4. Minutes of Discussion

4-1 MINUTES OF DISCUSSIONS ON BASIC DESIGN STUDY ON THE KILIMANJARO ELECTRIFICATION PROJECT IN THE UNITED REPUBLIC OF TANZANIA

In response to a request from the Government of the United Republic of Tanzania, the Government of Japan decided to conduct a Basic Design Study on the Kilimanjaro Electrification Project (hereinafter referred to as "the Project") and entrusted the study to the Japan International Cooperation Agency(JICA).

JICA has sent to Tanzania a study team, which is headed by Mr.Mitsuru Suemori, Director, First Basic Study Division, Grant Aid Study & Design Department, JICA, and is scheduled to stay in the country from October 16 to November 9, 1995.

The team held discussions with the officials concerned of the Government of Tanzania and conducted a field survey at study area.

In the course of discussions and field survey, both sides have confirmed the main items described on the attached sheets.

The team will proceed to further works and prepare the Basic Design Study Report.

Dar es Salaam, October 23, 1995

Mr.Mitsuru Suemori
Leader
Basic Design Study Team
JICA

for Mr.Raphael O.S.Mollel
Principal Secretary
Ministry of Water, Energy and Minerals

Mr.S.L.Mhaville
Managing Director
Tanzania Electric Supply Co.

Mr.M.Kibwana
Commissioner for External Finance
Ministry of Finance

ATTACHMENT

1. Objective
   The objective of the Project is to improve supply of electricity in Kilimanjaro Region through provision of necessary equipment and materials.

2. Project sites
   The project sites are shown in Annex I.

3. Responsible and Executing agencies

   1) Tanzania Electric Supply Company Limited (TANESCO) is the executing Agency of the Project.
   2) Ministry of Water, Energy and Minerals is the responsible agency of the Project.

4. Items requested by the Government of Tanzania
   After discussion with the Basic Design Study Team, items listed in Annex II were finally requested by the Government of Tanzania.

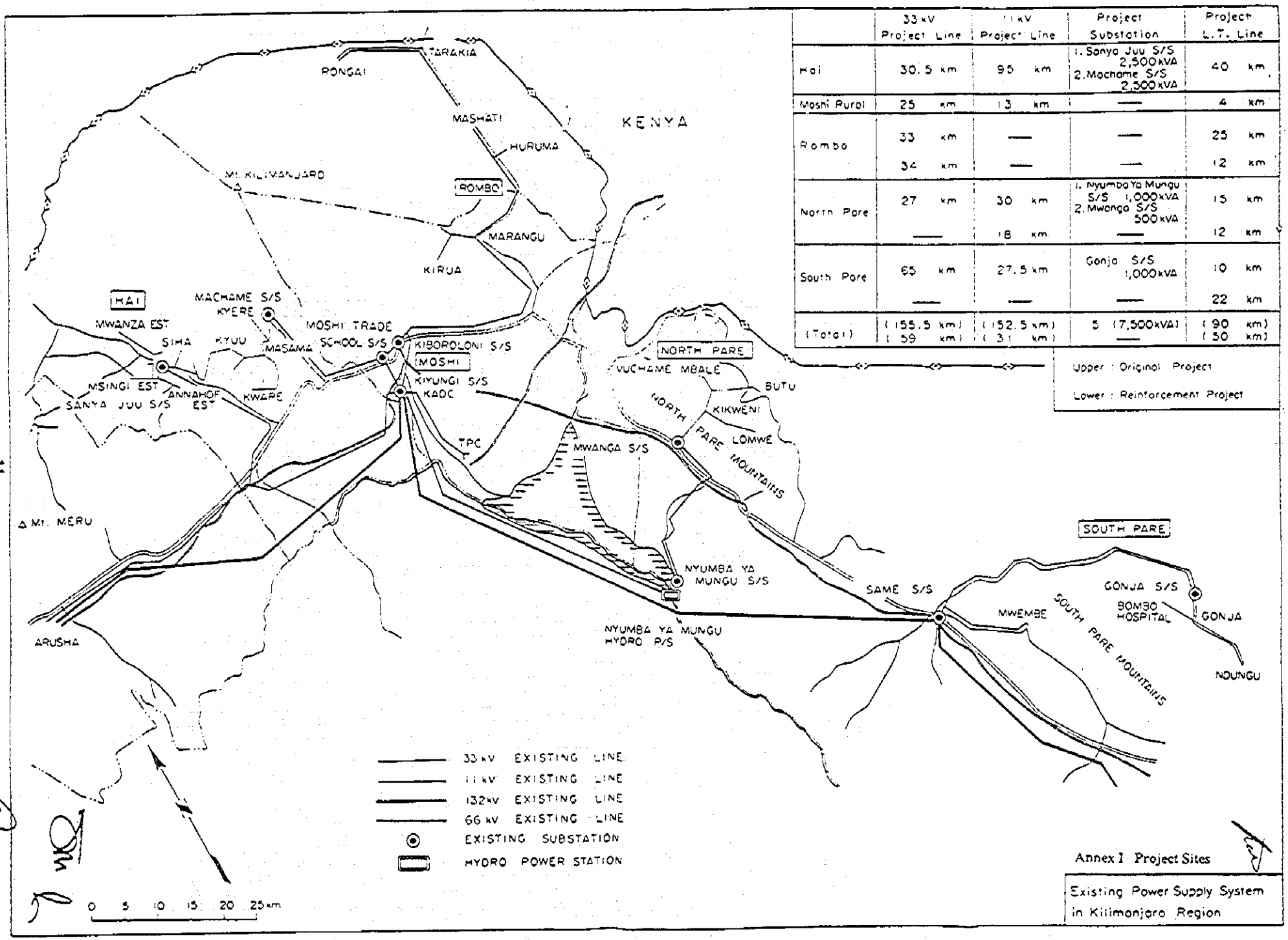
5. Japan's Grant Aid system

   1) The Government of Tanzania has understood the system of Japanese Grant Aid explained by the team as described in Annex III.
   2) The Government of Tanzania will take necessary measures, as described in Annex IV for smooth implementation of the Project on condition that the Grant Aid by the Government of Japan is extended to the Project.

6. Schedule of the Study
   1) The consultants will proceed to further study in Tanzania until November 9, 1995.
   2) JICA will prepare the draft report in English and dispatch a mission in order to explain its contents in January, 1996.
   3) In case that the contents of the Report is accepted in principle by the Government of Tanzania, JICA will complete the final report and send it to the Government of Tanzania by April, 1996.

7. Other relevant issues

1) It was confirmed that TANESCO is parastatal organization at present and will not be privatised in future.
2) Tanzania side requested Japanese Government to cover the installation work for compensator and transformer as well as supervision for construction works to be done by TANESCO, under the Japan's Grant Aid.
3) TANESCO shall strengthen the operation and maintenance system for power supply network in Kilimanjaro Region.
4) It will be informed to Japanese Government by the end of 1995 that TANESCO shall allocate and disburse necessary budget for the Project.



	33 kV Project Line	11 kV Project Line	Project Substation	Project L.T. Line
Hai	30.5 km	9.5 km	1. Sanya Juu S/S 2,500kVA 2. Machame S/S 2,500kVA	40 km
Moshi Rural	25 km	13 km	—	4 km
Rombo	33 km	—	—	25 km
	34 km	—	—	12 km
North Pare	27 km	30 km	1. Nyumba Ya Mungu S/S 1,000kVA 2. Mwanga S/S 500kVA	15 km
	—	18 km	—	12 km
South Pare	65 km	27.5 km	Gonja S/S 1,000kVA	10 km
	—	—	—	22 km
(Total)	(155.5 km) (59 km)	(152.5 km) (31 km)	5 (7,500kVA) —	(90 km) (50 km)

Upper : Original Project

Lower : Reinforcement Project

Annex I Project Sites

Existing Power Supply System in Kilimanjaro Region

Annex II

Items requested by the Government of Tanzania :

1. Voltage compensator (3MVA)	1 unit
2. Transformer (2.5MVA)	1 unit
3. 33KV line materials for construction of line	55 km
4. 11KV line materials for repairing and expansion of existing system	20 km
5. LT line materials for repairing of LT lines including pole mounting transformers with accessories	1 lot
6. Radio telecommunication system	1 Set
7. Vehicles and tools for construction and installation work	
1) Truck with crane	1
2) Pick-up truck	2
3) 4WD Station Wagon	1
4) Tools	1 lot

Annex III

Japan's Grant Aid Scheme

1. Grant Aid Procedures

1) Japan's Grant Aid Program is executed through the following procedures.

Application	(Request made by a recipient country)
Study	(Basic Design Study conducted by JICA)
Appraisal & Approval	(Appraisal by the Government of Japan and Approval by Cabinet)
Determination of Implementation	(The Notes exchanged between the Governments of Japan and the recipient country)

2) Firstly, the application or request for a Grant Aid project submitted by a recipient country is examined by the Government of Japan (the Ministry of Foreign Affairs) to determine whether or not it is eligible for Grant Aid. If the request is deemed appropriate, the Government of Japan assigns JICA (Japan International Cooperation Agency) to conduct a study on the request.

Secondly, JICA conducts the study (Basic Design Study), using (a) Japanese consulting firm(s).

Thirdly, the Government of Japan appraises the project to see whether or not it is suitable for Japan's Grant Aid Program, based on the Basic Design Study report prepared by JICA, and the results are then submitted to the Cabinet for approval.

Fourthly, the project, once approved by the Cabinet, becomes official with the Exchange of Notes signed by the Governments of Japan and the recipient country.

Finally, for the implementation of the project, JICA assists the recipient country in such matters as preparing tenders, contracts and so on.

2. *Basic Design Study*

1) Contents of the Study

The aim of the Basic Design Study (hereinafter referred to as "the Study"), conducted by JICA on a requested project (hereinafter referred to as "the Project") is to provide a basic document necessary for the appraisal of the Project by the Japanese Government. The contents of the Study are as follows:

a) Confirmation of the background, objectives, and benefits of the requested project and also institutional capacity of agencies concerned of the recipient country necessary for the Project's implementation.
b) Evaluation of the appropriateness of the Project to be implemented under the Grant Aid Scheme from a technical, social and economic point of view.
c) Confirmation of items agreed on by both parties concerning the basic concept of the Project.
d) Preparation of a basic design of the Project
e) Estimation of costs of the Project

The contents of the original request are not necessarily approved in their initial form as the contents of the Grant Aid project. The Basic Design of the Project is confirmed considering the guidelines of Japan's Grant Aid Scheme.

The Government of Japan requests the Government of the recipient country to take whatever measures are necessary to ensure its self-reliance in the implementation of the Project. Such measures must be guaranteed even though they may fall outside of the jurisdiction of the organization in the recipient country actually implementing the Project. Therefore, the implementation of the Project is confirmed by all relevant organizations of the recipient country through the Minutes of Discussions.

2) Selection of Consultants

For smooth implementation of the Study, JICA uses (a) registered consultant firm(s). JICA selects (a) firms(s) based on proposals submitted by interested firms. The firm(s) selected carry (ies) out a Basic Design Study and write(s) a report, based upon terms of reference set by JICA.

The consulting firm(s) used for the Study is(are) recommended by JICA to the recipient country to also work on the Project's implementation after the Exchange of Notes, in order to maintain technical consistency and also to avoid any undue delay in implementation should the selection process be repeated.

3. *Japan's Grant Aid Scheme*

1) What is Grant Aid ?

The Grant Aid Program provides a recipient country with non-reimbursable funds to procure the facilities, equipment and services (engineering services and transportation of the products, etc.) for economic and social development of the country under principles in accordance with the relevant laws and regulations of Japan. Grant Aid is not supplied through the donation of materials as such.

2) Exchange of Notes (E/N)

Japan's Grant Aid is extended in accordance with the Notes exchanged by the two Governments concerned, in which the objectives of the Project, period of execution, conditions and amount of the Grant Aid, etc., are confirmed.

3) "The period of the Grant Aid" means the one fiscal year which the Cabinet approves the Project for. Within the fiscal year, all procedures such as exchanging of the Notes, concluding contracts with (a) consultant firm(s) and (a) contractor(s) and final payment to them must be completed.

However in case of delays in delivery, installation or construction due to unforeseen factors such as weather, the period of the Grant Aid can be further extended for a maximum of one fiscal year at most by mutual agreement between the two Governments.

4) Under the Grant Aid, in principle, Japanese products and services including transport or those of the recipient country are to be purchased.

When the two Governments deem it necessary, the Grant Aid may be used for the purchase of the products or services of a third country.

However the prime contractors, namely, consulting, contracting and procurement firms, are limited to "Japanese nationals". (The term "Japanese nationals" means persons of Japanese nationality or Japanese corporations controlled by persons of Japanese nationality.)

5) Necessity of "Verification"

The Government of recipient country or its designated authority will conclude contracts denominated in Japanese yen with Japanese nationals. Those contracts shall be verified by the Government of Japan. This "Verification" is deemed necessary to secure accountability to Japanese taxpayers.

6) Undertakings required of the Government of the Recipient Country

In the implementation of the Grant Aid project, the recipient country is required to undertake such necessary measures as the following:

(1) To secure land necessary for the sites of the Project and to clear, level and reclaim the land prior to commencement of the construction.
(2) To provide facilities for the distribution of electricity, water supply and drainage and other incidental facilities in and around the sites.
(3) To secure buildings prior to the procurement in case the installation of the equipment.
(4) To ensure all the expenses and prompt execution for unloading, customs clearance at the port of disembarkation and internal transportation of the products purchased under the Grant Aid.
(5) To exempt Japanese nationals from customs duties, internal taxes and other fiscal levies which will be imposed in the recipient country with respect to the supply of the products and services under the Verified Contracts.
(6) To accord Japanese nationals whose services may be required in connection with the supply of the products and services under the Verified Contracts, such facilities as may be necessary for their entry into the recipient country and stay therein for the performance of their work.

7) "Proper Use"

The recipient country is required to maintain and use the facilities constructed and equipment purchased under the Grant Aid properly and effectively and to assign staff necessary for this operation and maintenance as well as to bear all the expenses other than those covered by the Grant Aid.

8) "Re-export"

The products purchased under the Grant Aid should not be re-exported from the recipient country.

9) Banking Arrangements (B/A)

a) The Government of the recipient country or its designated authority should open an account in the name of the Government of the recipient country in an authorized foreign exchange bank in Japan (hereinafter referred to as "the Bank"). The Government of Japan will execute the Grant Aid by making payments in Japanese yen to cover the obligations incurred by the Government of the recipient country or its designated authority under the Verified Contracts.

b) The payments will be made when payment requests are presented by the Bank to the Government of Japan under an authorization to pay issued by the Government of the recipient country or its designated authority.

Annex IV

Necessary measures to be taken by the Government of Tanzania on condition that Japan's Grant Aid is extended :

1. To secure land of the Project

2. To clear, level and reclaim the sites prior to the commencement of the Project

3. To bear commissions to the Japanese foreign exchange bank to execute the banking services based upon the banking arrangement

4. To ensure prompt unloading and customs clearance at port of disembarkation in Tanzania and facilitate internal transportation therein of the products purchased under the Grant Aid

5. To exempt Japanese nationals from customs duties, internal taxes and other fiscal levies which may be imposed in Tanazania with respect to the supply of the products and services under the verified contracts

6. To accord Japanese nationals, whose services may be required in connection with the supply of products and the services under the verified contracts, such facilities as may be necessary for their entry into Tanzania and stay therein for the performance of their work

7. To use and maintain properly and effectively all the facilities constructed and equipment purchased under the Grant Aid

8. To bear all the expenses other than those to be borne by the Grant Aid, necessary for the transportation and the installa tion of the equipment.

4-2 TECHNICAL NOTES

BASIC DESIGN STUDY ON THE
KILIMANJARO ELECTRIFICATION PROJECT
IN
THE UNITED REPUBLIC OF TANZANIA

The Consultant of the Basic Design Study Team had a series of discussions with TANESCO (Executing Agency) and conducted field surveys in the Project sites.

Through discussions on the results of the field survey and the final requests submitted by Tanzania side, both parties have confirmed the main technical items described on attached sheets.

Final component and details of the above items will be determined with further study and consultation with Japanese authority concerned.

8th November, 1995

Mr.Tatsuo Tomabechi
Chief engineer of Consultant
Basic Design Study Team
JICA

Mr.S.L.Mhaville
Managing Director
Tanzania Electric Supply Co.

ATTACHMENT

1. Transformer capacity to be installed at Mwanga Substation:
2.5 MVA 1 Unit is suitable.

2. Method of power receiving for Mwanga substation:
It is recommendable that the alternative system (receiving from NYM 66kv, by a newly installed 66/33kv 5MVA transformer and using the existing 33kv line) is better than the original system (from Same SS, by a newly constructed 33kv line)
Refer to attached drawing Sheet No.1.

3. Voltage drop problems in Rombo area:
It was clarified that voltage drop problems mainly caused by the weak LT (low tension) system. Remarkable voltage drop is not found in 33kv line side even at the end of line, at present. Accordingly, the requested item of booster installation should remain as a pending matter. It will be concluded upon consultation with JPN Governmental side and consideration about the additional requests described in attached Sheet No.2.

4. Expansion on 33kv, 11kv, and LT system:
TANESCO has provided a document describing further system extension and reinforcement in this Project, other than officially requested items. (Attached sheet No.2 above mentioned)
Scope of the extension will be considered in JPN side, in relation to the matter of former paragraph 3.

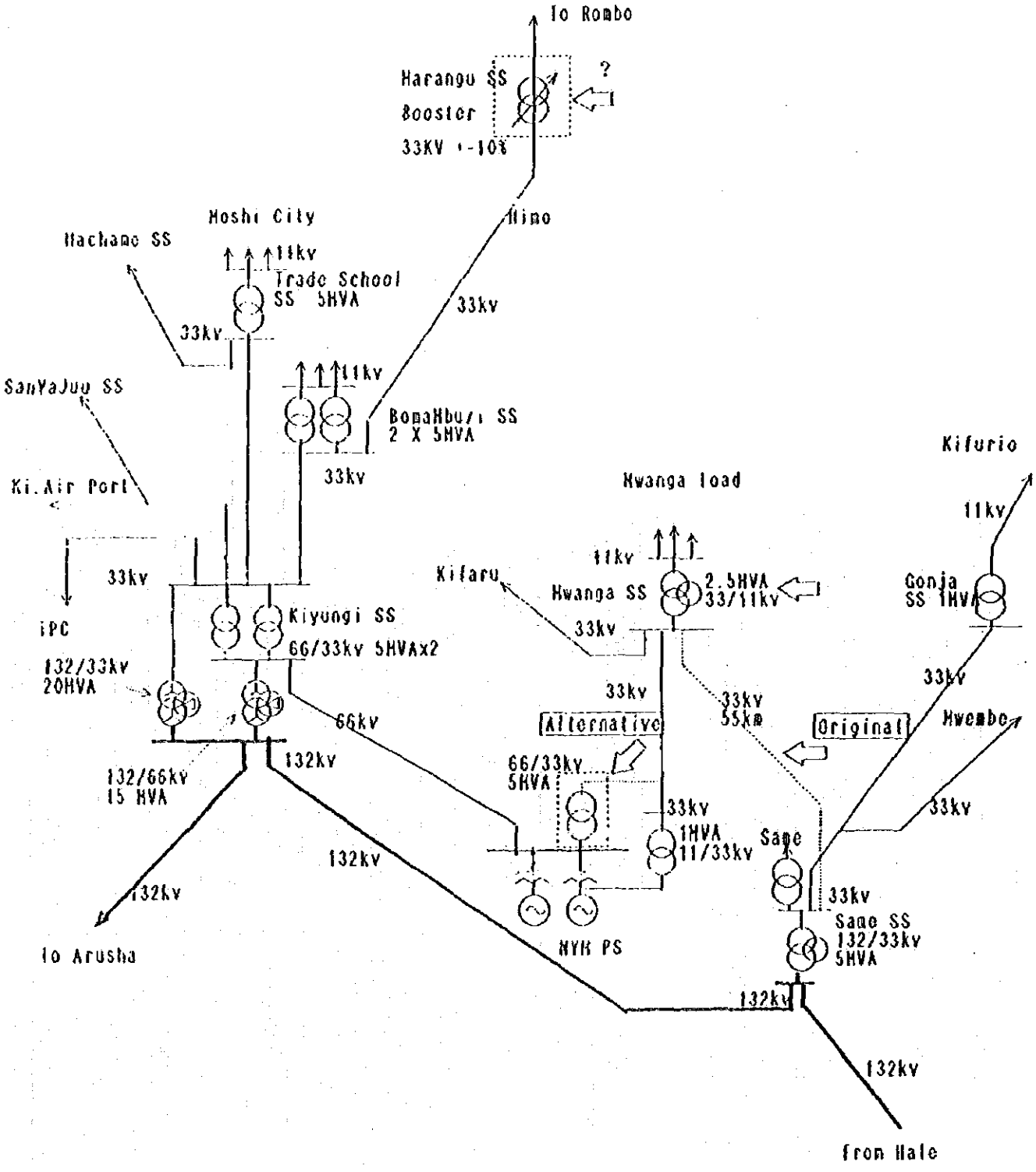
5. Improvement of operation, maintenance and billing system:
It is pointed out that lack of means of transport and poor communication system should be immediately solved in Kilimanjaro power system which spreads in a very broad mountainous area and has very long lines. Large improvement will be obtained if provision of some number of pick-up trucks and motor-cycles is made in this Project.

6. Origins of equipment and materials:
Kilimanjaro power system is composed mainly of JPN's materials and equipment. TANESCO want to use JPN made equipment due to its reliability and easily able to be exchanged (as description of "Request Letter").
However, for materials (poles, wires, etc.), it is acceptable to get ones made from other countries as far as they are of international standard.

7. Land survey:
Geographical survey of the land to be used for new transformer and switch yard at NYM power station is carried out by TANESCO by the end of this year.

8. Radio telecommunication system should be improved.

9. Storage:
TANESCO will provide storage at Mwanga before commencement of work of the Project.



Conceptional Drawing for
Kilimanjaro Power System
B/D Nov. 13, 1995

TENTATIVE TANESCO'S DESIRED COMPONENTS FOR KILIMANJARO ELECTRIFICATION PROJECT

1. Replacement or upgrading the existing transformers 2 x 500kVA, 33/11kV at Mwanga Substation to 1 x 2.5MVA to cover Mwanga District as the present capacity is becoming a big barrier for rural development.

2. 33kV line materials for construction of 33kV line from Same Substation to Mwanga Substation about 55km route length, or receiving power from Nyumba ya Mungu Power Station through 5MVA 66/33kV new transformer.

3. 33kV line materials for extension and rehabilitation of the existing system about 30km route length.

4. 11kV line materials for extension and rehabilitation of the existing system about 40km route length.

5. LV line materials for extension. and rehabilitation of the existing system about 100km route length of three phase and 150km of single phase including pole mounted transformers with accessories.

6. Radio communication system for effective maintenance of distribution network in project area.

7. Truck with crane, trucks and tools for construction and installation works in the project area. Other vehicles (Pick Ups) and motor cycles for operation and maintenance of the distribution system and for the billing system.

8. 33kV and 11kV circuit breakers and isolators for the lines in the project area to enable better operation and maintenance of the system.

4-3 MINUTES OF DISCUSSIONS ON BASIC DESIGN STUDY ON THE KILIMANJARO ELECTRIFICATION PROJECT IN THE UNITED REPUBLIC OF TANZANIA (CONSULTATION ON DRAFT REPORT)

In October 1995, the Japan International Cooperation Agency (JICA) dispatched a Basic Design Study team on the Kilimanjaro Electrification Project (hereinafter referred to as "the Project") to TANZANIA, and through discussion, field survey, and technical examination of the results in Japan, JICA has prepared a Draft Report of the Study.

In order to explain and to consult the Government of TANZANIA on the components of the Draft Report, JICA sent to TANZANIA a Draft Report Explanation Team, headed by, Mr.Mitsuo Nakamura, Grant Aid Management Department, Japan International Cooperation Agency, from 20th January to 31st of January, 1996.

As a result of discussions, both parties confirmed the main items described on the attached sheet.

Dar es Salaam, January 25, 1996

中村光夫

Mr.Mitsuo NAKAMURA
Leader
Draft Report Explanation Team,
Japan International
Cooperation Agency

Dr.Jonas Kipokola
Principal Secretary
Ministry of Energy & Minerals

Mr.S.L.Mhaville
Managing Director
Tanzania Electric Supply Co.

Mr.M.Kibwana
Commissioner
for External Finance
Ministry of Finance

ATTACHMENT

1. Component of Draft Report

The Government of TANZANIA has agreed and accepted in principle the components of the Draft Report explained by the Team that are described in ANNEX-I.

2. Japan's Grant Aid System

1) The Government of Tanzania has understood the system of Japan's Grant Aid Scheme described in ANNEX-II explained by the Team.

2) The Government of Tanzania will take necessary measures, described in ANNEX-III, for the smooth implementation of the Project on condition that Japan's Grant Aid is extended to the Project.

3. Further Schedule

The Study Team will make the Final Report in accordance with the confirmed items described in ANNEX-I, and send it to the Government of TANZANIA by the end of April, 1996.

ANNEX-I

Items confirmed by the both parties:

[Item]	[Q'ty]
1. 66/33kv 5MVA Transformer and associated switch-gears (Nyumba ya Mungu)	1 set
2. 33/11kv 2.5MVA Transformer and associated switch-gears (Mwanga)	1 set
3. Line materials for 33kv distribution lines	28 km
4. Line materials for 11kv distribution lines	15 km
5. Low tension line materials for repairing of LT lines including pole mounted transformers with accessories	
1) Line	50 km
2) Transformer	21 sets
6. Radio Telecommunication System	1 set
7. Vehicles and tools for construction and installation work	
1) Truck with crane	1
2) Pickup truck	3
3) Tools	1 lot

ANNEX-II

ON JAPAN'S GRANT AID PROGRAM

I. Japan's Grant Aid Procedures

(1) The Japan's Grant Aid Program is executed by the following procedures.

- Application
  (request made by a recipient country)
- Study
  (Preliminary Study / Basic Design Study conducted by JICA)
- Appraisal & Approval
  (Appraisal by the Government of Japan and Approval by the Cabinet of Japan)
- Determination of Implementation
  (Exchange of Notes between the both Governments)
- Implementation
  (Implementation of the Project)

(2) Firstly, an application or a request for a project made by the recipient country is examined by the Government of Japan (the Ministry of Foreign Affairs) to see whether or not it is suitable for Japan's Grand Aid. If the request is deemed suitable, the Government of Japan entrusts a study on the request to JICA (Japan International Cooperation Agency)

Secondly , JICA conducts the Study (Basic Design Study) using a Japanese consulting firm. If the background and objective of the requested project are not clear, a Preliminary Study is conducted prior to a Basic Design Study.

Thirdly, the Government of Japan appraises to see whether or not the Project is suitable for Japan's Grant Aid Program, based on the Basic Design Study report prepared by JICA and the results are then submitted for approval by the Cabinet.

Fourthly, the Project approved by the Cabinet becomes official when pledged by the Exchange of Notes signed by the both Governments.

Finally, for the implementation of the Project, JICA assists the recipient country in preparing contracts and so on.

2. Contents of the Study

1) Contents of the Study

The purpose of the Study (Preliminary Study/Basic Design Study) conducted on a project requested by JICA is to provide a basic document necessary for appraisal of the project by the Japanese Government. The contents of the Study are as follows:

a) to confirm background, objectives, benefits of the project and also institutional capacity of agencies concerned of the recipient country necessary for project implementation,
b) to evaluate appropriateness of the Project for the Grant Aid Scheme from a technical, social and economical point of view,
c) to confirm items agreed on by the both parties concerning a basic concept of the project,
d) to prepare a basic design of the project,
e) to estimate cost involved in the project.

Final project components are subject to approval by the Government of Japan and therefore may differ from an original request.

Implementing the project, the Government of Japan requests the recipient country to take necessary measures involved which are itemized on Exchange of Notes.

2) Selecting (a) Consulting Firm(s)

For smooth implementation of the study, JICA uses (a) consulting firm(s) registered. JICA selects (a) firm(s) through proposals submitted by firms which are interested. The firm(s) selected carry(ies) out a Basic Design Study and write(s) a report, based upon terms of reference made by JICA.

The consulting firm(s) used for the study is(are) recommended by JICA to a recipient country after Exchange of Notes, in order to maintain technical consistency and also to avoid possible undue delay in implementation caused if a new selection process is repeated.

(3) Status of a Preliminary Study in the Grant Aid Program

A Preliminary Study is conducted during the second step of a project formulation & preparation as mentioned above.

A result of the study will be utilized in Japan to decide if the Project is to be suitable for a Basic Design Study.

Based on the result of the Basic Design Study, the Government would proceed to the stage of decision making process(appraisal and approval).

It is important to notice that at the stage of Preliminary Study, no commitment is made by the Japanese side concerning the realization of the Project in the scheme of Grant Aid Program.

3. Japan's Grant Aid Scheme

1) What is Grant Aid?

The Grant Aid Program provides a recipient country with non reimbursable funds needed to procure facilities, equipment and services for economic and social development of the country under the following principles in accordance with relevant laws and regulations of Japan. The Grant Aid is not in a form of donation or such.

2) Exchange of Notes (E/N)

The Japan's Grant Aid is extended in accordance with the Exchange of Notes by both Governments, in which the objectives of the Project, period of execution, conditions and amount of the Grant etc. are confirmed.

3) "The period of the Grant Aid" means one Japanese fiscal year which the Cabinet approves the Project for. Within the fiscal year, all procedure such as Exchange of Notes, concluding a contract with (a) consulting firm(s) and (a) contractor(s) and a final payment to them must be completed.

4) Under the Grant, in principle, products and services of origins of Japan or the recipient country are to be purchased.

When the two Governments deem it necessary, the Grant may be used for the purchase of products or services of a third country origin.

However the prime contractors, namely, consulting, contractor and procurement firms, are limited to "Japanese nationals". (The term "Japanese nationals" means Japanese physical persons or Japanese juridical persons controlled by Japanese physical persons.)

5) Necessity of the "Verification"

The Government of the recipient country or its designated authority will conclude into contracts in Japanese yen with Japanese nationals. Those contracts shall be verified by the Government of Japan. The "Verification" is deemed necessary to secure accountability to Japanese tax payers.

6) Undertakings required to the Government of the recipient country

In the implementation of the Grant Aid, the recipient country is required to undertake necessary measures such as the following:

(i) to secure land necessary for the sites of the project and to clear and level the land prior to commencement of the construction work,

(ii) to provide facilities for distribution of electricity, water supply and drainage and other incidental facilities in and around the sites,

(iii) to secure buildings prior to the installation work in case the Project is providing equipment,

(iv) to ensure all the expenses and prompt execution for unloading, customs clearance at the port of disembarkation and internal transportation of the products purchased under the Grant Aid,

(v) to exempt Japanese nationals from customs duties, internal taxes and other fiscal levies which will be imposed in the recipient country with respect to the supply of the products and services under the Verified Contracts,

(vi) to accord Japanese nationals whose services may be required in connection with the

supply of the products and services under the Verified Contracts, such facilities as may be necessary for their entry into the recipient country and stay therein for the performance of their work.

7)Proper Use

The recipient country is required to maintain and use facilities constructed and equipment purchased under the Grant Aid properly and effectively and to assign staff necessary for their operation and maintenance as well as to bear all expenses other than those to be borne by the Grant Aid.

8)Re-export

The products purchased under the Grant Aid shall not be re-exported from the recipient country.

9)Banking Arrangement (B/A)

(a) The Government of the recipient country or its designated authority shall open an account in the name of the Government of the recipient country in an authorized foreign exchange bank in Japan (hereinafter referred to as "the Bank"). The Government of Japan will execute the Grant Aid by making payments in Japanese yen to cover the obligations incurred by Government of the recipient country or its designated authority under the contracts verified.

(b) The payments will be made when payment requests are presented by the Bank to the Government of Japan under an Authorization to Pay issued by the Government of the recipient country or its designated authority.

ANNEX-III

Necessary measures to be taken by the Government of TANZANIA on condition that Japan's Grant Aid is executed :

1. To secure the site for the Project

2. To clear, level and reclaim the site prior to the commencement of the Project

3. To undertake incidental outdoor works such as gardening, fencing, gates and exterior lighting in and around the site

4. To bear commissions of Authorization to Pay(A/P) and payment commission to a Japanese foreign exchange bank for the banking services based on the Banking Arrangement(B/A).

5. To ensure prompt unloading and customs clearance at port of disembarkation in Tanzania and facilitate internal transportation therein of the products purchased under the Grant Aid.

6. To exempt Japanese nationals from customs duties, internal taxes and other fiscal levies which may be imposed in Tanzania with respect to the supply of the products and services under the verified contracts

7. To accord Japanese nationals, whose services may be required in connection with the supply of products and the services under the verified contracts, such facilities as may be necessary for their entry into Tanzania and stay therein for the performance of their work

8. To use and maintain properly and effectively all the equipment purchased under the Grant Aid

9. To bear all the expenses other than those to be borne by the Grant Aid, necessary for the transportation

10. To take necessary measures and responsibility for the switching arrangements and safety procedures at the working sites during construction period when it is necessary

11. To obtain the space for equipment and materials procured under the Grant Aid, and,
To maintain the existing facilities (500KVA transformer etc.) properly, until next usage

12. To complete the foundation works for substations before arrival of equipment supplied by Japan's side

13. To provide budget and to complete all the works including Low Voltage lines within 1997

5. Cost Estimation Borne by the Recipient Country

The estimates costs to be borne by the Tanzania Electric Supply Company Limited are as follows:

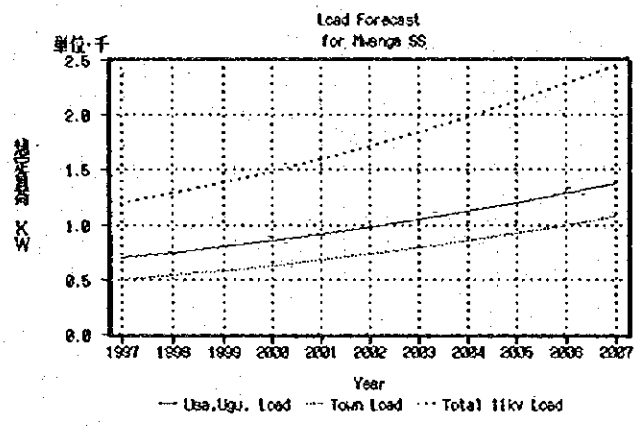
(1)	Civil work and foundation for Mwanga substation and Nymba Ya Mungu substation	30 M. Tsh
(2)	Construction work for 33 kV and 11 kV distribution line	41 M. Tsh
(3)	Construction work for low tension distribution line	25 M. Tsh
(4)	Others	4 M. Tsh
	Total	100 M. Tsh

6. References

12,10,1995
F:MwaLoad

6-1 Load Forecast in Mwanga 11 kV (1/2)
Upper Assumption

Place	Kind of Main Load	Present (kw)	Growth /year	Future Load(10y)	(kVA)
Mwanga SS 11kvLoad					
Usangi,Ugueno(M)	Residence,AgroIndu	700	7.0	1377	1620
Mwanga Town	Commercial	500	8.0	1079	1270
Total		1200		2456	2890
33kvNorth Area					
Mwanga Vicinity	Commercial	50	6.0	90	105
Upto Kifaru	Industry,Residence	350	6.0	627	737
Beyond Kifaru	Residence,AgroInd.	150	3.0	202	237
Total		550		918	1080
33kv South Area					
Kisangara	Estate,Residence	130	3.0	175	206
Lembeni	Estate,Residence	120	3.0	161	190
Total		250		336	395
	Grand Total	2000		3710	4365

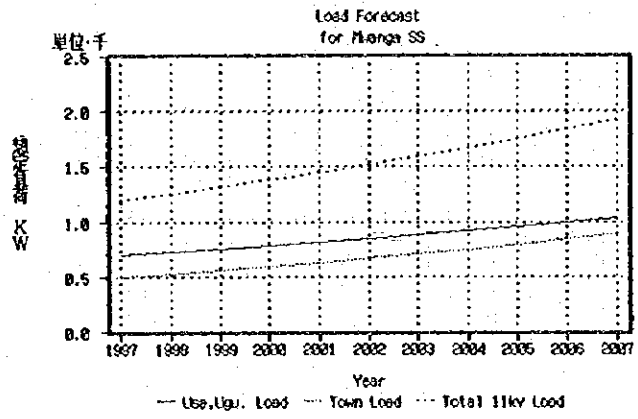


12,10,1995
F:HwaLoad

Load Forecast in Mwanga 11kv (2/2)

Lower Assumption

Place	Kind of Main Load	Present (kw)	Growth /y(%)	Futyre Load(10y)	(kVA)
Mwanga SS 11kv Load					
Usangi,Ugueno(M)	Residence,AgroIndu	700	4.0	1036	1219
Mwanga Town	Commercial	500	6.0	895	1053
Total		1200		1932	2272
33kv North Area					
Mwanga Vicinity	Commercial	50	6.0	90	105
Upto Kifaru	Industry,Residence	350	6.0	627	737
Beyond Kifaru	Residence,AgroInd.	150	3.0	202	237
Total		550		918	1080
33kv South Area					
Kisangara	Estate,Residence	130	3.0	175	206
Lembeni	Estate,Residence	120	3.0	161	190
Total		250		336	395
	Grand Total	2000		3186	3748



6-2 Comparison Study on Power Receiving System for Mwanga

Original: From Same SS through new 33kv 55km line
Alternative: From NYM PS by existing 33kv line through new NYM SS.

Sammary

1.Premises of calculation
1) 2 cases of load value
Present load (including suppressed) 2000kw
Future load (max. 10 years future) 4000kw
2) Allocation of loads : attached sheet
3) V. of sending point : 34 kv (3% up of rated V.) be fixed, To calculate V. of the receiving end point.
4) If V. of receiving end become beyond 33kv(rated V.), V. of sending point will be decreased.
5) In each case, power losses will be calculated.

2. Summary of calculation results

	Case No.	Ratio of V.drop (%)	Loss (%)	Justification
From Same				
2000kw	Case A-2	6.1	4.7	OK
4000kw	Case A-1	13.1	10.9	Problem
From NYM				
2000kw	Case B-2	3.1	2.1	OK
4000kw	Case B-1	6.4	6.4	OK

3. Evaluation
- If load remains as it is, (2000kw), System from Same has no problem.
- If future load 4000kw is considered, System from Same is in problem. About 11% power loss must be caused
- If System from NYM be adopted, even in the time of 4000kw the loss is only 4.5%. No problem.
- Even at present (2000kw), the loss of the System from NYM is less than 1/2 of the one of System from Same. As sending power increase, bigger advantage will be acquired for System from NYM.
- Furthermore, cost is about same. Thus, NYM alternative should be adopted.

Calculation Sheets

Comparison study on power receiving for Mwanga SS (1/4) '95.12.9
V.drop & loss (A:From Same) Case A-1 I:Mwa-1E

Premises
Wires: 95mm2 ACSR
Distance bt. each wire:
Dab: 1.65 Dbc: 1.05 Dca: 2.7 [m]
D mean =(Dab*Dbc*Dca)^1/3 = 1.67 [m]
Wire dia: d: 13.5 [mm]
Induct.:L' = 0.4605*log(D/r)+0.05 mH/km
= 1.15 [mH/km] = 0.36 [Ω/km](per phase)
Resis.: R' = 0.33 [Ω/km](per phase)
V. drop: $(2\pi f*l*\sin\phi+R*\cos\phi)I$ [kv] per phase

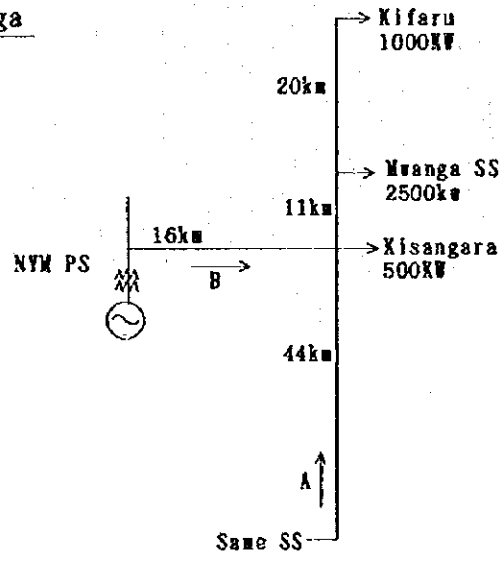
Load:	kw	pf		l[km]
Kifaru	1000	0.85	K-M	20
Mwanga	2500	0.85	M-Kis	11
Kisangar	500	0.85	Kis-S	44
--	0	0.85	--	0
Same	4000		total	75 km

(Abbreviation):
Load':total load
l:line length
Il:load curr.
It:total curr.
Vdx:reac.drop=I*X*sinφ
Vdr:resis.drop=I*R*cosφ

	Load kw	Load' kw	E kv	Pf	Il A	It A	l km	Vdx kv	Vdr kv	Drop kv	Loss kw	Loss' kw
									(per phase)			
Kifaru	1000	1000	29.7	0.85	22.8	22.8	20	0.08	0.12	0.21	3.45	3.45
Mwanga	2500	3500	30.1	0.84	56.4	79.3	11	0.16	0.24	0.41	22.8	26.2
Kisangar	500	4000	30.8	0.84	11.0	90.3	44	0.76	1.11	1.87	118.	144.
Same	0	4000	34.0	0.83	0	90.3	0	0	0	0	0	144.
atSame	0	4000	34.0	0.83	0	90.3				2.50		144.
	C	D	E	F	G	H	I	J	K	L	M	N

(A:From Same)
Case A-1 Results:
V at Same 34.0 kv Voltage drop: 4.33 kv (13.1 %)
V at Kifaru 29.7 kv line loss: 434. kw (10.8 %)

Power Receiving Method for Mwanga
A:Original - From Same SS
B:Alternative - From NYM PS



Comparison study on power receiving for Hwanga SS (2/4) '95,12,9
V.drop & loss (B:From NYH) Case B-1 F:Hwa-1E

Premises
Wires: 95mm2 ACSR
Distance bt. each wire:
Dab: 1.65 Dbc: 1.05 Dca: 2.7 [m]
D mean =(Dab*Dbc*Dca)^1/3 = 1.67 [m]
Wire dia: d: 13.5 [mm]
Induct.:L' = 0.4605*log(D/r)+0.05 mH/km
= 1.15 [mH/km] = 0.36 [Ω/km](per phase)
Resis.: R' = 0.33 [Ω/km](per phase)
$(2\pi f*L*\sin\phi+R*\cos\phi)I$ [kv] per phase

	kw	pf		l[km]
Kifaru	1000	0.85	K-H	20
Hwanga	2500	0.85	H-Kis	11
Kisangar	500	0.85	Kis-N	16
--	0	0.85	--	0
NYH	4000		total	47 km

(Abbreviation):
Load':total load
l:line length
Il:Load curr.
It:total curr.
Vdx:reac.drop=I*X*sinφ
Vdr:resis.drop=I*R*cosφ

	Load kw	Load' kw	E kv	Pf	Il A	It A	l km	Vdx kv	Vdr kv	Drop kv	Loss kw	Loss' kw
									(per phase)			
Kifaru	1000	1000	31.9	0.85	21.2	21.2	20	0.08	0.11	0.20	2.99	2.99
Hwanga	2500	3500	32.2	0.84	52.6	73.9	11	0.15	0.22	0.38	19.8	22.8
Kisangar	500	4000	32.9	0.84	10.3	84.2	16	0.25	0.37	0.63	37.4	60.3
--	0	4000	34.0	0.84	0	84.2	0	0	0	0	0	60.3
at NYH	0	4000	34.0	0.84	0	84.2				1.22		60.3
	C	D	E	F	G	H	I	J	K	L	M	N

(B:From NYH)
Case B-1 Results:
V at NYH 34.0 kv Voltage drop: 2.11 kv (6.40 %)
V at Kifaru 31.9 kv Line loss: 181. kw (4.52 %)

Comparison study on power receiving for Hwanga SS (3/4) '95,12,9
V.drop & loss A:From Same Case A-2 F:Hwa-1E

Premises
Wires: 95mm2 ACSR
Distance bt. each wire:
Dab: 1.65 Dbc: 1.05 Dca: 2.7 [m]
D mean =(Dab*Dbc*Dca)^1/3 = 1.67 [m]
Wire dia: d: 13.5 [mm]
Induct.: L' = 0.4605*log(D/r)+0.05 mH/km
= 1.15 [mH/km] = 0.36 [Ω/km](per phase)
Resis.: R' = 0.33 [Ω/km](per phase)
V. drop: $(2\pi f*L*\sin\phi+R*\cos\phi)I$ [kv] per phase

load:	kw	pf		l[km]
Kifaru	500	0.85	K-H	20
Hwanga	1250	0.85	H-Kis	11
Kisangar	250	0.85	Kis-S	44
--	0	--	--	0
Same	2000		total	75 km

(Abbreviation):
load':total load
l:line length
Il:Load curr.
It:total curr.
Vdx:reac.drop=I*X*sinφ
Vdr:resis.drop=I*R*cosφ

	Load kw	Load' kw	E kv	Pf	Il A	It A	l km	Vdx kv	Vdr kv	Drop kv	Loss kw	Loss' kw
									(per phase)			
Kifaru	500	500	32.0	0.85	10.6	10.6	20	0.04	0.05	0.10	0.74	0.74
Hwanga	1250	1750	32.2	0.84	26.3	37.0	11	0.07	0.11	0.19	4.97	5.71
Kisangar	250	2000	32.5	0.84	5.22	42.2	44	0.35	0.52	0.87	25.8	31.6
--	0	2000	34.0	0.84	0	42.2	0	0	0	0	0	31.6
atSame	0	2000	34.0	0.84	0	42.2				1.16		31.6
	C	D	E	F	G	H	I	J	K	L	M	N

A:From Same
Case A-2 Results:
V at Same 34.0 kv Voltage drop: 2.02 kv (6.13 %)
V at Kifaru 32.0 kv Line loss: 94.8 kw (4.74 %)

Comparison study on power receiving for Hwanga SS (4/4) '95,12,9
V.drop & loss B:From NYH Case B-2 F:Hwa-1E

Premises
Wires: 95mm2 ACSR
Distance bt. each wire:
Dab: 1.65 Dbc: 1.05 Dca: 2.7 [m]
D mean =(Dab*Dbc*Dca)^1/3 = 1.67 [m]
Wire dia: d: 13.5 [mm]
Induct.:l' = 0.4605*log(D/r)+0.05 mH/km
= 1.15 [mH/km] = 0.36 [Ω/km](per phase)
Resis.: R' = 0.33 [Ω/km](per phase)
$(2\pi f*L*\sin\phi+R*\cos\phi)I$ [kv] per phase

	kw	pf		l[km]
Kifaru	500	0.85	K-H	20
Hwanga	1250	0.85	H-Kis	11
Kisangar	250	0.85	Kis-N	16
--	0	0.85	--	0
NYH	2000	)	total	47 km

(Abbreviation):
Load':total load
l:line length
Il:Load curr.
It:total curr.
Vdx:reac.drop=I*X*sinφ
Vdr:resis.drop=I*R*cosφ

	Load kw	Load' kw	E kv	Pf	Il A	It A	l km	Vdx kv	Vdr kv	Drop kv	Loss kw	Loss' kw
									(per phase)			
Kifaru	500	500	33.0	0.85	10.2	10.2	20	0.03	0.05	0.09	0.69	0.69
Hwanga	1250	1750	33.2	0.84	25.5	35.8	11	0.07	0.11	0.18	4.67	5.37
Kisangar	250	2000	33.5	0.84	5.07	40.9	16	0.12	0.18	0.30	8.85	14.2
--	0	2000	34.0	0.84	0	40.9	0	0	0	0	0	14.2
at NYH	0	2000	34.0	0.84	0	40.9				0.59		14.2
	C	D	E	F	G	H	I	J	K	L	H	N

B:From NYH
Case B-2 Results:
V at NYH 34.0 kv Voltage drop: 1.02 kv (3.10 %)
V at Kifaru 33.0 kv Line loss: 42.6 kw (2.13 %)

6-3 Provisional Tool Lists

Tools for Substation 1/2

Description	Quantity
1. Universal circuit tester	1
2. Phase rotation meter	1
3. Voltage detector AC 11 kV - 33 kV	1
4. Voltage detector AC 600 V	2
5. Slide AC transformer	1
6. Relay test apparatus 3 phase	1
7. Relay test apparatus single phase	1
8. Phase angle indicator	1
9. Earth tester	1
10. Insulation tester 1,000 V 2,000 Mohm	1
11. Insulation tester 500 V 2,000 Mohm	1
12. Portable AC V-A meter (13 range)	1
13. Portable DC V-A meter (17 range)	1
14. Digital tester (LED 0.5 class)	1
15. Clamp meter, (power factor 1,000 A)	1

Tools for Distribution Line 2/2

	Instruments	Quantity
1.	Tension hoist 1.0 ton w. chuck	6
2.	Insulation glove	2
3.	Ladder 10 m (extentionable insulated)	4
4.	Safety belt (lines man use, double type)	10
5.	Grounding hook 33 kV earthing cable 12 m	4
6.	Switch stick 33 kV (rod length >6 m)	2
7.	Cable drum rack (dia. >1 m)	2
8.	Clamp tester (AC 15 - 1000 A, 0 - 600 V)	2
9.	Earth tester (hand type)	1
10.	Insulation meter 500 V	1
11.	Insulation meter 1000 V	1
12.	Voltage detector 33/11 kV (rod >2 m)	2
13.	Circuit tester	2
14.	Volt meter AC 0 - 750 V, 0.5 class	2
15.	Ampere meter AC 0 - 100 A	2
16.	Hand tool set (general maintenance)	2
17.	bolt clipper 600 mm	4
18.	Snatch block S-130	4
19.	Bar 1000 mm	4
20.	Safety helmet	10
21.	Sling wire 12 mm x 1 m (?)	12
22.	Compression tool (hand, oil, output 12 t)	4
23.	Cable stretching roller (aluminum)	10
24.	Pick	10
25.	Shovel	10
26.	Work-stand on pole 900 mm	4
27.	Bolt auger 18 mm w. handle	20
28.	Gasoline torch (prompt type)	2
29.	Pliers (insulated)	10
30.	Skinning knife	10
31.	Spanner (adjustable) 300 mm	10
32.	Pole step (chain type)	4
33.	Brush for AL conductors	10
34.	Holster (3 pockets)	10
35.	Tool bag	10

6-4 Energy for Cooking (1/2, 2/2)

Calculation on Energy for Cooking H8,2,15
(Surmise from Daily Load Curve of Mwanga SS T1) (1/2) F:MwaCook
Date: 5/11/1995 (Su)
Date: 1/11/1995 (We)

Time hr	5,11,'95 Sunday Load(KW)	1,11,'95 Wednesday Load(KW)	Assum. Cooking Time Base KW	Energy(KW) for Cooking Sunday	Energy(kw) for Cooking Wednesday
0	175	200			
1	160	175			
2	150	175			
3	150	200			
4	170	200	150	20	50
5	200	250	150	50	100
6	275	275	100	175	175
7	200	275	100	100	175
8	175	130			
9	130	100			
10	100	140			
11	125	100	100	25	0
12	150	130	100	50	30
13	125	110	100	25	10
14	100	90			
15	110	80			
16	130	175			
17	200	200	170	30	30
18	225	200	170	55	30
19	500	580	170	330	410
20	500	525	170	330	355
21	450	475	170	280	305
22	325	350	170	155	180
23	180	250			
24	175	200			
DayTtl.(kWh)	5005	5385		1625	1850
Average(kW)	209	224		68	77
Ratio of Energy for Cooking(%)				32	34
Year Total for Cooking Energy(MWh)				593	675

Average Year Total : 634 MWh
It is equal to 33 % of total consumption.

Conversion of the electric energy to timber quantity (2/2)

Conversion ratio: 1 KWh = 860 KCal/kWh
Timber (Soft)
Speci.Grav.:0.5, Heating value: 3800 KCal/kg
Wood 1m3(= 500 kg) 1,900,000 KCal/m3
Ordinary Tree Dia.: 15 cm,Length: 15 m
1 Tree : 0.27 m3 503,637 KCal
Cooking energy (above) 634 MWh is equal to
1,083 trees (Yearly)
Whole Kilimanjaro, max Demand: 17,000 kw.
Proportionally calculated : 31,741 trees are needed yearly.
(as max demand = 580 kw in Mwanga T1 transformer)

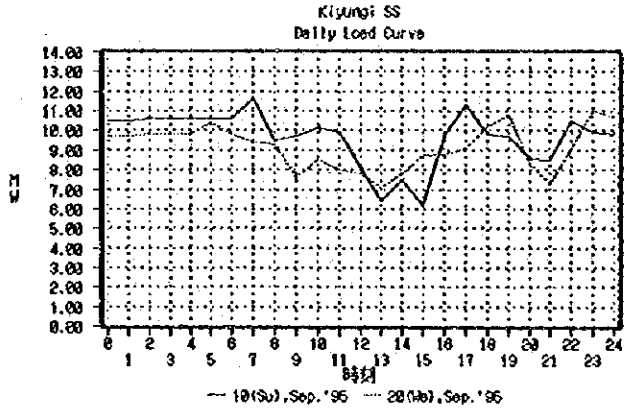
6-5 Load Data

20(We),Sep.'95

Load Data of feeders

Time	TPC->	Feeders K10	K20	K30	K50	K10-50 Ttl.	Ttl. Load (MW)
0		200	280	0	490	970	9.7
1		200	290	0	480	970	9.7
2		210	290	0	480	980	9.8
3		210	290	0	480	980	9.8
4		210	290	0	480	980	9.8
5		230	310	0	500	1040	10.4
6		200	360	0	420	980	9.8
7	*	40	430	0	470	940	9.4
8	*	20	360	0	550	930	9.3
9	*	70	310	0	380	760	7.6
10	*	90	240	0	520	850	8.5
11	*	0	230	0	570	800	8.0
12	*	0	240	0	540	780	7.8
13	*	0	230	0	480	710	7.1
14		120	200	0	460	780	7.8
15		210	200	0	465	875	8.8
16		210	210	0	460	880	8.8
17		210	210	0	490	910	9.1
18		120	280	0	620	1020	10.2
19	*	70	390	0	620	1080	10.8
20	*	0	430	0	400	830	8.3
21	*	30	350	0	350	730	7.3
22		160	350	0	400	910	9.1
23		210	380	0	510	1100	11.0
24		230	300	0	540	1070	10.7
Total		3250	7450	0	12155	22855	228.55 MWh

* Peak Load were suppressed due to TPC Stop.

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