13.2	14.0	3.4
Collection (MMUS\$)	8.2	8.9	9.7	8.9	7.2	4.9
Collection (%)	36%	43%	44%	68%	51%	142%

Source: Deloitte & Touche

Note): * Figure for half year up to June 2001

(4) Moshi

In Moshi, there are about 50,000 customers, about 50% of whom live in the city of Moshi. The changes in amount billed, amount collected, and collection rate in the past six years are as shown in Table 11.16.

The problems involved in revenue collection in Moshi are the same as those in Arusha. The reason why the collection rate has far exceeded 100% since 2000 is that the amount billed has been decreasing, and absolute amount collected has not been increasing.

Since many houses are standing on the slopes of the mountain in this area, meter reading takes much time. Besides, for many customers, it is troublesome to visit the TANESCO office for payment of their bills.

Table 11.16 Collection Performance in Moshi

	1996	1997	1998	1999	2000	2001*
Billings (MMUS\$)	14.8	16.0	13.8	16.8	8.1	1.3
Collection (MMUS\$)	6.4	5.3	3.7	7.1	9.3	3.1
Collection (%)	44%	33%	27%	42%	115%	239%

Source : Deloitte & Touche

Note): * Figure for half year up to June

(5) Zanzibar

TANESCO supplies electricity to the Zanzibar State Fuel and Power Company. The amounts of payments from Zanzibar to TANESCO are very small as shown in Table 11.17. As a result, the total amount of Zanzibar's account payable as of the end of 2000 is larger than five times of the amount of electricity sales to Zanzibar as of the same time. Since independence, the relationships between the government of Zanzibar and the mainland government have been so complicated that it is extremely difficult to solve the problem of outstanding of receivable from Zanzibar State Fuel and Power Company.

Table 11.17 Revenue Collection from Zanzibar

	1996	1997	1998	1999	2000
Billings (MMUS\$)	4.56	2.75	4.01	5.45	5.21
Collection (MMUS\$)	0.44	0.08	0.23	0.07	0.94
Collection (%)	9.6%	2.9%	5.7%	1.3%	18.0%

Source : Deloitte & Touche

11.3 Prepaid Card System

11.3.1 Outline of the System

The prepayment system known as LUKU is now used only in the capital city of Dar es Salaam. TANESCO introduced LUKU under the assistance of the World Bank. The company first installed some 300 LUKU meters experimentally in Kinondoni North Region of Dar es Salaam. The reason why Kinondoni North Region was selected as the pilot area was that there are many large users in the region and most of them were unwilling to give access to TANESCO staff to read meters in every month. The major objectives of introducing LUKU were as follows:

- Improve cash collection from each customer and increase the revenue of TANESCO
- Reduce the number of meter readers
- Reduce the cost of mailing bills to customers
- Eliminate the disconnection and reconnection cost
- Improve the customer services
- Prompt the customers to save electricity consumption

The LUKU project commenced in 1993 by the appointment of a consultant, Messrs. Worley International Ltd. of New Zealand. Its implementation commenced in October 1995 and was completed in February 1997. The other companies that were involved in the project are as follows:

- Messrs. ROSCHON of South Africa: Contractor
- CONLOG (Pty) of South Africa: Supply of meters, card vending system and training
- Brampton International: Public relations
- Messrs. Industrial & Commercial Installations Ltd.: Installation of meters

Initially, TANESCO planned to experimentally install 2,000 to 3,000 meters. However, as the World Bank judged the LUKU meter to be an effective means of solving the problem of bill collection, the number of meter installations was increased much. As of the end of the project, the number of LUKU meters installed was 40,382. Then, Tsh 22 million (about \$24,000) was being collected daily by the LUKU meters. The LUKU meter was spread in Kinondoni South, Ilala, and Temeke too. As of the end of May 2001, Tsh 34.5 million (about \$38,000) was being collected daily by 53,196 LUKU meters. As shown in Fig. 11.3, the contribution of LUKU to TANESCO's revenue doubled from 7% in 1996 to 14% in 2000. About 85% of the 53,196 LUKU meters are magnetic card type. Recently, a keypad type (numerical data input type), which is highly reliable and tamper-proof, is being introduced. TANESCO says that it will gradually replace the magnetic type with the keypad type in the future. The cost of a LUKU meter is about Tsh 60,000 (about \$67), including the installation cost. At present, TANESCO bears the entire cost of the LUKU meters. The appearances of LUKE meters are shown in Figures 11.4 and 11.5.

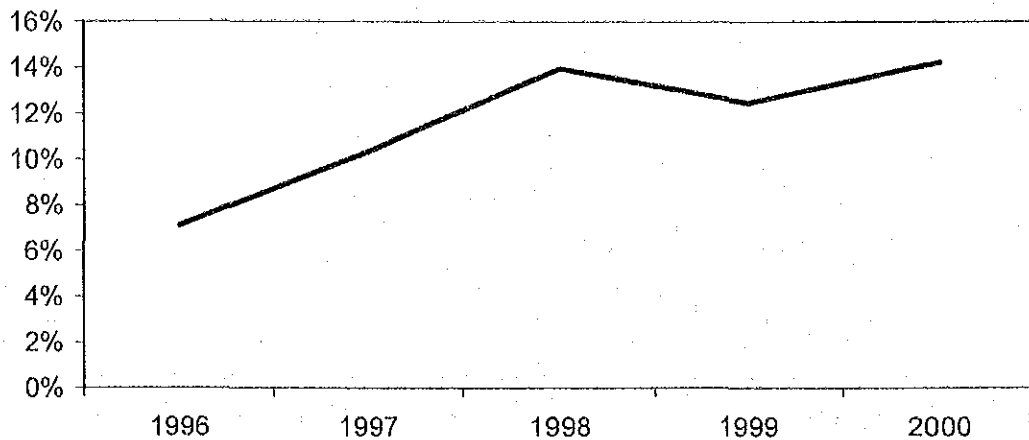


Fig 11.3 Percentage of LUKU to Total Revenue Collection

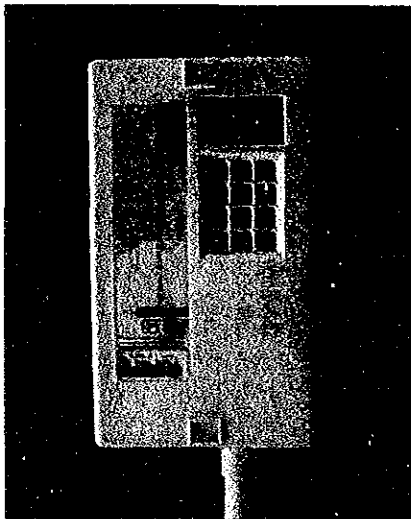


Fig. 11.4 The LUKU meter installed for demonstration in the collection office of TANESCO's headquarter (single-phase LUKU meter made by CONLOG).



Fig. 11.5 Three-phase LUKU meter (made by Tellumat).

11.3.2 Advantages and disadvantages of LUKU Meter

(1) For users

Many of the LUKU users are much satisfied with the LUKU meter. Nearly 90% of the users want to continue using their LUKU meters. The main reasons for this are as follows.

- The LUKU meter accurately measures the actual amount of electricity consumption, hence the amount billed is correct.
- The LUKU meter precludes the chances of incorrect billing based on assumptions (when the meters are read incorrectly or not read at all) or by mistakes in data input to the computer, etc.

- In Tanzania, there are burglars who pretend to be meter readers, hence not a few customers are unwilling to let the meter reader enter their premises. The LUKU meter does not require any person to read the meter.
- Formerly, it was not infrequent that a bill is sent to a customer two months or more behind. This does not occur with the prepaid-type LUKU meter.
- The customer can easily see the electricity consumed and the amount billed, hence the customer's cost consciousness is expected to improve.
On the other hand, the following two problems may be pointed out.
- There are not many offices which sell LUKU cards. Besides, issuing a card takes considerable time. Therefore, much time is required of customers to obtain a card. The reason why LUKU cards are sold at few offices is that unlike the prepaid telephone card, the LUKU card is not a ready-made item. Namely, each time a LUKU card is issued, it is necessary to write various pieces of information on the card electronically, hence LUKU cards cannot be sold easily at kiosks, etc. It should be noted that TANESCO closed many of the vending stations after discovering vendor collusions to tamper with the cards. Although TANESCO is making efforts to increase the sales offices and reduce the time required to issue the card, the above problem has not been solved completely.
- TANESCO imports LUKU meters (largely from South Africa), hence it takes time to purchase.

Some of the LUKU users are dissatisfied with the LUKU meter. The major reason for this is that even though there is no difference in meter reading between the beginning of a month (initial 100 kWh) and the end of the month (over 100 kWh), the amount of electricity charge is different. TANESCO employs a four-step progressive system of power rates (Tariff-1), and it is natural that the unit price of electricity should vary according to the amount of electricity consumption. Nevertheless, some users who do not have the correct understanding of the tariff system feel strange about the above situation. This problem was nonexistent in the past because the conventional meters do not indicate the amount of electricity charge itself. The above is not a problem of LUKU system itself, but a problem of tariff system or publicity. In order to make LUKU widespread more in the future, it is considered necessary for TANESCO to take some suitable measures, such as giving better publicity to its power rate system.

(2) For TANESCO

With the conventional meters, there are about two months from meter reading to cash receipt. Considering the benefit of 100% advance payment of LUKU, it is a very convenient system for TANESCO. LUKU is also extremely effective to prevent incorrect reading of meters, eliminate the delay in billing, and cut the costs of meter reading and billing. It can be said that LUKU contributes significantly to improve revenue collection performance.

On the other hand, LUKU meter has no effective ways to prevent such illegal acts as the bypassing or tampering with the meter. Therefore, TANESCO has to make inspections of meters periodically if it wants to prevent those illegal acts. Although systematic investigations on the illegal bypassing and modification of meters have not been made, there is a report that they are committed rather frequently. In terms of the hardware, some of the LUKU meters, especially the three-phase ones, have so many problems that they need repair or replacement. An investigation carried out by TANESCO suggests that failure rate of three-phase meters was 6% and single-phase meter was about 0.8%.

(3) Future movement

Although TANESCO has increased the number of LUKU meters based on the requests of customers, it did not carry out officially any quantitative evaluation of the LUKU system from financial viewpoint because the basic recognition of TANESCO on LUKU meter is a pilot project. However, there is no doubt that the LUKU system has benefited both the customers and TANESCO. From the technical viewpoint, there is nothing comparable to the LUKU meter, while LUKU meter cannot effectively prevent such illegal acts as mentioned above. TANESCO is planning to steadily increase installations of LUKU meter by making continual improvements on the hardware and software of the meter. The company is also studying installation of LUKU meters at government offices and houses of public servants. It should be said that the major hindrance to the spread of LUKU meters in the future is not any technical problem, but the shortage of fund (foreign currency) for purchasing (importing) additional LUKU meters.

11.3.3 Applicability of LUKU Meter in Arusha and Moshi

TANESCO does not intend to introduce the LUKU meter in local areas till it completes installation of LUKU meters in the greater part of Dar es Salaam. On the other hand, as described in 11.2 "Problems in Revenue Collection" the delay in billing operations in Arusha and Moshi is becoming a serious problem. The LUKU system is extremely effective to simplify the billing operations, and there is no other technically reliable and proven system than LUKU system. Therefore, if the above problem is not dissolved, it might become necessary to consider introducing the LUKU meter in Arusha and Moshi as early as possible. Concerning the problem of shortage of fund for obtaining LUKU meters, TANESCO should consider utilizing private companies (foreign companies) since Siemens and some other private companies show interest in the installation of the prepaid card system through a BOT (build-operate-transfer) scheme.

11.4 Overview of Electric Power Industries of Neighboring Countries

The electric power industries of Kenya and Uganda are outlined below in comparison with that of Tanzania.

In Kenya, the liberalization of energy sector in 1996 brought about substantial changes in the electric power sector. The de facto monopoly of Kenya Power and Lighting Company (KPLC) was broken, and KPLC exercises a monopoly status only in transmission and distribution. All power generation facilities (hydroelectric, geothermal, thermal, and wind force) that had been owned and managed by KPLC were transferred to the Kenya Electricity Generation Company (KenGen), a state owned enterprise. Today the entire electricity generated by KenGen is sold to KPLC. Independent Power Producers are allowed to generate electricity for bulk sales to KPLC. At present, KenGen accounts for about 90% of the total generation capacity in Kenya, and the remaining 10% is owned by the independent power producers shown in Table 11.18. Hydropower constitutes around 60% of the total electricity generation. The major hydropower stations are situated on the Tana River in northern Kenya. Thermal power is generated in power stations in Nairobi and Mombasa. There are geothermal power stations at Olkaria located in a Rift Valley.

Table 11.18 Independent Power Producers in Kenya

Name	Location	Type	Major Shareholder
IberAfrica	Nairobi	Diesel	Union Electric Fenosa, Spain
Westmont	Mombasa	Gas Turbine	Westmont Malaysia, Malaysia
Ormat Power	Olkaria	Geothermal	Ormat, USA
Tsavo Power	Monbasa	Diesel	Cinergy Corp, USA

Source: Deloitte & Touche

In Uganda, Uganda Electricity Board (UEB) had been monopolizing the electric power business until March 31 2001, when its electricity generation, transmission, and distribution departments became independent companies. Of the power sources, hydropower accounts for more than 90%. Surplus electricity is exported to Kenya, Tanzania, and Rwanda. Uganda also imports electricity from Rwanda. The exports and imports of electricity in 2000 were as shown in Table 11.19.

Table 11.19 Exports and Import of Electricity

Country	Exported (GWh)	Imported (GWh)
Kenya	229.51	--
Tanzania	21.53	--
Rwanda	0.10	1.1
Total	251.15	1.1

Source: Homepage of Uganda Electricity Board (www.ueb.co.ug)

The characteristics of the electric power industries of Tanzania, Kenya, and Uganda are summarized in Table 11.20. The table clearly indicates that an average tariff in Tanzania for 1999 is 60% and 21% higher than those in Kenya and Uganda, respectively. Among the three countries, Tanzania is the lowest in terms of electricity consumption per user.

Table 11.20 Characteristics of Power Sector in Tanzania, Kenya and Uganda in 1999

Particulars	Tanzania	Kenya	Uganda
Generation Capacity (MW)			
Hydro	399*	625	261
Thermal	233*	217	2
Geothermal	--	45	--
Total	632*	887	263
Revenue (TSch billion)	124.20	164.90	51.40
Total Sales (GWh)	1,748	3,717	876
Total No. of Customers	396,176	472,671	164,225
Average Sales per Customer (in kWh)	4,412	7,864	5,334
(in TSch)	313,495	348,871	164,317
Average Price per kWh (TSch)	71.05	44.36	58.68

Source: Deloitte & Touche, Home Pages of KenGen (www.kengen.co.ke), KPLC (www.kplc.co.ke) and UEB (www.ueb.co.ug), and The Economic Survey 2000, (The Planning Commission, Tanzania)

Note *: Small power stations isolated from grid are not included

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The financial conditions of the power sectors of Tanzania and Kenya are summarized in Table 11.20. As is evident from the table, the combined profit of KenGen and KPLC for 1999 and 2000 was TSch 41.3 billion, as against TANESCO was in the red. It is said that the outstanding performance of KenGen and KPLC is the result of restructuring of the power sector. Even in Kenya, the arrearage of electricity charges is a big problem, but it is not so serious as in Tanzania. The number of days required to collect a bill, calculated by the following formula, is 220 for Kenya and 570 for Tanzania (as of the end of 2000).

Total amount of accounts receivable at year end/Amount of electricity sold during the year x 365 (days)

The total amount of fixed assets of KenGen and KPLC combined is about 43% of that of TANESCO. Compared with TANESCO, KenGen and KPLC show smaller amounts of depreciation and have a lighter burden of interest payment. The reason for this is that TANESCO depends more than 80% of total electricity generation on hydropower, hence has made huge amounts of investment to construct hydropower stations and transmission lines. Concerning funds required for plant and equipment investment, TANESCO depends almost entirely on long-term loans, whereas KenGen and KPLC utilize short-term loans, as well as long-term loans.

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Table 11.21 Financial Performances of Power Sector in Tanzania and Kenya

Particulars	2000		1999	
	TANESCO 1)	KenGen & KPCL ²⁾	TANESCO 1)	KenGen & KPCL ²⁾
Profitability				
Revenue	130.77	170.20	124.20	164.90
Cost of sales + Operating Expenses	141.92	174.20	151.30	144.60
Operating Profit	▲11.16	▲4.00	▲27.10	20.30
Profit before Tax	▲9.24	28.23	▲25.17	20.30
Profit after Tax	▲9.24	24.66	▲25.68	16.64
Assets and Liabilities				
Current Assets	220.80	149.42	197.45	137.62
Current Liabilities	195.98	237.61	152.94	177.47
Net Current Assets	24.83	▲88.19	44.52	▲39.85
Investment	0.01	0.04	0.01	0.04
Fixed Assets and Capital WIP	1,229.79	522.62	1,235.96	235.80
Total Assets	1,254.63	434.47	1,280.49	195.99
Share Capital	294.30	124.65	294.30	21.05
Reserves and Surplus	617.30	158.76	624.34	133.73
Grants and Development Fund	42.03	--	37.46	--
Long-term Debt	301.00	136.63	324.39	30.55
Deferred Tax Liabilities	--	14.42	--	10.67
Total Liabilities	1,254.63	434.47	1,280.49	195.99
Ratios				
Operating Profit	0.00%	0.00%	0.00%	12.31%
Profit before Tax	0.00%	16.59%	0.00%	12.31%
Return on	▲0.63%	15.67%	1.38%	16.45%
Current Ratio	1.13	0.63	1.29	0.79
Liquid Ratio	0.94	0.45	1.04	0.64
Debt Equity Ratio	25%	33%	26%	16%
Total Debt to Total Assets	34%	56%	33%	56%

Source: Deloitte & Touche

Note 1): TANESCO pursues the calendar year as their accounting year.

 2): The financial year for KenGen and KPLC commences on 1st July and ends on 30th June.