

添付資料

- ① 要請書 (Terms of Reference)
- ② 質問票および回答
- ③ 署名したM/M

① 要請書 (Terms of Reference)

TERMS OF REFERENCE FOR APPLICATION FOR THE CO-OPERATION
(DEVELOPMENT STUDY) BY THE GOVERNMENT OF JAPAN.

1. PROJECT DIGEST.

(i) Project Title: Feasibility studies for small hydro power development at Nyamabuye in Kisoro district and Biseruka in Hoima district.

(ii) Location: Appendix 1 indicates the location of the two sites.

(iii) Implementing Agency:

a) Name: Ministry of Natural Resources (Energy Department, Electric Power Division).

b) Staffing of the Electric Power Division:

Assistant Commissioner for Power	1
Principal Electrical Engineer	1
Senior Electrical Engineer	2
Electrical Engineer	3
Plus other supporting staff.	

c) Budget allocated to the Agency: The total budget allocated to the Electric Power Division for the financial year 1994/5 is 20.7 million Uganda shillings. More finances would be secured for the project.

d) Organisation chart: Appendix 2 indicates the organisation chart of the Ministry of Natural Resources and Appendix 3 that of the Electric Power Division.

iv. Justification of the Project:

a) Present conditions of the sector.

Only about 5% of the entire population in Uganda have access to electricity. Currently woodfuel is the dominant source of energy used either as firewood or charcoal accounting for more than 90% of the country's energy consumption.

Yet, Uganda is endowed with abundant hydro-power potential resources which are rated to be amongst the World's cheapest. Of the total potential estimated to be well over 2,000 MW, only less than 180 MW has been exploited. It is the objective of the

Government of Uganda to exploit more of this potential to avoid over dependence on woodfuel and the associated environmental consequences as well as cut down on consumption of oil products for both economic and environmental reasons. Exploitation of the hydro-power resource will as well enhance power exports to neighbouring countries thus earning the country more foreign exchange. Uganda already exports power to Kenya and Tanzania.

It is also the objective of the Government of Uganda to avail more and more of her population with electricity. This could be realised by extension of the grid or development of small hydropower sites to serve population centres remote from the national power grid.

b) Sectoral development policy of the Government.

It is the current policy of the Government to extend electricity services to more and more of the population. The principle guideline will be to replace the existing diesel stations operated by the Uganda Electricity Board (UEB), and electrifying first and foremost all the administrative centres to the level of district or sub-district headquarters. Where viable, this will be realised by exploitation of small hydropower potential especially for places remote from the National grid.

c) Problems to be solved in the sector:

Power development in these remote areas, which are far from the national grid will reduce overdependence on woodfuel as an energy source and contribute to the abatement of deforestation. Electrification of these areas will facilitate introduction of agro-processing industries, which in turn will lead to improved agricultural production. It will also improve on the socio-economical aspects of life. Educational, training and health institutions will be better equipped for more efficient performance; thus uplifting the living standards of people in rural areas.

d) Outline of the Project.

The Nyamabuye and Biseruka projects have the following features; derived from previous studies.

Nyamabuye:

The power and energy outputs of the Nyamabuye hydro-power project are compatible with the demand in the service area, Kisoro district in South-Western Uganda. The features of the project would include:

- a gross head of 75 m.
- a design flow of 5.4 cumecs.
- use Lake Mutanda as a seasonal reservoir by drawing it down by 0.5m in dry seasons, thereby providing a reservoir volume of about 12 million cubic metres.
- a daily reservoir in the intake area at the mouth of Lake Mutanda to take variations in the daily load.
- an installed capacity of 4 MW.
- a mean annual energy production of about 11.0 GWh/yr.

Biseruka:

This is located in Hoima district in Western Uganda. The Hoima district centre is presently connected to the national grid but a number of major townships in the district are not yet connected. Therefore, in addition to electrifying these major townships the Biseruka project would supply power to the national grid. Accordingly, it would have the following merits:

Owing to the high head the production of peak power is relatively cheap. This means that the larger hydro-power potential sites on River Nile would be designed to meet the base demand.

The features of the Biseruka Project would include:

- a head of 297m,
- a design flow of 3.9 cumecs,
- an installed capacity of about 10 MW,
- a mean annual energy production of 29.9 Gwh/yr,
- a storage reservoir of 30,000 - 40,000 cubic metres,
- an internal rate of return of about 6.72% based on replacement of peak priced energy to correspond with the daily load variations.

e) Purpose of the Project.

The short-term objective of this project is to establish the economic, social, financial, technical and environmental feasibility of hydro-power development at

Nyamabuye and Biseruka. The project will also examine the possible alternatives for electrification of the service areas.

The final outcome of the project is expected to be a bankable document(s) with which funds for construction will be sought from international/bilateral financial agencies.

(f) Goal of the project.

The long-term objective of the project is to provide sufficient and reliable power supply to rural and semi-urban areas to enhance their economic development. This will, for example, facilitate the introduction of agro-processing industries as well as provision of better employment opportunities for the local population. Electricity will substitute most of the other sources of energy like fossil-fuels in small scale industries as well as in domestic applications (cooking and lighting), and woodfuel and other biomass. This will have associated environmental gains as well.

g) Prospective beneficiaries.

The project is to benefit the people of Kisoro and Hoima districts. If power development in the districts is implemented, it will benefit the following:

- The Nyamabuye power scheme will benefit directly all the inhabitants of Kisoro district totalling to about 187,000 (1991 population census) in terms of social and economic benefits accruing from the project.

- The Biseruka power scheme will, in addition to strengthening the power grid network in terms of availability and reliability of electricity and voltage stabilisation at the end of the long 132-kv line, lead to the electrification of various semi-urban centres in the Hoima district. This will enhance industrial development in Hoima district, which has a great potential basing on the existing sugar, tea and timber industries in the area. Hence, the total population of Hoima district of 197,900 (1991 population census) will benefit directly from electrification.

h) Project's priority in the National Development Plan.

Mini-hydro power development for electrification of load centres or population growth centres in rural areas has been given Government's priority in accordance with the Rehabilitation and Development Plan (RDP) period 1991/92 -

1994/95. The choice of the sites has been based on previous studies.

v) Desirable or scheduled time of the commencement of the project.

Commencement of the Project has not been scheduled but it is desired that the project be executed at the beginning of 1995. It requires urgent attention both socially, economically and politically.

(v) Expected funding source and/or assistance.

It is expected that the project will be financed by the Government of Japan with counterpart funds from the Government of Uganda.

(vii) Other relevant Project.

There is no other project ongoing or in the pipeline related to the development of hydro-power at the two sites.

2. Terms of Reference of the proposed study.

(i) Necessity/Justification of the study. There is potential for mini-hydro power development at the two sites and both of the sites lie within areas where there is established demand for electricity. Yet, the sites are so located that the national power grid cannot be conveniently extended to supply these areas with electricity.

From past experience, operation of diesel power stations for electrification of rural areas has proved to be too expensive. It is with this background that the feasibility of development of the small-hydro power potential at the two sites is being studied.

(ii) Necessity/Justification of the Japanese Technical Co-operation.

Uganda, with only less than 180 MW of its hydro-power potential exploited, does not have sufficient experience to carry out detailed feasibility studies for hydro-power development. For this reason, Uganda has to employ foreign expertise. Yet, Uganda is confronted with the difficult balance of payment.

Japan is one of the leading industrial countries with a great wealth of experience in power development in all areas including hydro. Japan derives its experience from the fact that almost all of its hydro-power potential has

been exploited and has gone ahead to create specialised international agencies for hydro-power development overseas.

It is for this reason that Uganda has chosen to request Japan's Grant Aid in accomplishing this objective in the Energy sector.

(iii) Objectives of the study.

As discussed in # 1 above, the objective of the study is to establish the economic, social, financial, technical and environmental feasibility of hydro-power development at Nyamabuye and Eiseruka with a goal of supplying relatively cheap and reliable power to the surrounding areas.

(iv) Area to be covered by the study.

The study will cover the hydro-power potential at Nyamabuye on R. Kaku and Eiseruka on R. Wambabya in Kisoro and Hoima districts respectively.

(v) Scope of the study.

The project entails the following scope of services for each of the two sites:

- Project schedules and protocols will be established at a meeting between the Japanese Study Team leader with key team members and the counterpart staff from the Uganda Electricity Board (UEB) and Ministry of Natural Resources. All relevant data from UEB and Ministry of Natural Resources will be reviewed for inclusion in the study process. The data will include: reports of previous investigations; hydrological data, precipitation, and stream gauging; geological and geotechnical data; topographic mapping and surveying; population trends; energy demand and rates, and land ownership and rights of way.

- Hydrology analysis and stream flow analysis will include establishment of gauging stations where necessary, establishment of gauging station rating curves, production of weekly, monthly and yearly extrapolations of flow duration curves and design flood hydrographs as well as carrying out drought analyses.

- Geological and geotechnical, investigations will have to be carried out to involve regional geological analysis, local geology and site analysis, foundation and material investigations as well as seismic considerations. Sub-

surface geological investigations will also be carried out by drilling bore-holes at appropriate locations.

-- Topography, aerial photo analysis and survey will call for obtaining and reviewing the following if available or producing them where they are not available: Adequate mapping aerial photos, streambed and swamp area profile and land ownership and rights-of-way, large scale topo-maps for locations of major proposed structures.

- Preliminary definition and analysis of alternatives will be made to define the alternative matrix and selection criteria, and evaluation of upstream storage leading to deduction of the preferred alternative.

- Environmental Impact Assessment will have to be carried out and required to meet the standards established by the World Bank or U.N. for hydro-electric projects.

- A preliminary design will be made to include diversion and headworks, headrace system, surge tank and penstock, powerhouse (civil, mechanical, electrical), upstream storage dam/outlet/spillway, transmission system, cost estimation, and construction schedule.

- Financial and economic evaluation will be carried out to determine the funding and pay back schedule, cost-benefit and internal rate of return.

- Finally, the project shall realise the important aspect of training local personnel in the design and development of hydro-power projects, operation and maintenance of hydro-power projects, and operation of a public utility.

- The final report will be prepared to include the findings of the investigations above.

(vi) Study schedule.

The study schedule is expected to take 8 months as drawn in appendix 4.

(vii) Expected major outputs of the study.

The major output of the study will be a bankable study report that will be used to solicit for financing of the implementation stage as recommended by the study. This will include a detailed Environmental Impact Assessment, a preliminary design of the hydro-power plant and transmission facilities, and a feasibility study report.

(viii) Request of the study to other donor agencies.

No other donor agency has been requested to finance this study.

(ix) Other relevant information.

A mission to evaluate small hydro-power sites (0.5 - 5 MW) in Uganda was fielded (from 13th Nov. -14th Dec. 1988) by the United Nations Department of Technical Co-operation for Development and Nyamabuye was ranked among the top three for priority development. At the time Biseruka was not studied because its potential lay outside the scope (Biseruka is approx. 10MW).

In August/September 1992 a team of experts from Norconsult of Norway carried out pre-investment studies at both sites and recommended further action towards development of the sites. Presently, no other activities are either ongoing or in the pipeline as far as power development at the sites is concerned.

3. Facilities and information for the study team.

(i) Assignment of counterpart personnel of the implementing agency for the study.

At least two counterpart personnel of the implementing agency for the study will be assigned to work on the project on full time basis. The minimum qualification of the two members will be a University degree in engineering.

It is also the intention of the implementing agency to mobilise a multi-disciplinary local counterpart team to be availed to the Consultant. In the past such counterpart team has included the Uganda Electricity Board, and the Departments of Water, Environment, Geological Surveys, and Energy .

(ii) Available data, information, documents, maps etc.

The list of sources of such information is given as Appendix 5.

(iii) information on the security situation in the study area.

The security situation in both of the study areas is completely positive. This is in spite of the fact that both of the sites are close to the border with neighbouring

countries. Kisoro borders Rwanda to the south and Zaire to the west, and Hoima borders Zaire to the west.

4. Global issues.

(i) Environmental components of the project.

The Nyamabuye power scheme, among others, will require a detailed Environmental Impact Assessment of using Lake Mutanda as a reservoir for seasonal storage. The Biseruka scheme will not involve storage but will also require an Environmental Impact Assessment.

(ii) Anticipated environmental impacts.

No major environmental impact is anticipated for both schemes. On the contrary, it has to be noted that most of the diesel operated equipment, especially for agro-processing, in the areas will be replaced by the electrically operated equipment leading to less emissions of green house gases. It is also anticipated that most of the firewood used in institutions will be replaced by electricity leading to less tree cutting and contributing to the abatement of deforestation and also contributing to the reduction of emissions of green house gases.

(iii) Women as main beneficiaries or not.

Electrification of rural areas has great gender attributes because of the role women play in social and economic activities in rural areas. It can be said that women are the main beneficiaries. More details are given in # 4 (v) below.

(iv) Project components which require special consideration for women.

This project will not require special considerations for women.

(v) Anticipated impacts on women caused by the project.

This project stands to benefit women in very many ways. First and foremost, availability of electricity will contribute towards saving women from the burden of walking long distances to fetch firewood. Also, water will be pumped more regularly in the areas which have been relying on diesel engines for water pumping. This will save women from walking long distances to fetch water (in some areas women walk distances of up to 5 km to fetch water).

Electricity will also assist women by providing a source of energy that will be convenient for agro-processing, especially grain milling, saving most women the burden of doing this manually. Children who assist women in fetching firewood and water, and providing labour for grain milling will be relieved and will have more time to assist the women in their household activities and to attend school.

All these activities will afford women more time to devote to income generating activities like animal husbandry, weaving and milk churning. Under the present circumstances it is almost practically impossible for women to spare any time for leisure. Electricity will contribute towards realising this.

(vi) Poverty reduction components of the project.

This project is also aimed at improving the facilities at hospitals and schools by making it possible for these institutions to use electricity operated appliances conveniently, offering better services to the rural poor. The project also improves the employment opportunities for the rural poor.

(vii) Any constraints against the low-income people caused by the project.

No constraints at all. In actual fact the project offers employment opportunities to the low-income people.

5. Undertakings of the Government of Uganda.

In order to facilitate a smooth and efficient conduct of the study, the Government of Uganda shall take the necessary measures:

(i) to secure the safety of the study team.

(ii) to permit the members of the study team to enter, leave, and sojourn in Uganda in connection with their assignments there-in, and exempt them from alien registration requirement and consular fees.

(iii) to exempt the study team from taxes, duties and any other charges on equipment, machinery, and other materials brought into and out of Uganda for the conduct of the study.

(iv) to exempt the study team from income tax and charges of any kind imposed on or in connection with any emoluments

or allowances paid to the members of the study team for their services in connection with the implementation of the study.

(v) to provide necessary facilities to the study team for remittance as well as utilisation of the funds introduced in Uganda from Japan in connection with the implementation of the study.

(vi) to secure permission for entry into private properties or restricted areas for the conduct of the study.

(vii) to secure permission for the study team to take all data, documents and necessary materials related to the study out of Uganda to Japan.

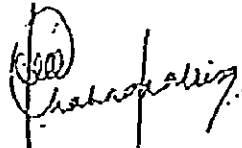
(viii) to provide medical services to the study team as needed, where expenses will be chargeable to members of the team.

6. The Government of Uganda shall bear claims, if any arises against member(s) of the Japanese study team resulting from, occurring in the course of or otherwise connected with the discharge of their duties in the implementation of the study, except when such claims arise from gross negligence or willful misconduct on the part of the members of the study team.

7. The Ministry of Natural Resources shall act as counterpart agency to the Japanese Study Team and also as co-ordinating body in relation with other governmental and non-governmental organisations concerned with the smooth implementation of the study.

The Government of Uganda assures that the matters referred in this form will be ensured for a smooth conduct of the Development Study by the Japanese Study Team.

Signed:



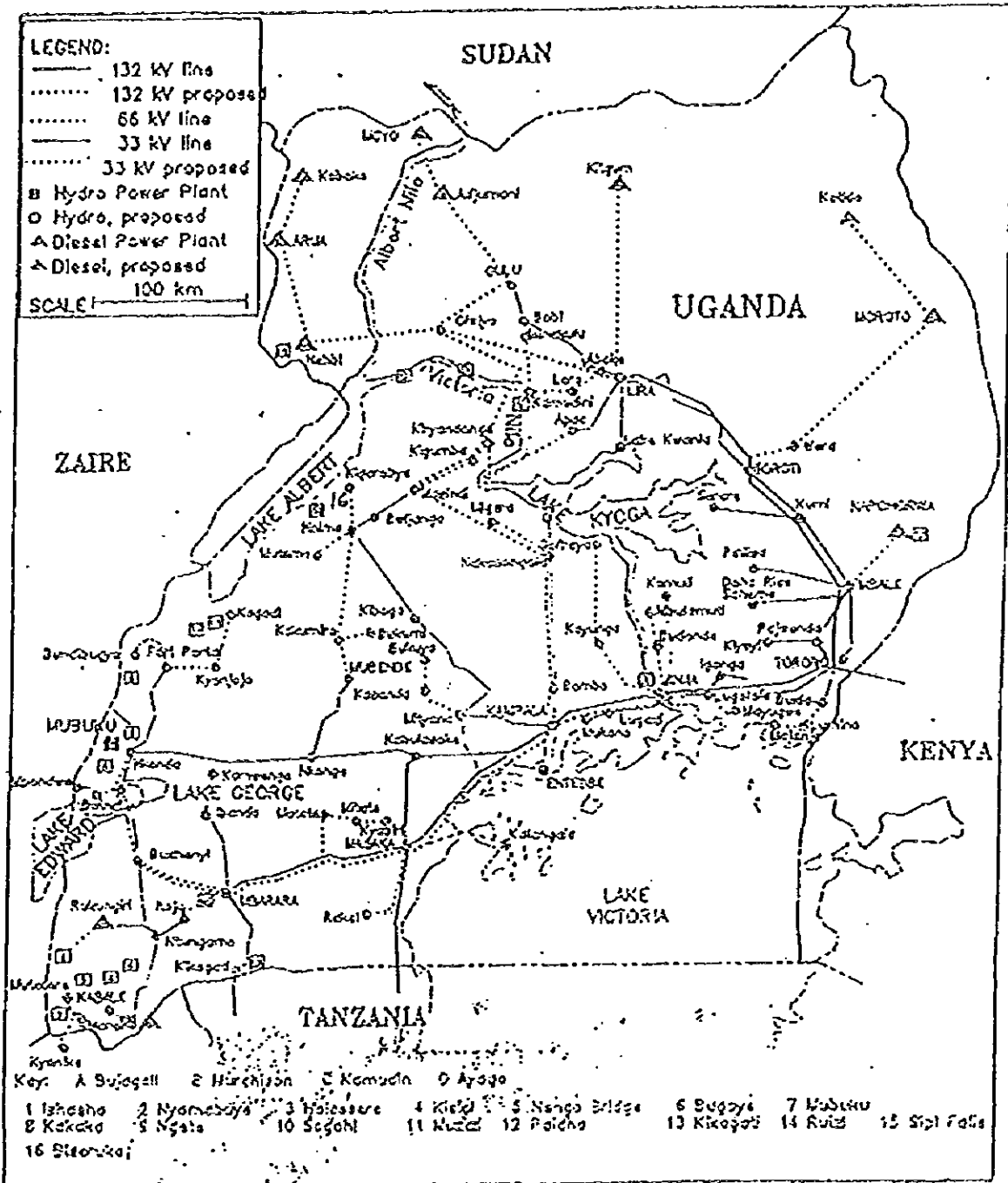
Permanent Secretary
MINISTRY OF NATURAL RESOURCES
P. O. Box 770, KAMPALA

Date: 23/11/1994

On behalf of the Government of Uganda.

APPENDIX I

PRESENT AND FUTURE UEB NETWORK



ORGANISATION CHART
MINISTRY OF NATURAL RESOURCES

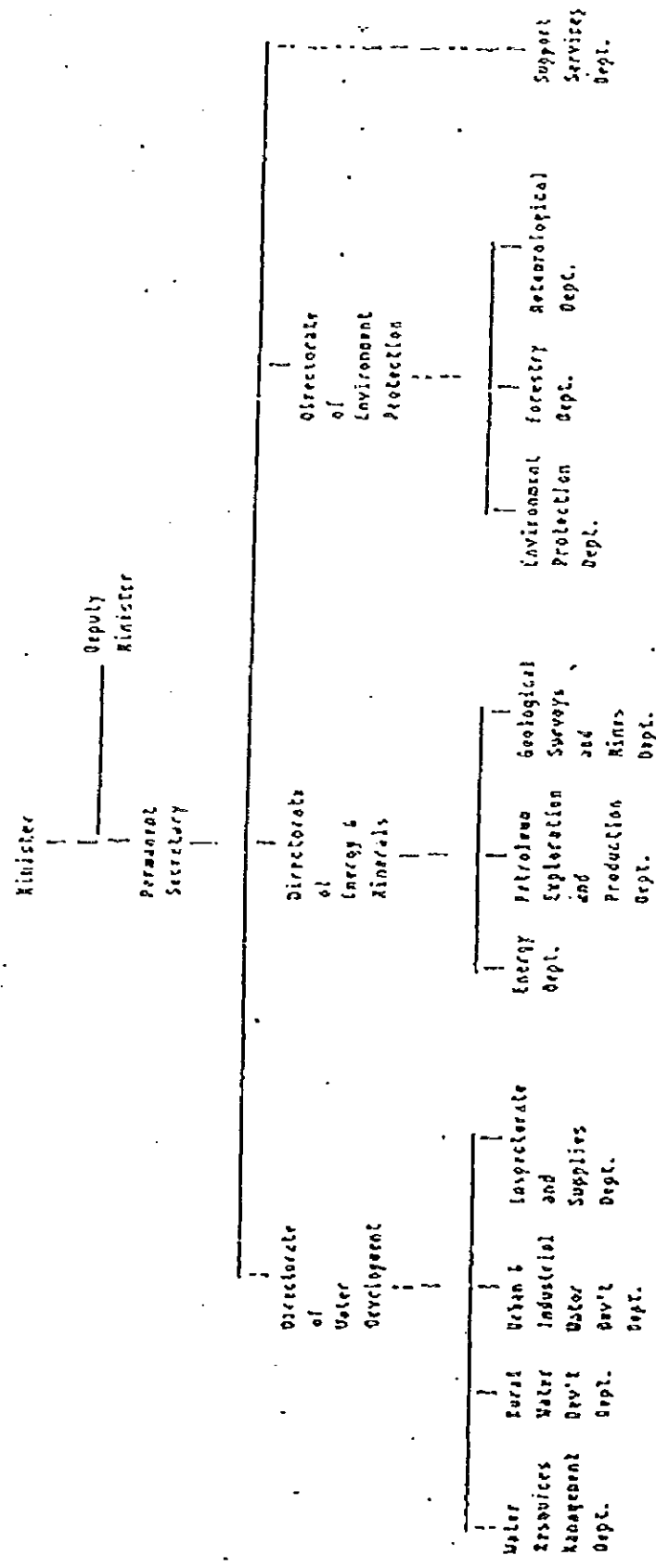
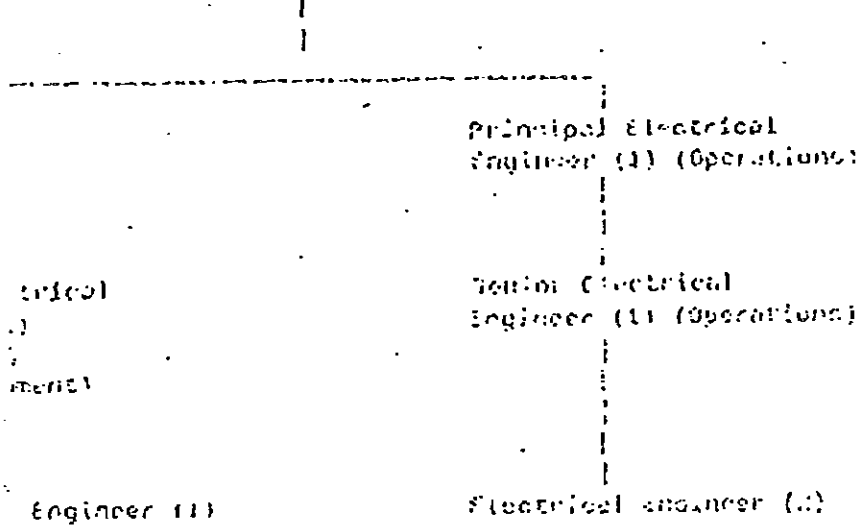


Fig: Organisation chart of the Ministry of Natural Resources upto Department level.

ORGANISATION CHART

ELECTRIC POWER DIVISION

Assistant Commissioner



PROJECT SCHEDULE: Feasibility study for the Nyabubu and Eseru Hydroelectric Projects

TASK NAME	Month							
	1	2	3	4	5	6	7	8
Site Inspection and Document Review								
Aerial Survey and Topo Mapping								
Hydrology								
Geology and Geotechnics								
Reservoir Operation								
Study of Alternatives								
Optimization and Preliminary Design								
Cost Estimates								
Economic and Financial Analyses								
Environmental Impact Assessment								
Training and Consultative Trips								
Reports Inception (I), Draft Final (D), and Final (F) Reports								

MAJOR REFERENCES.

1. EPD - Engineering & Power Development Consultants Ltd:
" Report of the Mission to Evaluate Small Hydro-power
Sites in Uganda", 1988.
2. Norconsult International: Four Hydro-power Schemes in
Western Uganda, Pre-Investment Report, Prepared for
Uganda Electricity Board, Ministry of Water, Energy,
Minerals, and Environment Protection.

② 質問票および回答

Questionnaire to Uganda Electricity Board(UEB)
for
Project Formation Study on Feasibility Study for Mini-Hydro Power Development
at Nyamabuye and Biseruka

This questionnaire is prepared beforehand for the smooth implementation of the forthcoming study and to facilitate discussions with your authority to be made by the Japanese study team.

It would be appreciated very much if your authority could prepare the answers to the following questions in writing and provide the team with them together with relevant data and information when the team visits your authority.

- 1 Electric power development and electric power facilities
 - 1-1 We understand that the Uganda's electric power development has been in progress based on the National Electrification Planning Study (NEPS) in 1992 and Hydro Power Master Plan Study (HPMPS) which has been carried out by the Rust Kennedy & Donkins of English consultant.
What are the basic policy papers and plans which the electric power development policy in Uganda is composed of ?
What organization is responsible for drawing up the electric power development plan ?
 - 1-2 Are there any study reports or proposals, besides NEPS and HPMPS, which have influenced the present electric power development policy and plans in Uganda?
 - 1-3 Please provide the past and present data on the power demand and supply system (power station, substation and transmission lines), and the latest data on power demand forecast and an investment plan for a future power supply system.
Are there any potentials in the development of the other power sources such as thermal power, geothermal power, solar photovoltaics, wind power and gas turbine)?
 - 1-4 Please provide information on how to maintain and manage the existing small-hydro power plant in rural areas, and on the maintenance status of those plants.
 - 1-5 Please provide information on the distribution system and the outline of voltage, etc.
 - 1-6 Please provide information on transmission system diagrams and the data on the capacity of

each facility, power flow, voltage drop and frequency drop.

With regard to the construction of transmission lines in Uganda, please provide information on the outline of the past projects and their costs.

- 1-7 Has hydropower potential survey been conducted in Uganda ? If any, please provide the result of the survey.

What positions do the rural electrification program and the small-hydropower development plan occupy in the national power development plan ?

How are those program and plan integrated into the demand forecasting and an investment plan for future supply system ?

- 1-8 Please provide information on the progress of the Owen Falls Hydropower Expansion program.

- 1-9 Please provide the past records and the future plan on selling electricity to Kenya and Tanzania.

2 Priority of Nyamabuye and Biseruka Projects and their positions in the electric power development plan

- 2-1 Nyamabuye small hydropower project was given the third high priority following Ishasha and Paidha projects in "Evaluation of Small Hydropower Sites in Uganda, 1988". Biseruka had not been identified in the above report. But It was found out by the later survey. Though the pre-feasibility study was carried out at both sites in 1993, do the two projects still have high priority among promising project candidates ? Please explain what positions the two projects occupy in the future's power demand and an investment plan for supply system.
- 2-2 According to your letter dated 7th July, the study of Bujagali and Murchison have been carried out as large-scale hydro power stations, and Ishasha, Paidha and Mobuku II as Mini-hydro power stations. Please provide information on the outline of the result of these studies and the priority of Nyamabuye and Biseruka projects in comparison with these other development areas ?
- 2-3 There seems to be several plans on the expansion of power grid from Owen Falls power station, an unique major power plant in Uganda. On the other hand, are there definite policy and/or plans on the development of decentralized power grids utilizing small hydropower resources in remote rural areas (the case in Nyamabuye) and/or on the small hydropower development near the load center with which the power source will be connected to the national grid (the case in Biseruka) ?

- 2-4 Please explain the reasons why Biseruka power station is expected to operate to meet peak load.
- 2-5 According to your letter dated 7th July, it is reported that Biseruka mini hydro will be expected to cater for the electrification of a number of rural townships in Hoima district and also improve the poor voltage profile that Hoima areas now experiences.
But it seems that if the Owen Falls power capacity is increased by 200MW, the major hydropower station will have sufficient capacity to bridge the 80MW power shortfall and in addition will be able to electrify the rural townships expected to be catered for by Biseruka.
In this connection, please clarify the necessity of Biseruka small-hydro power station and also explain with technical data the present situation of voltage drop in the area.

3 Data and information about the Project Sites

- 3-1 Please provide the basic data and information on the demand areas of Kisolo and Hoima, such as population, the number of houses, industries and so on.
- 3-2 What is the reason to decide the scale of each hydropower station ?
- 3-3 Please provide runoff data of both rivers, Kaku river and Wambabya river.
- 3-4 Please provide the geological information of each project site. If any, please show the geological survey reports.
- 3-5 Are there the topographic maps to scale 1 in 50,000 , 1 in 10,000 or 1 in 5,000 and aerial photographs of each project site ?

4 Environmental impact assessment in Uganda

- 4-1 What kind of laws and regulations related to environment exist in Uganda ? Please provide relevant information and guidelines on environmental consideration, if any.
- 4-2 What is the important items to be considered in environmental impact study when the small hydropower project is planed in Uganda ?
- 4-3 Is the water of rivers and/or lakes used for multi-purposes like industry, agriculture, water supply and hydropower ? If so, how is water allocated for respective purpose ?
Is there any standards for the minimum river maintenance flow in Uganda ?

5 Finance source for implementation of the project

Though your authority states in the request form for the project that Japanese grant aid is

expected to finance the implementation of the project, according to the Pre-FS study conducted by the Norconsult, construction costs of Nyamabuye and Biseruka are respectively 1270US\$ and 1750US\$, which are far beyond the scale of the amount provided under grant aid program.

In case that the scale of the project suggested by the Pre-FS study become feasible technically and economically, where are the construction funds procured for implementation of the projects.

In addition to the project for Nyamabuye and Biseruka, various studies have been implemented for Bujagali, Murchison, Paidha and Mobuku II projects.

How your authority procure construction funds for those projects?

**JICA QUESTIONNAIRE (RE: 9-715LN) CONCERNING
FEASIBILITY STUDY FOR MINI HYDRO DEVELOPMENT AT
NYAMABUYE & BISERUKA**

1.0 ELECTRIC POWER DEVELOPMENT AND ELECTRIC UTILITIES

1-1 BASIC POLICY PAPERS AND PLANS ON ELECTRIC POWER DEVELOPMENT

Ministry of Natural Resources (Department of Minerals and Energy) is the Policy formulating organ for the Electricity Subsector.

The Organisation responsible for drawing up the electric power development is UEB.

1-2 STUDY REPORTS/PROPOSALS WHICH HAVE INFLUENCED ELECTRIC POWER DEVELOPMENT

Refer to Appendix 1

1-3 PAST AND PRESENT DATA ON SUPPLY AND DEMAND

Please refer to appended:

- Transmission diagram (Appendix 2).
- Typical daily Load curve (Appendix 3).
- Latest data on power demand forecast (Appendix 4).
- Present and Future UEB Network map indicating plan for future power supply system (Appendix 5).
- Draft copy of UEB's Investment Plan (Appendix 6)
- Load Demand Curves (Appendix 7)

Other forms of energy like gas (imported), solar, geothermal, and biomass either make a negligible contribution or have not been explored. Solar Voltaic Panels are sold privately but are quite expensive for the general populace to afford.

Detailed information on the potential of these alternative energy sources can be obtained from the Ministry of Natural Resources.

A Strategic Plan for the Energy Sector has been formulated and awaits Government approval.

1-4 MANAGEMENT AND MAINTENANCE OF SMALL HYDRO POWER PLANTS IN RURAL AREAS.

This falls under the Generation, Operations and Consumer service Departments of UEB.

The set up at the existing Maziba Small Hydro is as follows:

Staffing: One Technician (in charge) and eight plant attendants.

Maintenance: Technician covers routine while Generation and Operation Departments do scheduled and major maintenance.

1-5 DISTRIBUTION SYSTEM AND OUTLINE OF VOLTAGES

1-5-1 TRANSMISSION

Generation takes place at Owen Falls Power Station (OFPS) at 11KV which is stepped up to transmission voltages of 132KV, 66KV and 33KV. These are stepped down at various substations to distribution voltages of 33KV and 11KV.

a) 132KV Lines

From Owen Falls Power Station:

- A double circuit transmits to Kampala North (83km).
- A double circuit transmits eastwards to Tororo.

From Tororo:

- * a double circuit continues into Kenya for export
- * a single circuit transmits northwards to Lira.

From Kampala:

- * by interconnection between 132/33/11KV substations of Kampala North, Lugogo and Mutundwe, Kampala load (which is over 60% of total consumption) is catered for.
- * a single circuit transmits westwards to Kabulasoke switching station from where:
 - ⇒ single circuit continues to Nkongwe and Nkenda.

⇒ a single circuit continues to Masaka then to Mbarara and from Masaka to Tanzania for export.

The total length of 132KV lines is about 1225 Km.

b) 66KV line

This voltage level is being phased out of UEB system and the remaining link is between Jinja and Lugazi, a distance of 35.5km.

c) 33KV Line

The 33KV voltage level is a sub-transmission as well as distribution hence spreads country wide to cover a distance of about 2500km. The 33KV lines originate from 132/33KV substations; of Kampala North, Lugogo, Mutundwe, Masaka West, Nkongge, Nkenda, Mbarara North, Tororo and Lira.

1-5-2 DISTRIBUTION

Distribution is typically by 11KV radial feeders from various substations country-wide which distribute to the Board's consumers at 415 volts for 3 phase consumers and 240V for single phase consumers. The total length of 11KV feeders is about 4200km. The amount of 33KV that is used for distribution rather than transmission is a matter of definition.

1-6 TRANSMISSION SYSTEM DIAGRAMS AND SUBSTATION CAPACITIES, POWER FLOW, VOLTAGE DROP AND FREQUENCY DROP:

- Refer to single line diagram in 1-3 above.
- Refer to load flow data attached.

PAST TRANSMISSION LINES PROJECTS INCLUDE:

ITEM	PROJECT/LINE NAME & LENGTH	COST (\$)
1	132 kV Masaka - Bukoba	
2	132 kV Masaka - Mbarara	
3	132 kV (Double cct) Owen Falls - Lugogo	
4	132 kV Lugogo - Mutundwe	
5	33 kV Hoima - Kigolobya	
6	33 kV Kyanika - Kisoro	
7	33 kV Sironko - Kapchorwa	
8	33 kV Lira Kitgum	

1-7 HYDRO POWER POTENTIAL SURVEY AND RESULTS

A number of studies have been conducted and candidate sites include:

ITEM	SITE	CAPACITY (MW)
MAJOR HYDROS		
1.	Bujagali	340
2.	Kalagala	450
3.	Kamdini	180
4.	Ayago North	304
5.	Ayago South	234
6.	Murchison	600
SMALL & MINI HYDROS		
1	Muzizi	20
2	Biseruka	10
3	Nengo Bridge	10
4	Mobuku II	10
5	Bugoye	7.5
6	Paidha	6
7	Nyamabuye	4
8	Ishasha	4
9	Kikagati	2.5
10	Kakaka	1.5

-Please note :

1. All the major hydro sites are yet to undergo Feasibility studies before further development.
2. Under the small and mini hydros:
 - Ishasha feasibility Study was completed in 1993.
 - Muzizi Feasibility Study was completed by CDC and its development varies from 2-20 MW. Currently it is being developed for 2 MW from run of river.
 - Paidha Feasibility study is ongoing under funding from USTDA.
 - The rest, Nyamabuye and Biseruka inclusive pend Feasibility studies before further development.

Position Of Rural Electrification And Small Hydro Power Development In The National Power Developemt Plan

For the economic development of Uganda, a good electricity infrastructure is a pre-requisite and both the Rural electrification and the small hydro power development contribute to the infrastructure. Small hydros promote Rural Electrification.

How Rural Electrification And Small Hydros Are Integrated Into The Demand Forecasting And Investment Plan For Future Supply System

Refer to UEB's present and future network map attached in 1-3. The programme, National Electrification Planning study (NEPS) was drawn after a comprehensive study, forecasting inclusive, that was carried out by *Electricite de France* under funding from the International Delopment Agency (IDA).

1-8 PROGRESS OF OWEN FALLS HYDRO POWER EXPANSION PROGRAM

Progress is at Civil works stage which halted following the termination of the SIETCO Contract. A new Contractor, Impregilio/Salin, (Joint Venture) has been awarded the Contract and is at mobilisation stage of commencing works.

The first 2 units of 40 MW each are expected to come on line in March 1999. While completion is expected in the year 2000.

1-9 PAST RECORDS AND FUTURE PLANS ON SELLING ELECTRICITY TO KENYA AND TANZANIA

UEB caters for about 142,000 consumers and in addition, due to its geographical position combined with its major hydro electric potential, is in an ideal position to export power to its neighbouring countries. Power is being exported to Kenya, Tanzania and Rwanda.

a) Kenya

UEB is under agreement with Kenya due to expire in 2008, to supply 30MW or more on request when available. The existing interconnection can accommodate a maximum of 60 MW. Past records are herewith attached (Appendix 8).

b) Tanzania

Uganda is currently supplying TANESCO 5MW though the contract in place up to 2003 is for supply of up to 16MW. At present UEB supplies the isolated grid of Bukoba region. When the Tanzania network expands, exports will increase. Past records are herewith attached (Appendix 9).

c) Rwanda

Rwanda approached UEB for an emergency supply of 5MW but the interconnecting 33KV line can only supply up to 3MW. If the interconnection is upgraded to 132KV, it will enable Rwanda to take up to 30MW, as stipulated in the memorandum of understanding signed between Rwanda and UEB in 1995.

2.0 PRIORITY OF NYAMABUYE AND BISERUKA PROJECTS AND THEIR POSITIONS IN THE ELECTRIC POWER DEVELOPMENT PLAN

2-1 POSITION OF NYAMABUYE & BISERUKA IN THE FUTURE POWER DEMAND & INVESTMENT PLAN.

UEB's investment plan (draft) is appended for reference - Appendix 10.

2-2 INFORMATION ON THE OUTLINE/RESULTS OF ISHASHA, PAIDHA, AND MOBUKU II

Ishasha results/information are contained in the Feasibility Study report.

Paidha and Mobuku's Feasibility Study results are not yet available as the studies are still in progress. Existing information is from preliminary surveys. Mobuku will be developed privately by Kasese Cobalt Company by 10 MW. Paidha's Study is conducted under UEB. A progress Report on Paidha is appended (Appendix 11)

2-3 POLICY AND/OR PLANS ON THE DEVELOPMENT OF DECENTRALISED POWER GRIDS UTILISING SMALL HYDRO POWER RESOURCES

Private Developers are encouraged to take up Generation Projects of the Decentralised Power Grid. Government is to invest in rural areas that are not attractive to Private Developers.

Nyamabuye will initially be decentralised and as the demand grows to more than 4 MW, there will be need to connect it to the National grid.

Biseruka on the other hand is planned for connection to the national grid and will in effect improve on the poor voltage profile and will reduce on losses.

2-4 REASON WHY BISERUKA POWER STATION IS EXPECTED TO OPERATE TO MEET PEAK LOAD

With reference to the daily load curve appended under 1-3, loadshedding at peak hours is obvious. Any additional generation at such a time would be a relief and would in addition stabilise the system.

2-5 NECESSITY OF BISERUKA SMALL HYDRO STATION AND TECHNICAL DATA ON THE PRESENT SITUATION OF LOW VOLTAGE PROFILE

It will take about 3 years plus to have the whole of 200 MW from the Owen falls Extension on line. Meanwhile the load growth now estimated at 2 MW/Month will be considerable by that time, considering the growing rate of industrialisation and investment in the country. In addition, the 200 MW would have to cater for the current problems:

- energy deficit (i.e to bridge the shortfall in capacity which stands at about 80 MW now)
- suppressed demand that has resulted in loadshedding at peak hours.
- reserves associated with generations i.e spinning reserve and system standby which have led to loadshedding when a machine is suddenly lost, or during scheduled or forced maintenance.
- UEB's contractual obligation of supplying 30 MW to Kenya which now cannot be met at peak hours.

3.0 DATA AND INFORMATION ABOUT PROJECT SITES

3-1 BASIC DATA ON KISORO AND HOIMA

See Appendix 12 & 13.

3-2 BASIS ON WHICH CAPACITY OF EACH HYDRO POWER STATION IS BASED

Current estimates are based on pre-investment studies which pend concretisation by a detailed feasibility study. The Hydro Power Stations will be developed to full capacity and will eventually be connected to the UEB Grid.

3-3 RUN OFF DATA FOR RIVERS KAFU AND WAMBABYA

This can be obtained from the Water Development Department (WDD)

3-4 GEOLOGICAL INFORMATION ON BISERUKA AND NYAMABUYE

A brief is contained in the pre-feasibility study reports. This pends concretising by the detailed feasibility study. Further details can be obtained from Department of Geological Surveys, Ministry of Natural Resources, Entebbe.

3-5 TOPOGRAPHIC MAPS

- Scale 1 in 50,000 is available form the Mapping section of Department of Survey at Entebbe, Ministry of Lands and Surveys.
- Scale 1 in 10,000 and 1 in 5,000 cannot be obtained for areas like Biseruka and Nyamabuye as they are normally used for Towns.
- Aerial photographs of each site can be obtained from the Mapping section, Ministry of Lands ans Surveys.

4.0 ENVIRONMENTAL IMPACT ASSESSMENT IN UGANDA

4-1 LAWS AND REGULATIONS ON ENVIRONMENT

These exist under the *National Environment Management Authority (NEMA)*. Guidelines can be obtaied from them.

4-2 Important items to be considered in Enviroment Impact Study

Refer to NEMA Guidelines but generally concern:

- Social impact of the project
- Cultural impact - relocation, infrastructure etc.

- Effects by the project on the environment (Flora and fauna)
- Archaeological
- Health
- etc..

4-3 USE OF WATER OF RIVERS; NYAMABUYE AND BISERUKA

This includes home use, fishing but on a very minor scale.

Allocation: Can be got from Water Development Department (WDD)

Standards on Minimum river maintenance: Consult WDD/Hydrology Department.

5.0 FINANCE SOURCE FOR THE IMPLEMENTATION OF THE PROJECT

The Uganda energy sector is under reform and the government Policy on Liberalisation has been extended to the electricity supply industry. The Electricity Act originally formulated in 1964 is under review to cater for the participation of Independent Power Producers.

For the particular case of Nyamabuye and Biseruka, it is anticipated that the type of funding for the project will be from Bilateral donors with IDA, JICA, NORAD, DANIDA and KFW as potential sources.

The Feasibility Study, however is required before further development is effected.

APPENDIX 1:

POWER DEVELOPMENTAL STUDIES

1. Uganda Hydro Power Development Master Plan by Kennedy & Donkins - July 1996
2. National electrification Planning Study (NEPS) by Electricite de France (EDF) - Nov 1992
3. Nile Investigations, North Uganda by Kennedy & Donkins and Sir Alexander Gibb & Partners - July 1957
4. Proposed Extension of Owen falls Generating Station by Acres International Ltd - October 1990 & Addendum - May 1991
5. Four Power Schemes in western Uganda - Pre-investment Study Report by Norconsult - March 1993
6. Evaluation of Small Hydro Projects in Uganda - United Nations 1988
7. Report on the Mission to evaluate Small Hydro Power Sites in Uganda.
8. Power Development study of the Uganda Electricity System - Environment Impact Assessment W S Atkins & Partners with Kennedy & Donkins and Sir Alexander Gibb & Partners - March 1986.

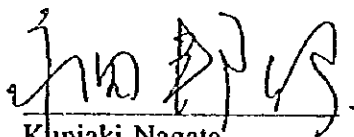
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MINUTES OF MEETINGS
FOR
"FEASIBILITY STUDY FOR MINI-HYDRO POWER DEVELOPMENT
AT
NYAMABUYE AND BISERUKA"
BETWEEN
UGANDA ELECTRICITY BOARD
AND
JAPAN INTERNATIONAL COOPERATION AGENCY

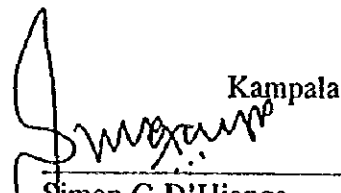
The Project Formation Study Team (hereinafter referred to as "the JICA Study Team") organised by the Japan International Cooperation Agency visited the Republic of Uganda from August 5th to 13th, 1997 for the purpose of discussing the proposal submitted by UEB regarding a feasibility study for mini-hydro power development at Nyamabuye and Biseruka with the Uganda Electricity Board (UEB) of the Republic of Uganda (hereinafter referred to as "the Uganda side")

In connection with the above, a series of discussions were held between the Uganda side represented by Mr S G D'Ujanga, Managing Director of UEB and the Japanese side headed by Mr Kuniaki Nagata, the leader of the JICA Study Team, and a site survey was also carried out by the JICA Study Team.

The results of the study are summarised in the Minutes of meetings, which is agreed upon herewith between both sides.



Kuniaki Nagata
LEADER
PROJECT FORMATION STUDY TEAM
JAPAN INTERNATIONAL COOPERATION
AGENCY(JICA)



Kampala, August 13th, 1997

Simon G D'Ujanga
MANAGING DIRECTOR
UGANDA ELECTRICITY BOARD(UEB)

PROJECT FORMULATION STUDY

The results of the study are summarised below:

1. Electric Power Policy and Plan:

The department of Energy and Minerals of the Ministry of Natural Resources (MNR) is the policy formulating body in the power sector. Uganda Electricity Board (UEB) is the parastatal operating under the general supervision of MNR and is responsible for planning and implementing public supply of electricity throughout Uganda.

The latest policy document is "The Strategic Plan for the Uganda Power Sector", which has been formulated by MNR and awaits Government approval. The Strategic Plan aims at transforming the power sector into an economically viable electricity industry capable of providing the people with a reasonable priced and reliable power service and maximizing inter-regional export opportunities.

Mini-hydro power development for electrification of load centres or population growth centres in rural areas has been given Government's priority. UEB has the following definite objectives to promote mini-hydro power development.

- * to promote rural electrification in remote areas not connected to the grid for promotion of agro-processing industries and improving the rural standard of living.
- * in areas that are connected to grid, to improve electric power system stability by connecting the mini-hydro sites to the grid.
- * to phase out diesel generators that serve remote areas due to their high operational costs.

UEB has formulated "An Investment Plan 1995 - 2005" for developing generation, transmission and distribution systems based on several studies carried out so far, especially "National Electrification Planning Study (NEPS)" by Electricite de France International (EDF) in November, 1992 and "Hydropower Development Master Plan (Final Draft)" by Kennedy & Donkins in July, 1996.

"Investment Plan 1995-2005", "UEB Demand Forecast 1995-2005" and "Present and Future UEB Network" are shown in Appendix 1, 2, and 3.

2. **PRESENT SITUATION OF THE POWER SECTOR:**

The present power supply system comprises generation (about 180MW), transmission (about 1225Km of 132KV lines, 35.5km of 66KV lines, and 2500 Km of 33KV lines), and distribution (about 4200Km of 11KV feeders), and provides about 146,000 customers with electricity in addition to exports to Kenya, Tanzania and Rwanda. The details are shown in Appendix 4.

Meanwhile the power demand is currently at over 270MW with a growth rate 2 percent per month. Therefore this leaves a deficit of 100MW, necessitating massive load shedding. Balance of future demand and supply is shown in the Appendix 2.

3. **POSITIONS OF NYAMABUYE AND BISERUKA PROJECTS:**

Following the above mentioned UEB's policy on mini-hydro power development, Nyamabuye and Biseruka Projects have currently been given a clear position in the power development plan and still given high priority together with Paidha and Ishasha Projects among other promising projects as shown in the Investment Plan 1995-2005.

4. **RESULTS OF SITE OBSERVATION:**

4.1 **Nyamabuye Site**

(1) **Hydropower plan:**

There are two candidates of the dam site, site A which is planned downstream of the falls and site B of the upstream. It seems site B is more promising than site A from viewpoint of topographic and river conditions, but technical and economic comparison of both sites should be carried out in order to determine the best site.

Regarding the hydropower system, a run-of-river type would be appropriate in terms of topography and the proposed power output. Location of the head race passage should call for comparison of the left bank and the right bank, and type of head race, tunner or canal, should also be considered. Dam type should be considered comparing a concrete gravity type or a rubber dam type, and reservoir type or a run-of-river type.

Because of the isolated power station site, a maintenance and management programme would be necessary for the smooth operation of the power station.

(2) Geology:

Geology around the site is composed of Pre-Cambrian phyllite, Quaternary lava, Pyroclasts and deposits. The phyllite distributes widely as a basement rock, and the lava and pyroclasts distribute along rivers, making flat topographic feature. Many deposits are identified as swamp deposit, river deposit and talus deposit. The phyllite is hard in case of non-weathered condition, and good for structures. The lava is mainly composed of carbonatite. Carbonatite has many cavity in its body because of water dilution, so the lava is not good for dam and tunnel from a viewpoint of permeability. The basement of proposed dam site A is phyllite and site B is mainly lava. The basement rock of site A is enough for both run-of-river and reservoir types, but that of site B is not enough for reservoir type from a view point of physical properties and permeability.

4.2 Biseruka Site

(1) Hydropower Plan:

Topographic feature and river condition of the dam site are good for electric power site, because of high water head and short headrace. Penstock should be designed with consideration of an inclination and topographic feature. Dam scale should be decided with consideration of sediment yield so that it can be operated as a reservoir type.

(2) Geology:

Geology of the site is composed of Pre-Cambrian acidic gneiss and Quaternary deposits. Acidic gneiss is hard and distributes at mountain area, and Quaternary deposits are not consolidated and distribute at plain area. Basement of dam, headrace and penstock is assumed to be gneiss and that of power station is fan deposit. The physical properties of each basement are probably enough for each structure. Several researchers report that Albert rift valley is extending several cm per year so a master fault producing a steep cliff supposed to be an active fault. Activity of a master fault should be measured and estimated before construction.

5. MAINTENANCE & MANAGEMENT OF MAZIBA MINI-HYDROPOWER STATION:

Maziba Mini-Hydro Power Station has been operated at a 500KW capacity to supply the peak load in Kabale. Since the station was established in 1963, it suffered from large - scale flooding and the two machines were buried with mud in 1976. The station was rehabilitated in 1992 and has currently been managed by nine staff (1 technician and 8 operators). The station is maintained well with periodic inspection every 3 - 4 days. If serious electrical or mechanical troubles take place, engineers are dispatched from Jinja. The station is supposed to be expanded to 1MW capacity with additional installation of a 500KW generator, but lack of a spare part has delayed its operation.

6. UEB'S ORGANISATION, STAFF AND FINANCIAL SITUATION:

Uganda Electricity Board is a parastatal which was established in 1948 as a public utility responsible for generation, transmission and distribution of electricity throughout Uganda.

Presently UEB is governed by a Board of Directors appointed by the Ministry of Natural Resources. The Management which is answerable to the Board is structured as in the Appendix 5 herewith attached. The total number of staff is 3,228 broken down as shown in Appendix 6.

Since its inception UEB has enjoyed the monopoly of generating, transmitting and distributing power throughout Uganda and exporting to neighbouring countries viz, Kenya, Tanzania and Rwanda.

Uganda Government has recently developed a strategic plan which is intended to make the power sector more financially sound. In the strategic plan the Government of Uganda plans to involve the private participation in the distribution and commercial sectors of UEB.

It is also the intention of the Government of Uganda to keep the generation and transmission sectors under the UEB Management. The monopoly of generation of electricity has, however, been removed from UEB by Government and therefore private developers are allowed to invest in generation. Under the plan the private developers will be allowed to sell power to UEB for despatch to its (UEB) customers.

In the long term Government of Uganda will determine the appropriate structuring of the power sector based on achieved results in the medium term.

The Electricity Act which established UEB is also currently under review in order to take into account the current changes proposed under the Strategic Plan.

Financial Position of UEB

The UEB financial position has been improving in the last 10 years. It should be noted that the poor performance of the National Economy prior to 1986 had a serious effect on the financial performance of UEB but the situation has changed in response to the improvement in the performance of the National economy. A copy of the recent audited UEB Annual Report is attached (see Appendix 7).

7. POSSIBLE SOURCES OF FUNDS FOR PROJECTS:

If the Projects prove to be technically feasible and economically viable, Uganda Government will request international or bilateral donor agencies for financing the Projects. The donor agencies to be approached among others are; World Bank, the Government of Japan, Norwegian Government, Swedish Government and the Republic of Germany.

UGANDA ELECTRICITY BOARD

INVESTMENT PLAN , 1995 - 2005

PROJECT	AMOUNT REQUIRED	EXPENDITURES (million US\$)																		
		1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005								
1.0 GENERATION																				
1.1 Rehabilitation of OFPS	257.0	182.0	75.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1.2 OFPS Extension (Power III)	368.6	68.6	81.0	80.3	35.7	5.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1.3 Maziba	12.5	0.0	12.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1.4 Paloha Mini-hydro	10.0	0.0	0.0	0.0	1.0	8.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1.5 Ishasha Mini-hydro	10.0	0.0	0.0	0.0	0.0	1.0	8.0	1.0	0.0	0.0	0.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1.6 *Bujagali	450.0	0.0	0.0	0.0	0.0	0.0	90.0	120.0	0.0	0.0	120.0	0.0	0.0	120.0	0.0	0.0	0.0	0.0	0.0	0.0
1.7 *Muzizi	77.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1.8 Nyamabuye Mini-hydro	10.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	10.0	0.0	0.0	0.0	0.0	0.0	0.0
1.9 Biseruka	25.0	0.0	0.0	0.0	0.0	0.0	2.5	20.0	0.0	0.0	2.5	0.0	0.0	2.5	0.0	0.0	0.0	0.0	0.0	0.0
1.10 *Murchison	820.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1.11 *Ayago	580.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1.12 *Kamdini	390.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1.13 *Kalagala	530.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1.4 Sub-Total	3,010.1	248.6	168.5	80.3	36.7	14.0	201.5	141.0	132.5	120.0	120.0	0.0	0.0	132.5	0.0	0.0	0.0	0.0	0.0	0.0

* To be developed by the private sector

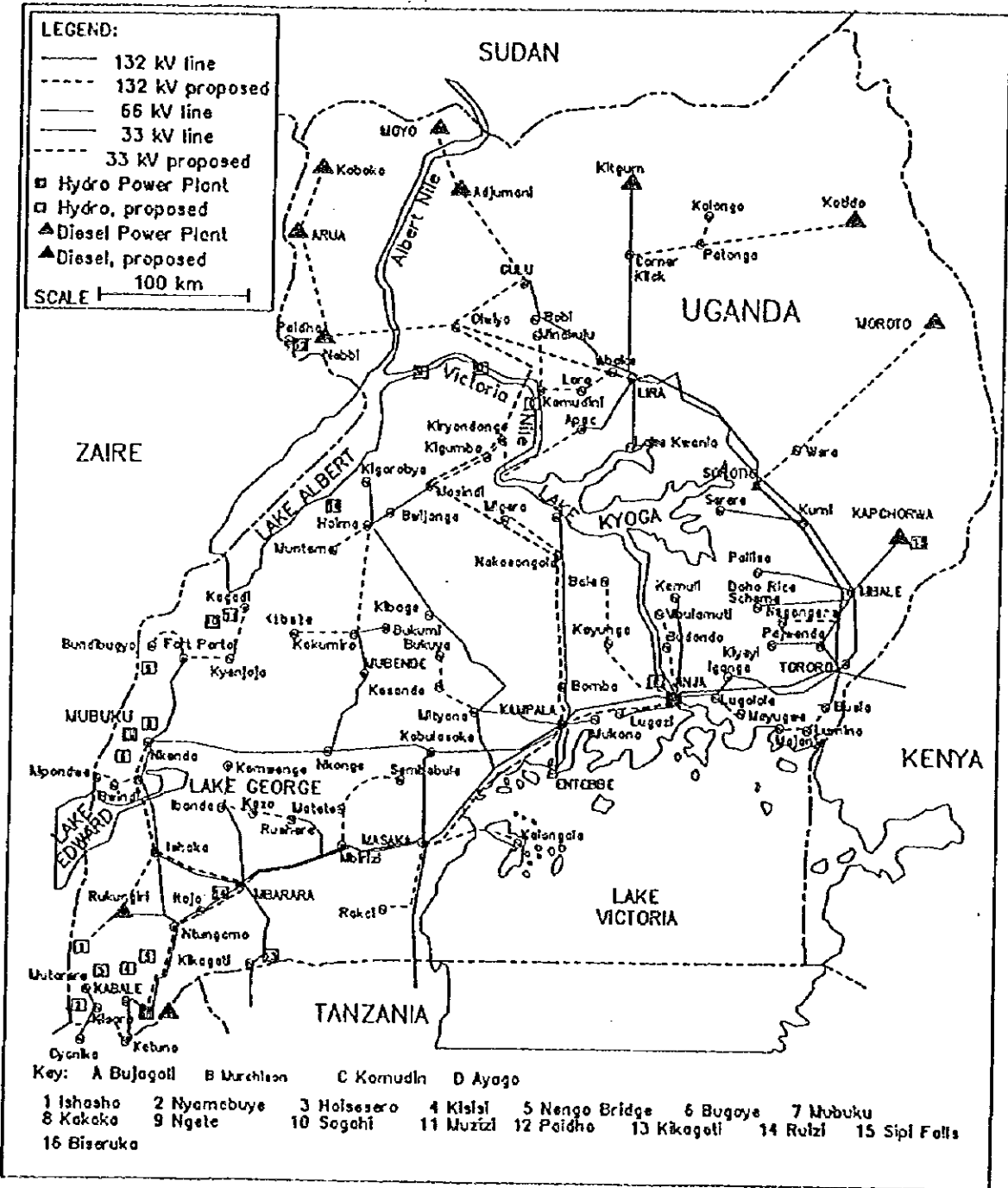
UEB ELECTRICITY FORECAST, 1995 - 2005

	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
Maximum Demand (MW)	173.6	174.0	178.4	178.4	252.7	272.9	287.9	303.7	320.4	338.1	356.7
Load Shedding (MW)	30	40	50	60	0	0	0	0	0	0	0
Kenya (MW)	50.5	45.1	40.9	30	30	30	30	30	30	100	100
Tanzania (MW)	4	5	5	5	5	10	11	12	12	15	15
Rwanda (MW)	0	1	1	3	3	20	20	20	20	20	20
Demand Side Management	0	0	0	(3)	(8)	(10)	(12)	(14)	(15)	(15)	(20)
Total Demand (MW)	258.1	265.1	275.3	273.4	282.7	322.9	336.9	351.7	367.4	458.1	471.7
Generation Capacity (MW)	177	180	180	180	260	380	380	380	380	480	480
Reserve Margin	18	18	18	18	40	40	40	40	40	54	54
Demand Surplus/(Deficit) (MW)	(99.1)	(103.1)	(113.3)	(111.4)	(62.7)	17.1	3.1	(11.7)	(27.4)	(32.1)	(45.7)

MAP 1

APPENDIX 3

PRESENT AND FUTURE UEB NETWORK



APPENDIX 4

UGANDA'S ELECTRICAL POWER SYSTEM.

Uganda's Electrical Power System is mainly operated by Uganda Electricity Board (UEB). The UEB's System comprises of Generation, Transmission and distribution.

Generation

The major source of electricity is Owen Falls Power Station which was commissioned in 1954. Initially there were ten Units of 15 MW, with total installed capacity of 150 MW.

The plant has undergone rehabilitation which uprated the units from 15 to 18 MW. This rehabilitation was completed on 16th July 1997 bringing the installed capacity to 180 MW.

Maziba Minihydro plant, commissioned in 1962 with an installed capacity of 0.5 MW, was rehabilitated and uprated from 0.50 MW to 1 MW. Currently one machine of 0.5MW is out of order. Repairs are being carried out by UEB.

UEB also serves remote isolated areas using nine diesel generator units in different localities.(See the Appendix 3). The total installed capacity is 3.2 MW.

Generation Expansion Plans

Under Power III, UEB embarked on the construction of Owen Falls Extension (OFE). This extension when completed will provide 200 MW of additional capacity. The work is scheduled in two phases. Phase I - 2 units with 80 MW installed capacity will be commissioned in 1999. Phase II - 3 units with 120 MW of installed capacity will be commissioned by the year 2000.

Transmission

Generation takes place at Owen Falls Power Station (OFPS) at 11KV which is stepped up to transmission voltages of 132KV, 66KV and 33KV. These are stepped down at various substations to distribution voltages of 33KV and 11KV.

a) 132KV lines:

From Owen Falls Power Station:

- A double circuit transmits to Kampala North (83Km).
- A double circuit transmits eastwards to Tororo.

From Tororo:

- * a double circuit continues into Kenya for export
- * a single circuit transmits northwards to Lira.

From Kampala:

- * by interconnection between 132/33/11KV substations of Kampala North, Lugogo and Mutundwe, Kampala load (which is over 60% of total consumption) is catered for.
- * a single circuit transmits westwards to Kabulasoke switching station from where:
 - > single circuit continues to Nkonge and Nkenda.
 - > a single circuit continues to Masaka then to Mbarara and from Masaka to Tanzania for export.

The total length of 132KV lines is about 1225Km.

b) 66KV line

This voltage level is being phased out of UEB system and the remaining link is between Jinja and Lugazi, a distance of 35.5Km.

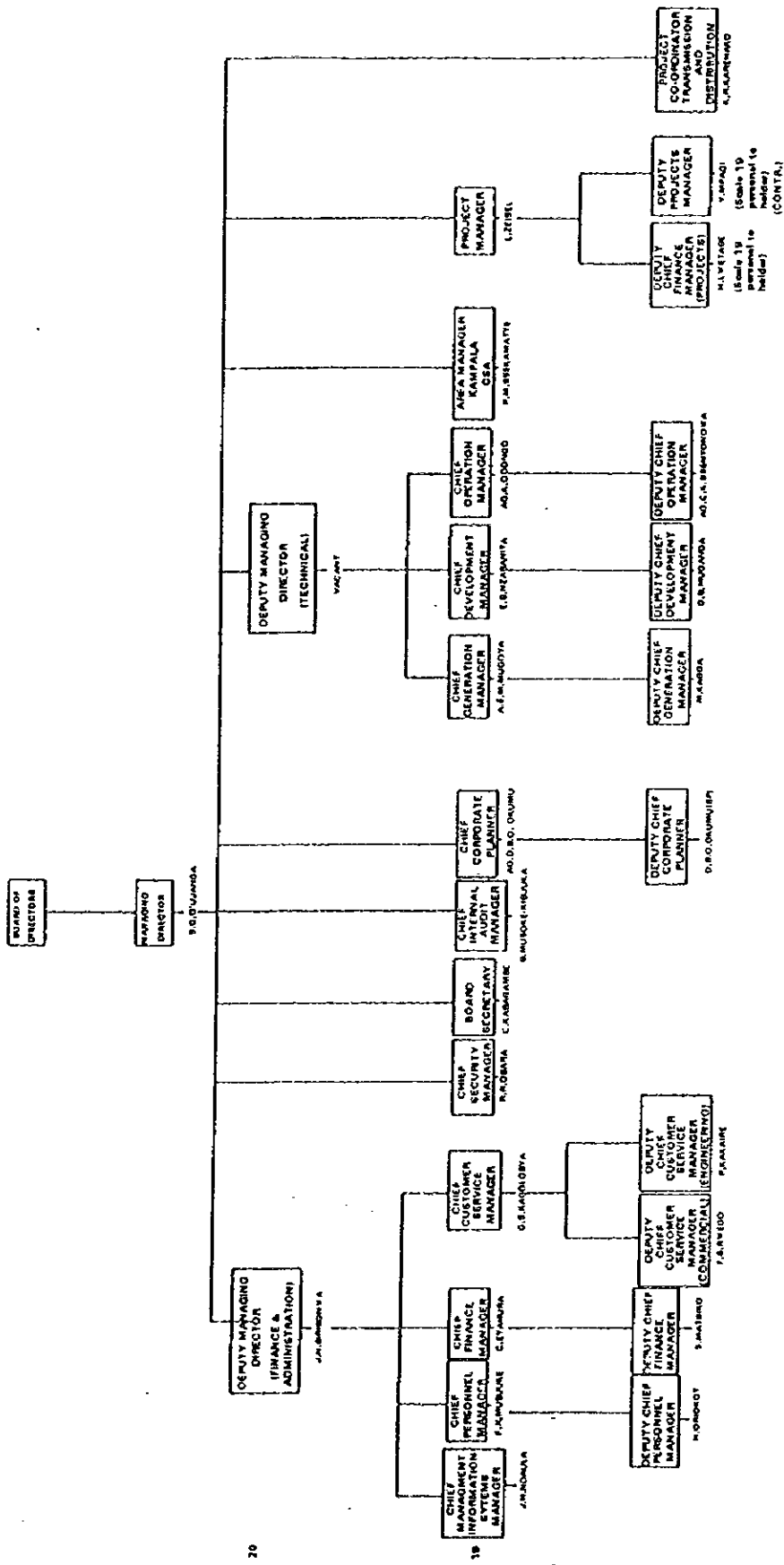
c) 33KV line

The 33KV voltage level is a sub-transmission as well as distribution hence spreads country wide to cover a distance of about 2500Km. The 33KV lines originate from 132/33KV substations; of Kampala North, Lugogo, Mutundwe, Masaka West, Nkonge, Nkenda, Mbarara North, Tororo and Lira.

Distribution:

Distribution is typically by 11KV radia feeders from various substations country-wide which distribute to the Board's consumers at 415 volts for 3 phase consumers and 240V for single phase consumers. The total length of 11KV feeders is about 4200 Km. The amount of 33KV that is used for distribution rather than transmission is a matter of definition.

UGANDA ELECTRICITY BOARD SCALES 18 - 20



NOTE:
AQ = ACTING
CONTR. = CONTRACT
SP = SUBSTANTIVE POST
CSA = CUSTOMER SERVICE AREA

as at 01.08.97

APPENDIX 6

UGANDA ELECTRICITY BOARD

EMPLOYEE STATISTICS

A. NUMBER EMPLOYED

Aa. The Board has 3406 employees of whom 360 are female. These figures are as of 30th September, 1994.

B. EMPLOYEES BY GRADES

Ba.	Executive Grade	-	3
Bb.	Management Grade	-	49
Bc.	Senior Staff Grade	-	205
Bd.	Intermediate Staff Grade	-	808
Be.	Junior Staff Grade	-	1,884
Bf.	Employees on temporary terms	-	<u>457</u>
	TOTAL		<u>3,406</u>

C. CATEGORISATION OF EMPLOYEES BY PROFESSIONS

Professional (Qualification) Grade	No. of Employees
1. Engineer	103
2. Administrator	15
3. Accountant	20
4. Economist	6
5. Auditor	8
6. Lawyer	8
7. Statistician	10
8. Forester	1
9. Surveyor	8
10. Detective Security	5
11. Technician	125
12. Diver	3
13. Personal Secretary	17
14. General Secretarial Support Staff	52
15. Artisan	294
16. Clerical	668
17. Driver	172
18. Nurse	1
19. Non-professional	<u>1,889</u>
TOTAL	<u>3,406</u>

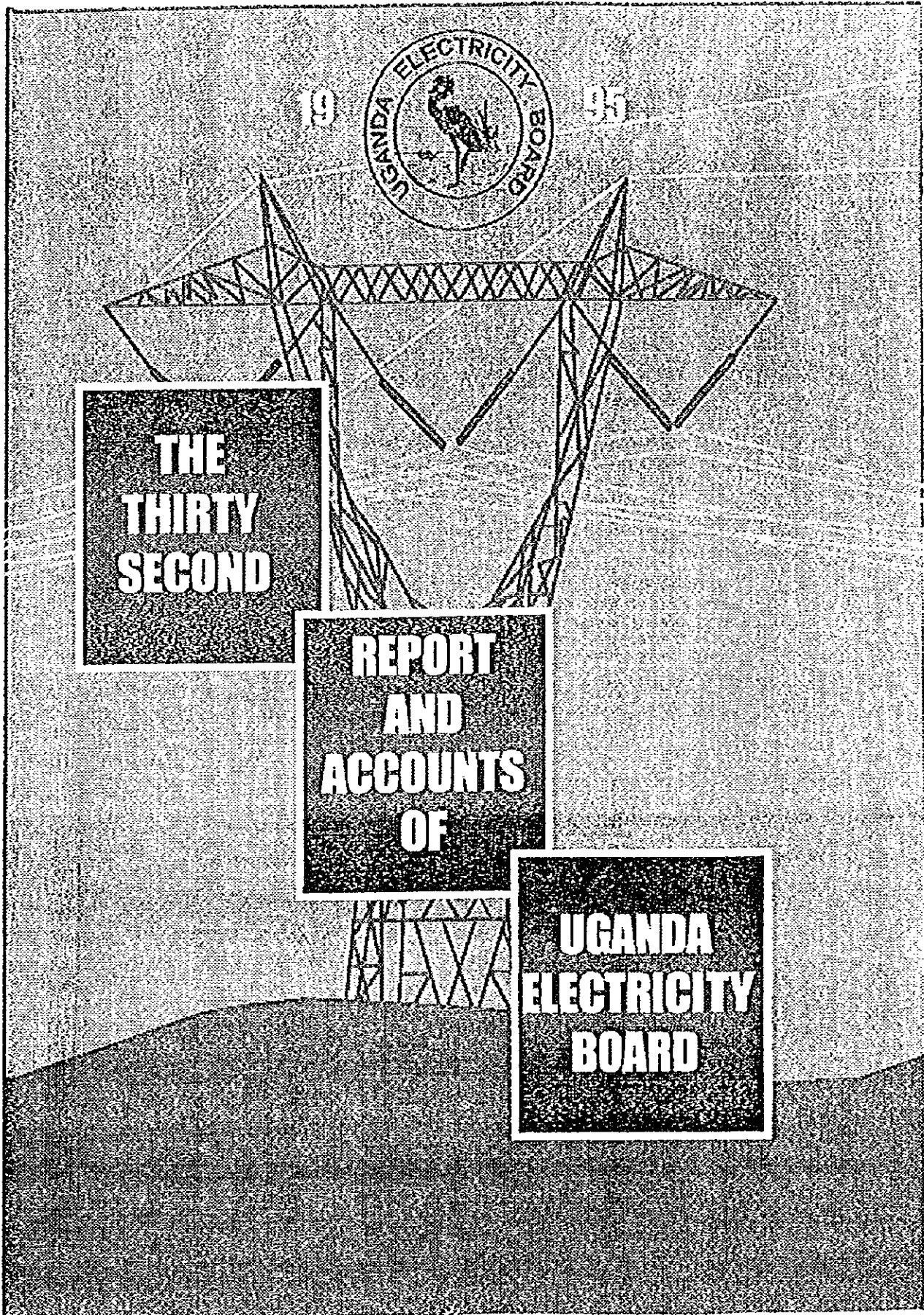


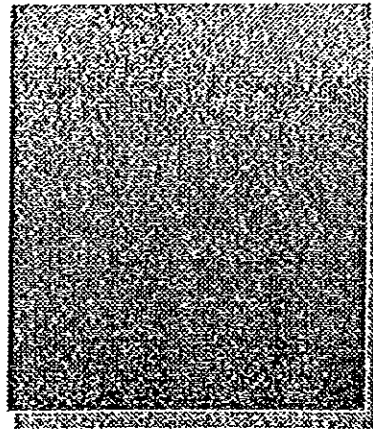
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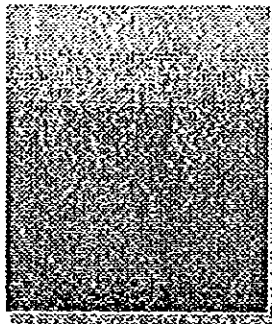
Abbreviations used in the Annual Report

ABB NERA	Asea Brown Boveri
ADB	African Development Bank
ADF	African Development Fund
BITS	Swedish Board for Investment Technical Support
CDC	Commonwealth Development Co-operation
DANIDA	Danish International Development Agency
EEC	European Economic Community
EIB	European Investment Bank
ESBI	Electricity Supply Board International
GDP	Gross Domestic Product
GTA	Gesellschaft für Technischen Anlagenbau mbH
IDA	International Development Association
JICA	Japanese International Co-operation Agency
KCC	Kampala City Council
MIS	Management Information Systems
MTAC	Management Training and Advisory Centre
NORAD	Norwegian Agency for Development Corporation
ODA	Overseas Development Agency
OFE	Owen Falls Extension
OFPS	Owen Falls Power Station
PLC	Power Line Carrier
RTU	Remote Transmission Unit
SAD	Starkstromanlagen Dresden GmbH
SCADA	Supervisory Control and Data Acquisition System
SIDA	Swedish International Development Agency
SIETCO	China Schuan Corporation for International Techno-Economic Co-operation
SFF	Standard Service Fee
TANESCO	Tanzania Electricity Supply Company
UEB	Uganda Electricity Board
UNDP	United Nations Development Programme
VCT	Vocational Training Centre
VTI	Vocational Training Institute
UCC	Uganda College of Commerce
UPTC	Uganda Posts and Telecommunications Corporation
UMI	Uganda Management Institute
USAID	United States Agency for International Development

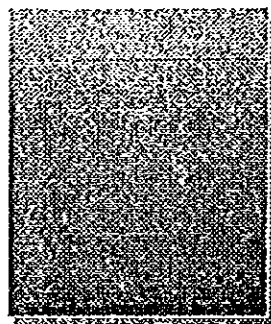
Board of Directors 1995



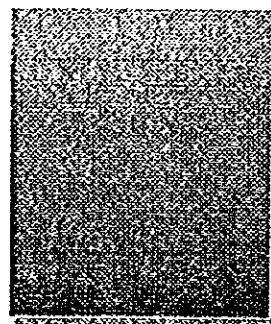
*Eng. Henry Nalikka
Chairman*



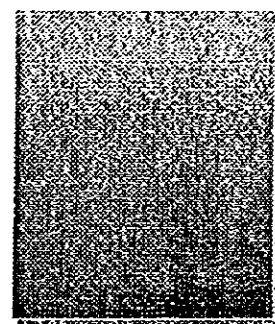
*Eng. A.R. Rutta
Managing Director*



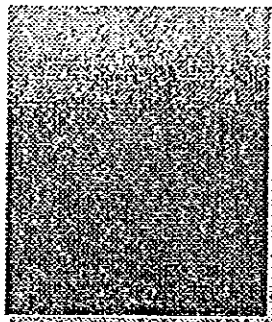
Hon. V.P. Kobel



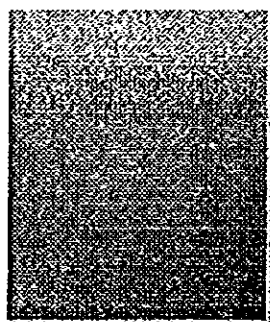
Prof. W.W. Anokbonggo



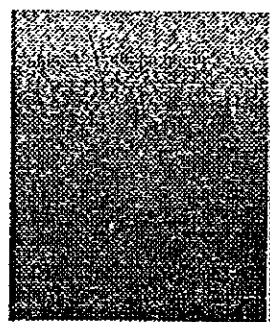
Eng. F.P. Openyto



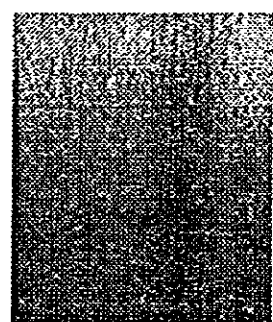
*Mr. F. Kabagambe
Kaliisa*



Mr. F.Y.S. Lwanga



Prof. J.O. Ilukor



Mr. J.R. Katarikawe

Executive and Chief Manager

Deputy Managing Director (D)
Eng. S.G. D'Ujanga
B.Sc. B.Sc. Eng. Hon. M.B.E. M.V.E.S.
M.B.A. M.P.E. R.D. Eng. C. Eng.

Managing Director
Eng. A.R. Ruffa
B.Sc. Hon. M.B.E. M.P.E. M.C.P.

Deputy Managing Director (F&A)
Mr. J. H. S. S. S.
M.C.A. M.P.A.

Board Secretary
Mr. C. Kabagambe
L.L.B. Dip. LP (L.D.C.)

Chief MIS Manager
Mr. J.H. Ndanda
M.Sc. B.Sc.

Chief Personnel Manager
Mr. I.A. Mabumba
M.L.B.A. (Soc) Dip. M.B.A. M.P.A.

Chief Security Manager
Mr. H. Bamvuyana
L.L.B. Dip. LP (L.D.C.)

Chief Distribution Manager
Mr. G.S. Kagolabya
B.Sc. Eng.

Chief Internal Auditor
Mr. A. Rutebenberwa
(CIS)

as at 31st December 1995

Chief Generation Manager
Mr. A.E.M. Mugora
B.Sc. Eng.

Chief Development Manager
Mr. P.B. Nsubanta
M.Sc. B.Sc. (Eng.)

Chief Operations Manager
Mr. L. Tugshima
B.Sc. Eng.

Chief Finance Manager
Mr. W.D. Young
C.M.A.

Chief Finance Manager
Mr. C. Eyahura
B.Com.

Project Manager
Mr. Rod Vincent
B.Sc. Eng. B.E. Civil

Project Co-ordinator
Mr. C. Rosembera
B.Sc. Eng. MCIPE

Chief Corporate Planner
Mr. P.M. Sekamute
MBA, DMS, R.A., Himgt. Cert. Law

Ag. Chief Commercial Manager
Mr. K.R. Karekaho
B.Sc. Eng. MCIPE, MIEEE, Cert. Eng.,
MEE, SMIEEE, MInst. REng (C)

HISTORICAL OVERVIEW

1948 The Uganda Electricity Board was established by the Uganda Electricity Ordinance as an independent institution charged with the responsibility to generate, transmit, distribute and supply electricity within Uganda and other countries in the region as economically as possible.

1950 ■ Two additional diesel generating sets were installed at Kampala "B" Power Station, raising the total generating plant capacity to 4.51MW.

■ The construction of Njeru Power Station was completed.

1951 Amberly Estates in Jinja consisting of eight blocks of flats, each containing six flats and in addition, thirty six chalets were completed.

1954 ■ The Queen and the Duke of Edinburgh officiated at the opening of the Pound sterling 22 million Owen Falls Dam with the commissioning of the first two of the ten turbines - Thursday, April 29th, 1954.

■ The White Nile stopped flowing (at the Owen Falls Dam) for the first time in history when, 15 minutes before the Queen's

arrival to open the Owen Falls Dam, all sluices were closed.

■ The first 132kV transmission line on East Africa, Owen Falls -Kampala North was commissioned.

1955 The "Kenya - Uganda Electricity Agreement" was signed to supply Kenya with 45 MW continuously for 50 years.

1956 ■ The Board issued the "Uganda Electricity Stock", for the first time to a tune of £6 million.

■ Nyanza Textiles factory and Kilembe Mines Copper Smelter at Jinja were supplied with electricity for the first time.

1958 ■ The Board's Head Office organization, previously located in separate buildings in Kampala moved in April to Amber House, owned by Amber House Limited.

■ New branch offices opened in Masaka and Mbale.

■ The Board's London office was moved from Regent Street to Uganda House in Trafalgar Square.

■ Renovation of Kikagati hydro-electric scheme was completed and a 750 kV set was commissioned.

- A new diesel power station was commissioned in Mbarara.
 - Commercial supply to Kenya started in January.
 - The pole treatment plant at Tororo commenced operation.
- 1959
- The eighth 15 MW set was commissioned at Owen Falls scheme making a total installed capacity of 120 MW.
 - Branch offices were opened at Mityana and Kamuli.
 - Her Majesty Queen Elizabeth, the Queen Mother visited the Owen Falls Scheme on 25th February, 1959.
- 1960
- An extension of Kampala North 132 kV substation and the construction of five miles of double circuit tower line was completed.
 - 33 kV substations at Nakifuma, Kawanda, Bombo and extensions in Masaka were completed and commissioned.
- 1961
- Electricity Ordinance replaces the Uganda Electricity Ordinance, 1948.
- 1963
- Maziba hydropower station with an installed capacity of 1.018MW was approved by the Board.
- 1964
- Electricity Act, 1964 replaces the Electricity Ordinance, 1961. The Board was re-established under the same name.
 - Supplementary Agreement revising Kenya Bulk Supply to 30 MW was signed.
- 1965
- Arua Diesel Station with an installed capacity of 0.522MW was commissioned.
- 1966
- Moroto diesel Station with an installed capacity of 0.448MW was commissioned.
 - Ninth 15 MW turbine was commissioned at OFPS, bringing total installed rated capacity to 135MW.
 - Government approved Board's recommendation that the proposed new hydro-electric station should be at Bujagali.
- 1967
- Harmonised standard tariffs adopted throughout the country.
 - Sub-offices opened at Bugembe, Ndeeba, Mengo and Mukono.
 - The second 0.25MW water-driven turbine generating set was commissioned at Maziba, Kabale.

1968 Sub-office opened in Mpigi.

1969 Rukungiri diesel Station with an installed capacity of 0.39 SMW was commissioned.

1969 ■ The tenth 15 MW turbine set was commissioned. Owen Falls Power Station gains installed capacity of 150MW.

■ Diesel Stations to serve Moyo and Mubende were commissioned.

1969 Kitgum diesel Station with an installed capacity of 0.336 MW was commissioned.

1970 Diesel station with an installed capacity of 0.107MW was installed at Kapchorwa.

1971 ■ An additional 0.165 MW diesel generating set was installed at Kitgum to meet expected increase in demand owing to the new hotel and ginnery.

■ Government decided not to proceed with a power development at Murchison Falls and directed an examination of alternative sites.

■ Power Line Carrier (PLC) communications over the Owen Falls—Kampala and Owen Falls — Tororo 132kV lines were introduced.

1973 A new diesel station with an installed capacity of 0.25 kW was commissioned in Kapchorwa.

1975 ■ A diesel station was commissioned at Koboko.

■ Diesel station with an installed capacity of 0.107MW was commissioned at Adjumani.

■ The Board provided premises free of charge in Kampala for conversion to a social club for senior staff.

1987 The rehabilitation and uprating of Owen Falls Hydro-Electric Generating Station from 150 to 180MW, and its associated network of transmission and distribution lines started.

1992 ■ Diesel station with an installed capacity of 0.107 MW was installed at Nebbi.

■ Rukungiri was connected to the main grid and the diesel plant there was demobilised.

1993 An agreement known as "The UEB-TANESCO AGREEMENT, 1993" for UEB to supply Tanzania Electricity Supply Company (TANESCO) with electric power for 30 years was signed and export started for the first time on 30th November, 1993.

1994 China Sichuan Corporation for International Techno-Economic Co-operation (SIETCO), on 22nd 1993 won the civil works contract OFE-1, a component of the Third Power Project which (The Project) involves the construction of a 200MW Owen Falls Extension Power Station immediately downstream the Owen Falls Dam.

His Excellency, the President Yoweri Museveni, officially

inaugurated the Owen Falls Extension Project by breaking the ground at a ceremony held on January 22nd, 1994.

1995 On the 16th December 1995 UEB started supplying electricity to Rwanda following the Agreement for electrical energy supply between Uganda Electricity Board and Electrogaz of Rwanda signed on 15th July, 1995.

Letter of Transmittal

Amber House
KAMPALA

24 April 1997

OUR REF: /mkr/

The Honourable Henry M. Kajura
Minister of Natural Resources
KAMPALA

Dear Hon. Minister

I have the honour of presenting the 32nd Annual Report of the Uganda Electricity Board together with the Accounts for the year ended 31st December 1995 audited as required by section 16(3) of the Electricity Act 1964.

Respectfully submitted.

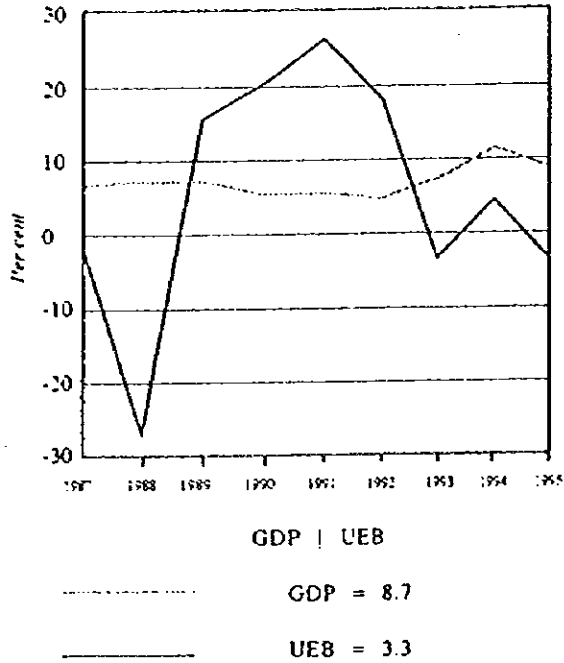
Eng. H. Nalikka
CHAIRMAN
UGANDA ELECTRICITY BOARD

1995 Highlights

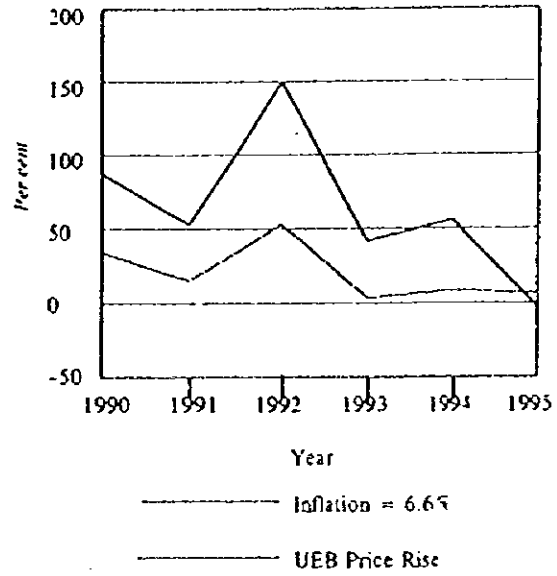
		1995	1994
1. FINANCIAL			
Total Income	Million UShs.	51,593	50,205
Total Expenditure	Million UShs.	50,818	48,831
Surplus/(Deficit)	Million UShs.	776	1,374
Energy Sales	Million UShs.	50,411	48,310
Uganda	Million UShs.	48,030	46,126
Kenya	Million UShs.	541	676
Tanzania	Million UShs.	1,840	1,508
Financial Expenses	Million UShs.	22,012	23,102
Revenue Reserves	Million UShs.	652	542
Additions to Fixed Assets	Million UShs.	23,156	9,368
2. OPERATING			
Total Generation	GWh	1,057.7	1,018.2
Hydro	GWh	1,056.3	1,016.8
Thermal	GWh	1.4	1.4
Units sent out (available)	GWh	1,056.0	1,015.5
Uganda	GWh	861.5	763.3
Kenya	GWh	175.8	237.1
Tanzania	GWh	18.7	15.1
System Maximum Demand	MW	173.6	161.4
Kenya	MW	50.5	77.2
Tanzania	MW	4.0	8.0
Consumption:			
Total			
Uganda	Gwh	521.5	47.5
Kenya	Gwh	175.8	237.1
Tanzania	Gwh	18.7	15.1
Employees as at 31st December	Number	3,248	3,155.0
Customers as at 31st December	Number	107,117	107,518
3. SALES			
Electrogaz of Rwanda started importing power from UEB on the 16th December, 1995.			

At a Glance

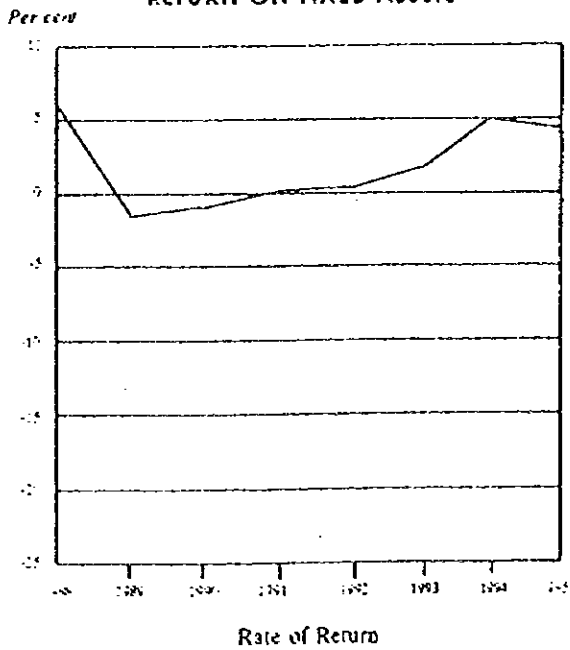
REAL GDP VS. UEB SALES GROWTH



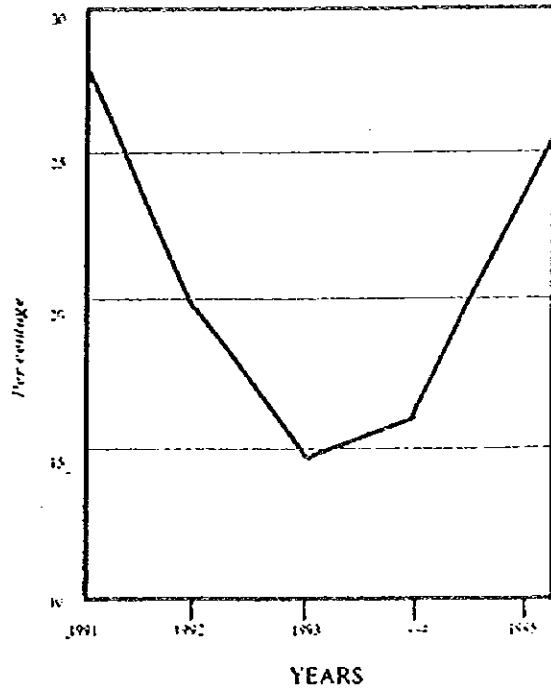
INFLATION VS. ELECTRICITY AVERAGE PRICE INCREASES



RETURN ON FIXED ASSETS



LONG TERM DEBT AS % OF EQUITY



Corporate Profile

At the end of 1995, UEB had total assets worth Ushs.676.2 , turnover for the year was Ushs 50.4 billion and net income stood at Ushs 1.0 billion. UEB is a public enterprise 100% owned by the Government of the Republic of Uganda, and is funded from Government equity, debt and accumulated reserves.

UEB operates under the legal arm of the Electricity Act re-enacted in 1964. Its policies are determined by the Board of Directors, who are appointed by the Minister of Natural Resources.

The day to day running of UEB is executed by the Managing Director, who is the Chief Executive Officer together with a Management Team appointed by the Board of Directors.

UEB's main power station is the Owen Falls Hydro Power Station originally built in the early 1950's and has recently undergone a rehabilitation and uprating exercise to boost up the installed capacity from 150 MW to 180 MW. There is another small hydro power station at Maziba, near Kabale town, with a installed capacity of 9.26 MW.

Five diesel stations serve the towns of Anja, Nebbi, Adjumani, Moyo and Moroto which are isolated and not connected to the main grid. Their combined installed capacity amounts to 2 MW. A new power station, the Owen Falls Extension, is under construction on the right bank of the Victoria Nile, immediately down stream the existing OFPS. It will have 200 MW installed capacity and it is anticipated to be commissioned in 1999.

A small amount of power is imported from the privately-owned Mubuku (Kilembe Mines) 5 MW hydro power station in Kasese, and also from Rwanda to serve the town of Kisoro. UEB on the other hand, exports power to neighbouring Kenya, Tanzania and Rwanda during off-peak periods.

The UEB power network is made up of some 1298.8Km of 132 KV and 66KV transmission route-lengths, with a total of 1316.8 Km of circuit-length cutting across the country from East to West and East to North. 3008.6 Km of 33KV lines criss-cross the country side and are used both as Sub-transmission and distribution lines.

Distribution lines at 33KV, 11KV, and low voltage (LV) carry power directly to our customers.

Within Uganda, UEB sells electricity to about 120,000 customers categorized as Domestic, Commercial, Industrial, General and Street Lights customers. In providing this Customer Service, UEB operates 4 regions, 28 districts, and 14 Sub-districts/revenue collection centres.

A total of 3248 persons were in the service of UEB as at 31st December 1995, organised under twelve functional departments.

UEB is committed to being an efficient and business oriented organisation that will serve it's customers with due care in order to promote a balanced development of Uganda.

Registered Head Office

Anber House
Plot No.29/33, Kampala Road,
P.O.Box 7059,
Kampala, Uganda.
Phone:256-41-254071/7
Fax:256-41-235119
Telex:61028 AMBER UG

Bankers

Uganda Commercial Bank
Nile Bank
Standard Chartered Bank
(Uganda) Limited

Auditors

Cooper & Lybrand
Chartered Accountants

Vision

UEB for Development

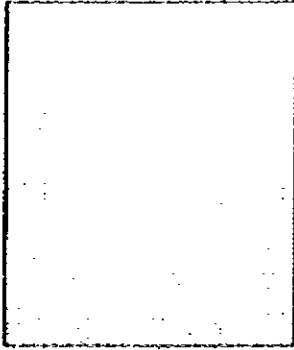
Mission

To efficiently provide quality service to our customers, through generating, transmitting, distributing and trading electricity,

and

to be a leader in accelerating the development of Uganda.

Chairman's Message



Eng. H. Nalikka
Chairman, Board of Directors

The Electricity Act 1964 mandates UEB:
"to perform functions relating to the Generation, Transmission, Distribution and supply of electricity and certain other matters, for the inspection and Testing of Electricity Plant and the safe use of electricity."

Against this mandate UEB re-defined its mission during the year 1995 as follows:-

"To efficiently provide quality service to our customers through generating, transmitting, distributing, and trading electricity and to be a leader in accelerating the developing of Uganda".

The year under review witnessed UEB's acknowledgement of the need for change in order to match current dynamism within the electricity industry, the national economy and the needs of the people. Customer service excellence was singled out as a sole most significant factor for success.

In line with the Government policy of promoting Regional Co-operation, UEB expanded exports of electricity to Rwanda through Katuna, starting December 1995. On the other hand, the town of Kisoro was served with electric Power for the first time from the town of Cyanika in Rwanda. The town of Kitgum was connected to the main grid on 8th December 1995.

The Owen Falls Power Station Extension Project made some significant achievements by completing the Power House rock excavation.

UEB faces the future with confidence.

On this note, I would like to thank the Directors, Management and staff for their valuable contributions that led to the success story of 1995 □

Eng. H. Nalikka
CHAIRMAN, UGANDA ELECTRICITY BOARD

Membership of the Board

There were no changes during the year in the membership of the Board.

Highlights of the Year

As compared with the previous year:

- i) Total Income at Shs.51.59 billion registered an increase of Shs.1.39 billion from the previous year.
- ii) Net surplus on Revenue Account after charging interest and making full provision for depreciation was Shs.1.25 billion.
- iii) The rate of return on net fixed assets was 4.2%.
- iv) Fixed Assets increased during the year by 1.8% from Shs.540.15 billion in 1994 to Shs.549.71 billion in 1995.

Projects under construction increased by 75% from Shs.58.69 billion in 1994 to Shs.102.65 billion in 1995.

Current Assets increased by 20.7% from Shs.46.90 billion in 1994 to Shs.56.59 billion in 1995.

Operations Review

UEB and the Community

In fulfilling her mission, UEB played a leading role, directly and indirectly in providing employment and national development.

At the end of 1995 the Board employees were 3,248 a rise of 2.9% from 3155 in 1994.

UEB used both major international contractors for major projects and local subcontractors for the minor ones. There was employment of 1,753 workers, 1,461 local staff and 292 of expatriate class in the on-going Owen Falls Extension Project.

Personnel Management

The Board declared human resource development as a strategic priority given the major technological advancement in the electricity industry and a wave of business liberalisation sweeping through the continent.

Human Resources Development

UEB pursued rigorous training policy to support employees development through the provision of in-house courses, general skill development, apprenticeship, on the job and of the job training and specialised technical and managerial training both with in the country and abroad.

Summary of the year's activities is given on pages.....to

Industrial Rotations

During 1995 Representatives of the Board and Uganda Electricity and Allied Worker's Union successfully concluded negotiations which culminated an average increase in pay of 22% for the workers.

Recreation

Revived in 1991 and a Senior member of the National Super Division league by 1993, the UEB football team exhibited fantastic performance in the year 1995. This contributed to the improvement of the Board's public image.

Meanwhile, UEB Netball team, formed only in 1993 performed excellently ranking 3rd in the National League competitions.

Generation

Owen Falls Power Station (OFPS)

The refurbishment and uprating of the Owen Falls Power Station from the original installed capacity of 150MW to 180MW that started in 1987 progressed satisfactorily during the year. To date nine (9) machines are fully refurbished bringing the installed capacity to 177MW. Work on the 10th and last unit is underway and its completion is expected by June 1996.

Subsequent to the foregoing, OFPS generation increased by 4% i.e. from 1017Gwh in 1994 to 1056Gwh in 1995.

UEB Netball team

**Units generated in the past five years/
Millions of Units (KWH)**

	1991	1992	1993	1994	1995
Hydro	781.5	993.3	976.5	1,016.8	1,056.3
Diesel	1.1	1.0	1.4	1.4	1.5
TOTAL	782.6	994.3	977.9	1,018.2	1,057.8

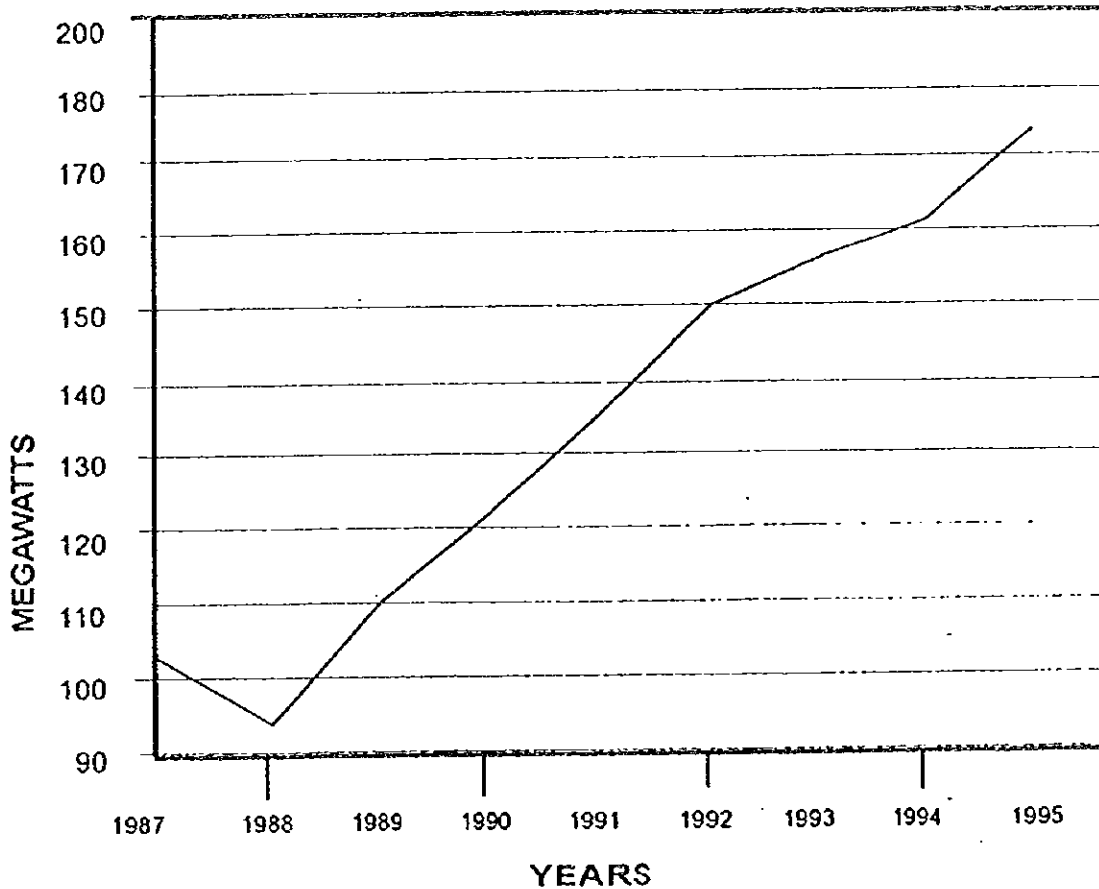
Generation during the year at each station:-

Station	1994		1995	
	Units (Gwh)	Maximum Demand (MW)	Units (Gwh)	Maximum Demand (MW)
Owen Falls	1,015.82	161.40	1,056.34	173.60
Arva	0.68	0.91	0.60	0.90
Moroto	0.30	0.38	0.28	0.37
Kitgum	0.30	0.38	0.32	0.24
Kapchorwa	0.01	0.01	0.01	0.01
Moyo	0.09	0.09	0.09	0.10
Nebbi	0.07	0.07	0.07	0.08

System Demand

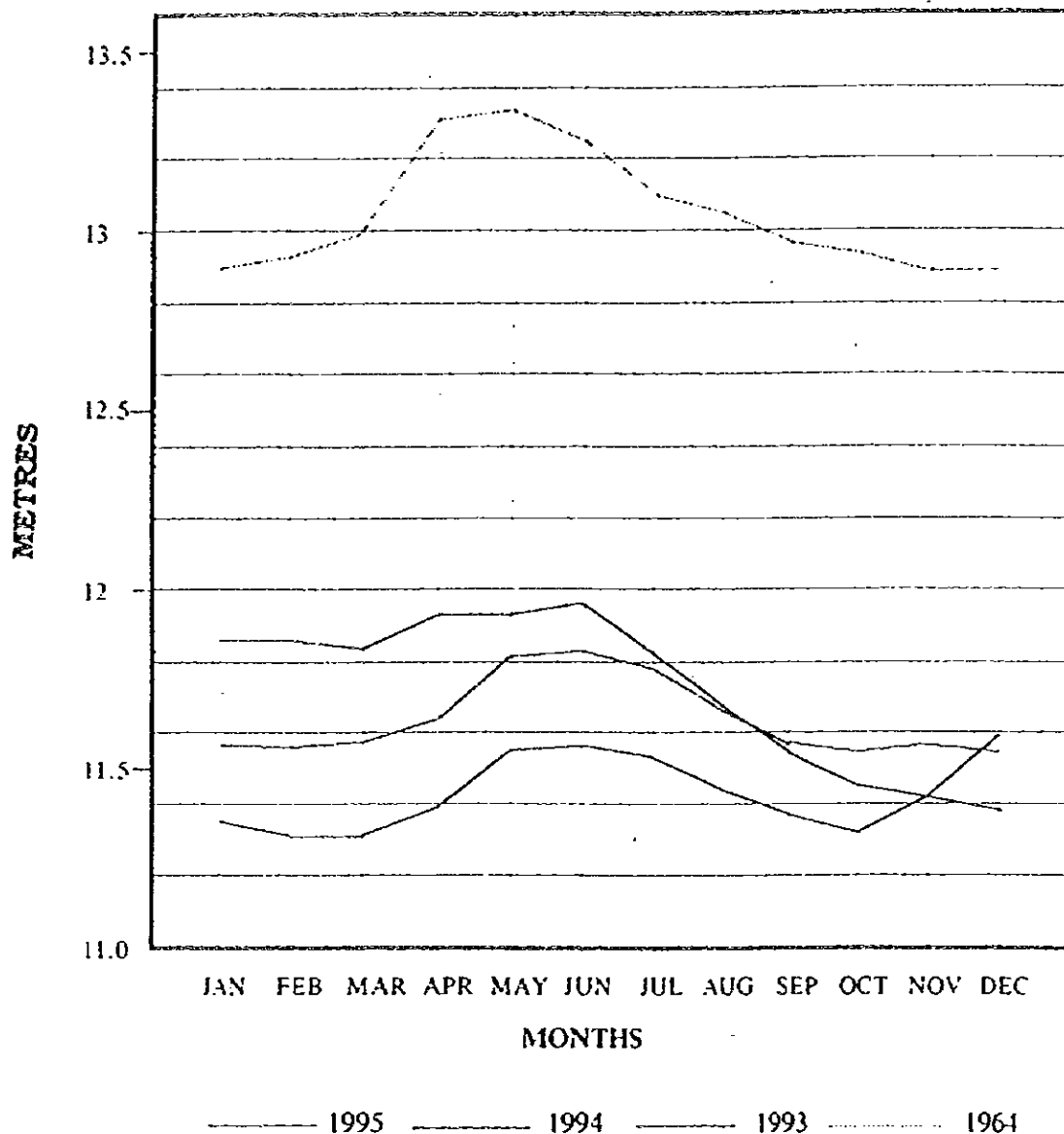
The simultaneous maximum demand for the entire system was 173.6MW and 1,056.3Gwh was generated corresponding to an annual load factor of 69.6%. Of this energy output, export to Kenya was 175.8 Gwh.

Owen Falls Power Station: Annual Maximum Demand since 1987



OWEN FALLS POWER STATION

Lake Victoria Lake levels at Jinja Pier



Power II

The Overseas Development Agency (ODA), International Development Association (IDA) and Commonwealth Development Co-operation (CDC) funded rehabilitation and uprating of Owen Falls Power Station (OFPS) comprising the uprating of installed capacity

from 150 to 180MW. To date nine (9) machines are fully refurbished bringing the installed capacity to 177MW.

Power III

The core of this project — Owen Falls Power Station Extension, is the construction of a

200MW hydro power station on the right bank of the Victoria Nile down stream the Owen Falls Dam.

Significant achievements attained during the period under review include among others:-

- i) Completion of the Power house rock excavation, by 30th September 1995. A total of 3,673 million cubic meters of rock and unclassified material was excavated.
- ii) Despatch of the first consignment of turbine embedded parts from Kvaerner Energy Factory in Norway.
- iii) Commencement of the work on the design of the gates and overhead travelling cranes, having signed the contract with Tungabbadra Steel Products Limited (TSPL).
- iv) Signing of a contract with ABB Generation, for provision of Mechanical and Electrical Services on 16th August 1995.
- (v) Signing of a Contract with ABB National Transformer AS for the supply of two 132/33kV, 40MVA power transformers; these are to be installed at Mutundwe and Kampala North substations.

Pauwels International BVI's completion of the manufacture of 157, 11kV distribution transformers.
- (vi) The transformer oil purification plant manufacture and subsequent shipment from Durban, on 24th September, 1995.

Contract OFE-7

This is one of the programmes under the Power III Project. It is funded by DANIDA and constitutes: the extension of the 132kV Switchyard at OFPS, the construction of a 132kV double circuit transmission line between Jinja and Lugogo, construction of the 132kV single circuit line between Lugogo and Mutundwe and the rehabilitation of the existing 132kV OFPS Kampala line.

This is intended to transmit the power to be generated from the Owen Falls Extension project in particular, to the various load centres and also to reinforce the existing transmission lines to Kampala.

In 1995 the survey of the route was completed and appropriate arrangements were made to settle respective compensation claims.

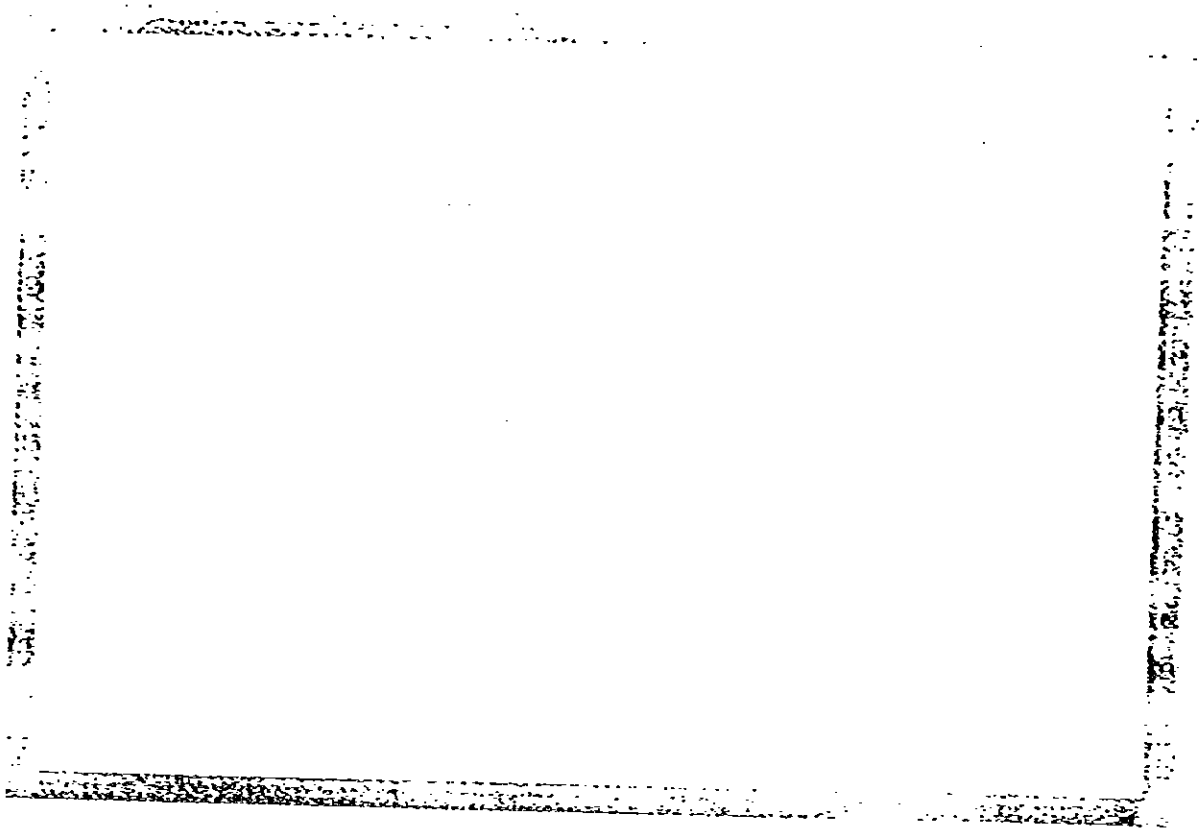
The executing contractor is Pihl/KLC of Denmark and construction works have commenced.

Diesel Generation

UEB maintained diesel generation at the stations of Arua, Nebbi, Moyo, Adjumani, Moroto and Kapchorwa despite the uneconomical nature of this operation. The town of Kitgum was connected to the main grid on 8th December 1995. It is UEB's plan to eliminate diesel generation altogether by the year 2005 through the extension of the national grid to various remote areas of the country currently served by the same.

Maziba Power Station

The IMW Maziba Power Station was fully refurbished following the severe damage



Sluice gate spilling at Mazia before rehabilitation works.

caused to it by floods in 1975. Installation of the Automatic Voltage Regulators (AVRs) procured under IDA Power III Project funding was completed.

Generation at the station that was revived in 1994 increased, although the low river flow permits only 16 hours operation per day at full output.

Power Import

UEB imports about 10Gwh of electricity per Annum from the privately owned Mubuku (Kilembe Mines) hydro power station situated near Kasese. The energy imported is directly injected into the national grid and thereafter distributed by UEB.

On December 16, 1995, the town of Kisoro was served with electric power for the first time following a Power Purchase Agreement between UEB and Electrogaz Rwanda signed on 5th July, 1995. Prior to this date a power line had been built during the year connecting the towns of Cyanika in Rwanda to the town of Kisoro in Uganda.

Power Exports

In addition to exports to Kenya and Tanzania, UEB expanded exports of electricity to Rwanda through Katuna, starting December 1995. This is intended to generate resources to assist further investment and also in line with Government Policy for promotion of Regional Co-operation.

Transmission and Distributions: Lines

The Western Transmission Line Project

Mbarara-Itojo 33kV Line

Part of the Western Transmission Line Project was the construction of 33kV lines from Ntungamo to Itojo and from Mbarara to Itojo. Both sections of the line were constructed by UEB and commissioned by end of 1995.

Mbarara-Ishaka

Also included in the Western Transmission line Project was the 150km 33kV line from Mbarara

to Ishaka. Materials for this programme were provided under EIB financing while construction work was undertaken by UEB. The line was commissioned by end of 1995.

Substations

Primary substation

Mbarara North Substation

Construction of the 132/33kV-10MVA substation at Mbarara North that started in June 1994 under EIB funding was completed. Subsequently, the substation was commissioned in October 1995. Work was undertaken by GTA/SAD of Germany

Distribution Substation

- a) JICA III Project funded the reinforcement of Electric Power Distribution

Rehabilitation of Mbarara North Substation in progress. January 3, 1995

Installation work and performance testing complete at Kawanda Substation, March 15 1995

Network in Kampala Sub-Urban Area. It comprised the construction of lines 33/11kV distribution substations.

Commissioning of the following substations was done during 1995:

- i) 33/11kV, 10MVA Kampala South Substation;
- ii) 33/11kV, 5MVA Kawanda Substation;
- iii) 33/11kV, 5MVA Ntinda Substation;
- iv) 33/11kV, 5MVA Kisugu Substation;
- v) 33/11kV, 2.5MVA Kisubi Substation;
- vi) 33/11kV, 10MVA Njeru Substation;
- vii) 33/11kV, 5MVA Kawaala Substation.

- b) The Swiss Government agreed to provide upto 5 million Swiss Francs during the year 1995, to be used to purchase substation equipment to rehabilitate six up-country substations. They were identified as Fort-Portal, Gulu, Mityana, Kamuli, Mukono and Kabale. The installation of the equipment is expected to commence early 1996.

High Voltage Route Length (km)

YEAR	132kV	66kV	33kV
1992	909.2	73.6	2,664.2
1993	994.2	73.6	2,696.8
1994	1,089.7	73.6	2,715.6
1995	1,225.2	73.6	3,008.6

The Northern and Luwero Triangle Rehabilitation Programme

This Programme covers replacement of rotten poles, transformer replacement, re-conductoring and general system improvement. Achievements recorded in this area included:

Transformer Replacement

Under the year 1995, 18 transformers were injected into the system within Luwero Triangle. Of these 11 were replacements 5 were part of new schemes and 2 related to system improvement work.

Distribution Lines

The 33kV Lira-Kitgum Line Construction was completed towards the end of 1995.

Meanwhile, the 33kV Soroti-Lira-Kalaki rehabilitation continued and construction of the 33kV Soroti-Kapchorwa line commenced. Similarly, in progress during the year was the rehabilitation of the lines listed below:

- Soroti-Urungu
- Kalaki-Kaberamaido, and
- Soroti TV Station T-off.

Transmission Lines

Major rehabilitation was carried out on the Northern and Western 132kV transmission lines. This resulted into a tremendous drop in the rate of outages on the Northern transmission line.

A 132kV Lira-Olwiyo line construction was proposed for funding.

Masaka West Substation: November 1995

*A new air compressor installed at
Kabulasoke Substation
March 17, 1995*

Communication

Supervisory Control and Data Acquisition System (SCADA)

As a direct result of the installation of the SCADA system in the previous years, during 1995, UEB achieved the following

operational advantages:-

- i) An improvement in response time in case of outages;
- ii) Improved safety for staff;
- iii) A reduction in fuel costs, and
- iv) Provision of better basic data required for system monitoring, analysis, planning and decision making.

Mbarara North Substation

At this new substation a Remote Transmission Unit (RTU) together with its communication was erected. Commissioning was expected to be early January 1996.

Other RTU's were installed in the new 33/11kV substations at Kampala South, Ntinda, Kisugu and Kawanda.

Rural and Urban Electrification

Rural Electrification

The Rural Electrification programme is meant to promote balanced socio-economic growth of all regions.

The Programme achievements in the year 1995 included the following:-

- i) Construction of the 24km 33kV Hoima—Kigolobya line;
- ii) Construction of the 40km 11kV Kabulasoke—Maddu—Kisozi Line, completed and commissioned in August 1995;
- iii) Surveying, designing and pegging of the 33kV Sironko—Kapchorwa line;
- iv) Construction of the 33kV Mubende—Kakumiro-Bukuumi line;
- v) Construction of the 33kV Kabale—Katuna line. This line was energised on 22nd December, 1995.
- vi) Construction of the 33kV Cyanika—Kisoro—Mutolere line. It was commissioned on the 16th December, 1995.

UEB construction crew during recess on site

Urban Electrification

Urban Power Rehabilitation Project

During the year 1995 preparations for the tender documents was started. This project is meant to cover rehabilitation of Kampala, Jinja and Tororo MV and LV networks aimed at reducing power and energy losses and construction of a 33kV line from Apac to Masindi.

Studies

Hydro-Power Development Master Plan Study

This study being funded by the African Development Fund is meant to carry out a least cost development master plan up to the year 2020 and a detailed feasibility study for the first project recommended for construction after the Power III Project has been completed. Kennedy and Donkin of U.K is undertaking the contract.

ESBI Diagnostic Study

The World-Bank funded the customer service management study, concluded mid-1995. It made recommendations concerning Procedures, Responsibility, Structures and MIS/Technology.

Corporate Excellence

Customer Re-registration Exercise

All Kampala customers were re-registered and a new computer file created, to facilitate accurate meter reading, billing and revenue collection.

Short-term Improvements

Kampala District was further re-organised into eight (8) District sub-offices to provide for more effective delivery of commercial functions. The Bad Debt Task Force was aggressive throughout the year.

ADB Institutional Support

This project is biased towards improvement of Customer Service. Under a contract with Manitoba Hydro Electric Board of Canada, ADB agreed to finance five experts, training, vehicles and office equipment. It commenced in December, 1995 and is on-going.

ODA Institutional support

This is a 3 year Institutional support Project funded by ODA and being implemented by Seaboard International. The Project focuses on manpower development, improvements in engineering and information systems. It commenced in September 1995 and is on-going.

Financial Review and Analysis

During the year under review, UEB realised a net profit of US\$ 1,248 million, a drop from US\$ 1,884 million in the previous year. The drop was mainly due to a sharp rise on staff related costs.

Starting December 1995, UEB supplied electric power to Rwanda through Katuna under the "UEB—Electrogaz Supply Agreement 1995" of July 1995. One of the cordial aims of this contract is to broaden the revenue base of UEB.

Sales of Electricity within Uganda generated revenue amounting to US\$ 48,030 million, an increase of 4.3% in nominal terms from US\$ 46,126 million the previous financial year.

Meanwhile, electricity exports to Kenya and Tanzania generated revenue totalling to US\$ 2,381 million compared to US\$ 2,184 million the previous year.

Operating and administrative expenses rose by 12% to US\$ 28,806 million from US\$ 25,728 million, mainly due to increase on staff costs.

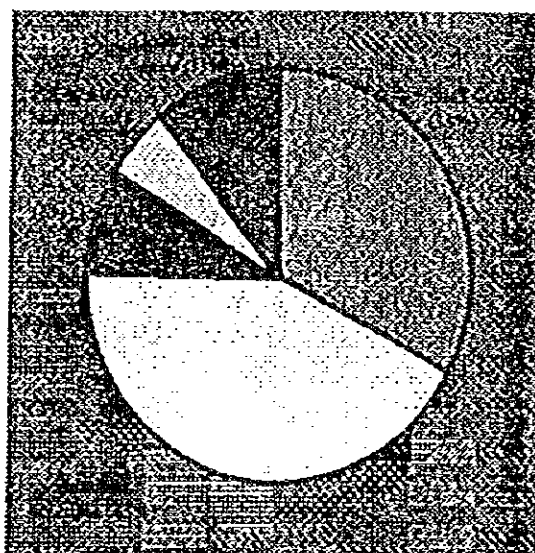
Financial expenses in the year decreased by a modest 4.8% to US\$ 22,012 million from US\$ 23,102 million the previous year. This was mainly due to a reduction in capitalised interest, and a gain in exchange.

Depreciation expenses increased by 7.1% over the year to US\$ 13,595 million compared to

US\$ 12,686 million to the previous year. The increase is in agreement with the market values of assets as per 1992 revaluation principles.

Fixed assets increased by value from US\$ 540,154 million in the previous year to US\$ 549,716 millions. This was mainly due to increased activity under the Third Power Project.

Where the 1995 money goes



UEB continued to fund her operational activities from both internal earnings and external borrowing to finance capital investment. The period under review witnessed dramatic increase in net cash flow from operating activities by 176% to US\$ 7,799 million from US\$ 2,829 million the previous financial year.

Meanwhile, customers contribution to fixed assets totalled to US\$ 3,186 million, an increase of 27% from US\$ 2,503 million the previous year.

The Way Forward

Strategies and planned activities during the 1996 financial year shall be directed at:

- (a) Increasing UEB's revenue collection to achieve the targeted total UShs. 73,73 billion at the end of 1996. In this regard, the following activities are either under way or planned:
 - Completion of the Customer census by re-registration of all consumers thereby updating the customer billing master file;
 - Development and implementing amended procedures for collecting, processing, validating and controlling all customer billing source data and outputs; and
 - Implementation of the ESBI Diagnostic Study recommendations including the re-organisation and decentralisation of the Kampala District customer service function.
- (b) Reduction of losses both technical and non-technical through employment of professional methods, in addition to the implementation of the urban power rehabilitation project to be funded by ADF and expected to take off in the coming financial year;
- (c) Training and developing of staff at all levels; managerial, professional,

supervisory, etc. to equip them with necessary skills to attend to the complexities of our business.

- (d) Effective planning to ensure co-ordination of all our activities to allow for the best allocation of scarce resources through a prioritisation process properly supported by an agreed budget;
- (e) Improved and effective billing; and
- (f) Implementation of the master hydro-development study to be funded by ADF to assist identification of the next hydro station and plan accordingly.

In conclusion, I wish to cordially thank the Ministry of Natural Resources officials for backing the Board during the difficult days of capacity shortages, the painful load shedding.

I also wish to express my deep appreciation to the Board of Directors, Management and staff for their dedication to duty during the difficult years.

Finally, I sincerely recognise the support of our customers and stakeholders. UEB welcomes some meaningful criticism.

A.R. Rutta
MANAGING DIRECTOR