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Conservation in Industry

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REPORT OF TANZANIA*

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* The views expressed in this paper are those of the author and do not necessarily reflect the views of the Secretariat of UNIDO. This document has not been edited.

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1.0 INTRODUCTION

1.1 National Energy Consumption

Tanzania energy demand and use pattern is characterized by heavy dependency on the use of woodfuel (both as fuel and wood charcoal) and agricultural wastes which account for 92% of final energy consumption. Commercial fuels; electricity and petroleum accounts for 0.8% and 7.2% of the final consumption respectively. It is estimated that Tanzania energy consumption was 14.95 million tones of oil equivalent (TOE) in 1988 giving a per capital energy consumption of the order of 0.62 TOE. This compares with Sudan 0.83 TOE and Malawi 0.4 TOE per capital consumption for the year 1981.
(Annex 1 shows table for national energy supplies and consumption).

1.2 Energy Resources

Trees are the main sources of biomass based fuels. Total forested area in Tanzania is 28 million hectares, 13 million hectares of which are reserved forests. Village woodlots accounts for only 0.2 million hectares.
Coal reserves are estimated at one trillion tonnes of which 304 million tonnes are proven.

Natural gas reserves at Songo Songo are put at around 1.016 trillion cubic feet. Hydroelectric potential in Tanzania is of the order of 4.7 GW of installed capacity and 3.2GW of firm capacity. To-date only about 5% of the installed capacity has been developed. Other energy resources like geothermal, solar and wind energy are virtually untapped energy resources.

Table 1 ENERGY RESOURCES AND PRODUCTION

Energy resource	Proven energy million TOE	Estimated energy (1989) million TOE
Biomass	318	10.55
Coal	150	0.03
Natural Gas	18	-
Hydropower	6.95	0.4
Solar	1 kw/m^2	-

2.0 INSTITUTIONAL FRAMEWORK

2.1 Government Policy on energy conservation

National energy policies and goals are based on overall guiding principles of self reliance. Recent guidelines to the National Development Plan are spelt under the Economic Recovery Programme (ERP). The programme makes a note on development and use of indigenous resources in the country including hydropower potential, coal natural gas and biomass. As for the biomass the programme notes the importance of protecting their resources for both energy supplies and environmental reasons.

Strictly speaking, the government has not yet come up with a clear policy on energy conservation. However, energy conservation measures have been dictated by the prevailing economic constraints. Individuals and organizations have been compelled to exercise energy conservation due to the high costs of energy. Since the occurence of petroleum crisis in 1973 which led to escalation of petroleum prices and the increased depletion of forest due to overharvesting of woodfuel, Tanzania has embarked on energy conservation programme with the aim of limiting the use of imported fuel and conserving in the use. Measures instituted in the petroleum subsector can be summarized as:

(a) conservation by curtailment
(b) conservation by improved efficiency.

In curtailment the government instituted measures which included restrictions in driving and rationing of petroleum products. On the improvement of efficiency the government used price as a mechanism for inducing more efficient use of the fuel in the transportation as well as the industrial sector. In the industrial sector the government in collaboration with UNIDO established an energy conservation programme at Tanzania Industrial Research and Development Organization (TIRDO) in 1983. The activities included energy audits as well as follow ups on energy conservation activities in industries.

In the power sector, goals have been to improve the power sector by extending the hydropower based national grid to the major consumption areas which were still relying on power from isolated diesel generators. Second in priority has been the improvement of the transmission and distribution system to reduce losses. The power sector masterplan also envisages development of more hydropower stations to conserve on imported fuels and use the locally available energy resource.

In the household sector which is largely dominated by the use of woodfuel, priority has been that of tree planting. The energy policy provides for establishment of village woodlots while energy conservation efforts have been directed into the design and manufacture of improved cooking stoves and improved charcoal making kilns. Traditional stoves offer very small thermal efficiencies of the order of 10 - 15% while improved stoves offer between 30 - 35% thermal efficiency. The traditional earthmound kilns uses 12 tons of wood for emery ton of charcoal produced, the improved kilns are expected to offer a better yield of charcoal.

2.2 Energy Conservation Centre

While the Ministry of Energy and Minerals (MEM) coordinates all the activities in the energy sector, programmes for industrial energy conservation have largely been centred in TIRDO and of late in the University of Dar es Salaam. These energy conservation activities started in 1983 with assistance from UNIDO in the form of training and provision of equipment. At present energy conservation activities are mostly confined to energy audits, seminars and workshops organized specifically for the industrial sector.

Efforts are being made to equip TIRDO to function as an energy conservation centre. Using the existing data bank on energy audits, TIRDO is in a position to implement and advice other industries on energy conservation measures.

Other agencies which have shown interest in promoting energy efficiency include the Tanzania Electric Supply Company (TANESCO) and the Kidatu based Sugar Institute and the Commission for Science and Technology.

3. ECONOMIC FRAMEWORK

3.1 Pricing of fuels and electricity

The pricing of energy sources and carriers is governed by the general economic conditions obtaining in the country. The pricing pattern reflects the inflationary trend which have gripped the national economy since the oil crisis of 1973.

Energy intensive industries are very much affected by price changes. Increasing energy price affects the costing of the manufacturing companies and energy conservation programmes are well received especially when the promoters show explicitly that cost-benefit analysis is in favour of energy consumers.

3.2 Pricing of petroleum products

Pricing of petroleum products allows for subsidy in agricultural sector. Any price change likely to affect the performance of this sector is done with great care. The pricing pattern is, therefore, geared to promote agricultural activities.

Initially conservation by curtailment was approved, and rationing of petroleum products was instituted. But as the prices hiked due to inflation and devaluation of the local currency, the extravagance in fuel consumption was directly checked and rationing was lifted. With the prevailing economic hardships reduction in production cost is a constant requirement and it is a question of survival for most companies. Therefore energy conservation is being incorporated in the ongoing economic recovery programme and well organized energy conservation programmes targeted to consumers will be very effective. However, to encourage industries to seriously engage in energy conservation programmes, broad spectrum cost-benefits analysis covering energy consumers in industries should be worked out.

Subsidy is provided for all petroleum products except motor spirits, LPG and Jet A-1. The subsidies do not work against energy conservation but provide the necessary breathing space for industries to operate atleast marginally under the present economic recovery programme, the brain-child of IMF. The Government does not pay for this cross-subsidy but the necessary fund is generated from the sale of other petroleum products likely to be put to luxury use rather than economic one. Conservation is directly implied because this is intended to induce people to use petroleum products for economic purposes and curtail luxury end use. Price structure is shown in Annex II.

3.3 Pricing of electricity

Electricity is subsidized for domestic consumption, agro-based industries and activities such as irrigation. Ref. Annex III. Commercial and other industrial consumers are charged according to demand and units consumed: See tariff No.4 through No.5 in Annex III. The tariff structure is such that, the Government-owned, and sole electricity generating company, TANESCO, should be self-sustaining i.e. it should be able to generate enough funds for debt-servicing, dividends, development and rehabilitation needs. The company borrowed heavily from foreign sources in order to develop more hydropower sources and rehabilitate the existing ones. Consequently, the financial status of the company is very much

susceptible to inflation and devaluation and tariff rates are frequently changing thus overburdening the consumers. Therefore, electricity has generally been expensive in Tanzania and attempts to conserve it are appreciated.

The pricing system is intended to promote the use of electricity in homes and in agriculture as seen from the tariff rates. In agro-based industries or agriculture, subsidy is only applicable above a given value of electricity demand. Though this works against energy conservation, it is important that the electricity supply company recovers the cost for power supply infrastructure. This pricing system also promotes environmental protection by reducing air pollution and dependency on woodfuel. Note that the country has excessive hydropower potential.

Overall outlook of the energy pricing system shows that energy costs reflect medium and long-term acquisition costs and electricity price includes factors for future energy development and rehabilitation of existing facilities. Likewise price for petroleum products include factors for generating funds for developing indigenous sources. On the average the energy cost is far above the opportunity costs even in subsidized cases.

4.0 LEGAL FRAMEWORK

4.1 Laws and regulations

The Government is currently working on a wide ranging energy policy to cover all aspects of energy development, utilization and conservation. The Government is very positive on energy conservation a and therefore keen to develop effective national energy management systems. However, the absence of clear energy policy has hindered achievement because various efforts could not be well coordinated and mobilized towards this end.

Some standing regulations of various institutions have contributed to energy conservation. Some of these include:-

1. Penalty is applied for using appliances of poor power factor: see "NOTE 3" of electricity tariff (Annex III)
2. Restrictions imposed on time allowed for purchasing fuels from petrol stations
3. Wood charcoal prepared under permit
4. For protection of forests and environment, for every one tree felled, two trees should be planted.

However, some regulations constrain energy conservation efforts. For instance importation of equipment meant to promote energy conservation have import duty levied under the same general terms and conditions governing importation of machinery. In general the custom duty is a fixed percentage of importation cost. Energy efficient equipment cost more to import, therefore, more import duty paid.

No law can be traced as a stumbling block to energy diversification. The main constraint has been non availability of funds. The country has proven reserves of natural gas situated about 200 km from the main industrial centre but so far had remained unexploited. The combustion processes could conserve more energy by converting oil-fired systems to gas-fired systems which have proved to be more energy efficient because of better temperature control and improved combustion efficiency.

Protection of locally produced coal of inferior quality is not necessarily against energy conservation. In Tanzania, coal mining has just started and its use in industries requires promotion. Regardless of its quality, this coal is an indigenous source of energy and its efficient use have to be worked out to reduce the fuel import bill. Resulting foreign currency savings can be diverted for use in energy conservation programmes like importation of energy efficient equipment and energy saving equipment like the power factor correction equipment for electricity consumers.

There are two effective ways to dispose of these constraints. The first one is to have a national energy policy to be promoted through bilateral, multilateral international cooperation. The Government of Tanzania is soon to promulgate an energy policy and this is an attribute to such international interaction and cooperation. The second way is to solicit funds for implementing various energy conservation programmes.

4.2 Tax incentives

So far no tax incentive system has been formulated as a deliberate move to conserve energy. There can be some form of taxes which incidentally favour energy conservation. Therefore there is a lot to learn from other countries' experience. The proposed reduction of import duties on energy efficient equipment or material, accelerated depreciation for energy saving projects etc. is quite promising and should be implemented.

5.0 INFORMATION PROGRAMME

5.1 General Publicity Compaigns

A survey conducted by TIRDO in 1983 to find out the extent of awareness to the energy conservation in industries revealed that over 60% of the industries had no clear information of the subject. Since then, TIRDO and the University have come out with brochures and booklets of Energy Conservation and distributed some of them to the industries. A few books and stickers from donor agencies like IIRS and GTZ were also used as the initial sources of information.

TIRDO in collaboration with Spix Sarco conducted seminars to the steam using industries on steam management. The Kidatu based Sugar Institute has also conducted several workshops on efficient boiler operations and steam management. to the industries. In all these seminars and many others, the attendance from the industries was satisfactory. Government officials attended the seminars to facilitate implementation of the resolutions reached.

Publicity on the subject of energy conservation is however not yet enough. Efforts are being made to promote publicity compaigns by publishing more booklets on energy conservation for industry and arranging for more seminars and workshops.

5.2 Energy Auditing

So far all energy audits to the industries are conducted by TIRDO. An energy audit programme was prepared to cover all the industries in the country. More than 40 energy audits have been conducted across the country covering industries in the sub-sectors such as food and beverages, textiles, cement, paper, metal and chemical related industries. Follow up to energy audits have been done by TIRDO on a number of firms audited upon which specific energy conservation projects have been implemented.

Typical cases of energy conservation programmes implemented in industry include: Tanzania Shoe Company with assistance from GTZ special energy programme and KIOO Ltd. a glass making plant which had to put up recuperative and regenerative heat recovery system. Some other industries have been able to save energy by instituting good house-keeping measures.

The bulky of the industries audited however could not implement energy efficiency measures highlighted in their audit reports because of a number of reasons which include:-

(a) lack of foreign currency to procure equipment and material
(b) lack of skilled personnel
(c) liquidity problems and
(d) lack of awareness on the importance of energy savings.

A highlight of the summarized audit findings for the first 15 audited companies is given in Annex IV.

5.3 Training and Education

Energy conservation concepts are fairly new in Tanzania. The educational structure does not have special training in the subject. It is neither taught at elementary schools nor at the university.

Awareness in energy conservation has been introduced through seminars, workshops and short course trainings at post graduate levels.
The first pioneering trainings were initiated by UNDP/UNIDO to TIRDO staff at the IIRS in Ireland. Later the same donor provided experts and equipment to conduct and implement energy conservation measures in the industries.
Further trainings have been sponsored by agencies like The World Bank, SIDA, CIDA, SADCC, JICA, GTZ, AF Energikonsult of Sweden etc.

The few personnel who benefited from these trainings are now participating in conducting seminars, workshops and energy audits for the industries.
In so doing they are transfering their knowledge to the responsible personnel in the industries.

6.0 RESEAR H & DEVELOPMENT

Research and development activity on energy conservation are on very low level of initiation basically due to lack of appropriate equipment. However the energy audit section of Tanzania Industrial Research and Development Organization will soon or later be involved more seriously in the said research. We therefore rely on the experience of other countries.

7.0 FUNDING

A number of energy programmes for supply and conservation activities in the country have been initiated and supported through bilateral, multilateral cooperation. Stove programme in Morogoro Urban had been initiated and supported through IDRC research funds, while in Dodoma town improved stove programme had been supported through GTZ of Germany. The Dar es Salaam improved charcoal programme has been initiated by the Ministry of Energy and Minerals and supported through the World Bank.

International cooperation in energy conservation in industry has been of great help, first in the introduction of the conservation programme in the country and secondly in the provision of technical assistance in energy conservation projects. International organizations such as the World Bank, SIDA, GTZ and UNDP/UNIDO have featured prominently in fostering energy conservation activities in the country. They have directly helped energy conservation projects and financed trainings, seminars and workshops. Tanzania being a member of SADCC also benefits from the energy conservation programme of SADCC which are sponsored by CIDA of Canada.

Other agencies which have extended their technical assistance in form of offering training on energy conservation for industry includes JICA of Japan, AF Energikonsult of Sweden, the USAID and IIRS of Ireland. Local agencies have also featured prominently in supporting the energy conservation activities. TIB (Tanzania Investment Bank) sponsored the energy audit activities in fifteen industries in the country. The Ministry of Industries and Trade (MIT) financed a seminar on steam management for the steam using industries in Dar es Salaam. More funds are set aside for more seminars to include all industries in the country. The industries themselves have also accepted to pay for the energy conservation activities in their industries.

TANESCO has recently contributed greatly to the efforts of energy conservation by commissioning TIRDO to carry out a survey of electricity consumption in some 50 selected industries in the country with the intension of improving the electricity distribution network.

Reference

1. Issue and Options in the Energy Sector in Tanzania
Report No. 4969-TA
UNDP/World Bank Energy Sector Assessment Program.

2. Power Sector in Tanzania 1986
Tanzania Electric Supply Company (TANESCO)
Planning Directorate, Tanzania

3. The National Energy Policy
Draft prepared by a committee for the Ministry of Energy and Minerals, Tanzania.

4. Coal Sector Investment
Report prepared for the Ministry of Energy and Minerals 1987, Tanzania.

ANNEX I

**** LEAP84: TRANSFORMATION PROGRAM ..... 28/5/89 6:24 ****

COUNTRY: TANZANIA - BASE
DEMAND: BASE CASE
TRANSFOR: BASE CASE
REPORT: TR-5 (1988)

..... AGGREGATE ENERGY BALANCE FOR 1988 .....
(MILLIONS OF TONNES OIL)

	CRUDE OIL	PETRO PROD	COAL	NATURAL GAS	HYDRO	ELEC-TRICITY	COMMERC WOOD	WOOD FUEL	CHAR COAL	BIOMASS	WIND/ SOLAR	TOTAL *****
INDIGENOUS	.000	.000	.023	.000	.121	.000	.001	13.384	6.271	1.015	.000	20.814
IMPORTS	.600	.557	.000	.031	.000	.000	.000	.000	.000	.000	.000	1.188
EXPORTS	.000	-.124	.000	.000	.000	.000	-.001	.000	.000	.000	.000	-.125
TOTAL FINAL REQUIREMENTS	.600	.433	.023	.031	.121	.000	.000	13.384	6.271	1.015	.000	21.877
MILL AND HARVEST	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
KILNS	.000	.000	.000	.000	.000	.000	.000	.000	-4.959	.000	.000	-4.959
ELECTRIC GENERAT	.000	-.040	.000	.000	-.121	.116	.000	.000	.000	.000	.000	-.044
OIL AND GAS	-.600	.566	.000	.000	.000	.000	.000	.000	.000	.000	.000	-.034
COAL AND COKE	.000	.000	-.005	.000	.000	.000	.000	.000	.000	.000	.000	-.005
DIST LOSSES	.000	-.047	-.000	-.000	.000	-.023	.000	-.134	-.013	.000	.000	-.218
TOTAL FINAL CONSUMPTION	.000	.911	.018	.031	.000	.093	.000	13.250	1.299	1.015	.000	16.617

				FINAL CONSUMPTION FOR 1988 BY SECTOR								
RURAL HOUSEHOLDS	.000	.086	.000	.000	.000	.000	.000	10.495	.555	.750	.000	11.886
URBAN HOUSEHOLD	.000	.118	.000	.000	.000	.027	.000	.057	.744	.000	.000	.945
AGRICULTURE	.000	.099	.009	.000	.000	.008	.000	.265	.000	.265	.000	.666
INDUSTRY(FORMAL)	.000	.193	.009	.031	.000	.017	.000	.109	.000	.000	.000	.359
RURAL INDUSTRY	.000	.000	.000	.000	.000	.000	.000	1.616	.000	.000	.000	1.616
COMM./OTHER	.000	.038	.000	.000	.000	.042	.000	.688	.000	.000	.000	.768
TRANSPORTATION	.000	.376	.000	.000	.000	.000	.000	.000	.000	.000	.000	.376
TOTAL	.000	.912	.018	.031	.000	.093	.000	13.250	1.299	1.015	.000	16.617

Annex II NEW PRICE STRUCTURE FOR PETROLEUM PRODUCTS
EFFECTIVE JULY 1989
EXCHANGE RATE TAKEN TSHS 145.00 = 1 USD

Product Name	TPDC Selling Price	Bonded Wholesale Prices	Wholesale Price	Approved Retail/ Wholesale Price	Previous Retail/ Wholesale Price
TSHS	TSHS	TSHS	TSHS	TSHS	TSHS
LPG	49.7228	59.0401	62.6003	62.6	36
MSP	63.27614	76.59844	93.8196	96	67
MSR	61.62344	74.94574	89.8735	92	61
JET A-1	49.04943	58.36673	61	61	43
IK	22.59443	31.91173	35.23	37	20
GO	27.8627	37.18	37.18	39	22.5
IDO	23.9327	33.25	33.25	33.25	21.35
FO	13.68593	23.00323	27.52	27.52	18.05

NOTE: PRICES ARE PER LITRE OF PRODUCT EXCEPT FOR LPG WHICH IS PER KG

Annex 111 ELECTRICITY TARIFFS WITH EFFECT FROM 1ST JUNE, 1989 BILLINGS

TARIFF NO. 1 RESIDENTIAL

Applicable to premises used exclusively for domestic and private residential purposes:-

0 - 100 KWH	Shs. 0.75 per KWH
101 - 1000 KWH	Shs. 1.00 per KWH
1001 - 2500 KWH	Shs. 4.00 per KWH
2501 - 7500 KWH	Shs. 8.00 per KWH
Over - 7500 KWH	Shs. 17.00 per KWH
Customer service Charge up to 1000 KWH	Shs. 25.00 per meter reading period
Customer service Charge over 1000 KWH	Shs. 100.00 per meter reading period

TARIFF NO. 2: LIGHT COMMERCIAL

Applicable to shops, restaurants, theatres, hotels clubs, harbours, schools, hospitals, airports, lodging houses, group of residential premises with one meter and on premises where similar business or trade is conducted and where consumption is less than 10,000 kilowatt hours per meter reading period:-

0 - 200 KWH	Shs. 1.00 per KWH
201 - 1000 KWH	Shs. 9.50 per KWH
1001 - 10000KWH	Shs. 17.75 per KWH
Over - 10000KWH	Shs. 30.00 per KWH
Customer service Charge up to 200 KWH	Shs.100.00 per meter reading period
Customer service Charge over 200 KWH	Shs.300.00 per meter reading period

TEMPORARY SUPPLIES

Temporary supplies will be given on this tariff.

Annex III

TARIFF NO. 3: LIGHT INDUSTRIAL

Applicable to premises engaged in production of any article/commodity or in Industrial process where the main use of electricity is for motive power, or an electrochemical or electrothermal process and where the the consumption is less than 10,000 kilowatt hours (KWH) per meter reading period:-

0	-	1500	KWH	Shs.	4.00 per KWH
1501	-	3000	KWH	Shs.	8.50 per KWH
3001	-	10000	KWH	Shs.	16.50 per KWH
Over	-	10000	KWH	Shs.	30.00 per KWH
Customer service charge				Shs.	300.00 per meter reading period

TARIFF NO. 4: LOW VOLTAGE SUPPLY

Applicable for general use where the consumption is more than 10,000 kilowatt hours per meter reading period:-

a) Demand charge — Shs. 745.00 per KVA of billing demand (B.D) per meter reading period

The KVA maximum demand (M.D) indicator shall be reset every meter reading period.

b) Units charge:-

First 150 times B.D (KVA) units,	Shs.	8.75 per KWH
Next 150 times B.D (KVA), units,	Shs.	8.00 per KWH
Remainder of units		7.50 per KWH

c) Customer service charge — Shs. 10,000.00 per meter reading period.

TARIFF NO. 4A: AGRICULTURAL CONSUMERS

Applicable to Agricultural consumers whose consumption is more than 5,000 units per meter reading period engaged in direct raw farm produce production and/or processing.

a) Demand charge: — Shs. 180.00 per KVA of Billing Demand (B.D) per meter reading period.

The KVA maximum demand (M.D) indicator shall be reset every meter reading period.

b) Units charge: — Shs. 2.10 per KWH

c) Customer service charge — Shs. 10,000.00 per meter reading period.

TARIFF NO. 5: HIGH VOLTAGE SUPPLY

Applicable for general use where power is metered at 11 KV and above.

a) Demand charge: — Shs. 670.00 per KVA of Billing Demand (B.D) per meter reading period.

The KVA maximum demand (M.D) indicator shall be reset every meter reading period.

Annex III

b) Units charge:

First 150 times B.D (KVA) units	Shs. 8.25 per KWH
Next 150 times B.D (KVA) units	Shs. 7.55 per KWH
Next 150 times B.D (KVA) units	Shs. 6.90 per KWH
Remainder of units	Shs. 6.00 per KWH

c) Customer services charge: Shs. 15,000 per meter reading period.

TARIFF NO. 5A: HIGH VOLTAGE SUPPLY ENERGY INTENSIVE CUSTOMERS

Applicable to high tension consumers whose demand is above 5,000 KVA and consumption above 800,000 KWH per meter reading period.

a) Demand charges: Shs. 475.00 per KVA of Billing Demand (B.D) per meter reading period.

The KVA maximum demand (M.D) indicator shall be reset every meter reading period.

b) Units charge: Shs. 4.70 per KWH

c) Customer service charge Shs. 20,000.00 per meter reading period.

TARIFF NO. 6: PUBLIC LIGHTING

Applicable to public lighting and places of worship.

All units Shs. 1.90 per KWH

TARIFF NO. 8: NUWA ACCOUNTS

Applicable to all installations of National Urban Water Authority pumping installations with consumption above 10,000 units per meter reading period.

a) Maximum demand charge: Shs. 300.00 per KVA of billing Demand per meter reading period.

The maximum demand indicator will be reset every meter reading period.

b) Units charge: Shs. 2.50 per KWH

c) Customer service charge: Shs. 10,000.00 per meter reading period.

TARIFF NO. 9: ZANZIBAR SUPPLY

Maximum demand Shs. 83.33 per KVA of Maximum Demand during each meter reading period.

The KVA maximum demand indicator shall be reset every meter reading period.

Unit charges: Shs. 0.20 per KWH

Maximum demand readings are taken at Mtoni substation while the units reading are taken at Ubungo substation.

Annex III

NOTE:

1. Billing Demand (B.D) is the higher of the KVA Maximum Demand (M.D) during the month and 60% of the highest KVA Maximum Demand for the preceding 11 months; provided that during the first year of operation the billing demand shall be the higher of the KVA Maximum Demand during the month, and 60% of the highest KVA Maximum demand recorded commencing from the month the consumer is connected.

2. Meter reading period is the period of time elapsing between any consecutive readings of the meter and/or maximum demand indicator installed by the Company but with exception of their first and last period; each such a period shall be as near to thirty days as possible.

3. The tariffs are applicable only to supply of electricity to consumers with power factor not lower that 0.95 in case of lighting loads or 0.9 in case of other loads, otherwise power factor surcharge shall be applied on the normal charges.

Annex IV SUMMARIZED FINDINGS OF AUDIT TEAM

TOTAL ANNUAL BILL & AUDITED COMPANIES: TSHS. 14,301,926

EXCHANGE RATE DURING FIELD VISITS: TSHS. 10 = 1 USD

Item	Annual potential savings (TShs.)	Estimated cost (TShs.)	Savings as % of Total fuel	Annual savings in litres of fuel oil
Install Insulation	1,227,000	910,000	8.6	421,000
Improve maintenance of boilerhouse practice	892,750	510,650	6.2	306,261
Heat Recovery projects	2,900,000	3,000,000	19	1,010,000
Power Factor improvement	118,800	68,800	-	-