付属資料

SCOPE OF WORK
FOR
THE MASTER PLAN ON THE POWER SECTOR
FOR MAJOR TOWNS
IN THE UNITED REPUBLIC OF TANZANIA
AGREED UPON BETWEEN
TANZANIA ELECTRIC SUPPLY COMPANY LTD.
AND
JAPAN INTERNATIONAL COOPERATION AGENCY

Signed at Dar-Es-Salaam
on 17th October 2000

Bashir J. Mrindoko
Commissioner for Energy and Petroleum
Affairs, Ministry of Energy and Minerals,
the Government of Tanzania

Masahiko Kaneko
Leader,
The Preliminary Study Team
Japan International
Cooperation Agency

Beat Luhanga
Managing Director,
Tanzania Electric Supply Company LTD.
(TANESCO)

I. INTRODUCTION

In response to the request of the Government of Tanzania, the Government of Japan has decided to conduct the master plan study on the power sector for major towns in the United Republic of Tanzania. (hereinafter referred to as "the Study") in accordance with the relevant laws and regulations in force in Japan.

Accordingly, the Japan International Cooperation Agency (hereinafter referred to as "JICA"), the official agency responsible for the implementation of the technical cooperation programmes of the Government of Japan, will undertake the Study in close cooperation with the authorities concerned of Tanzania.

The present document sets forth the scope of work with regard to the Study.

II. OBJECTIVES OF THE STUDY

The objective of the Study is to formulate the master plan and pre-feasibility study to assess the technical, economic and financial viability of the projects for the expansion and maintenance of the electrical distribution system in major towns in the United Republic of Tanzania.

III. SCOPE OF THE STUDY

In order to achieve the Study, JICA shall carry out the following study.

1. Master Plan Study

The master plan shall comprise the long-term master plan for 10 years and the medium-term plan for 5 years.

2. Pre-feasibility study

The Pre-feasibility study shall be conducted for the projects identified in the medium-term master plan.

3. Target towns and districts for the Study.

The target towns of the Study would be Dar-Es-Salaam, Arusha and Moshi.

4. The offices of the Study

Tanzania Electric Supply Company LTD (hereinafter referred to as "TANESCO"), Head office, Arusha and Moshi office would prepare the offices of the Study.

5. The offices of the operation and maintenance study

The office of the Dar-Es-Salaam Power Distribution and Maintenance Project (hereinafter referred to as "DAMP") at Msasani Peninsula would be used as the office of the operation and maintenance study.

And the sub- Maintenance Centre would be established at Arusha od Moshi.

6. Relevant organization and enterprises

TANESCO; Head office, Arusha and Moshi.offices.

7.Administration organization

Ministry of Energy and Minerals

8. Study items.

In order to achieve the above objective, the Study will cover the following items;

(1) Master plan study

1) Collection and review of data
2) Field survey
3) Power demand forecast
4) Planning of power transmission and substation facilities
5) Planning of distribution line facilities
6) Planning of reinforcement of manpower and facilities for operation and maintenance
7) Environmental study
8) Implementation schedule
9) Cost estimation
10) Economic and financial study

(2) Pre-feasibility study

1) Detailed site survey
2) Preliminary design
   - Transmission lines
   - Substation
   - Distribution network
3) Implementation schedule
4) Cost estimation
5) Economic and financial study

(3) The model case study of the operation and maintenance center

1) Present situation of DAMP
2) the role of the sub- Maintenance Centre at Arusha or Moshi
3) the five-year-medium-term plan of DAMP(including expansion plan of DAMP) and the . sub- Maintenance Centres

IV. STUDY SCHEDULE

The Study will be carried out in accordance with the attached Tentative Work Schedule shown in Appendix I.

V. REPORTS

JICA shall prepare and submit the following reports with floppy discs to the Government of Tanzania

(1) Inception Report (20 Copies) in English
(2) Progress Report (20 Copies) in English
(3) Interim Report (20 Copies) in English
(4) Draft Final Report and its summary (20 Copies) in English
(5) Final Report and its summary (20 Copies) in English

The government of Tanzania will provide its comments on the draft final report within one month after the submission of the draft final report.

VI. DIVISION OF TECHNICAL UNDERTAKING

The division of technical undertakings for the study by TANESCO and JICA is shown in Appendix II.

VII. UNDERTAKINGS OF THE GOVERNMENT OF TANZANIA

1. To facilitate smooth conduct of the Study, the government of Tanzania shall take necessary measures:
   (1) to secure the safety of the Japanese study team,
   (2) to permit the members of the Japanese study team to enter, leave and sojourn in Tanzania for the duration of their assignment therein, and exempt them from foreign registration requirements and consular fees,
   (3) to exempt the members of the Japanese study team from taxes, duties and other charges on equipment, machinery and other materials brought into Tanzania for the conduct of the Study,
   (4) to exempt the members of the Japanese 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 Japanese study team for their services in connection with the conduct of the Study,
   (5) to provide the necessary facilities to the Japanese study team for unrestricted re-export of equipment and machinery brought into Tanzania for the conduct of the Study,
   (6) to provide necessary facilities to the Japanese study team for remittance as well as utilization of the funds introduced into Tanzania from Japan in connection with the conduct of the Study,
   (7) to secure permission for entry into private properties or restricted areas for the conduct of the Study,
   (8) to secure permission for the Japanese study team to take all data, documents (including photographs) and specimens related to the Study out of Tanzania to Japan,

(9) to provide medical services as needed, its expenses will be chargeable to members of the Japanese study team,

(10) to secure permission to use walkie-talkies and other wireless telecommunications for execution of the field Study.

2. The Government of Tanzania shall bear claims, if any arise, against the members of the Japanese study team resulting from, occurring in the course of, or otherwise connected with, the discharge of their duties in the conduct of the Study, except when such claims arise from gross negligence or willful misconduct on the part of the members of the Japanese study team.

3. TANESCO shall act as counterpart agency to the Japanese study team and also as coordinating body in relation with other governmental and non-governmental organizations concerned for the smooth conduct of the Study.

4. TANESCO shall, at its own expense, provide the Japanese study team with the following, in cooperation with other organizations concerned:

(1) available data and information related to the Study,

(2) counterpart personnel including one distribution-system-manager to work for the Study under the management of TANESCO.

(3) suitable office space with necessary equipment in TANESCO; Head office, Arusha, Moshi, DAMP and the sub- Maintenance Centre at Arusha or Moshi.

(4) credentials or identification cards.

Ⅵ. UNDERTAKINGS OF JICA

For the conduct of the Study, JICA shall take the following measures:

(1) to dispatch, at its own expense, the Japanese study teams to Tanzania,

(2) to pursue technology transfer to Tanzanian counterpart personnel in the course of the Study.

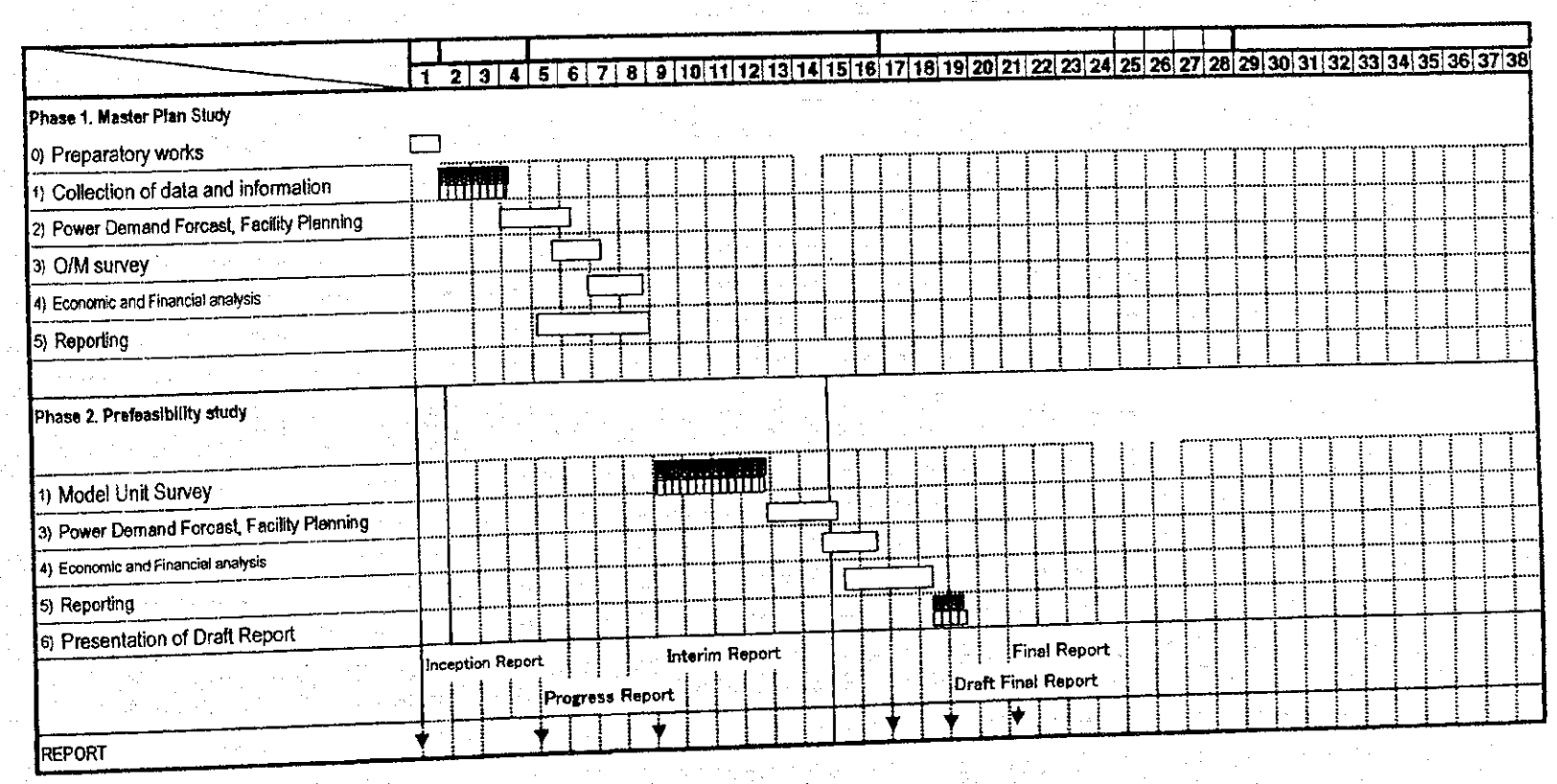
Ⅶ. OTHERS

JICA and Tanzania Electric Supply Company LTD and Ministry of Energy and Minerals shall consult with each other in respect of any matter that may arise from or in connection with the Study.

APPENDIX I

TE TENTATIVE SCHEDULE

: by JICA in Tanzania
: by TANESCO etc.
: Report
: by JICA in Japan



APPENDIX II

Division of Works

Work items	Undertakings by JICA	Undertakings by TANESCO
Master Plan Study		
1) Power demand forecast	planning, forecast	provision of population data, industrial development plan
2) Planning of power transmission and substation facilities	planning,cost estimation	provision of necessary data and information
3) Planning of distribution line facilities	planning,drawing plans, cost estimation	provision of present drawing
4) Planning of reinforcement of manpower and facilities for operation and maintenance	Equipment planning,cost estimation	provision of necessary data and information
5) Environmental study		provision of necessary data and information
6) Implementation schedule	planning	provision of necessary data and information
7) Cost estimation	procurement survey	provision of necessary data and information
8)Economic and financial study	review, financial analysis	provision of necessary financial data
Pre Feasibility Study		
1) Detailed site survey	planning	provision of detail map
2) Preliminary design		
Transmission lines	planning,drawing	provision of necessary data and information
Substation	planning	provision of necessary data and information
Distribution network	planning,drawing,mapping	provision of necessary data and information
3) Implementation schedule	planning	provision of necessary data and information
4) Cost estimation	procurement survey	provision of necessary financial data
5) Economic and financial study	review, financial analysis	to make comments on the works
The model case study of O/M center		
1)Present situation of DAMP	review	provision of necessary data
2) the role of the sub- Maintenance Centre at Arusha or Moshi	planning	provision of necessary data
3)the five-year-medium-term plan	planning	provision of necessary data

資料－2

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Dar es Salaam

Your Ref.	Our Ref.	Date
	PR/PR/001	17th October, 2000

PRESS RELEASE

The Japanese Government has agreed to conduct a master plan study on the power sector for the country's three towns with the highest electricity consumption which are Dar es Salaam, Arusha and Moshi.

The Japan International Cooperation Agency (JICA) is expected to undertake the study in close cooperation with the Tanzania Electric Supply Company (TANESCO).

An agreement to that effect was signed today in Dar es Salaam between the TANESCO Managing Director, Mr. Baruany Luhanga, the Leader of the Preliminary Study Team from JICA, Mr. Masahiko Kaneko and the Commissioner for Energy in the Ministry of Energy and Minerals, Mr. B. J. Mrindoko who signed on behalf of the Permanent Secretary.

JICA, TANESCO and Ministry of Energy and Minerals will consult with each other in respect of any matter that may arise in connection with the study.

The objective of the study is to formulate a master plan and pre-feasibility study which will assess the technical, economic and financial viability of the project for the expansion and maintenance of the electrical distribution system in the three towns.

Presently, the three towns are estimated to have a total demand of over 335 MW with their load growth ever on fast increase due to various economic activities. The individual demands are as follows:- Dar es Salaam – 180 MW; Arusha 30 MW and Moshi 25 MW.

The study is expected to cover among other things collection of data, field survey, power demand forecast, planning of power transmission and substation facilities, planning of distribution line facilities and environment study.

Based on the study and the final report, it will then be possible to determine the cost of the project, which materials and equipment will be required for the rehabilitation, expansion and reinforcement of the electricity networks in the three towns.

Presently, TANESCO's distribution system is aged and characterized by frequent outages and low voltages affecting the entire network and making power supply unreliable. The low quality of supply disrupts social, commercial and industrial activities in those towns.

Issued by: **TANESCO Public Relations Office**

Phone: 2114983

MP 569 3/2

Tanesco, Japan commission study on power sector

By Correspondent Carel Grol

THE Tanzania Electric Supply Company Limited (TANESCO) and Japan International Cooperation Agency (JICA) yesterday signed an agreement to conduct a study on the power sector.

TANESCO managing director Baruany Luhanga and the leader of the Japan International Cooperation Agency (JICA), Masahiko Kaneko, signed the agreement yesterday at the Ministry of Energy and Minerals headquarters in an event witnessed by the Commissioner for Energy in the Ministry, Bashir Mrindoko. The agreement which has been signed at the times of severe power interruptions in Dar es Salaam, secures cooperation between TANESCO, JICA and the Ministry of Energy and Minerals as the three will work together to conduct a master plan.

The study will be focussed on the three towns with the highest electricity consumption in the country: Dar es Salaam, Arusha and Moshi, which have an estimated 180, 30 and 25 megawatts respectively, while the amount is growing mainly due to economic activities. The aim of the study is to formulate a master plan which will assess technical, economical and financial potential for the project which will make it possible to expand, maintain and improve the electrical distribution systems in the three towns. The study will concentrate on collection of data, field survey, power demand forecast, planning of power transmission, planning of distribution line facilities and the environment.

Based on the investigation and its final report, it will be possible to determine the cost of the project and materials and equipment needed to rehabilitate and expand the power network in the three towns.

Gardian 紙. 10/18 5T 2面

Japan agrees to fund power study

By CHARLES KIZIGHA

JAPAN has agreed to fund a power study in urban centres with the highest electricity consumption rate. The findings will be used to improve the power distribution network in Tanzania.

The study to be undertaken by the Japan International Co-operation Agency (JICA) is expected to be completed early next year.

An agreement to that effect was signed in Dar es Salaam yesterday between the Commissioner for Energy, Mr Bashir Mrindoko, who signed on behalf of the Permanent Secretary in the Ministry of Energy and Minerals, Mr Patrick Rutabanzibwa, and Tanesco's chief executive, Mr Baruany Luhanga.

The other signatory was the leader of the preliminary study team from JICA, Mr Masahiko Kaneko.

JICA would work with the Tanzania Electric Supply Company (Tanesco). The findings of the study would be used to draw a power master plan. A pre-feasibility study could also be based on the results.

The master plan and pre-feasibility study would assess the technical, economic and financial viability of the project for the expansion and maintenance of the electrical distribution system in Dar es Salaam, Arusha and Moshi.

The three urban centres are estimated to have a total demand of over 335 megawatts — 180 megawatts for Dar es Salaam, 30 for Arusha and 25 mega watts for Moshi.

The final report would help determine the cost of the power rehabilitation and expansion project, the needed materials and equipment.

Tanesco's distribution system is aged, characterised by power outages and low voltage, factors which make the power supply highly unreliable.

Other towns identified for major power rehabilitation are Mwanza, Shinyanga, Mbeya, Tanga, Dodoma and Iringa, which would not be covered under this particular study.

Daily News 紙 10/18 5T 1面

収集資料リスト

1. TANZANIA POWER SYSTEM MASTER PLAN (October,2000) - 厚さ2 cm 位
2. POWER SYSTEM MASTER PLAN
   Executive Summary (June,1999)ー厚さ5mm 位
3. Schematic Representation of TANESCO Transmission Network
   (For 66kV,132kV,& 220kV) ー図面1枚
4. TANESCO - 220,132,and 33kV Network of Dar es Salaam Region
5. Dar es Salaam Power Master Plan 220kV,132kV,and 33kV Single Line Diagram
6. THE NATIONAL GRID SYSTEM
7. Power Plants Present Situation
8. Power Consumption Records for 10 Years (GWH)
9. High Voltage Transmission Lines
10. TANESCO Telecommunication Systems
11. Distribution Lines
12. Distribution Substations
13. Transformer Bank Capacity
14. Electricity Installed Capacity by Type
15. TANZANIA Electric Supply Company Limited
    Problem Facing Distribution Network-ARUSHA TANZANIA
16. TANZANIA Electric Supply Company Limited
    Electricity Tariff with Effect from January 1999 Billing
17. Maximum Demands (with Tables)
18. Relay Tripping in the P/S and Lines Oct. 1997 - Oct. 2000
19. MAINTENANCE AND OPERATION
20. The Application Form of Japan's Grant Aid

資料－4

DAMP 面談記録

12 Oct., 2000

1．訪問日時　2000 年 10 月 12 日 14 時 30 分
2．場所　DAMP (Dar es Salaam Maintenance Project)トレーニングセンタ
3．面談者　Mr. Jafari Mpina : Project Engineer
JICA 予備調査団：金子団長、黒川、柏村、高橋、向井
4．面談内容
(1) トレーニング内容
11 kV、33 kV の中圧配電線路に関する次のトレーニングを行っている。
・線路保守（除くケーブル）
・線路工事（除くケーブル）
・線路運用（含むケーブル）
この他、遮断器トリップ後の対応、バッテリチェックなどのトレーニングが是非必要と思っている。
(2) トレーニングの効果
・ DAMP での訓練のお陰で優秀な配電マンが育ち、彼らはあちこちに出かけて線路の補修、建設に当たっている。

世界銀行 Power Project (06)

Status: † Active
Region: † AFR
† **Country:** † Tanzania
† **Major Sector:** † Electric Pwr & Engy.
† **SubSector(s):** † Thermal
† **Environmental Category:** † A
† **Project Id:** † P002756
† **Board Approval Date:** † 5/6/93
† **Closing Date:** † 6/30/01
† **Total Commitment At Board*** (USD$M): † 200
† **Lending Instrument:** † SPECIFIC INVEST LN
† **Borrower:** † MINISTRY OF ENERGY
† **Implementing Agency:** † TANESCO

The main objectives of the project are to: (a) help meet the growing demand for electricity at least cost; (b) help the government restructure the power sector to promote efficiency and private investment; (c) continue improving energy efficiency by reducing system losses, upgrading service quality, and supporting demand side management initiatives; (d) provide training and technology to staff of sector institutions; and (e) promote the development and operation of gas-fueled generation by private investors.

The project consists of three main parts. The first part, which the Tanzania Electric Supply Company Ltd. (TANESCO) will implement, includes: (1) the 180 MW first stage of the Lower Kihansi hydroelectric scheme; (2) expansion, reinforcement, and loss reduction in the distribution systems of major load centers; (3) vehicles, tools, and meters to improve distribution and commercial operations; (4) completion of rehabilitation of the Kidatu hydroelectric plant; (5) management support and training; (6) computerized management information systems, and services to support TANESCO's decentralized operations; (7) studies including tariffs, assets valuation, power system master plan, hydroelectric plant feasibility, and distribution standards; (8) demand side management activities, including audits and advertising; (9)

upgrading of the dispatch center; and (10) provision of workshop equipment.

The second part, which the Zanzibar State Fuel and Power Corporation (ZSFPC) will implement, includes: (a) a study of the operation of ZSFPC to define feasible options for its future structure; (b) a commercial manager to oversee commercial operations until the completion of the utility restructuring; and (c) prepayment meters and associated materials to help improve collections.

The third part, which the Ministry of Water, Energy, and Minerals (MWEM) will implement, includes: (1) a study of the structure of the power sector and its associated regulatory framework in Tanzania to define options for restructuring to improve efficiency, and to explore ways of involving the private sector; (2) consulting services to promote private sector financing and operation of thermal generation using gas from Songo Songo; (3) development of generation (about 9 MW) from the Mnazi bay gasfield in a joint arrangement with the private sector; and (4) training and office technology for energy staff of the ministry.

Questionnaires

Questionnaires 回答 目次

Questionnaires

The Preparatory Study on the power sector for

Major towns in the United Republic 0f Tanzania.

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Item	Description	Remarks	Answer
1.1 Future Plan 1.1.1 Future development plan till 2015	1.1.1-1 Power plants for whole country (1) Site name/Location, city name (2) Capacity(MW)/number of unit and unit capacity (3) Hydro/Steam/Diesel/GT (4) year 1.1.1-2 Transmission line for each voltage, 66 kV, 132 kV, 220 kV, for whole country (1) Location (where to where) , city name (2) Capacity(MW)/number of circuit (3) Voltage(kV) (4) Length(km) (5) year 1.1.1-3 Transmission Substation for each primary voltage, 66 kV, 132 kV, 220 kV, for whole country (1) Site name/Location, city name (2) Capacity(MVA)/ number of unit and unit capacity (3) Voltage (HV/LV)	Power developing plan for 5 years plan and 10 years plan or other plan. How do you think of thermal power plants and hydro power plants?	On item 1.1.1-1 to 1.1.1-3, See TANZANIA Power System Master Plan 2000 Update Report (October 2000)

	(4) Year		
	1.1.1-4 Distribution line for each city (DAR ES SALAAM, TANGA, MOSH, ARUSHA, MOROGORO, DODOME, MBEYA, IRINGA, MWANZA) (1) Total number of feeders 1) 132kV 2) 66kV 3) 33 kV 4) 11 kV (2) Total length 1) 132kV/33kV,11kV 2) 66kV/33kV,11kV 3) 33 kV/11 kV		See attached document No1
	1.1.1-5 Distribution Substation for each city(DAR ES SALAAM, TANGA, MOSH, ARUSHA, MOROGORO, DODOME, MBEYA, IRINGA, MWANZA) (1) Number of transformers 1) 132kV/33kV, 132kV/11kV 2) 66kV/33kV, 66kV/11kV 3) 33 kV/11 kV (2) Total Capacity (MVA) 1) 132kV/33kV, 132kV/11kV 2) 66kV/33kV, 66kV/11kV 3) 33 kV/11 kV		See attached document No1
	1.1.1-6 Demand Forecast (MW) (1) Whole Country - Grid System - Isolated system (2) Each city (MW) - Grid System - Isolated system		On item 1.1.1-6 and 1.1.1-7, See TANZANIA Power System Master Plan 2000 Update Report

			(October 2000)
1.2 Present Situations 1.2.1 Existing Facilities	1.1.1-7 Future plan for national grid 1.2.1-1 Power plants (1) Total installed rated capacity(MW), and actual capacity(MW), (Interconnected plant + Isolated plant) 1)TANESCO - Hydro - Steam/GT - Diesel 2)IPP(Independent Power Producer) - Hydro - Steam - Diesel 3)Captive Power - Hydro - Steam - Diesel (2)Interconnected power plant to grid 1)Total capacity(MW) - TANESCO - IPP - Captive Power (3) Isolated power plant from grid 1)Total capacity(MW) - TANESCO - IPP - Captive Power 1.2.1-2 Transmission line for each voltage , 66 kV, 132 kV, 220 kV (1) The number of circuit (2) Total Length (km)		See attached document No2 See attached document No3

	1.2.1-3 Transmission Substation for each primary voltage:66 kV, 132 kV, 220 kV) (1) The number of stations (2) Total installed capacity(MVA)		See attached document No3
	1.2.1-4 Distribution line for each city (DAR ES SALAAM, TANGA, MOSH, ARUSHA, MOROGORO, DODOME, MBEYA, IRINGA, MWANZA) (1) Number of feeders 1) 132kV 2) 66kV 3) 33 kV 4) 11 kV (2) Total length 1) 132kV 2) 66kV 3) 33 kV 4) 11 kV (3) Number of Long Distance Distribution Line more than 100 km 1)33 kV (4) Number of Long Distance Distribution Line more than 30 km 1)11 kV		See attached document No3
	1.2.1-5 Telecommunication systems including SCADA with understandable system drawing		See attached document No4
	1.2.1-6 Single line diagrams - Transmission/Distribution lines with S/S and P/S - Typical Substation for HV and MV		See attached document No5
1.3 Electric Power Situations 1.3.1 Existing Power Demand	1.3.1-1 Peak demand sent-out (MW) (1) Whole Country - From grid - When it was recorded?	Peak-load and bottom-load	See attached document No6

1.3.2 Power Supply Records past 10 years	1.3.2-1 Load curve for whole country, grid (1) Daily Load Curve of typical peak day, year 2000 or 1999 (2) Annual load duration curve, year 1999		See attached document No7
1.3.3 Power Consumption Records past 10 years	1.3.3-1 Power Consumption sold a year (GWh or MWh) (1)Whole Country - From grid - From isolated plants (2) each city - From grid - From isolated plants		See TANZANIA Power System Master Plan 2000 Update Report (October 2000
	1.3.3-2 Number of consumers for each city		See attached document No8
1.3.4 Power Loss Records past 10 years	1.3.4-1 Energy Loss % based on sent-out (1) Whole Country 1)Technical 2)Non technical (2) each city if possible 1)Technical Loss 3)Non technical Loss		See attached document No2
1.3.5 Reliability	1.3.5-1 Number of relay tripping past 5 years for each city (1)Lines & Transformer 1) Distribution lines - 132 kV - 66 kV - 33 kV - 11 kV 2) Transformer - 132kV/33kV - 132kV/11 kV		See attached document No14

	- 66kV/33kV - 66kV/11kV - 33kV/11kV (2)Major reasons of tripping 1)Distribution Lines - 132 kV - 66 kV - 33 kV - 11 kV 2) Transformer - 132kV/33kV - 132kV/11 kV - 66kV/33kV - 66kV/11kV - 33kV/11kV		
	1.3.5-2 Overload situation for each city 1) Number of overload distribution Lines - 132 kV/66 kV - 33/11 kV 2) Number of overload transformer - 132,66/33,11 - 33/11		See attached document No15
1.3.6 Standard	1.3.6-1Standard for transformer bank capacity and number		See attached document No1
	1.3.6-2allowable voltage drop		
2. General Information 2.1.1 Information of relevant Power Sector	2.1.1-1 Annual reports of TANESCO		See attached document No9
	2.1.1-2 Tariff table		See attached document No10

	2.1.1-3 Money/tariff collecting system		On item 2.1.1-3 and 2.1.1-4, See attached document No11
	2.1.1-4 subsidy situation about tariff		
	2.1.1-5 Organization		See attached document No12
	2.1.1-6 Privatization situation	The basic strategy of privatization plan of TANESCO, the current situation of the progress, and the future implementation plan. (The privatization plan in distribution sector is highly intrigued)	Written in the report
	2.1.1-7 Program on technical engineer training		Did not receive
	2.1.1-8 Legal structure on relative electric		Electricity ordinance (1957)
2.1.2 Maintenance and Operation			TANESCO Electrical Workshop
	2.1.2-1 How to supervise P/S, S/S		
	2.1.2-2 How to operate P/S, S/S		On item 2.1.2-1 to 2.1.2-5, See attached document No16
	2.1.2-3 How to maintain P/S, S/S		
	2.1.2-4 How often to maintain the facilities	Program on the training	
	2.1.2-5 Who is in charge of maintenance about the facilities		
	2.1.2-6 Dispatching facilities - over 132kV - 11kV – 33kV - 66kV		On item 2.1.2-6 written in the report
2.1.3 Cord and regulation	2.1.3-1 Technical standards for electrical installation - Applied standards or regulations		Written in the report

	- Design manual - Construction manual		
2.1.4 External assistance	2.1.4The basic policy and the present situation (including the future plan) of external assistance in the power sector.	(Documents which give a bird-view information on this project are highly appreciated)	JICA, NORAD(Norway), SIDA(Sweden) and so on
2.1.5 Economic Plan	2.15Economical and social development plan at present.		TANZANIA Power System Master Plan 2000 Update Report (October 2000)
2.1.6 others	2.1.4-1Land acquisition - How to get the land of new lines and substations - Compensation cost 2.1.4-2Purchase facilities - How to purchase facilities for construction 2.1.4-3Import duties - Machinery and materials for construction		On item 2.1.4-1 to 2.1.4-3, See attached document No13

1.1. 1-4

DISTRIBUTION LINES.

TOWN	TOTAL NO. OF FEEDERS				TOTAL LENGTH			
	132KV	66KV	33KV	11KV	132KV	66KV	33KV	11KV
DAR ES SALAAM	3	0	9	32	34.5	0	54	120
TANGA	0	0	3	12	0	0	18	60
MOSHI	1	1	3	12	17	55	18	60
ARUSHA	1	1	3	12	15	8	18	60
MOROGORO	0	0	2	8	0	0	20	40
DODOMA	0	0	2	8	0	0	12	40
MBEYA	0	0	2	8	0	0	12	40
IRINGA	0	0	2	8	0	0	12	40
MWANZA	1	0	4	16	8	0	24	80

1.1 1-5

DISTRIBUTION SUBSTATIONS

TOWN	NO. OF TRANSFORMERS			TOTAL CAPACITY		
	132/33KV	66/33KV	33/11KV	132/33KV	66/33KV	33/11KV
DAR ES SALAAM	3	0	9	135	0	135
TANGA	0	0	3	0	0	45
MOSHI	1	1	3	45	15	45
ARUSHA	1	1	3	45	15	45
MOROGORO	0	0	2	0	0	10
DODOMA	0	0	2	0	0	10
MBEYA	0	0	2	0	0	10
IRINGA	0	0	2	0	0	10
MWANZA	1	0	4	45	0	25

1.3. 6-1

TRANSFORMER	TRANSFORMER BANK CAPACITY BANK CAPACITY
220/33KV 220/33 kV	45
	30
	10
132/33KV	45
	30
	10
66/33KV	30
	10
33/11KV	15
	5
	2.5

質問票回答 No1　　質問番号 1.1.1-4、1.1.1-5、1.3.6-1、1.3.6-2

1.3 6-2

Allowable voltage drop = 10%.

質 10

1.2.1-1, 1.3.4-1

1.2.1-1

Electricity installed capacity by type	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Total	481	482	482	482	575	655	655	655	655	655	808
Hydro	328.2	328.2	328.2	328.2	381	381	381	381	381	381	561
Gas turbines	0	0	0	0	40	120	120	120	120	120	120
Diesel	153	154	154	154	154	154	154	154	154	154	154
Total electricity generation (GWh)/Year	1629.5	1826.9	1,819.90	1,880.50	1,804.20	1858.3	2013.2	1979.4	2194.8	2340.3	

DATA ON IPPs		
Name of IPP	(MW)	Year Licensed
Songas	112	NR
Independent Power Tanzania Ltd (IPTL)	100	1996
Kiwira Coal Mine (steam)	6	NL
Tanwatt (steam)	2.5	1994
Sao Hill (steam)	1	NL
Kilombero 1 Sugar factory (steam)	2.8	NL
Mtibwa Sugar Factory (steam)	4	NL
Tanganyika Planting Company (Sugar f	2.5	NL
Kagera Sugar Co.Ltd (steam)	5	NL
Kilombero 2 Sugar factory (steam)	6	NL

1.3.4-1

System losses(%)/Year											
Transmission	13.3	8.8	14	12	7.6	6.7	?	?	?	?	
Distribution	6.1	10.2	11	10	14	11.5	?	?	?	?	
Total system losses	19.1	20	22.5	28	19.4	14	9.5	11.25	11.7	?	
Non-technical losses (%)	0.6	?	0.5	0.6	0.6	0.6	?	?	?	?	

質問票回答 No2　　質問番号 1.2.1-1、1.3.4-1

質問票回答 No3　　質問番号 1.2.1-2、1.2.1-3、1.2.1-4、1.3.3-1

1.2 1-2 POWER PLANTS _ PRESENT SITUATION

TRANSMISSION LINES	NO. OF CIRCUITS	TOTAL LENGTH
66KV	4	366
132KV	12	1460
220KV	6	2622

1.2 1-3 TRANSMISSION SUBSTATIONS

VOLTAGE	NO. OF STATION	TALL. CAPACITY(MVA)
66KV	2	20
132KV	8	490
220KV	4	240

1.2 1-4 DISTRIBUTION LINES.

TOWN	TOTAL NO. OF FEEDERS				TOTAL LENGTH				NO. OF LONG DISTRIBUTION LI	
	132KV	66KV	33KV	11KV	132KV	66KV	33KV	11KV	33KV, > 100KM	11KV, >30KM
DAR ES SALAAM	4	0	33	80	26	0	210	416.55	0	1
TANGA	2	0	6	4	0	0	851.9	833.29	2	0
MOSHI	1	1	8	15	0	59	874.7	477.01	1	0
ARUSHA	1	1	5	9	0	78	208.1	208.51	1	1
MOROGORO	1	3	6	4	0	0	702	154.61	2	0
DODOMA	0	0	4	8	0	0	320.4	318.28	1	0
MBEYA	0	0	6	2	0	0	735.8	169.1	2	0
IRINGA	0	0	4	4	0	0	546.4	134.73	0	0
MWANZA	0	0	6	8	0	0	269.5	116.21	1	0

1.3 3-1 POWER CONSUMPTION RECORDS FOR 10 YRS (GWH)

	FROM GRID									FROM ISOLATED SOURCES									
REGION	1991	1992	1993	1994	1995	1996	1997	1998	1999	1991	1992	1993	1994	1995	1996	1997	1998	1999	NO. OF CONSUMERS
WHOLE COUNTRY	1348.5	1298	1397	1,400	1372	1384.7	1666	1655.9	10511.4	58	70	73.3	70.6	66.9	69	71.9	71.4	67.7	423472
DAR ES SALAAM	618	561.8	682.1	697	727.7	612.8	813.6	819.1	9808.4	0	0	0	0	0	0	0	0	0	154039
TANGA	88.3	106.8	111.9	110	102.3	100.3	89	102.4	100	0	0	0	0	0	0	0	0	0	28122
MOSHI	87.7	91.7	74.8	69.1	96	95.5	98.1	102	106.1	0	0	0	0	0	0	0	0	0	46779
ARUSHA	84	88.1	108.3	92.3	114.5	125.3	135.4	136.7	140.7	1.2	1.6	1.8	1.9	1.1	1.4	1.8	1.3	0	38162
MOROGORO	84.8	74.4	84.1	80.3	81.8	77.1	63.7	71.9	77.8	0	0	0	0	0	0	0	0	0	19709
DODOMA	33.7	30.5	36.7	31.8	34.7	39.6	39.1	41.5	41.2	0.6	1.4	1.5	1.5	1.3	1.6	1.6	1.3	0	13956
MBEYA	48.6	46	60	67.4	57	48.3	43.7	51.5	68.3	0	0	0	0	0	0	0	0	0	24367
IRINGA	86.9	80.9	26.4	33.1	38.7	51.1	37.3	32.9	35.3	2.2	4.2	6.9	6.6	6.3	6.2	6.8	6.5	86	14184
MWANZA	57.5	60	58.2	61.2	59.2	73.9	85.5	100.1		0	0	0	0	0	0	0	0	0	22221

HIGH VOLTAGE TRANSMISSION LINES

FROM - MAIN SUBSTATION	VOLTAGE (kV)	ROUTE LENGTH (KM)	NO. OF TOWERS	TYPE OF SUPPORT	TYPE OF FOUNDATION	TOWER CONFIG.	TYPE & NO. OF INSULATOR/PHASE	CONDUCTOR TYPE AND SIZE (Al)	SIZE OF EARTH WIRE	YEAR COMMISS'D.	CONTRACTOR	CONSULTANT
MOROGORO - UBUNGO 1ST	220	179	456	GUYED	GRILLAGE	HORIZONTAL	15/16 STANDARD TYPE	BLUEJAY 565 sq. mm ACSR	70 sq. mm STEEL	1975	COMSTOCK QUEBEC	SHAWINIGAN ENG.
MOROGORO - UBUNGO 2ND	220	172	477	SELF SUPPORT	CONCRETE	TRIANGULAR	15/16 STANDARD TYPE	BLUEJAY 565 sq mm ACSR	70 sq. mm STEEL	1995	SIEMENS	FICHTNER
MINDU - MOROGORO (DEVIATION)	220	12	41	GUYED	CONCRETE/GRILLAGE	HORIZONTAL	15/16 STANDARD TYPE	BLUEJAY 565 sq. mm ACSR	70 sq. mm STEEL	1982	CGEE ALSTHOM	COGELEX
KIDATU - MINDU	220	116	279	GUYED	CONCRETE/GRILLAGE	HORIZONTAL	15/16 STANDARD TYPE	BLUEJAY 565 sq. mm ACSR	70 sq. mm STEEL	1975	COMSTOCK QUEBEC	SHAWINIGAN ENG.
KIDATU-MOROGORO 2ND	220	130	328	SELF SUPPORT	CONCRETE	TRIANGULAR	15/16 STANDARD TYPE	BLUEJAY 565 sq. mm ACSR	70 sq. mm STEEL	1993	SIEMENS	FICHTNER
KIDATU - IRINGA	220	160	441	SELF SUPPORT	CONCRETE/GRILLAGE	HORIZONTAL	15/16 STANDARD TYPE	BISON 382 sq. mm ACSR	50 sq. mm STEEL	1985	ENERGOINVEST	EPDC- U.K
IRINGA - MUFINDI	220	130	336	SELF SUPPORT	CONCRETE/GRILLAGE	HORIZONTAL	15/16 STANDARD TYPE	BISON 382 sq. mm ACSR	50 sq. mm STEEL	1985	ENERGOINVEST	EPDC- U.K
MTERA-IRINGA	220	107	297	SELF SUPPORT	CONCRETE/GRILLAGE	HORIZONTAL	15/16 STANDARD TYPE	BISON 382 sq. mm ACSR	50 sq. mm STEEL	1985	SADELMI	SHAWINIGAN ENG.
MTERA - DODOMA	220	130	393	SELF SUPPORT	CONCRETE/GRILLAGE	HORIZONTAL	15/16 STANDARD TYPE	BISON 382 sq. mm ACSR	50 sq. mm STEEL	1985	SADELMI	SHAWINIGAN ENG.
DODOMA - SINGIDA	220	210	528	SELF SUPPORT	CONCRETE/GRILLAGE	HORIZONTAL	15/16 STANDARD TYPE	BISON 382 sq. mm ACSR	50 sq. mm STEEL	1988	ENERGOINVEST	SHAWINIGAN ENG.
SINGIDA - SHINYANGA	220	200	532	SELF SUPPORT	CONCRETE/GRILLAGE	HORIZONTAL	15/16 STANDARD TYPE	BISON 382 sq. mm	50 sq. mm STEEL	1988	ENERGOINVEST	SHAWINIGAN ENG.
SHINYANGA - MWANZA	220	140	336	SELF SUPPORT	CONCRETE/GRILLAGE	HORIZONTAL	18/16 STANDARD TYPE	BISON 382 sq. mm	50 sq. mm STEEL	1988	ENERGOINVEST	SHAWINIGAN ENG.
MUFINDI - MBEYA	220	220	544	SELF SUPPORT	CONCRETE/GRILLAGE	HORIZONTAL	17/16 STANDARD TYPE	BISON 382 sq. mm ACSR	50 sq. mm STEEL	1985	SAE	EPDC - U.K
CHALINZE- UBUNGO	132	97	334	GUYED	GRILLAGE	HORIZONTAL	9/10 STANDARD TYPE	WOLF 150 sq. mm ACSR	50 sq. mm STEEL	1963	BALFOUR BETTY	SHAWINIGAN ENG.
MOROGORO - CHALINZE	132	82	286	GUYED	GRILLAGE	HORIZONTAL	9/10 STANDARD TYPE	WOLF 150 sq. mm ACSR	50 sq. mm STEEL	1967	BALFOUR BETTY	SHAWINIGAN ENG.
CHALINZE - HALE	132	175	534	GUYED	GRILLAGE	HORIZONTAL	9/10 STANDARD TYPE	WOLF 150 sq. mm ACSR	50 sq. mm STEEL	1963	BALFOUR BETTY	SHAWINIGAN ENG.
HALE - TANGA	132	60	389	WOODEN H-POLES	-	HORIZONTAL	9/10 STANDARD TYPE	WOLF 150 sq. mm ACSR	50 sq. mm STEEL	1971	BALFOUR BETTY	SHAWINIGAN ENG.
HALE - SAME	132	173	561	GUYED	GRILLAGE	HORIZONTAL	9/10 STANDARD TYPE	WOLF 150 sq. mm ACSR	50 sq. mm STEEL	1975	BALFOUR BETTY	SHAWINIGAN ENG.
SAME - KIYUNGI	132	102	291	GUYED	GRILLAGE	HORIZONTAL	9/10 STANDARD TYPE	WOLF 150 sq. mm ACSR	50 sq. mm STEEL	1975	CHECO - DNE	SHAWINIGAN ENG.
UBUNGO - ILALA 1ST	132	11	25	SELF SUPPORT	GRILLAGE	HORIZONTAL	9/10 STANDARD TYPE	WOLF 150 sq. mm ACSR	50 sq. mm STEEL	1963	BALFOUR BETTY	COGELEX
UBUNGO - ZANZIBAR(T)	132	41	146	SELF SUPPORT	GRILLAGE	HORIZONTAL	9/10 STANDARD TYPE	WOLF 150 sq. mm ACSR	50 sq. mm STEEL	1980	CGEE ALSTHOM	COGELEX
UBUNGO - ZANZIBAR(C)	132	36	NONE	NOT APPLICABLE	NOT APPLICABLE	-	NOT APPLICABLE	Submerine cable, 94 mm2 CU	-	1980	CGEE ALSTHOM	SHAWINIGAN ENG.
MWANZA - MUSOMA	132	210	628	SELF SUPPORT	GRILLAGE	HORIZONTAL	9/10 STANDARD TYPE	WOLF 158 sq. mm	50 sq. mm STEEL	1989	SAE SADELMI	SHAWINIGAN ENG.
SHINYANGA - TABORA	132	203	587	SELF SUPPORT	GRILLAGE	HORIZONTAL	9/10 STANDARD TYPE	WOLF 158 sq. mm	50 sq. mm STEEL	1989	SAE SADELMI	SHAWINIGAN ENG
KIYUNGI - ARUSHA	132	70	208	SELF SUPPORT	GRILLAGE	HORIZONTAL	9/10 STANDARD TYPE	WOLF 158 sq. mm ACSR	50 sq. mm STEEL	1983	CGEE ALSTHOM	COGELEX
KYM - KIYUNGI	66	53	463	WOODEN POLES	-	TRIANGULAR	5/6 STANDARD TYPE	RABBIT 50 sq. mm ACSR	1/4" DIA	1968	BALFOUR BETTY	SHAWINIGAN ENG.
KIYUNGI - ARUSHA	66	78	625	WOODEN POLES	-	TRIANGULAR	5/6 STANDARD TYPE	RABBIT 50 sq. mm ACSR	1/4" DIA	1967	BALFOUR BETTY	SHAWINIGAN ENG.
BABATI - KONDOA	66	85	251	SELF SUPPORT	CONCRETE	TRIANGULAR	7/7 STANDARD TYPE	WOLF 158 sq. mm ACSR	38.3 sq. mm STEEL	1999	ABB SAE	TECSULT
BABATI - MBULU	66	85	192	SELF SUPPORT	CONCRETE	TRIANGULAR	7/7 STANDARD TYPE	WOLF 158 sq. mm ACSR	38.3 sq. mm STEEL	1999	ABB SAE	TECSULT
MBULU - KARATU	66	65	172	SELF SUPPORT	CONCRETE	TRIANGULAR	7/7 STANDARD TYPE	WOLF 158 sq. mm ACSR	38.3 sq. mm STEEL	1999	ABB SAE	TECSULT
KIHANSI - IRINGA	220	95.23	277	SELF SUPPORT	CONCRETE	TRIANGULAR	15/16 STANDARD TYPE	BLUEJAY 565 sq. mm ACSR	70 sq. mm STEEL	1998	SIEMENS	IVO
KIHANSI - ESCARPMENT	220	1.67	2	SELF SUPPORT	CONCRETE	TRIANGULAR	15/16 STANDARD TYPE	PHEASANT 702 sq. mm AACSR	70 sq. mm STEEL	1998	SIEMENS	IVO
KIHANSI - KIDATU	220	180	528	SELF SUPPORT	CONCRETE	TRIANGULAR	15/16 STANDARD TYPE	BLUEJAY 565 sq. mm ACSR	70 sq. mm STEEL	1999	SIEMENS	IVO
UBUNGO - ILALA 2ND	132	11	25	SELF SUPPORT	CONCRETE	VERTICAL DOUBLE CKT	11/12 STANDARD TYPE	WOLF 158 sq. mm ACSR	55 sq. mm ACS	1999	TAKAOKA ENGINEERING	E.P.D.C.I
UBUNGO - KIPAWA	132	16	35	SELF SUPPORT	CONCRETE	VERTICAL DOUBLE CKT	11/12 STANDARD TYPE	WOLF 158 sq. mm ACSR	55 sq. mm ACS	under constr.	TAKAOKA ENGINEERING	E.P.D.C.I
P/FALLS - SONGA	132	8.5	33	SELF SUPPORT	GRILLAGE	VERTICAL DOUBLE CKT	10/12 STANDARD TYPE	HAWK 241 sq. mm ACSR	62.4 sq. mm AAAC	1995	TANESCO	IVO
HALE - TANGA	132	60	200	SELF SUPPORT	GRILLAGE	TRIANGULAR	10/12 STANDARD TYPE	HAWK 241 sq. mm ACSR	62.4 sq. mm AAAC	1994	TANESCO	IVO
SINGIDA - BABATI	220	150	424	SELF SUPPORT	CONCRETE	TRIANGULAR	15/16 STANDARD TYPE	RAIL 517 sq. mm ACSR	70 sq. mm STEEL	1996	DREC	CARL-BRO
BABATI - ARUSHA	220	162	433	SELF SUPPORT	CONCRETE	TRIANGULAR	15/16 STANDARD TYPE	RAIL 517 sq. mm ACSR	70 sq. mm STEEL	1996	DREC	CARL-BRO
MTUKULA - KYAKA	132	30	85	SELF SUPPORT	CONCRETE	HORIZONTAL	10/12 STANDARD TYPE	TIGER 130 sq. mm ACSR	70 sq. mm STEEL	1992	ABB SAE SADELMI	EPDC- U.K
KYAKA - BUKOBA	132	54	157	SELF SUPPORT	CONCRETE	HORIZONTAL	10/12 STANDARD TYPE	TIGER 130 sq. mm ACSR	70 sq. mm STEEL	1992	ABB SAE SADELMI	EPDC- U.K

質問票回答 No3-1　　質問番号 1.2.1-2　　補足

1.2 1-5

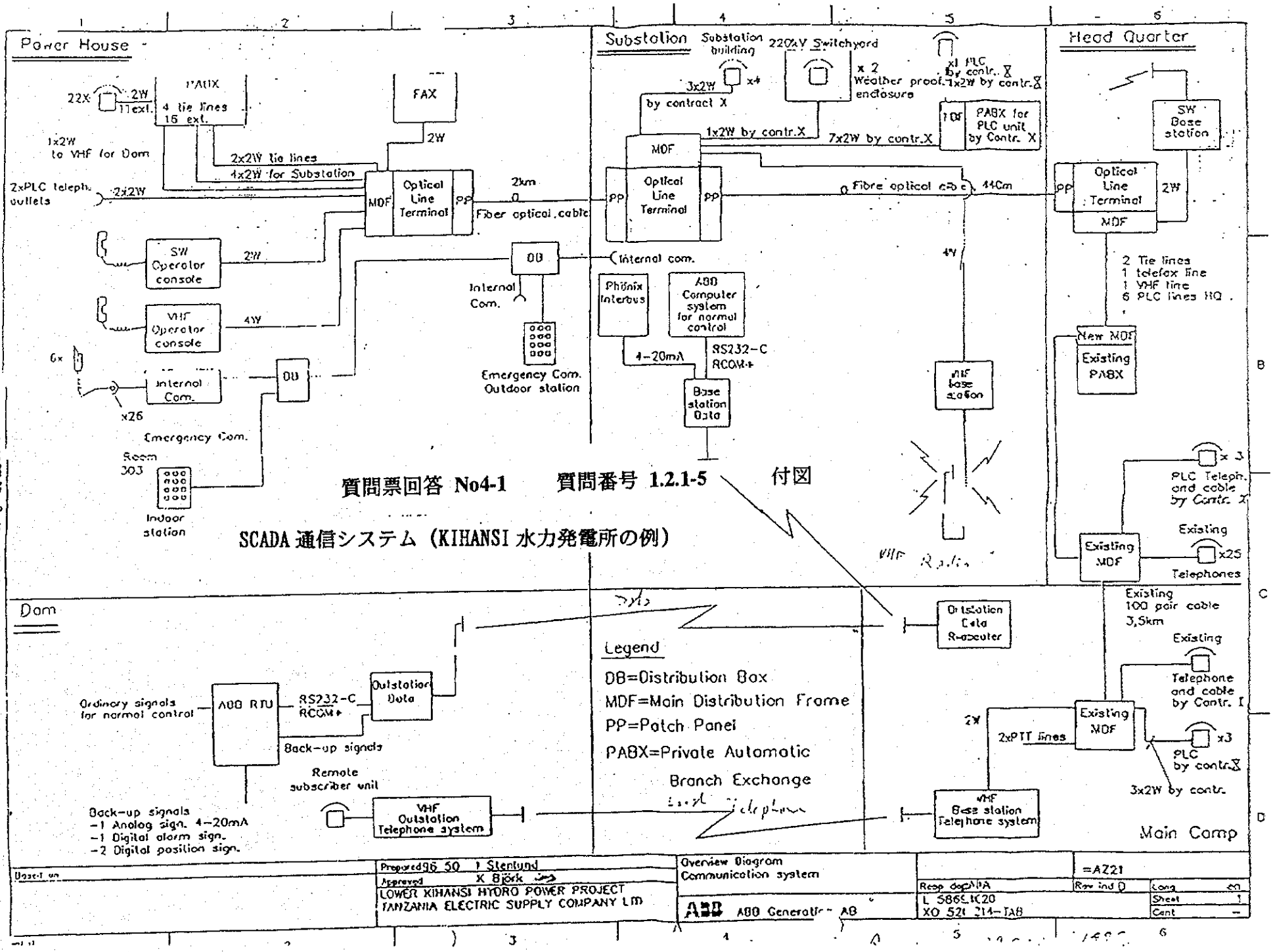
TANESCO TELECOMMUNICATION SYSTEMS

Tanesco uses different telecommunication means including telephones and other which are particularly for TANESCO. These are

- Pilot Cables
- Radio Communications
- Power line carriers
- SCADA.

Drawings are attached to show these networks.

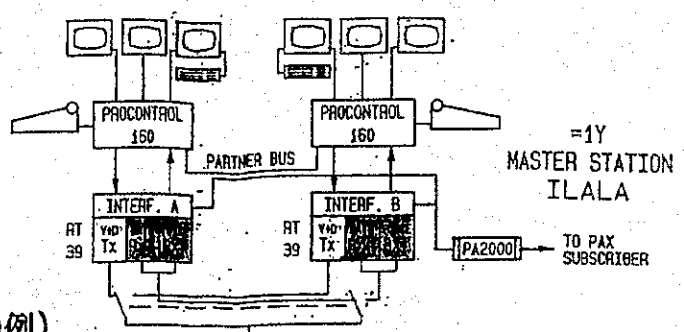
質問票回答 No4　　質問番号 1.2.1-5



質問票回答 No4-1　　質問番号 1.2.1-5　　付図

SCADA 通信システム（KIHANSI 水力発電所の例）

SCADA 通信システム（ILALA コントロールセンタの例）



LEGEND:

RT39	UHF-RADIO
RTU	REMOTE TERMINAL UNIT
DI	DOUBLE INDICATION
SI	SINGLE INDICATION
AL	ALARM
*	TANESCO SUPPLY
SCADA	SYSTEM CONTROL AND DATA AQUISITION

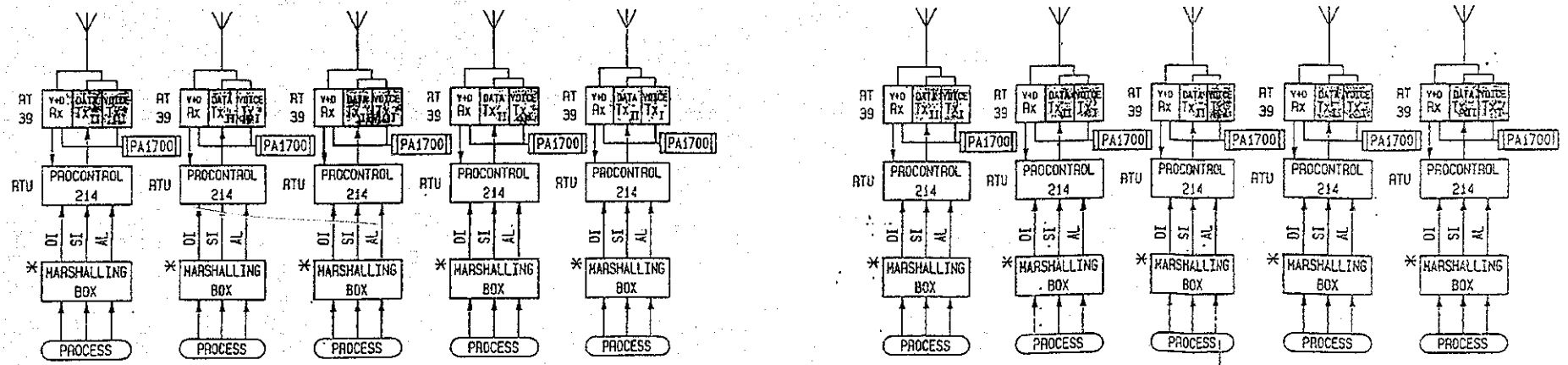
REMARK:

EACH REMOTE TERMINAL UNIT (RTU) IS SUITABLE TO CARRY 16DI, 16SI AND 48AL (EXCEPT UBUNGO) TOTAL EQUIVALENT 96SI

UBUNGO TOTAL EQUIVALENT 192SI

$Tx = 383.420$ MHz
$Rx_I = 371.470$ MHz
$Rx_{II} = 371.420$ MHz

$Tx_I = 371.470$ MHz
$Tx_{II} = 371.420$ MHz
$Rx = 383.420$ MHz

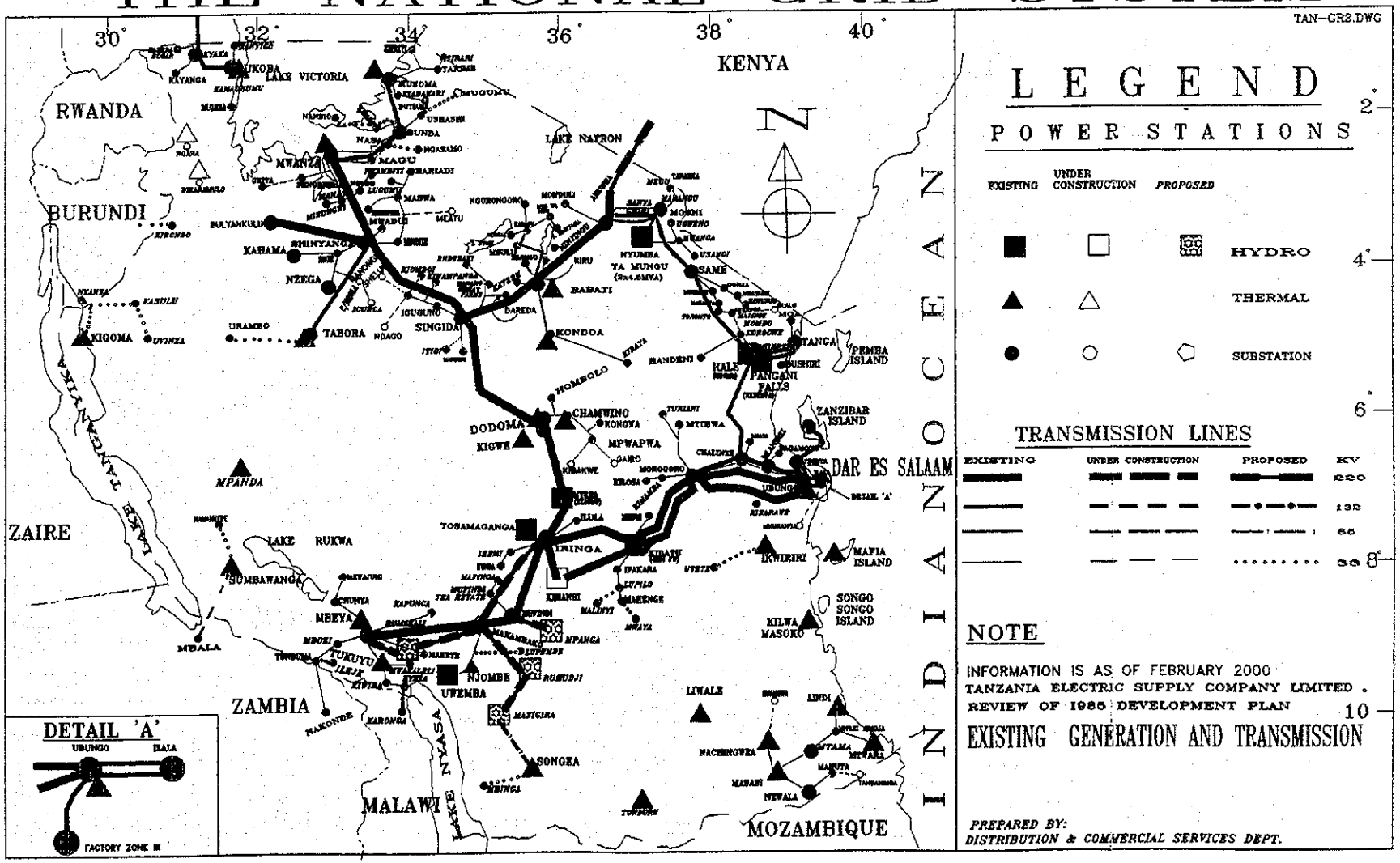


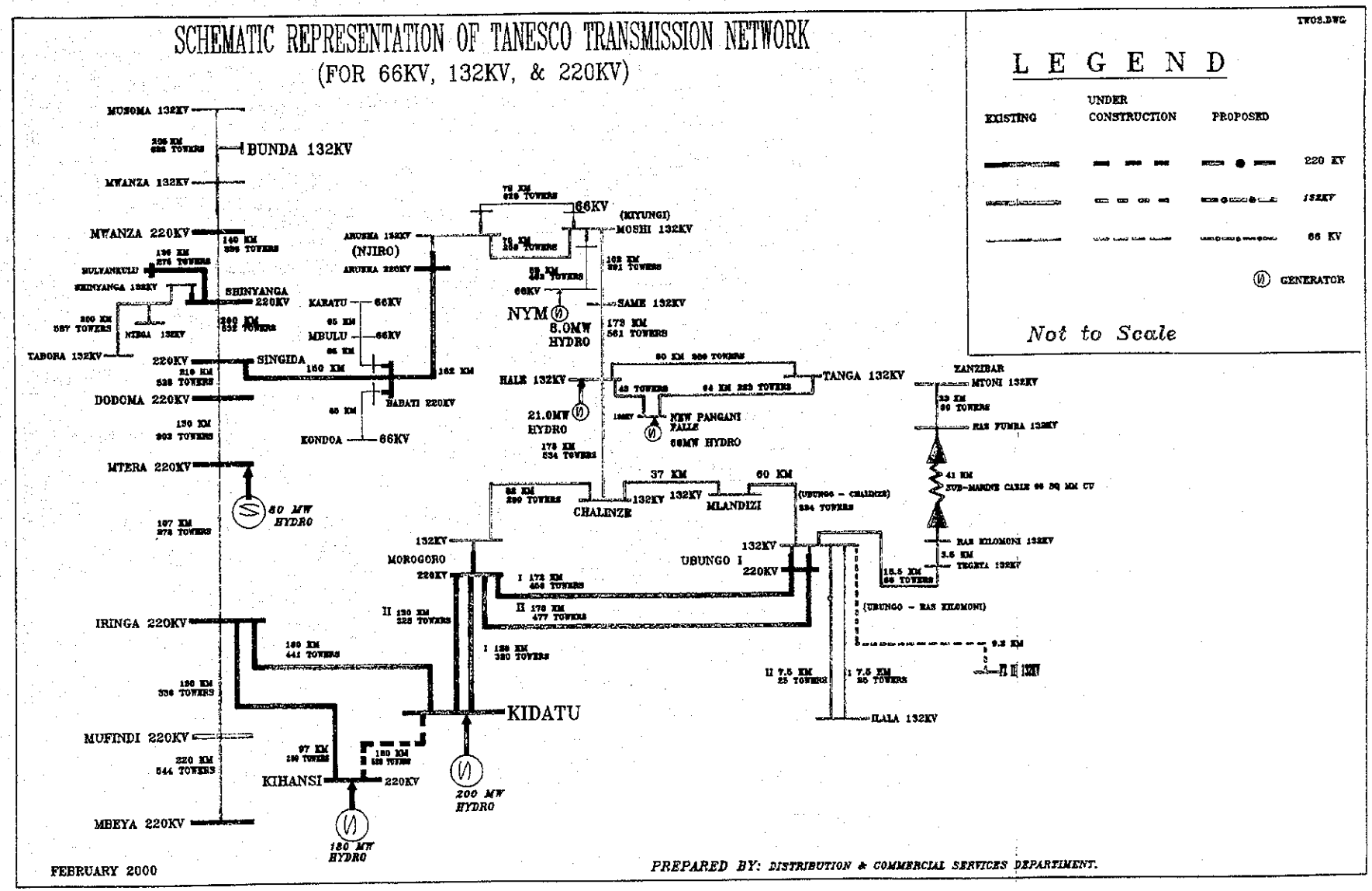
Issued	88-03-16/MG	TANESCO NAT. REHAB. PROJECT	BBC BROWN BOVERI	Office resp. ENF-V	Title TELECOMMUNICATION SYSTEM
Checked	88-03-16/JKA	COMMUNICATIONS SYSTEM / TANZANIA			
Standard		CONTRACT : 11 BBC ORDER : 1-350445			CYCLIC RADIO & SCADA SYSTEM
Released	88-03-16/JKA	Dervd. from . Repl.	Repl. by		

= Y

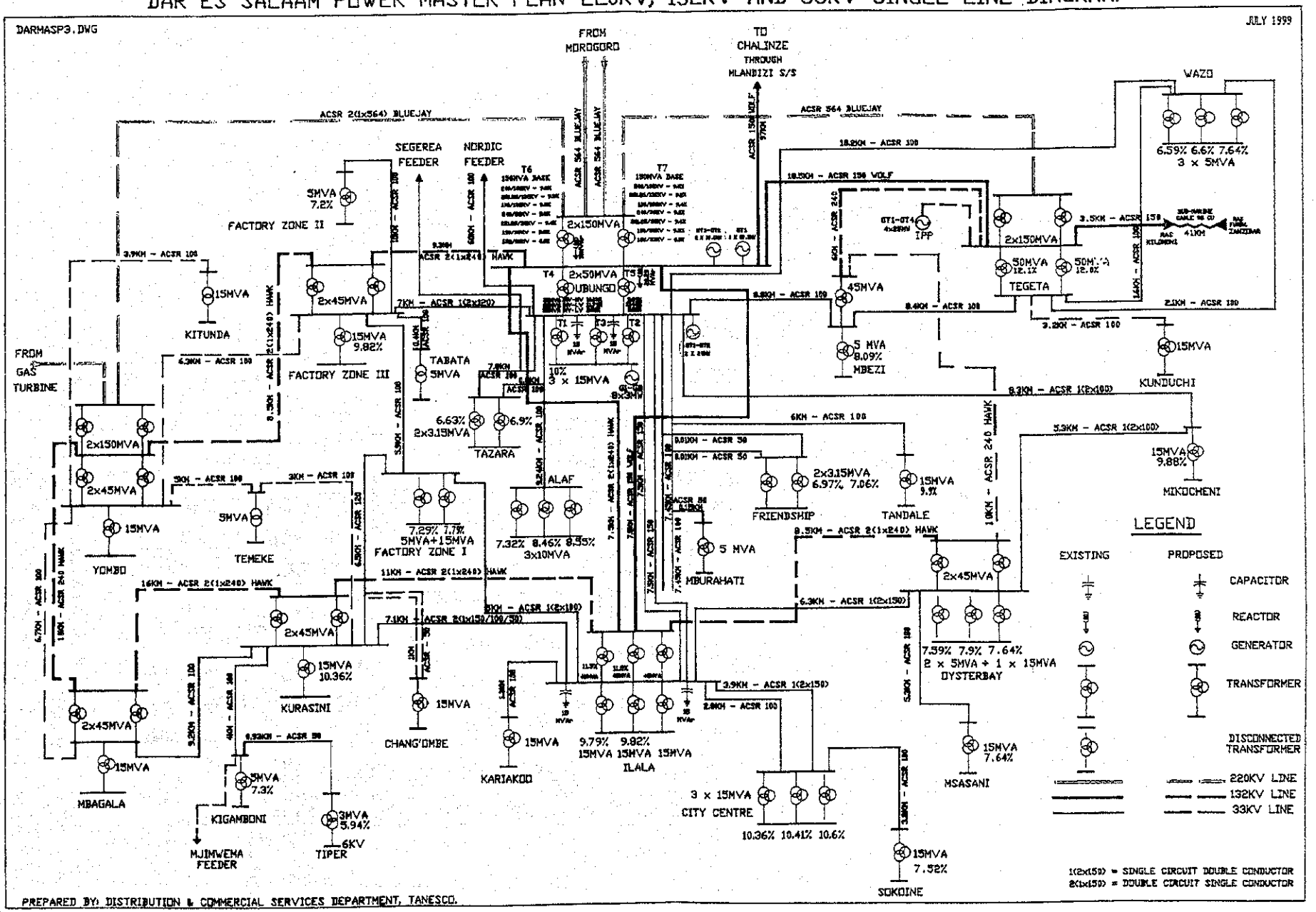
Doc. | Format 3 | Lang. E | HENF 327756 | Sht.nr. 01 | Nr.shts 3

THE NATIONAL GRID SYSTEM

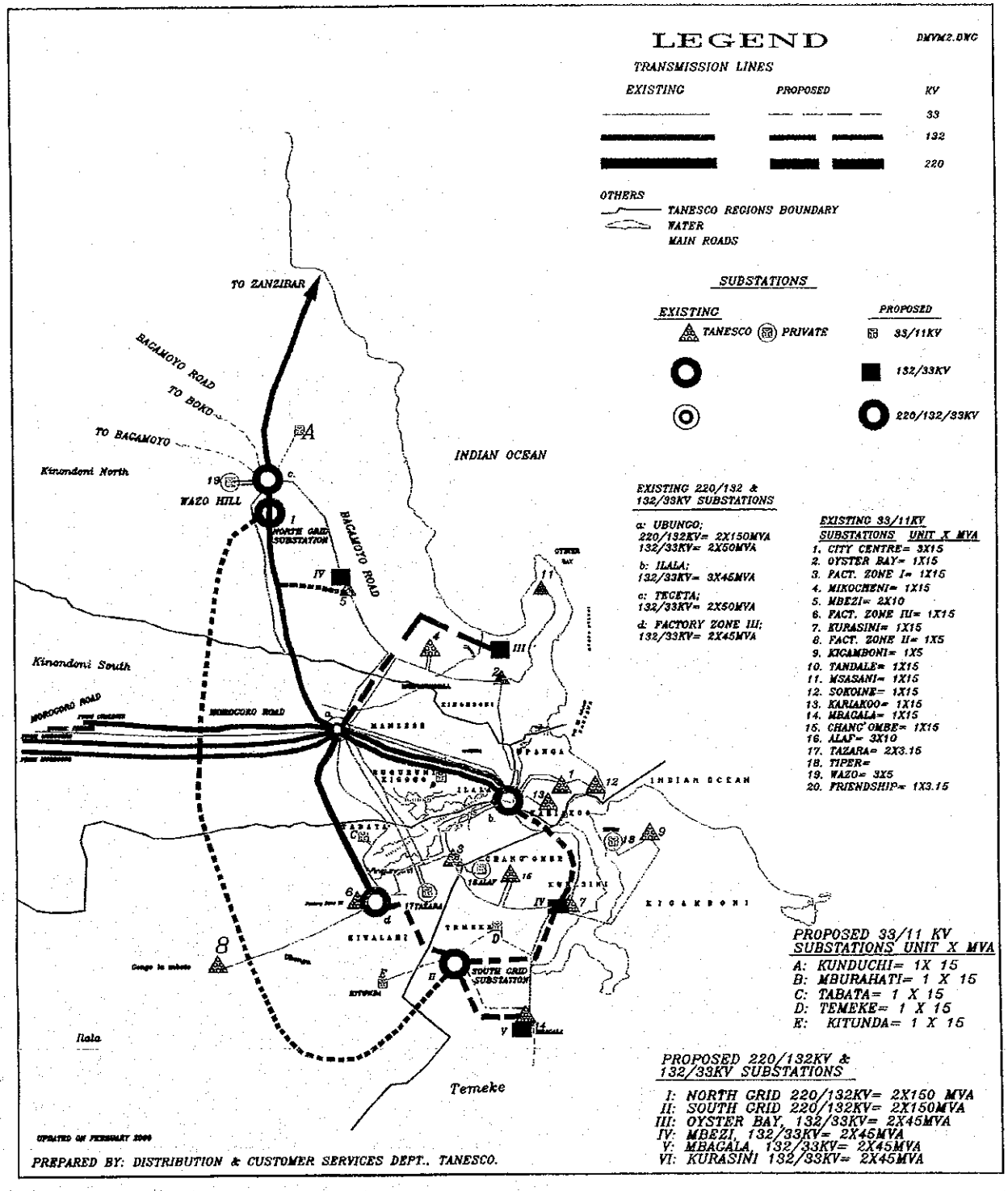



SCHEMATIC REPRESENTATION OF TANESCO TRANSMISSION NETWORK
(FOR 66KV, 132KV, & 220KV)
TW03.DWG
LEGEND
EXISTING
UNDER CONSTRUCTION
PROPOSED
220 KV
132KV
66 KV
GENERATOR
Not to Scale
MUSOMA 132KV
BUNDA 132KV
MWANZA 132KV
MWANZA 220KV
SHINYANGA 220KV
SHINYANGA 132KV
SULYANKULU
NZEGA 132KV
TABORA 132KV
SINGIDA
DODOMA 220KV
MTERA 220KV
60 MW HYDRO
IRINGA 220KV
MUFINDI 220KV
MBEYA 220KV
KIHANSI
180 MW HYDRO
KIDATU
200 MW HYDRO
ARUSHA 132KV
(NJIRO)
ARUSHA 220KV
KARATU
MBULU
KONDOA
BABATI 220KV
66KV
(KIYUNGI)
MOSHI 132KV
NYM
8.0MW HYDRO
SAME 132KV
HALE 132KV
21.0MW HYDRO
TANGA 132KV
NEW PANGANI FALLS
68MW HYDRO
ZANZIBAR
MTONI 132KV
RAS FUMBA 132KV
41 KM
SUB-MARINE CABLE 95 SQ MM CU
RAS KILOMONI 132KV
TEGETA 132KV
(UBUNGO - RAS KILOMONI)
9.2 KM
CHALINZE
MLANDIZI
(UBUNGO - CHALINZE)
MOROGORO
UBUNGO I
ILALA 132KV
PREPARED BY: DISTRIBUTION & COMMERCIAL SERVICES DEPARTMENT.
FEBRUARY 2000

DAR ES SALAAM POWER MASTER PLAN 220KV, 132KV AND 33KV SINGLE LINE DIAGRAM.



TANESCO – 220, 132, AND 33 KV NETWORK OF DAR ES SALAAM REGION.



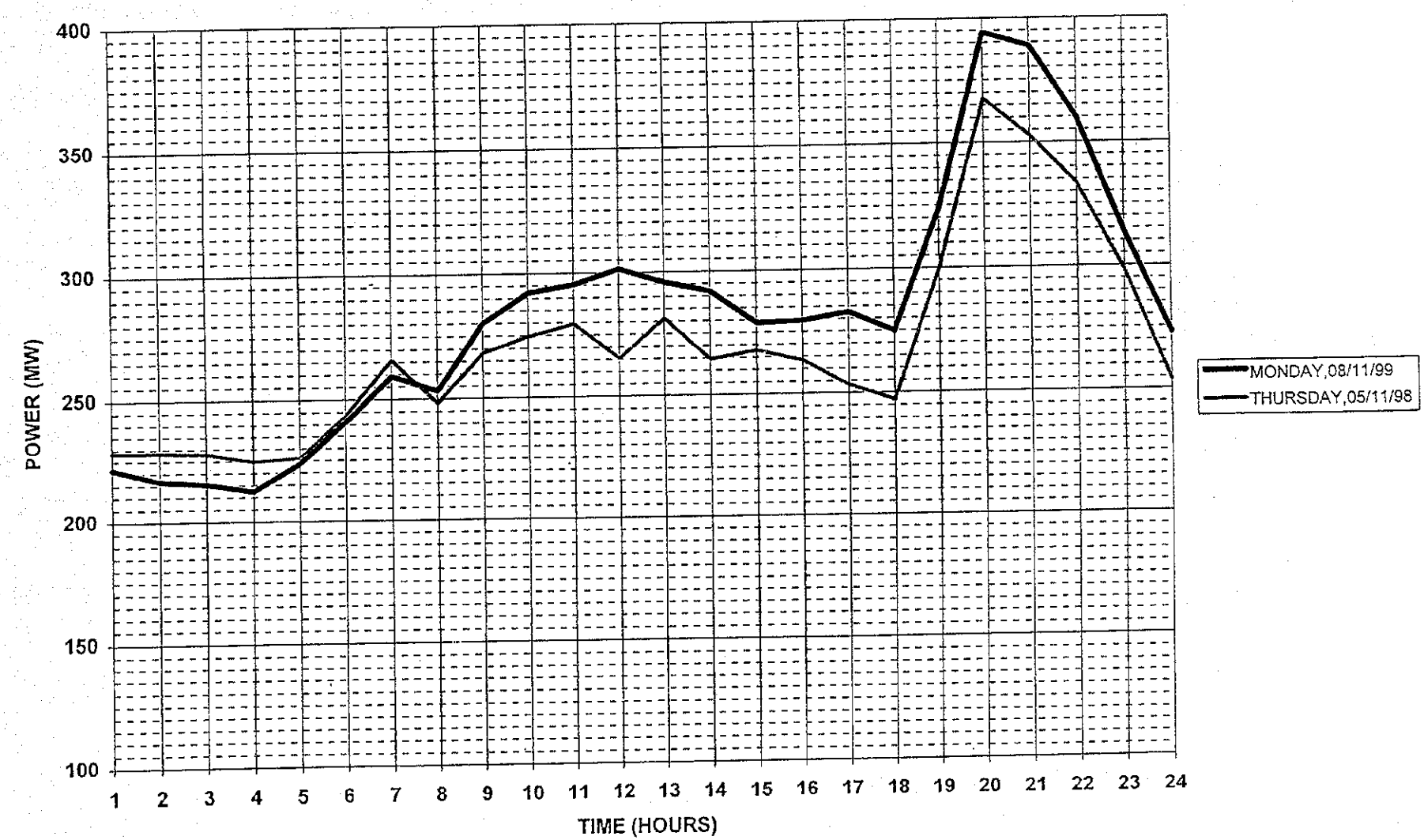
	MAXIMUM DEMANDS
GRID SYSTEM	416.75 MW at 20:00 hrs on 10th
DAR ES SALAAM	179.40 MW at 20:00 hrs. on 10th
DSM & DISTRICT	191.40 MW at 20:00 hrs. on 10th
TANGA TOWN	21.80 MW at 19:00 hrs. on 02th
TANGA & DISTRICT	27.30 MW at 19:00 hrs. on 02th
ARUSHA	37.00 MW at 20:00 hrs. on 24th
MOSHI	29.10 MW at 20:00 hrs. on 03th
KILIMANJARO REGION	31.50 MW at 20:00 hrs. on 03th
NORTHERN REGION	65.80 MW at 20:00 hrs. on 14th
MOROGORO & DISTRICT	13.34 MW at 19:00 hrs. on 30th
MLANDIZI S/STN. FDRS.	12.60 MW at 21:00 hrs. on 21st
KILOMBERO AREA	7.70 MW at 21:00 hrs. on 08th
NGERENGERE	1.00 MW at 20:00 hrs. on 14th
IRINGA	5.40 MW at 20:00 hrs. on 03rd
MUFINDI	4.11 MW at 11:00 hrs. on 30th
MBEYA	15.70 MW at 20:00 hrs. on 22nd
DODOMA	8.62 MW at 20:00 hrs. on 10th
SINGIDA	3.00 MW at 21:00 hrs. on 04th
SHINYANGA	9.40 MW at 21:00 hrs. on 21st
TABORA	4.30 MW at 21:00 hrs. on 18th
NZEGA	7.40 MW
MWANZA	21.00 MW at 21:00 hrs. on 21st
MUSOMA	6.00 Mw at 20:00 hrs. on 19th
SAME	0.98 MW at 19:00 hrs. on 07th
ZANZIBAR	22.20 MW at 20:00 hrs. on 23rd
BABATI	0.92 MW at 21:00hrs. on 31st
KARATU	1.09 MW at 19:00 hrs. on 10th
KONDOA	0.70 MW at 20:00 hrs. on 10th
MBULU	0.21 MW at 19:00 hrs. on 19th
SYSTEM LOAD FACTORS	
AVERAGE FOR THE MONTH	67.19 %
MAXIMUM DAILY	71.60 %

Mallale

M. F. Mallale
CHIEF SYSTEM CONTROL ENGINEER

質問票回答 No6　　質問番号 1.3.1-1

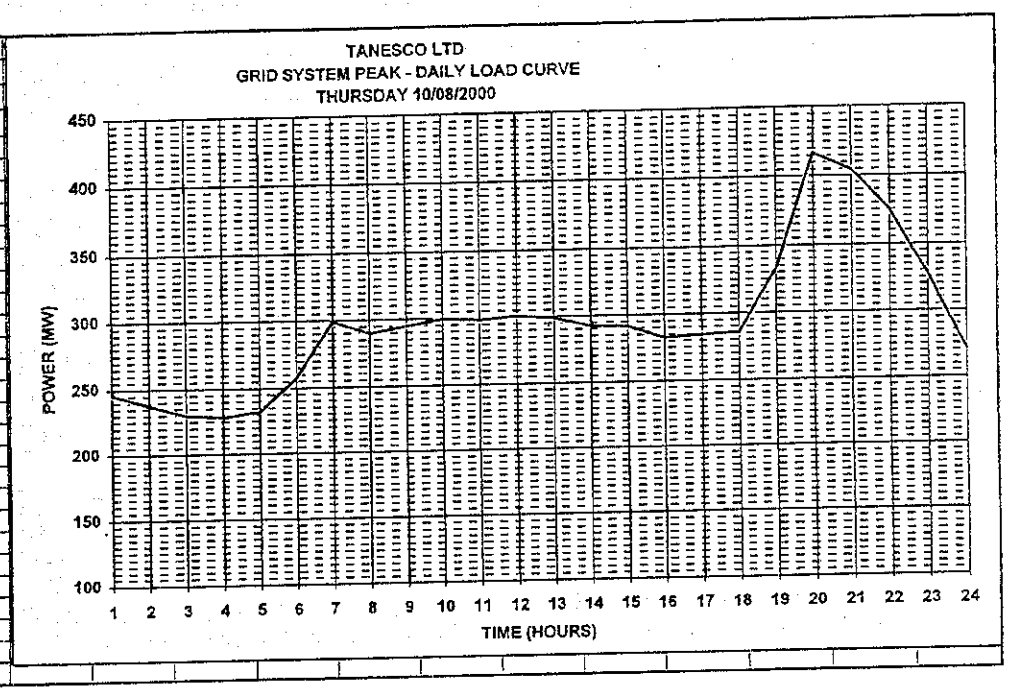
TANESCO LTD
GRID SYSTEM PEAK 1998/1999　質問票回答 No7　質問番号 1.3.2-1



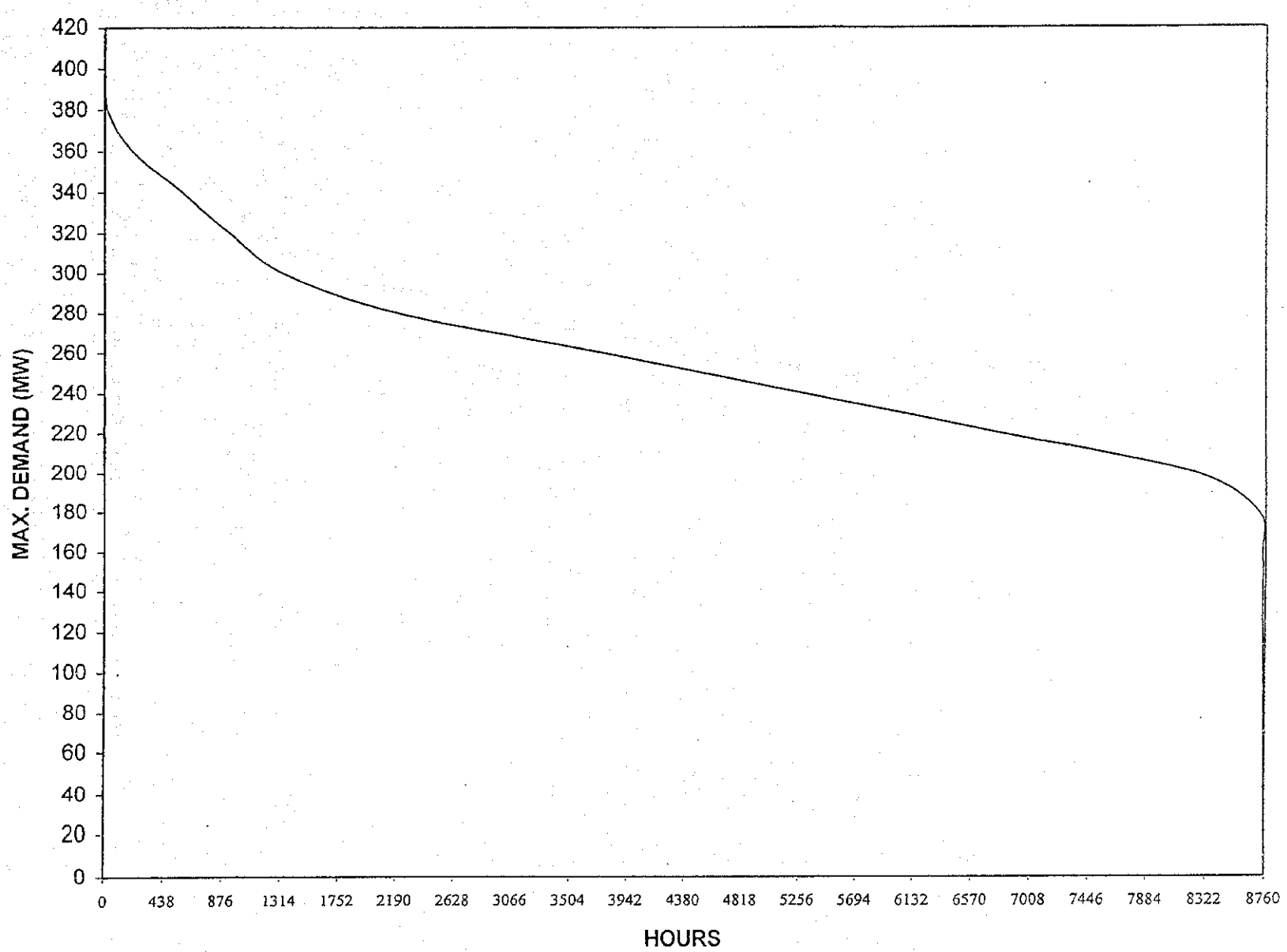
資 21

10-08-2000

TIME(Hrs)	GRID SYS. DEMAND (MW) ON 10/08/2000
1	246.00
2	237.70
3	229.75
4	227.95
5	232.35
6	257.47
7	298.79
8	289.64
9	294.74
10	299.30
11	298.13
12	300.79
13	298.71
14	292.09
15	291.48
16	282.53
17	284.29
18	285.50
19	332.81
20	416.75
21	404.59
22	374.71
23	327.42
24	270.26



ANNUAL LOAD DURATION CURVE 1999



REGION.	NO. OF CONSUMERS
1. Dar es Salaam	154,039
2. Tanga	28,122
3. Kilimanjaro	46,779
4. Arusha	38,162
5. Dodoma	13,956
6. Morogoro	19,709
7. Singida	6,037
8. Mwanza	22,221
9. Kagera	7,582
10. Mara	7,437
11. Mbeya	24,367
12. Iringa	14,184
13. Rukwa	4,465
14. Tabora	7,153
15. Shinyanga	8,740
16. Kigoma	4,148
17. Mtwara	6,493
18. Ruvuma	5,265
19. Lindi	4,613
Total	**423,472**

質問票回答 No8　　質問番号 1.3.3-2

The summary of operating statistics from all the zones for the year 1999 are as follows:-

		Previous Year	This year
Service Lines completed during the year	-	17,421	22,624
Service lines in progress	-	24,886	9,750
Pending service line applications	-	34,353	31,987
Additional length of 33 kV & 11 KV lines during the year (km)	-	306.73	351.72
Total length of 33 KV lines and 11 KV lines by the end of the year (km)	-	8,719.19	9,070.91
Additional length of LV lines (km)	-	261.62	517.67
Total length of LV lines at the end of the year (km)	-	11,112.74	11,630.41
Additional number of distribution transformers installed during the year	-	75	164
Total number of distribution transformers at the end of the year	-	4,585	4,749
Total number of distribution CWO's completed during the year	-	628	1,451
Total number of distribution CWO's in progress during the year	-	1,276	1,315
Additional number of consumers connected	-	20,351	19,103
Total number of consumers	-	352,130	371,233
Total Number of Staff in the company	-	6,439	7,008
Consumer/Staff ratio	-	55	53
Total outage time due to 33 & 11kV feeder outage (Hrs)	-	75,135.24	32,872.80
Total unserved energy due to 33 & 11kV feeder outage (MWH)	-	111,026.92	40,123.56
Total Blackout time (Hrs)	-	29,361.51	19,234.96
Total unserved energy due to Blackout (MWH)	-	18,990.89	25,678.36
Funds spent on distribution CWO's (Tshs.)	-	697,411,077.84	1,829,655,875.52
Funds spent on Service Line construction (Tshs.)	-	739,408,136.44	1,448,065,937.85
Funds spent on distribution R & M works (Tshs.)	-	874,622,534.09	1,381,747,593.75
Funds spent on distribution P & L works (Tshs.)	-	295,441,569.01	398,975,637.10
Capital Contribution (Tshs.)	-	973,864,515.91	15,317,717,842.04
Service Line charge Payment(Tshs.)	-	2,394,837,065.60	1,881,508,185.21

質問票回答 No9　　質問番号 2.1.1

TANZANIA ELECTRIC SUPPLY COMPANY LIMITED

SUMMARY OF REGIONAL OPERATION STATISTICS OF JULY AND AUGUST, 2000.

ITEM	KAGERA	MARA	MBEYA	IRINGA	RUKWA	TABORA	SHG	KIGOMA	MTWARA	RUVUMA	LINDI	TOTAL
Service Line completed	71	39	306	210	78	279	121	29	139	64	27	4,054
Service Lines in Progress	17	141	90	157	8	549	78	7	53	5	9	4,557
Outstanding Service Line Applications	801	0	676	596	131	868	209	370	202	370	97	11,614
Previous length of 33kV line (km)	253.37	334.84	723.29	548.36	0.00	80.94	414.69	0.00	270.35	0.00	161.50	6,512.36
Additional 33 kV lines (km)	0.60	0.00	12.50	0.00	0.00	11.98	0.80	0.00	0.00	0.00	0.00	361.23
Total route length of 33 kV line(km)	253.97	334.84	735.79	548.36	0.00	92.92	415.49	0.00	270.35	0.00	161.50	6,811.14
Previous length of 11kV line (km)	112.68	57.79	166.30	134.73	46.10	107.70	40.13	41.89	111.55	74.12	74.56	3,642.67
Additional 11 kV lines (km)	0.90	123.03	2.80	0.00	0.00	0.00	35.04	0.00	0.00	0.00	0.00	188.33
Total route length of 11 kV lines (km)	113.58	180.82	169.10	134.73	46.10	107.70	75.17	41.89	111.55	74.12	74.56	3,831.00
Previous length of 33kV and 11KV lines (km)	366.05	392.63	889.59	683.08	46.10	188.64	454.82	41.89	381.90	74.12	236.06	10,155.03
Additional 33 kV & 11kV lines (km)	1.50	123.03	15.30	0.00	0.00	11.98	35.84	0.00	0.00	0.00	0.00	549.57
Total route length of 33 kV and 11kV lines (km)	367.55	515.65	904.89	683.08	46.10	200.62	490.66	41.89	381.90	74.12	236.06	10,704.59
Previous length of LV line (km)	232.41	180.82	489.27	247.65	111.51	199.69	191.71	108.27	246.26	173.59	106.63	11,453.78
Additional LV lines (km)	5.79	1.57	10.26	8.66	2.07	6.41	3.32	0.09	6.95	0.00	3.80	117.81
Total route length of LV lines (km)	238.20	182.39	499.53	256.31	113.58	206.10	195.03	108.36	253.21	173.59	110.43	11,571.58
Addition Distribution Transformers	2	0	0	1	0	12	7	0	0	0	1	102
Total Number of Distribution Transformers	116	123	304	220	44	111	123	50	105	63	68	5,324
Total Number of Distribution CWO's completed	24	30	15	11	18	0	12	4	22	14	14	360
Total Number of Distribution CWO's in progress	17	32	173	0	79	41	37	18	47	38	5	913
Total unserved energy due to feeder outage (MWh)	14.68	46.71	56.11	477.15	27.98	0.84	122.95	148.45	47.39	191.79	3.90	2,889.48
Total unserved energy due to feeder blackout (MWh)	8.32	7.90	288.64	2.67	3.34	237.18	115.42	210.55	36.61	11.40	55.07	1,784.77
Previous Number of Consumers	7,501	7,239	23,851	13,929	4,399	6,951	7,727	4,124	6,224	5,201	4,474	413,134
Addition Consumers connected	81	198	516	255	66	202	1,013	24	269	64	139	10,338
Total Number of Consumers todate	7,582	7,437	24,367	14,184	4,465	7,153	8,740	4,148	6,493	5,265	4,613	423,472
Total Number of Staff	144	120	303	222	92	143	124	79	179	138	140	6,756
Consumer/Staff ratio	53	62	80	64	49	50	70	53	36	38	33	63
Funds Spent on Distribution CWOs	3,251,494.84	5,555,055.59	33,643,686.89	5,886,530.00	17,203,087.83	5,860,987.75	12,499,259.67	0.00	15,934.67	7,795,538.75	1,770,219.14	784,938,879.15
Funds Spent on S/L construction	21,224,542.18	632,529.80	18,530,473.63	8,366,700.00	9,023,747.37	17,242,279.54	1,856,716.38	870,000.00	20,601,718.25	7,542,392.42	2,379,853.20	191,318,974.25
Funds Spent on Distribution R & M	20,224,542.18	1,713,594.90	1,505,389.60	1,509,642.80	247,040.00	3,918,318.86	4,960,633.17	2,605,292.46	5,077,496.20	2,044,473.92	243,125.60	213,077,957.55
Funds Spent on Distribution P & L	0.00	531,384.00	11,994,606.00	708,602.30	1,664,775.52	1,386,592.20	2,810,751.00	914,185.00	2,705,675.40	896,856.28	822,993.20	69,429,101.36
Capital Contribution	94,075.01	194,419.05	4,595,000.00	1,118,160.50	43,015.95	18,455,160.55	82 615.25	1,431,962.00	0.00	0.00	66,457,355.00	1,196,9 1,644.71
Service Line charge Payment	16,672,886. 5	9,727,227.65	20,350,980.00	16,752,600.00	7,054,767.00	31,094,814.00	13, 7,580.00	3,224,067.50	4,237,000.00	5,220,000.00	2,800,000.00	478,25 950.05

TANZAN ELECTRIC SUPPLY COMPANY LIM ED

SUMMARY OF REGIONAL OPERATION STATISTICS OF JULY AND AGUST, 2000.

S/No.	ITEM	K' NORTH	K' SOUTH	ILALA	TEMEKE	TANGA	K'NJARO	ARUSHA	DODOMA	MORO	SINGIDA	MWANZA	S/No.
1	Service Line completed	158	83	264	284	201	495	414	194	249	60	289	1
2	Service Lines in Progress	586	486	357	643	77	410	464	54	134	137	95	2
3	Outstanding Service Line Applications	106	905	44	1,011	1,080	1,335	154	370	1,776	116	397	3
4	Previous length of 33kV line (km)	68.50	74.00	61.41	56.99	812.86	662.57	207.86	311.35	702.09	504.37	263.02	6
5	Additional 33 kV lines (km)	3.05	3.00	62.45	0.00	39.00	212.10	0.20	9.05	0.00	0.00	6.50	5
6	Total route length of 33 kV line(km)	71.55	77.00	61.41	56.99	851.86	874.67	208.06	320.40	702.09	504.37	269.52	6
7	Previous length of 11kV line (km)	139.68	101.00	158.05	132.89	833.29	476.77	205.38	317.70	154.25	42.92	113.21	7
8	Additional 11 kV lines (km)	17.26	0.00	0.56	1.46	0.00	0.24	3.13	0.56	0.36	0.00	3.00	8
9	Total route length of 11 kV lines (km)	156.94	101.00	158.61	134.34	833.29	477.01	208.51	318.26	154.61	42.92	116.21	9
10	**Previous length of 33kV and 11KV lines (km)**	**208.18**	**175.00**	**219.46**	**189.88**	**1,646.15**	**1,139.34**	**413.24**	**629.05**	**856.34**	**547.29**	376.23	10
11	**Additional 33 kV & 11kV lines (km)**	**20.31**	**3.00**	**63.01**	**1.46**	**39.00**	**212.338**	**3.33**	**9.61**	**0.36**	**0.00**	**9.50**	11
12	**Total route length of 33 kV and 11kV lines (km)**	**228.49**	**178.00**	**282.47**	**191.34**	**1,685.15**	**1351.678**	**416.57**	**638.66**	**856.70**	**547.29**	385.73	12
13	Previous length of LV line (km)	3,604.70	657.00	286.50	99.35	576.41	2,121.22	308.07	460.63	378.95	241.61	431.53	13
14	Additional LV lines (km)	23.88	11.17	0.00	0.12	4.68	11.26	3.73	5.04	6.42	1.60	1.00	14
15	Total route length of LV lines (km)	3,628.58	668.17	286.50	99.47	581.10	2,132.48	311.80	465.67	385.37	243.21	432.53	15
16	Addition Distribution Transformers	28	5	7	2	5	7	9	7	9	0	0	16
17	Total Number of Distribution Transformers	427	221	507	311	590	604	412	223	353	89	260	17
18	Total Number of Distribution CWO's completed	23	35	1	3	49	12	10	33	30	0	0	18
19	Total No. of Distribution CWO's in progress	0	12	66	0	232	0	0	62	0	19	35	19
20	Total unserved energy due to feeder outage (MWh)	24.10	271.17	127.61	6.94	520.69	233.82	88.17	3.65	13.80	10.44	451.15	20
21	Total unserved energy due to feeder blackout (MWh)	256.33	0.00	0.00	0.00	0.00	2.66	295.05	0.32	107.32	0.00	146.00	21
22	**Previous Number of Consumers**	35,739	40,101	44,706	32,231	27,873	45,406	34,187	13,733	19,668	5,977	21,893	22
23	**Addition Consumers connected**	143	424	564	131	249	1,373	3,975	223	41	60	328	23
24	**Total Number of Consumers todate**	35,882	40,525	45,270	32,362	28,122	46,779	38,162	13,956	19,709	6,037	22,221	24
25	Total Number of Staff	260	362	307	310	347	257	260	293	258	100	262	25
26	Consumer/Staff ratio	138	112	147	104	81	182	147	48	76	60	85	26
27	Funds Spent on Distribution CWOs	76,630,386.42	162,783,007.95	37,862,890.04	20,693,728.34	93,314,500.00	73,632,357.57	103,819,077.74	33,119,628.42	12,353,591.29	11,812,297.62	65,435,618.72	27
28	Funds Spent on S/L construction	0.00	1,872,589.00	22,076,734.00	17,953,066.00	7,885,310.00	3,474,479.00	8,900,228.25	2,923,855.33	##########	2,431,489.70	9,040,169.51	28
29	Funds Spent on Distribution R & M	10,913,425.72	8,115,584.11	15,851,065.94	2,932,776.98	45,313,427.12	41,772,137.18	31,451,847.25	5,022,954.85	9,809,920.54	318,998.26	17,526,269.91	29
30	Funds Spent on Distribution P & L	0.00	1,843,333.00	925,766.00	8,906,263.06	18,704,000.00	0.00	2,084,050.00	9,806,208.52	1,314,318.05	558,032.20	1,050,709.63	30
31	Capital Contribution	932,547,294.40	25,035,809.50	1,745,501.00	6,248,676.07	1,095,046.20	104,162,359.39	4,758,412.40	11,119,647.00	6,055,044.45	105,091.00	846,000.00	31
32	Service Line charge Payment	40,963,356.40	29,565,000.00	40,891,153.00	49,890,807.00	24,780,008.00	40,166,647.85	3,576,721.90	15,550,000.00	20,642,500.00	6,971,232.80	15,015,600.00	32

TANZANIA ELECTRIC SUPPLY COMPANY LIMITED

ELECTRICITY TARIFF WITH EFFECT FROM JANUARY, 1999 BILLING

TARIFF No. 1:

Applicable for general use of electricity; including residential, small commercial and small industrial use, where the average consumption is less than 7,500 units (KWH) per meter reading period.

CONSUMPTION RANGE				CHARGING RATES		
0	-	100	KWH	TSHs.	24.00	per KWH
101	-	500	KWH	TSHs.	38.75	per KWH
501	-	2500	KWH	TSHs.	88.50	per KWH
Over		2500	KWH	TSHs.	165.50	per KWH

Service Charge per meter reading period:

0	-	100	KWH	TSHs.	200.00
0	-	500	KWH	TSHs.	750.00
Over		500	KWH	TSHs.	2,000.00

TARIFF No. 2:

Applicable for general use of electricity where power is metered at 400 Volts and the average consumption is more than 7,500 units (KWH) per meter reading period.

a) Demand Charge:- TSHs 7,660.00 per KVA of Billing Demand (B.D.) per meter reading period.

The KVA Maximum Demand (M.D.) indicator shall be reset every meter reading period.

b) Units Charge:- TSHs 70.35 per KWH

c) Customer Service Charge
Per meter reading period TSHs 4,000.00

TARIFF No. 3: HIGH VOLTAGE SUPPLY

Applicable for general use of electricity where power is metered at 11kV and above.

a)	Demand Charge:-	TSHs 5,950.00 per KVA of Billing Demand (B.D.) per meter reading period.
	The KVA Maximum Demand (M.D.) indicator shall be reset every meter reading period.	
b)	Units Charge:-	TSHs 67.50 per KWH
c)	Customer Service Charge Per meter reading period	TSHs 4,000.00

TARIFF No. 4: PUBLIC LIGHTING

Applicable to public lighting.

All units	TSHs 27.80 per KWH

TARIFF No. 5: ZANZIBAR SUPPLY

a)	Maximum Demand:-	TSHs 3,350.00 per KVA of Maximum Demand during each meter reading period.
	The KVA Maximum Demand (M.D.) indicator shall be reset every meter reading period.	
b)	Units Charge:-	TSHs 21.50 per KWH
c)	Customer Service Charge Per meter reading period	TSHs 4,000.00

The maximum Demand readings are taken at Mtoni Substation, while the units readings are taken at Tegeta Substation.

NOTE:

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

2. Billing Demand (B.D.) is the higher of the KVA Maximum Demand(M.D.) during the month and 75% of the highest KVA Maximum Demand for three preceding three months ; provided that during the first year of operation or when a consumer installs power factor correction equipment, the Billing Demand shall be the higher of the kVA Maximum Demand recorded Commencing from the month the consumer is connected or the date when the power factor correction equipment is commissioned.

3. These Tariffs are applicable only to supply of electricity to consumers with power factor not lower than 0.95 in case of lighting loads or 0.9 in case of other loads, otherwise power factor surcharge shall be applied on the normal charges, in accordance with the general conditions of supply.

4. Temporary supply with consumption below 7,500 units per month will be charged in Tariff 1, otherwise higher Tariff will be applicable to correspond with the proposed consumption.

5. Consumers are entitled to change from tariff one to tariff two or vice versa, once a year, if their average demand over twelve (12) consecutive months is more or less than 7,500 units respectively.

TARIFF.DOC
2ND, DECEMBER, 1998.

2.1 1-3 , 2.1 1-4 **Tariff:**

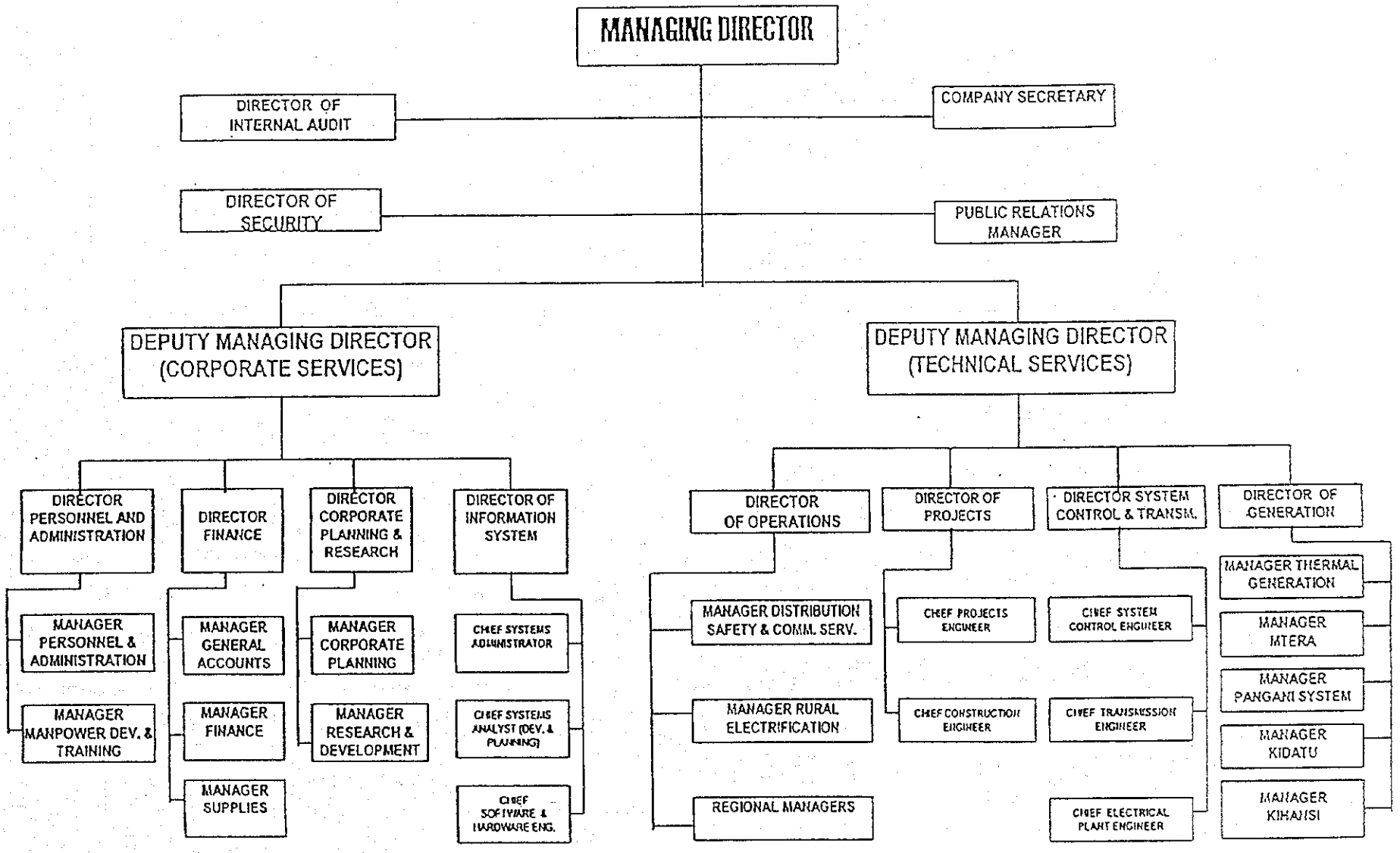
2.1 1-3 There are two commonly used money collecting systems in TANESCO:

(i) Prepayment metering system: This applies in Dar es salaam where these meters are installed in some areas.
(ii) Through conventional metering system where Customers are billed at the end of the month. For the customers who fail to pay their dues they normally face power disconnection until they have settled their bills.

2.1 1-4 Subsidy situation:

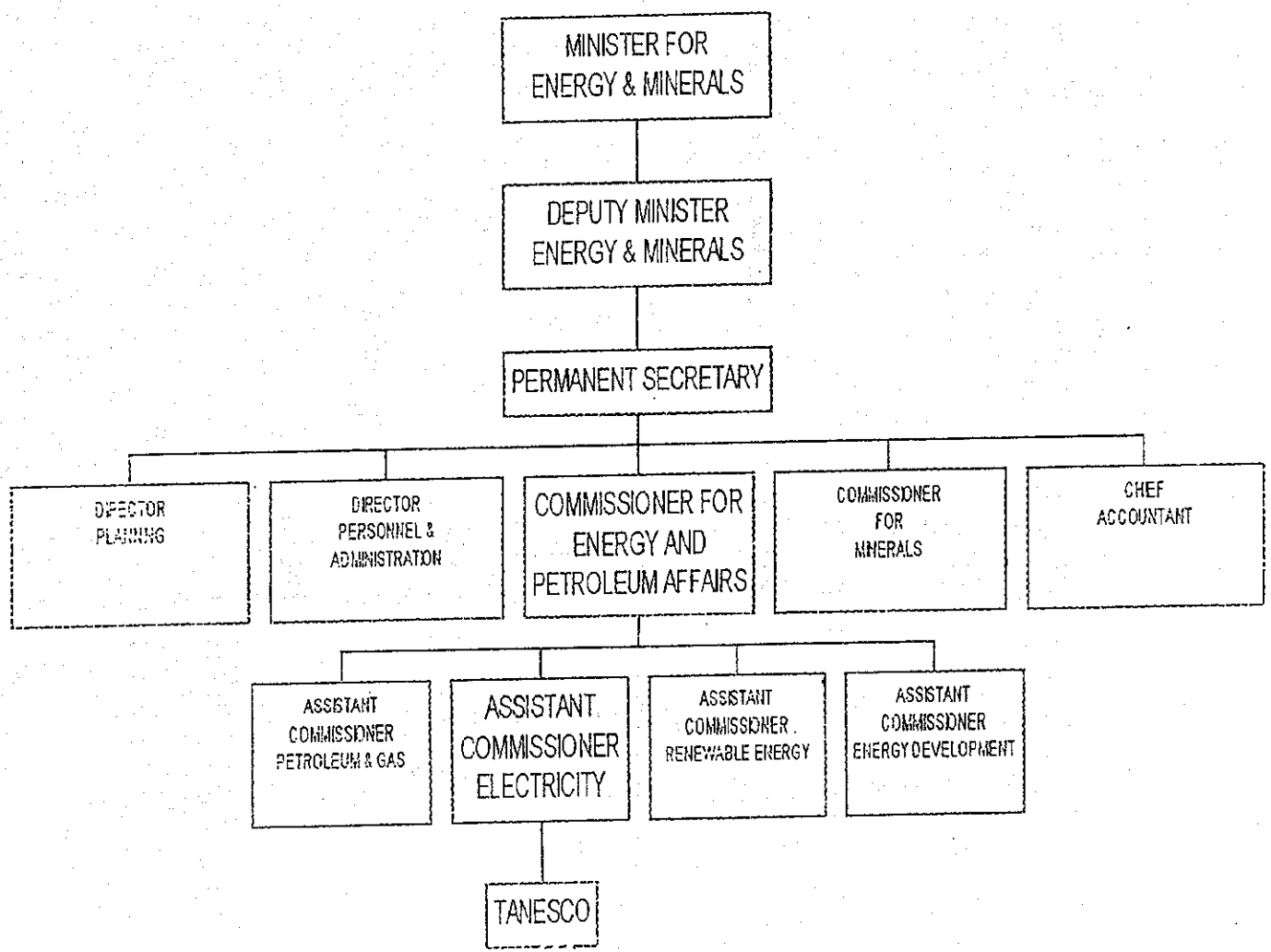
No subsidy is applied in TANESCO tariff structure but only cross subsidy within tariff.

質問票回答 No11　　質問番号 2.1.1-3、2.1.1-4



質問票回答 No12　　質問番号 2.1.1-5

ORGANIZATION CHART OF MINISTRY OF ENERGY AND MINERALS.



2.1 4-1 Land Acquisition:

When acquiring a land for line constructions the following procedures:

1. The route selection for a new line is made and drawn on a map at an appropriate scale.
2. The map showing the position of a new line is submitted with an application letter for the right of the way for the line to the relevant land authority
   i.e. City authorities, municipality or Town councils for areas in towns and the ministry of land in areas outside cities or townships.
3. Compensation is made by TANESCO for any exhausted improvement for any piece of land granted to it by the land authorities. Approved government valuers determine the value of the properties found on the land so acquired.

2.1 4-2 Purchase facilities

In purchasing facilities for construction the following Purchasing Cycle is followed:

1. Initiate requirements
2. Request for quotations
3. Evaluate quotations and select supplier
4. Approval of award
5. Issue purchase order.
6. Expedite Delivery
7. Receive materials
8. Process supplier Invoices for payment.

2.1 4-3 Import Duties

Import duty is 20%
VAT is 20%
ID = CIF X 20%
VAT = (CIF + ID) X 20%.

質問票回答 No13　　質問番号 2.1.4-1、2.1.4-2、2.1.4-3

RELAY TRIPPING IN THE P/S AND LINES.OCT. 1997 – OCT 1998.

1.3.5-1

STATION	NO. OF TRIPPINGSI	TIME (HOURS . MINUTES)
1. GRID	9	8 .38
2. Kidatu	6	5 .33
3. Mtera	7	7 .53
4. NP/Falls	9	9 .47

LINE	NO. OF TRIPPINGS	TIME (HOURS . MINUTES)
1. 220kV-MT/DD	46	20. 54
2. 220kV-MT/IR	14	10.17
3. 220kV-IR/MF	18	41 .51
4. 220kV-MF/MB	8	6.57
5. 220kV-IR/KD	20	11.05
6. 220kV-SI/NJ	10	10.40
7. 220kV-SH/MZ	3	1 .12
8. 220kV-MG/UB2	2	1 .13
9. 220kV-MG/UB1	4	3 .51
10. 220kV-SI/SH	6	1.46
11. 220kV-KD/MG1	5	130 .04
12. 220kV-KD/MG2	4	28 .02
13. 220kV-DD/SI	4	0 .58
14. 132kV-MZ/MU	39	18 .30
15. 132kV-UB/KC	1	7 .27
16. 132kV-KY/NJ	13	30 .31
17. 132kV-HL/TA	4	238 .41
18. 132kV-PA/HL	5	5 .24
19. 132kV-PA/TA	1	2 .29
20. 132kV-MG/CH	1 36	9 .43
21. 132kV-HL/KY	9	1.29
22. 132kV-HL/CH	2	0.48
23. 132kV-SH/	6	0 .14
24. 132kV-UB/CH	2	0 .59
25. 220kV-KD/MG2	1	0 .32

質問票回答 No14　　質問番号 1.3.5-1

RELAY TRIPPING IN THE P/S AND LINES. NOV. 1998 – OCT 1999.

1.3.5-1

STATION	NO. OF TRIPPINGSI	TIME (HOURS . MINUTES)
1. GRID	7	7 .01
2. Kidatu	5	3 .00
3. Mtera	3	4 .00
4. NP/Falls	1	0 .49
5. U.P.S(GT)	1	0. 22

LINE	NO. OF TRIPPINGS	TIME (HOURS . MINUTES)
1. 220kV-KD/MG1	02	3 .20
2. 220kV-KD/MG2	02	1.19
3. 220kV-MG/UB1	03	27 .24
4. 220kV-MG/UB2	03	2 .06
5. 220kV-MF/MB	07	5 .30.
6. 220kV-MT/DD	21	6 .02
7. 220kV-SI/SH	13	4 .38
8. 220kV-IR/MF	04	0 .33
9. 220kV-MT/IR	02	0 .50
10. 220kV-SH/MZ	18	2 .53
11. 220kV-DD/SI	02	1 .23
12. 220kV-SI/NJ	03	3 .07
13. 132kV-HL/KY	06	3 .43
14. 132kV-KY/NJ	12	1 .14
15. 132kV-SH/TB	07	1 .28
16. 132kV-MZ/MU	35	19 .58
17. 132kV-UB/IL	01	0 .09
18. 132kV-HL/CH	03	2 .23
19. 132kV-UB/CH	01	0 .07
20. 132kV-PA/HL	03	6 .31
21. 132kV-MG/CH	02	0 .38
22. 132kV-HL/TA	01	0 .10
23. 132kV-KC/ZB	01	11.09
24. 132kV-PA/TA	01	0 .19
25. 66kV-KY/NY	05	17.25

GRID SUBSTATION FEEDER INTERRUPTION LOSSES (kWh) 2000

MONTH	LOAD SHEDDING	FAULTS	MAINTENANCE	TOTAL
JANUARY	19,179	1,575,353	1,005,230	2599761.53
FEBRUARY	55,941	1,064,804	1,122,643	2243388
MARCH	366	890,314	1,256,947	2147627.08
APRIL	59,036	1,453,339	843,726	2356101
MAY	28,815	656,549	876,213	1561577
JUNE	59,466	827,248	907,950	1794664
JULY	212,148	497,210	790,542	1499900
AUGUST	68,368	287,154	532,279	887801
SEPTEMBER	306,426	469,128	759,287	1534841
OCTOBER				0
NOVEMBER				0
DECEMBER				0
TOTAL	809,745	7,721,099	8,094,817	16,625,661

1.3 5-2

OVERLOADED SITUATIONS				
TOWN	NO. OF OVERLOADED DISTR. LINES		NO. OF OVERLOADED T/FORMERS	
	132KV/66KV	33KV/11KV	132KV,66KV/33KV,11KV	33KV/11KV
DAR ES SALAAM	0	15	0	5
TANGA	0	4	1	4
MOSHI	0	3	1	3
ARUSHA	1	5	0	4
MOROGORO	0	2	0	2
DODOMA	0	1	0	1
MBEYA	0	1	0	1
IRINGA	0	0	0	0
MWANZA	0	3	0	2

質問票回答 No15　　質問番号 1.3.5-2

MAINTENANCE AND OPERATION

2.1 2-1

Supervision of P/S and S/S is normally done by three shifts per three operators.

2.1 2-2

Operation is also done by three shifts each shift having two operators.

2.1 2-3

Routine maintenance is . done normally done by a team of three and a driver.

2.1 2-4

Maintenance schedule
Oil – Six months
Others – 12 months

2.1 2-5

Maintenance Incharge Person: Chief Electrical plant maintenance Engineer.

質問票回答 No16　　質問番号 2.1.2-1、2.1.2-2、2.1.2-3、2.1.2-4、2.1.2-5