

Japan International Cooperation Agency

Department of Energy Affairs,

Ministry of Mines, Natural Resources and Environment, Republic of Malawi

**The Follow-up Study for the Master Plan
on
Rural Electrification
in
Malawi**

Final Report

September 2004

Nomura Research Institute, Ltd.

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Preface

In response to a request from the Government of the Republic of Malawi (GOM), the Government of Japan decided to conduct “The Follow-up Study for the Master Plan on Rural Electrification in Malawi,” and commissioned it to the Japan International Cooperation Agency (JICA).

JICA sent a study team led by Mr. Masayasu Ishiguro of Nomura Research Institute, Ltd. to Malawi three times between December 2003 and September 2004.

The study team had a series of discussions with the concerned officials from the Department of Energy Affairs of the Ministry of Mines, Natural Resources and Environment, and the conducted necessary field surveys. After returning to Japan, the study team carried out further studies and compiled final results in this report.

I hope that this report will contribute to the implementation of Malawi’s Rural Electrification Master Plan and the promotion of amity between two countries.

I also express my sincere appreciation to the concerned officials from the GOM for their close cooperation throughout the study.

September 2004

Tadashi Izawa
Vice President
Japan International Cooperation Agency

September 2004

Mr. Tadashi Izawa
Vice President
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Letter of Transmittal

We are pleased to submit to you the report of the Follow-up Study for the Master Plan on Rural Electrification in Malawi.

This study was conducted by Nomura Research Institute, Ltd. under the contract with JICA during the period of December 2003 to September 2004. This study provided technical assistance for institutional and organizational issues as well as technical ones to the Department of Energy Affairs of the Ministry of Mines, Natural Resources and Environment, and the Electricity Supply Corporation of Malawi Limited (ESCOM), which were engaged in the implementation of the Rural Electrification Master Plan of Malawi, and enhanced their capacity.

In this study, we transferred technology necessary not only for the implementation of feasibility studies and project management in the next (Phase 5) rural electrification program, but also for institutional arrangements for the new industrial structure, which would be introduced under the power sector reform, including drafting of implementing rules and regulation of related laws. All of the study members strongly believe that this technical assistance will contribute to the successful implementation of the Rural Electrification Master Plan of Malawi.

Finally, we would like to express our sincere gratitude to the related officials from JICA, the Japanese ministries of Foreign Affairs, and Economy, Trade and Industry. We also express our thanks to the concerned officials and persons from the Government of the Republic of Malawi, ESCOM, the JICA Malawi Office and the Embassy of Japan in Zambia for their cooperation and assistance through our study.

Masayasu Ishiguro
Team Leader

The Follow-Up Study for the Master Plan on Rural Electrification in Malawi

Final Report

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ABBREVIATIONS

ADMARC	Agricultural Development and Marketing Corporation
BAREM	Barrier Removal to Renewable Energy of Malawi
BOQ	Bill of Quantity
DOE / DEA	Department of Energy Affairs
EC	Electric Cooperative
EIRR	Economic Internal Rate of Return
ESCOM	Electricity Supply Corporation of Malawi Limited
FIRR	Financial Internal Rate of Return
FS	Feasibility Study
GPS	Global Positioning System
IPD	Independent Power Distributor
IRR	Implementing Rules and Regulations
IRR	Internal Rate of Return
JICA	Japan International Cooperation Agency
MAREP	Malawi Rural Electrification Planning
MMNREA	Ministry of Mines, Natural Resources and Environment Affairs
M.K	Malawi Kwacha
O&M	Operation and Maintenance
RE	Rural Electrification
RF	Revolving Fund
SHS	Solar Home System
TC	Trading Center

Chapter 1. Background and Objectives of the Study

1.1 Background of the Study

The Republic of Malawi is a landlocked country in southern Africa, surrounded by Tanzania, Zambia and Mozambique. Its average household electrification ratio is only 4%, one of the lowest in Africa, where the average household electrification ratio is about 20%. The average household electrification ratio in rural areas in Malawi is still less than the national average, and reportedly does not reach even 1%. This low electrification ratio is considered to be one of causes of Malawi's low average life span, low literacy rate and poverty.

The Government of Malawi transferred the obligation for rural electrification (RE), most of which is not profitable, from the Electricity Supply Company of Malawi (ESCOM) to the Department of Energy Affairs (DOE) in order to promote poverty mitigation. Belonging to the Ministry of Mines, Natural Resources and Environment Affairs (MMNREA) since 1999, the DOE sets criteria for the electrification, plans implementation schedules, secures budgets, and manages constructions for RE. In order to promote RE, THE DOE utilizes the Energy Fund, which is collected from the purchase of gasoline and petroleum products. At present, the DOE is implementing the RE program using the Japanese grant aid for debt relief and government's own money from the Energy Fund.

Japan International Cooperation Agency (JICA) has been assisting RE project in Malawi by dispatching experts since 1999 and conducting the development study, "The Master Plan Study on Rural Electrification in Malawi", from September 2001 to March 2003.

The former study prioritized 249 trading centers (TCs) for electrification using criteria for social and economic activities, forecasted the electricity demands for all TCs until 2020, and suggested the electrification plan by extension of distribution lines and/or installation of stand-alone systems, which is divided into 11 stages. Furthermore, in addition to the technical transfer for the electrification planning, the study team grasped the organizational and institutional problems in promoting RE in Malawi. For these problems, the former study team suggested some systems that support business models for future privatization and RE project, and in particular on an advisable type of subsidy system.

It is not very long since the DOE started RE project, and it cannot rightly be said that its organizational and individual abilities are fully sufficient to promote its business by itself. Under this situation, for quick and smooth implementation of the RE, the Government of Malawi requested of the Government of Japan to conduct a follow-up study for the assistance of the next, Phase 5 in the rural RE project and for recommendations regarding subsidy systems and business models for the future independent RE project. Based on the request, the Government of Japan decided to commence the Follow-up Study for the Master Plan on Rural Electrification in Malawi (Study).

1.2 Objectives of the Study

The objectives of the Study are as follows;

- (1) Assist the feasibility study (FS) for the Phase 5 in the RE project
(FS to promote the RE project harmoniously from the detail design to contract and construction, analyzing routes, machinery and materials, costs for construction and overall cost effectiveness.)

- (2) Make concrete recommendations for the Detailed Regulations for the RE policies and institutions
(The study team will review the existing policy, laws and systems to propose the methodology to select new entrepreneurs, to complete detailed regulations for RE fund and subsidy system, based on basic information, such as the result of FS and the discussion with local parties concerned.)

- (3) Make recommendations for RE business models for newcomers
(The study team will analyze new business models for the RE project in Malawi and propose the most effective one with some alternatives, based on the discussion with local parties concerned.)

- (4) Transfer technique for improvement of organizational and individual abilities of counterparts.
(The study team will transfer basic technique to counterparts. The technique includes the methodology of the FS, electricity demand forecast method, method of un-electrified TC electrification prioritization, the evaluation of economic efficiency, the assessment of new entrepreneurs and estimation items for the provision of subsidy.)

1.3 Overall Study Flow

The Study was carried out over about 10 months from December 2003 to September 2004, and the JICA Study Team conducted work three times locally in Malawi. The overall study flow is shown in Table 1-1.

Table 1-1 Overall Study Flow

JFY	2003				2004					
Month	12	1	2	3	4	5	6	7	8	9
Work in Japan	□ Preliminary Work in Japan				□ 1st Task in Japan		□ 2nd Task in Japan		□ 3rd Task in Japan	
Work in Malawi		■ 1st Task in Malawi				■ 2nd Task in Malawi			■ 3rd Task in Malawi	
Report	△ Inception Report						△ Draft Final Report			△ Final Report
Workshop		△ 1st Workshop						△ 2nd Workshop		
Work Items in Japan	<p><u>Preliminary Work in Japan</u></p> <ul style="list-style-type: none"> • Data Collection and confirmation of contents in the Master Plan • Preparation of the draft FS implementation manual • Preparation of the draft Inception Report • Procurement of the survey equipment • Determination of present conditions of organizations, institutions and plans related to the rural electrification in Malawi • Advance evaluations of post FS results • Preparation for the 1st Workshop • Presentation to JICA 				<p><u>1st Task in Japan</u></p> <ul style="list-style-type: none"> • Presentation to JICA • Acquisition of FS results from the DOE and assistance of FS management • Analysis, evaluation and direction of FS results from the DOE • Preparation of the revised FS implementation manual • Provision of information and recommendation for the project management • Revision of recommendation for the Detailed Regulations related to the Rural Electrification Bill • Revision of draft business models • Improvement of Electricity Demand Forecast Method 		<p><u>2nd Task in Japan</u></p> <ul style="list-style-type: none"> • Presentation for the 2nd Workshop • Preparation of the Draft Final Report <ol style="list-style-type: none"> (1) Confirmation of results of the Phase 5 project (2) Recommendations for the Phase 6 project (3) Revision of the FS implementation manual (4) Preparation of a recommendation report related to the Detailed Regulations for the Rural Electrification Bill (5) Revision of draft business models 		<p><u>3rd Task in Japan</u></p> <ul style="list-style-type: none"> • Preparation of the Final Report • Presentation to JICA 	
Work Items in Malawi	<p><u>1st Task in Malawi</u></p> <ul style="list-style-type: none"> • Presentation and discussion of the Inception Report • 1st Workshop • Discussion with ESCOM over FS • Confirmation of FS methods • Assistance of FS • Study of modification for FS procedures • Evaluation of FS conducted by the DOE • Discussion with the DOE over the Detailed Regulations related to the Rural Electrification Bill • Discussion with ESCOM over the organizational and institutional aspects • Draft Recommendations for organizations and institutions 				<p><u>2nd Task in Malawi</u></p> <ul style="list-style-type: none"> • Evaluation and direction for results of all sites in the Phase 5 project • Technology Transfer related to project management • Discussion of recommendations related to the Detailed Regulations for the Rural Electrification Bill • Discussion of the revised business models • Improvement of Electricity Demand Forecast Method and revision of criteria for TC prioritization targeted to Phase 6 and later 		<p><u>3rd Task in Malawi</u></p> <ul style="list-style-type: none"> • Discussion of the Detailed Regulations and the business models • 2nd Workshop 			

Chapter 2. Technical Transfer related to FS Procedure for Distribution Line

This chapter presents an outline of the feasibility study (FS) and the technical transfer related to FS procedure for distribution line extension implemented in the follow-up study.

2.1 Outline of the FS

2.1.1 Overall Schedule

The DOE implemented the Phase 5 FS for the RE project from October 2003 to June 2004. From the standpoint of technical transfer, it was decided to present a detailed account of this aspect, which was grounded in the support furnished by the JICA Study Team in the follow-up study, by dividing the work into three phases: before the FS support; during the FS support; and after the FS support. Table 2-1 shows the number of trading centers (TCs) studied and the time of field surveys at each stage, and Figure 2-1 shows the location of trading centers (TCs) studied at Phase 5.

Table 2-1 Number of TCs studied and time of field surveys at each FS stage

Stage	Before FS support	During FS Support	After FS Support	Total
Number of TCs studied	23	13	18	54
Time of Field Surveys	from 10/2003 to 12/2003	from 1/2004 to 2/2004	from 2/2004 to 6/2004	-

2.1.2 Setup for the DOE FS Implementation

(1) Organization and Staffing

The DOE and ESCOM have implemented the Phase 5 FS for RE project together. the DOE assigned 9 counterparts including a manager, engineers and economists to implement the FS. In addition, it has appointed one chief engineer and one chief economist to take general charge of the work.

ESCOM has assigned one employee each to the FS in the northern, central, and southern offices.

(2) Team

The FS work is implemented by teams. Each team consists of one or two DOE engineers, one economist and one ESCOM engineer. Because teams are formed with consideration of the scheduling for other activities, the membership of the team may change each time.

Engineers and economists implement the preparation and the map study. The major duty of the engineers, in terms of deskwork after field survey, is calculation of voltage drop and construction cost, while those of the economists are forecasting of demand and assessment of economic merit.

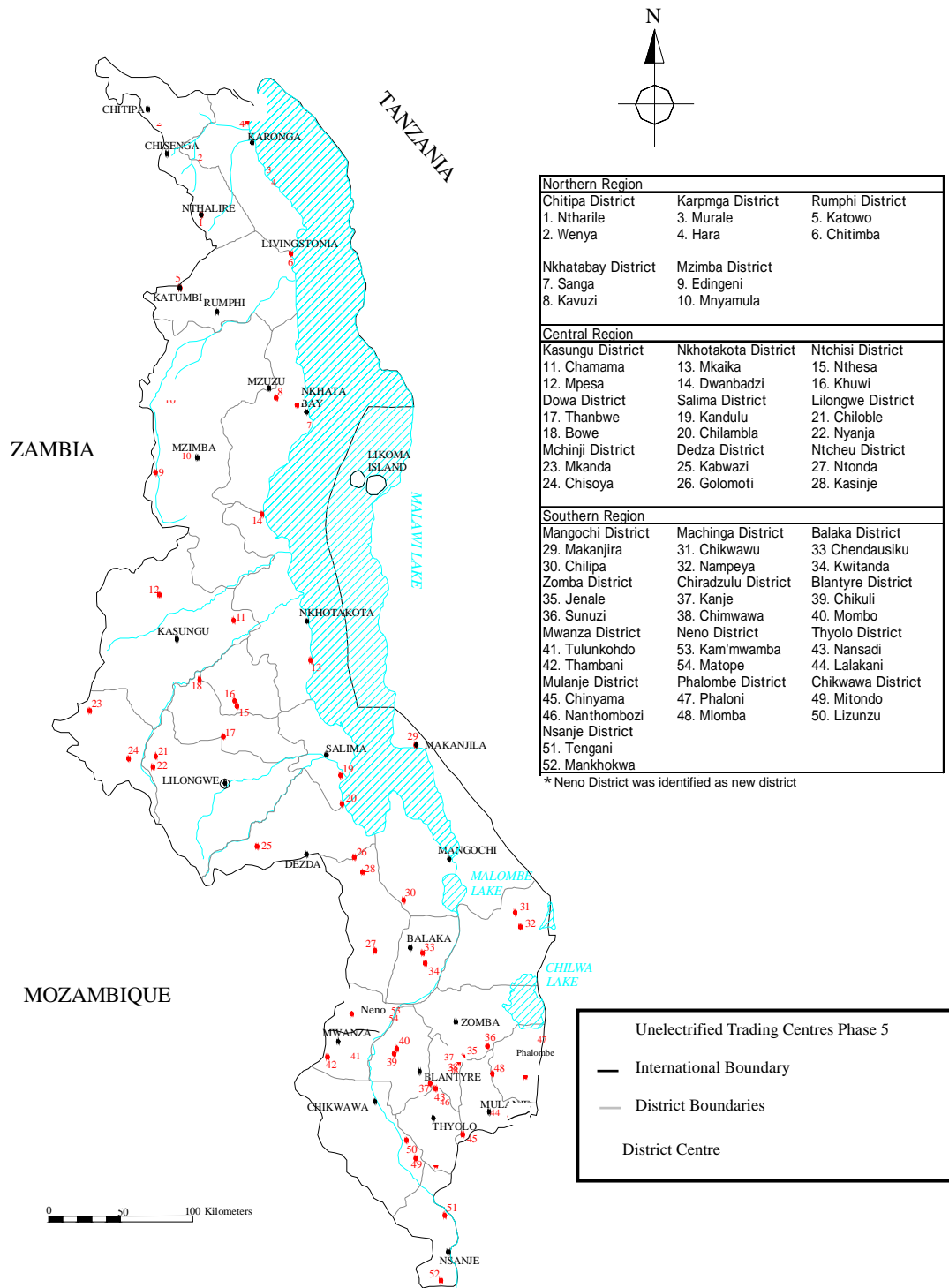


Figure 2-1 The location of trading centers (TCs) studied at FS for Phase5

(3) Basic steps FS work

Since a site survey in the central region does not need lodgings, the basic steps of a FS work in the central region consist of repeat of both one-day site survey and one-day deskwork. On the other hand, because a site survey in the southern and northern regions need lodgings, from a viewpoint of efficiency, the basic steps of a FS work in the regions consist of one-week site survey and one-week deskwork. The work teams are formed from virtually the same members under the guidance of the JICA expert.

2.1.3 FS Flow

(1) As shown in Figure 2-2, the FS flow in the DOE consists of the 7 stages including preparation, map study, field survey, demand forecasting, calculation of voltage drop, calculation of construction cost, and assessment of economic merit. Table 2-2 presents the outline of each FS stage (for a detailed description, see the FS implementation manual). The manual was prepared on the basis of the draft prepared by the DOE, upon addition and revision by the JICA Study Team.

(2) The FS results are presented in a FS report, in drawings of site situation and calculation sheets prepared in accordance with the FS implementation manual. The items to be noted in each type of document are as follows.

(a) FS report

- Name of the TC surveyed
- Name(s) of the person(s) conducting the survey
- Time of the survey
- Summary of the results of the calculation using the calculation sheet

(b) Drawings of site situation

- Location of candidate sites for installation of distribution-use transformers and prospective distribution line route within the TC
- Prospective 33kV (11kV) distribution line route from the feeder (branch) point on the existing distribution line to the TC

(c) Calculation sheets

- Results of the power demand forecast
- Results of the voltage drop calculation
- Results of the construction cost calculation
- Results of the IRR calculation

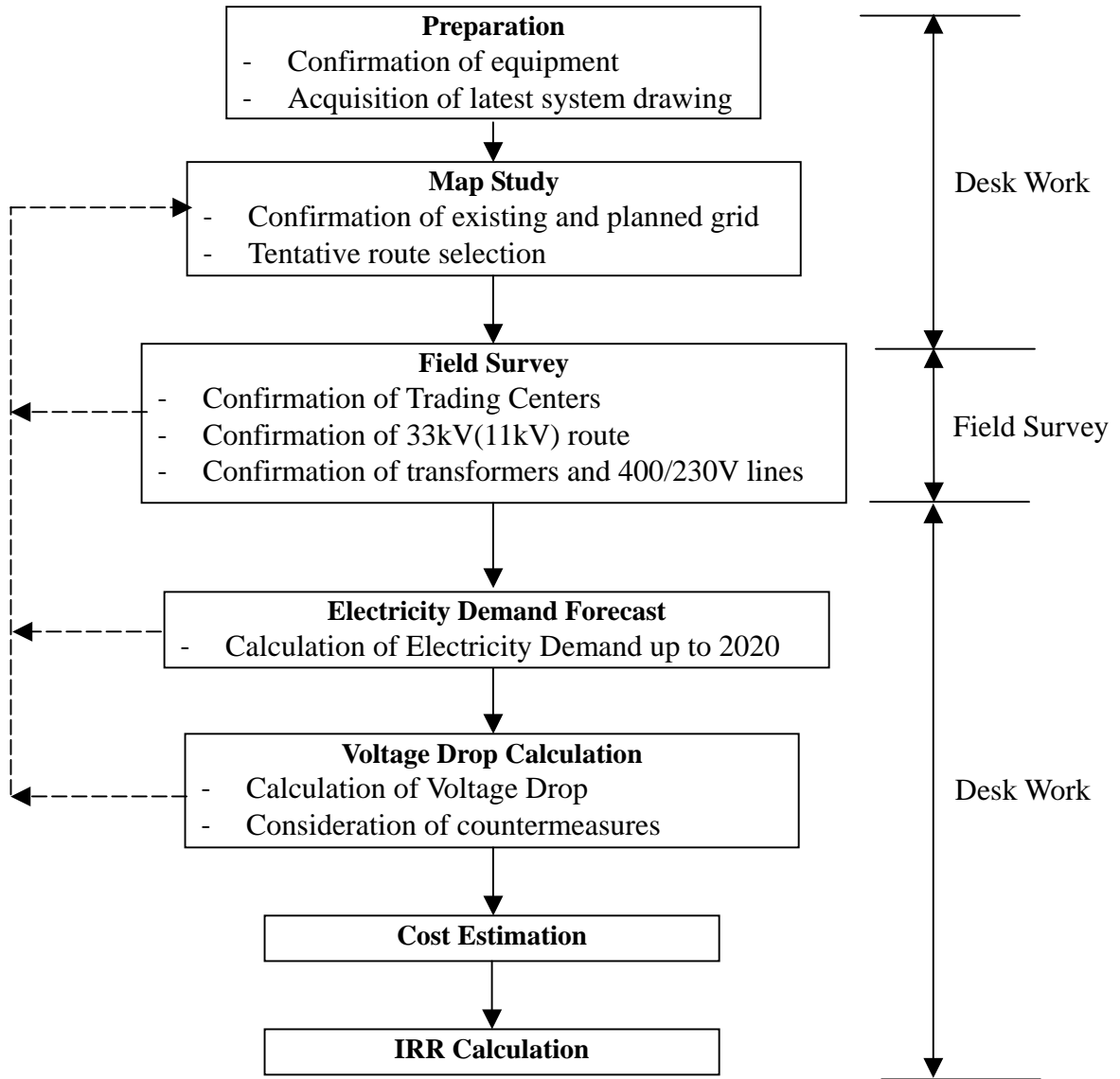


Figure 2-2 FS Flow (extracted from the FS implementation manual)

Table 2-2 Outline of FS stages

Stage	Implementing Party	Objective	Procedure
Preparation	DOE engineers DOE economist ESCOM engineer	Practice of Map-study and Field Survey	<ul style="list-style-type: none"> • Confirmation of the equipment used at site • Acquisition of the latest distribution network map
Map-study	DOE engineers DOE economist ESCOM engineer	Construction of routes for 33kV(11kV) distribution lines from the distribution line branch point to the TCs	Routes along access roads are the standard. The team uses a system drawing depicting the existing and planned distribution lines on a 1/250,000-scale map. In the case of some TCs, the map study cannot be executed (e.g., if the access road to the TC is not clearly marked on the map). In such cases, a field survey is made upon confirmation of the location of the nearest existing or planned distribution line.
Field survey	DOE engineers DOE economist ESCOM engineer	Determination of the feeder point for the 33kV (11kV) distribution line	Survey of the vicinity of the branch point, bay for feeder at substation or power plant for the 33kV(11kV) distribution line selected in the map study, and confirmation of the status as regards the type of high-voltage line and deterioration.
		Determination of the route for the 33kV (11kV) distribution line	Confirmation of the presence or absence of obstacles to distribution line construction, large rivers, or steep slopes making it difficult to install supporting structures.
		Determination of the position of the distribution-use transformer and route for the 400/230V distribution line	<p>Examination of the distribution line route offering the shortest extended route line length¹ for electrification of public facilities as well as maize mills and other commercial facilities.</p> <ul style="list-style-type: none"> • Making an site sketch of the TC • Drawing of the distribution line route from the transformer to target facilities for electrification on the sketch, and measurement of the route distance by means of a digital roller measure, laser binocular, and pacing. • Selection of candidate sites for installation of distribution-use transformers
Electricity Demand forecasting	DOE Economist	Supply of the basic data for the construction calculation and the calculation of IRR	Input of the number of public facilities as well as maize mills and other commercial facilities, and ordinary homes confirmed in the field survey into the electric power demand forecasting system (more details are presented in Chapter 3).
Voltage drop calculation	DOE Engineers	Confirmation as to whether or not the amount of voltage drop is within the scope stipulated in the Electricity Supply Regulations in Malawi	After drawing the site situation, use of the voltage drop calculation tool to calculate the voltage drop after construction of the planned distribution line, based on the demand forecast, distance from the existing distribution line, and value for the voltage drop up to the branch point; collection of data for the current voltage drop value from ESCOM.
Calculation of construction cost	DOE Engineers	Calculation of the construction cost required for TC electrification	Use of the construction cost calculation tool to calculate the construction cost required for TC electrification based on the construction cost applied by ESCOM per kilometer of 33kV(11kV) and 400/230V distribution lines, and per unit of 50kVA and 100kVA transformers; this cost includes the cost of materials, personnel expenses, domestic transport cost, and fuel cost.
Evaluation of economic merit	DOE Economist	Calculation of the internal rate of return (IRR) used in analysis of business possibilities	Calculation of IRR through input of values for power consumption, construction cost, power tariffs, subsidies, etc. into the IRR calculation tool.

¹ The value added the distance between each pole.

2.2 Technical Transfer related to FS procedure for distribution line extension

2.2.1 Problems with FS Results before Provision of Support, and Instruction for them

(1) Problems

The JICA Study Team identified the following problems with the results and procedure of FSs implemented independently by the counterparts for 23 TCs before the provision of support.

- (a) As shown in Table 2-3, the TC drawings of site situation did not contain uniform symbols, this made it difficult for non-drawers to ascertain their meaning, which may cause misunderstandings in subsequent work and ultimately inaccurate work.
- (b) According to information from the JICA expert, there was not enough cooperation among the team members, and the field surveys of TCs consequently took a lot of time. As a result there were cases where scheduled FS work was not finished in a day, as planned, which may cause delay of the schedule for FS for Phase 5.
- (c) A definite method had not been established for determination of the number and capacity of transformers, which may cause inaccurate cost calculation results.

(2) Methods of instruction

(a) Preparation of standard symbols

To solve the problem described in Section (1) (a) above, the JICA Study Team prepared the standard symbols shown in

Table 2-3 and instructed the counterparts regarding their meaning. In preparing these symbols, the JICA Study Team studied the drawings of the FS results prepared by the counterparts, selected lines and buildings with a high frequency of use, and reflected these symbols in the FS implementation manual.

(b) Preparation of the basic schedule and the role of each member in the field survey

To achieve adequate cooperation among members, it is important for all FS team members to have a solid grasp of their respective roles, discharge these roles, and be prepared to assist other members when their own part is completed. To solve the problem described in Section (1) (b), the JICA Study Team prepared a check sheet on field survey shown in Table 2-4 and a standard time schedule and respective roles sheet shown in Figure 2-4 for field surveys and instructed the counterparts in their purpose. Methods of instruction and effects for problems (1) (c) are described in 2.2.4, and effects against methods of instruction (1) (a), (1) (b) are described in 2.2.5.

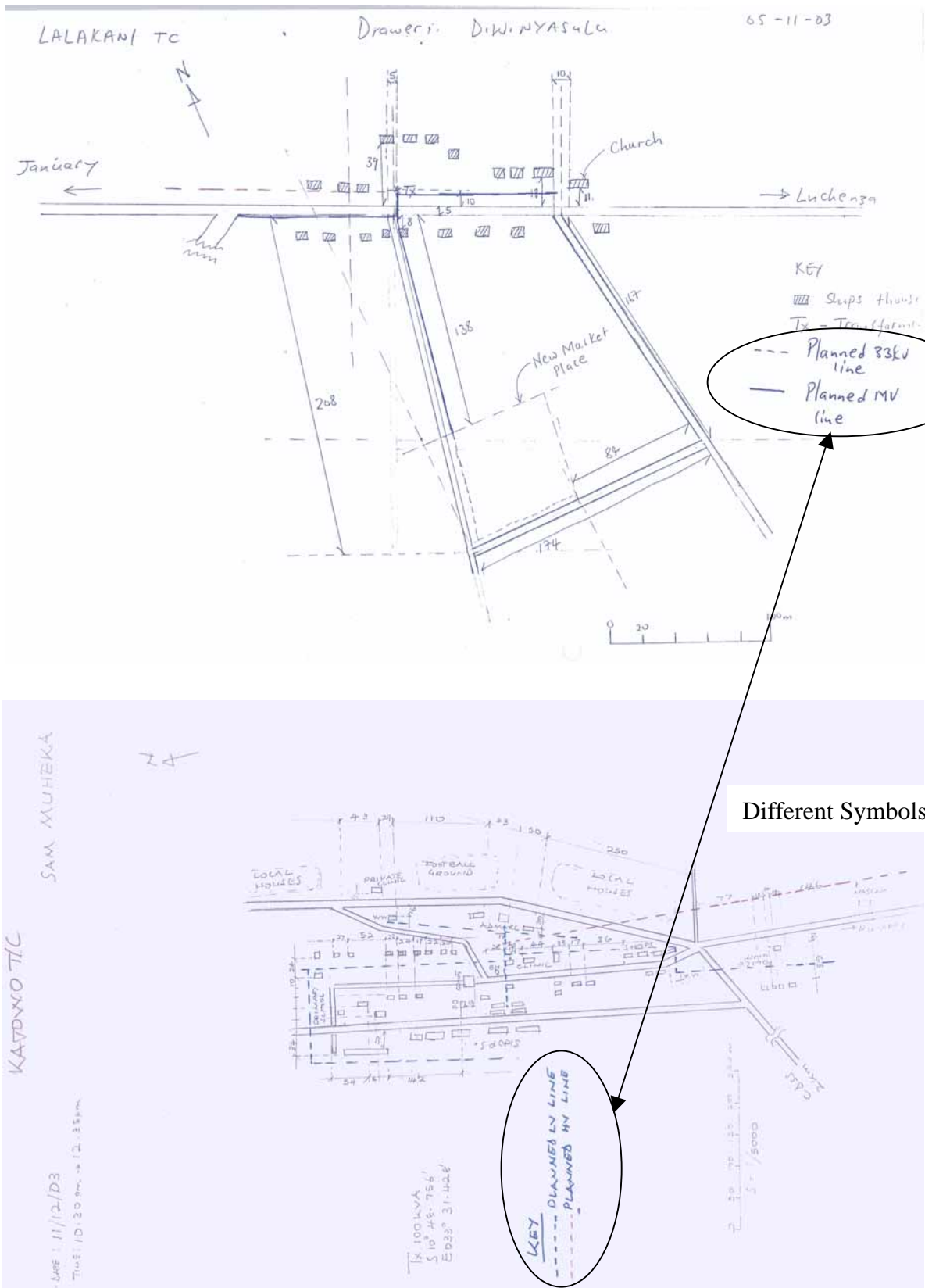


Figure 2-3 Example of Different Symbols in TC Drawings of Site Situation [Lalakani TC (above) and Katowb TC (below)]

Table 2-3 Standard Symbols (extracted from the FS implementation manual) (1/2)























Item		Example	
Scale	Choose a suitable reduced scale fitting A4 size paper		1/500, 1/1000, 1/5000 etc
Symbol	Transformer	 Tx100kVA	
	33kV HV line	 33 kV	33kV HV
		 33 kV	Blue dotted-line means “proposed.” Green dotted-line marked by fluorescent pen means “planned.”
		 33 kV	Green solid line marked by fluorescent pen means “existing.”
	11kV HV line	 11 kV	11kV HV
		 11 kV	Blue dotted-line means “proposed.” Red dotted-line marked by fluorescent pen means planned.”
		 11 kV	Red solid line marked by fluorescent pen means “existing.”
	LV line	 1	3 : 3-phase 4-wire system (400V) 1 : 1-phase 2-wire system (230V)
			Blue solid line means “proposed.”
	Existing Extra High Voltage Line	 66 kV	Red solid line
	Existing Telecommunication Line	 Tele	Red solid line
	Direction		
	Maize Mill	 Sh	Sh means “Maize mill with Sheller”
	Shop		
	House		H in square is not necessary to be shown.
	Secondary School		
	Primary School		
Church			
Mosque			
Court			
Health Center			
Hospital			
Clinic			

Table 2-3 Standard Symbols (extracted from the FS implementation manual) (2/2)

Item		Example	
Symbol	Police Station	POL	
	Police Unit	PU	
	Police Post	PP	
	Agriculture Office	AG	
	Government Office	GO	
	Post Office	PO	
	Admarc	AD	
	Teacher's Training Center	TTC	
	Government Office	GO	
	Agriculture Office	AG	
	Staff House	STA	
	Other Public Facility	OPF	Write the concrete type of facility
	Market	MA	Solid line means "the area."
	Restaurant	RE	
	Rest House	RH	
	Battery Charge Station	BCS	
Tree	Tree	Solid line means "the area."	

Table 2-4 Check sheet on field survey

Name of the Trading Center: _____		
No	Activities	Check
	Map Study (Using 1/250,000 maps)	
1	Put existing/planned lines on the map	
2	Decide estimated route distance from branch points on existing line to the target TC on the map	
	Field Survey – Outside TC (sketching)	
3	Confirm GPS position at each and every relevant corner of the road	
4	Confirm relevant TCs, bridges etc on the route to the target TC	
5	Confirm the target TC	
6	Confirm existing line and end pole with GPS	
7	Confirm planned line or relevant TCs with GPS if any	
8	Confirm distance from branch points on existing line to the target TC by odometer	
9	Confirm voltage level of existing line (ESCOM engineer)	
10	Check size "square mm" and condition of conductor on existing line (ESCOM engineer)	
	Field Survey – Inside TC (sketching)	
11	The TC's name of, date, start and finish time, drawer's name, direction (North), scale and GPS position should be included on the sketches	
12	Confirm public facilities by interviewing responsible person(s)	
13	Confirm private entities	
14	Confirm daily activities inside/outside of the TC	
15	Measure each person's step length if no digital roller measure	
16	Measure radius (length and width) of the TC	
17	Measure width of the main road through the TC and branches	
18	Measure distance from the main road to existing public facilities	
19	Include major features such as shops in the sketch	
20	Confirm maize mill(s) and measure distance	
21	Confirm obstacles for the proposed line	
22	Decide the transformer position (normally load center) considering the voltage drop	
23	Measure GPS position of the transformer	
24	Put tentative 400/230V lines on the sketch considering the voltage drop	
25	Cross check proposed/planned/existing lines for the TC	

Person	Main Role	Main Equipment	The Basic Time Schedule					
			Start	1st Meeting for confirmation	2nd Meeting for confirmation	Finish		
			☆	☆	☆	☆		
			Outside TC	Inside TC				
DOE Economist	Socio-economic Survey		Assistance of Engineer	12	13,14	25		
DOE Engineer	Making Sketch	<ul style="list-style-type: none"> • GPS • Compass 	3,4,5,6,7	11	15,16,17,18	19	23,24	25
ESCOM Engineer	<ul style="list-style-type: none"> • Measuring the Distance • Deciding the position of Transformer 	<ul style="list-style-type: none"> • Digital Roller Measure • Laser Binocular 	8,9,10	15,16,17,18	20,21,22,24	25		

*After finishing your survey, cooperate with and help other member.

*The numbers in bar show ones in [Check sheet on field survey]

Figure 2-4 The Basic Schedule and each Role in Field Survey

2.2.2 First Workshop

The first workshop was staged for the purpose of raising technical understanding of FS items among the counterparts and FS personnel at ESCOM from January 14th 2004 to January 16th 2004. Table 2-5 outlines the nature of guidance/instruction and explanations presented at the first workshop. Figure 2-5 shows the guidance given for the use of measuring devices, and Figure 2-6 shows the guidance provided for the use of calculation tools.

Table 2-5 Nature of guidance/instruction and explanations at the first workshop

Date	Nature of guidance/instruction and explanations
First Day (Training in the room)	<ul style="list-style-type: none"> • FS Objectives • Items of on-site confirmation • Procedure for calculation of voltage drop • Cost calculation procedure • Standard symbols • Standard time schedule
Second day (Training implemented at the Chilobwe TC)	<ul style="list-style-type: none"> • Efficient survey methods • Procedure for use of measuring devices including digital roller measure, laser binocular, compass and GPS • Procedure for preparation of site sketches
Third day (Training in the room)	<ul style="list-style-type: none"> • Perspectives on calculation of voltage drop • Procedure for preparation of drawings • Procedure for use of voltage drop calculation tool and construction cost calculation tool • Free discussion on subjects such as FS objectives and significance, and requirements for RE

The counterparts were able to acquire basic skills such as confirming items at site, how to use the equipment for measurement, and calculation tools. Sections 2.2.3 and 2.2.4 describe the problems identified by the JICA Study Team with the procedure for FS implementation by the DOE in the first workshop, and the corresponding methods of instruction.



Figure 2-5 Photograph of Guidance about Procedure for Use of Measuring Devices



Figure 2-6 Photograph of Guidance about Procedure for Use of Calculation Tools

2.2.3 Guidance/Instruction related to Procedure for FS Field Surveys

The JICA Study Team accompanied FS personnel on trips to 12 TCs of the 54 TCs planned for phase 5 and provided the following guidance/instruction related to FS field survey procedure.

(1) Procedure for preparation of site sketches

(a) Problems

- (i) In preparation of TC site sketches, subsequent deskwork and controlling the data of FS results are facilitated if the scale is adjusted so that the sketches fit on A4-size paper as much as possible. Some counterparts, however, were unable to fit sketches on paper of this size.
- (ii) Certain counterparts had an errant sense of road direction in preparing site sketches. The sketches they produced were seriously lacking in the accuracy needed for reflection in the preparation of drawings in the deskwork stage.

(b) Methods of instruction

- (i) The JICA Study Team instructed the counterparts to ascertain the overall status of the TC in the initial stage after arrival by using vehicles or other means for mutual confirmation of the subject facilities in the TC area, and then to study strategies for survey procedure.
- (ii) The team also made the following proposal to correct an errant sense of road direction in preparation of site sketches.

- 1) Finding a distant object (e.g. mountain) to represent north and drawing the line of the road by referring to that one.
- 2) Always placing a compass on the paper and drawing the line of the road by rotating the paper in the northern direction as indicated by a compass.

(c) Effects

- (i) The counterparts understood the importance of grasping the overall image of TCs. As a result, they became able to make site sketches that fit on A4 paper.
- (ii) The counterparts became able to reflect the direction of roads more accurately in their site sketches. As a result, they were able to draw the site situation during deskwork without confusion.

(2) Decision of method (equipment) of distance measurement and position finding

(a) Problems

There are four major types of method (equipment) for measuring distances on sites: use of a vehicle odometer; laser binocular; digital roller measure; and pacing. GPS is used for measuring location, and GPS or compass is used for measuring direction. Each of these measurement methods (equipment) has its relative strengths and weaknesses. The choice of proper method (equipment) for the case at hand increases not only the survey precision but also its effectiveness. For finding a position, GPS is used. The counterparts were not sure which method (equipment) was the best for each place, and also did not have a good understanding of items such as laser binocular and the GPS measurement error.

(b) Methods of instruction

The Team also reconfirmed that the counterparts knew of the measurement error of the GPS (around 2m) and maximum and minimum scopes (10m – 400m) of laser binocular.

Table 2-6 shows the guidance provided to the counterparts in respect to ascertaining which of the measurement methods (equipment) is the best for the place.

Table 2-6 Best measurement methods (equipment) for each type of place

Type of Place	Measurement methods (equipment)
Measurement of the distance of distribution line installation outside the TC and of the TC scale	Vehicle odometer
Measurement of distance (10 - 400 m) in a vertical orientation on the main road in the TC	Laser binocular
Measurement of distance in a parallel orientation on the main road in the TC	Digital roller measure
Measurement of distance (0 - 10 m) in a vertical orientation on the main road in the TC	Digital roller measure, Pacing

(c) Effects

Understanding of the effective match-ups of place and method as well as measurement error enabled the counterparts to make measurements with higher levels of accuracy and efficiency as exemplified by the following.

- (i) Digital roller measure or pacing came to be used instead of laser binocular for measurement of distances of no more than 10 m
- (ii) The counterparts stopped making re-measurements by GPS in the event of a change in the candidate point of transformer installation by no more than 2 m.

(3) More efficient survey procedures

(a) Problems

In some cases, counterparts overlooked places that required measurement, and so had to measure sites two or three times. This made the survey work more inefficient.

(b) Methods of instruction

(i) Unified approach in the team through meetings

Upon arrival in the TC, a meeting was held for the application of a unified procedural approach for the survey by the team. The places requiring measurement and the target measurement time (duration) were confirmed with the counterparts. In addition, at the end of the work on each survey, a meeting was held on the site to have counterparts check whether or not they had omitted any measurements. Table 2-7 presents the outline of the meetings.

Table 2-7 Outline of the meetings

Stage	Implementation items
Pre-departure meeting	<ul style="list-style-type: none">• Confirmation of materials taken along• Confirmation of the assumed branch point at distribution line• Confirmation of the route to the TC
Meeting upon arrival at the TC	<ul style="list-style-type: none">• Application of unified approach in survey procedure by the team• Confirmation of the places requiring measurement• Confirmation of the target time for completion of the survey
Interim meeting at the TC	<ul style="list-style-type: none">• Confirmation of the places for which measurements have been completed• Exchange of information between engineers and economist
Post-survey meeting at the TC	<ul style="list-style-type: none">• Confirmation of the absence of measurement omissions• Confirmation of points requiring improvement in succeeding surveys

(ii) Use of rough sketches by economists

Even in advance of the provision of FS support, economist made rough sketches of sites indicating the position of public facilities in TC while conducting interview surveys. It was decided to use these rough sketches as a means of preventing measurement omissions and reducing the time needed to prepare site sketches. The JICA Study Team consequently proposed the following measurement method.

- First half.....Economist makes a rough sketch from the opposite direction to where the engineers start to measure
- Interim meeting.....Exchange of information of first half between engineers and economist
- Second half.....Measurement by engineers based on the sketch information from economist

Figure 2-7 shows the scene at the interim meeting.

(c) Effects

The counterparts understood:

- (i) Importance that time is managed efficiently and information is exchanged to accommodate meetings.
- (ii) The method of using rough sketches.

As a result, they reduced the incidence of measurement omissions and repeated measurement of the same place, and therefore they became able to survey more efficiently. They also became able to organize and complete meetings themselves by nominating the team member as a facilitator in orderly manner.

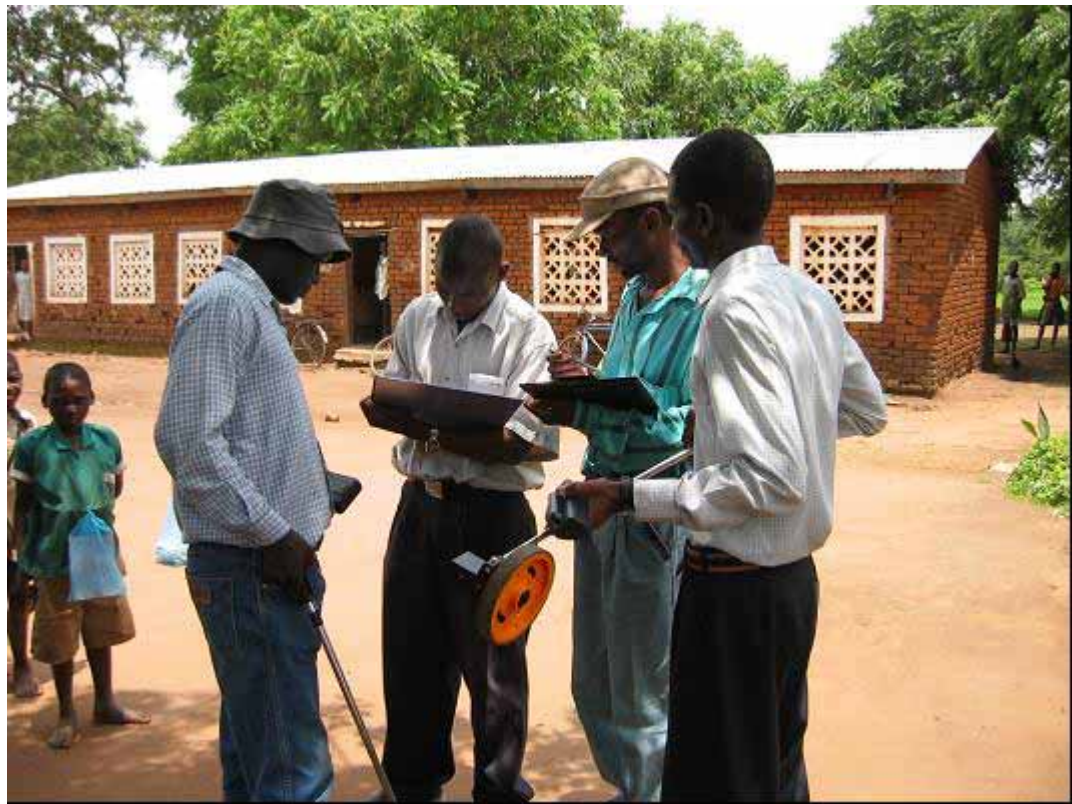


Figure 2-7 Photograph of Interim Meeting

2.2.4 Guidance/Instruction related to the Procedure for FS Deskwork

The JICA Study Team provided the following guidance/instruction for FS deskwork procedure for 12 TCs that had already been surveyed.

(1) Method of scale calculation

(a) Problems

- (i) In the preparation of drawings, while referring to site sketches, the first task is to make calculations to determine the scale so that the drawings fit on A4-size paper as much as possible. Some counterparts needed a lot of time to perform this scale calculation when beginning a drawing, because they were not good at calculation.
- (ii) Some counterparts possess scaling rulers. However, they didn't use the scaling rulers efficiently, and also needed a lot of time to prepare drawings because scaling rulers are made with each notation according to the corresponding distance.

(b) Methods of instruction

- (i) After discussion with the counterparts on procedure for efficient preparation of drawings, the JICA Study Team prepared and proposed a scale conversion table. This table presents the results of scale conversion based on advanced calculation using the Microsoft Excel to omit the calculation work for scale conversion. The table is shown in Figure 2-8.
- (ii) The counterparts were also instructed in use of a scaling ruler.

(c) Effects

The counterparts became able to determine the scale to be used in the drawing and the length of lines on the drawing within a shorter time by using the scale conversion table and a scaling ruler.

Length (m)	100	105	110	115	120	125	130	135	140	145	150	160	170	180	190	200	250	300	350	400	450	500	550	600	650	700	750	800	850
Scale	"mm" on the map																												
1/100	1000	1050	1100	1150	1200	1250	1300	1350	1400	1450	1500	1600	1700	1800	1900	2000	2500	3000	3500	4000	4500	5000	5500	6000	6500	7000	7500	8000	8500
1/150	667	700	733	767	800	833	867	900	933	967	1000	1067	1133	1200	1267	1333	1667	2000	2333	2667	3000	3333	3667	4000	4333	4667	5000	5333	5667
1/200	500	525	550	575	600	625	650	675	700	725	750	800	850	900	950	1000	1250	1500	1750	2000	2250	2500	2750	3000	3250	3500	3750	4000	4250
1/250	400	420	440	460	480	500	520	540	560	580	600	640	680	720	760	800	1000	1200	1400	1600	1800	2000	2200	2400	2600	2800	3000	3200	3400
1/300	333	350	367	383	400	417	433	450	467	483	500	533	567	600	633	667	833	1000	1167	1333	1500	1667	1833	2000	2167	2333	2500	2667	2833
1/350	286	300	314	329	343	357	371	386	400	414	429	457	486	514	543	571	714	857	1000	1143	1286	1429	1571	1714	1857	2000	2143	2286	2429
1/400	250	263	275	288	300	313	325	338	350	363	375	400	425	450	475	500	625	750	875	1000	1125	1250	1375	1500	1625	1750	1875	2000	2125
1/450	222	233	244	256	267	278	289	300	311	322	333	356	378	400	422	444	556	667	778	889	1000	1111	1222	1333	1444	1556	1667	1778	1889
1/500	200	210	220	230	240	250	260	270	280	290	300	320	340	360	380	400	500	600	700	800	900	1000	1100	1200	1300	1400	1500	1600	1700
1/550	182	191	200	209	218	227	236	245	255	264	273	291	309	327	345	364	455	545	636	727	818	909	1000	1091	1182	1273	1364	1455	1545
1/600	167	175	183	192	200	208	217	225	233	242	250	267	283	300	317	333	417	500	583	667	750	833	917	1000	1083	1167	1250	1333	1417
1/650	154	162	169	177	185	192	200	208	215	223	231	246	262	277	292	308	385	462	538	615	692	769	846	923	1000	1077	1154	1231	1308
1/700	143	150	157	164	171	179	186	193	200	207	214	229	243	257	271	286	357	429	500	571	643	714	786	857	929	1000	1071	1143	1214
1/750	133	140	147	153	160	167	173	180	187	193	200	213	227	240	253	267	333	400	467	533	600	667	733	800	867	933	1000	1067	1133
1/800	125	131	138	144	150	156	163	169	175	181	188	200	213	225	238	250	313	375	438	500	563	625	688	750	813	875	938	1000	1063
1/850	118	124	129	135	141	147	153	159	165	171	176	188	200	212	224	235	294	353	412	471	529	588	647	706	765	824	882	941	1000
1/900	111	117	122	128	133	139	144	150	156	161	167	178	189	200	211	222	278	333	389	444	500	556	611	667	722	778	833	889	944
1/950	105	111	116	121	126	132	137	142	147	153	158	168	179	189	200	211	263	316	368	421	474	526	579	632	684	737	789	842	895
1/1000	100	105	110	115	120	125	130	135	140	145	150	160	170	180	190	200	250	300	350	400	450	500	550	600	650	700	750	800	850
1/2000	50	53	55	58	60	63	65	68	70	73	75	80	85	90	95	100	125	150	175	200	225	250	275	300	325	350	375	400	425
1/3000	33	35	37	38	40	42	43	45	47	48	50	53	57	60	63	67	83	100	117	133	150	167	183	200	217	233	250	267	283
1/4000	25	26	28	29	30	31	33	34	35	36	38	40	43	45	48	50	63	75	88	100	113	125	138	150	163	175	188	200	213
1/5000	20	21	22	23	24	25	26	27	28	29	30	32	34	36	38	40	50	60	70	80	90	100	110	120	130	140	150	160	170
1/6000	17	18	18	19	20	21	22	23	23	24	25	27	28	30	32	33	42	50	58	67	75	83	92	100	108	117	125	133	142
1/7000	14	15	16	16	17	18	19	19	20	21	21	23	24	26	27	29	36	43	50	57	64	71	79	86	93	100	107	114	121
1/8000	13	13	14	14	15	16	16	17	18	18	19	20	21	23	24	25	31	38	44	50	56	63	69	75	81	88	94	100	106
1/9000	11	12	12	13	13	14	14	15	16	16	17	18	19	20	21	22	28	33	39	44	50	56	61	67	72	78	83	89	94

A4 size : 297mm *210mm

Figure 2-8 The example of Results of Scale Conversion based on Advance Calculation using Microsoft Excel

(2) Procedure for selection of distribution line routes

(a) Problems

The counterpart did not all share the same perspective on the selection of distribution line routes, which may cause incorrect construction cost calculation results.

(b) Methods of instruction

ESCOM has a wealth of knowledge and experience related to procedure for selection of distribution line routes because it has executed the plan, design and installation of many distribution line extensions in Malawi. For this reason, the JICA Study Team confirmed the basic procedure for such selection at ESCOM with ESCOM engineers, and held a seminar to instruct the DOE engineers in it. Table 2-8 shows the items of instruction regarding selection of distribution line routes.

Table 2-8 Instruction in selection of distribution line routes

Distribution line type	Instruction
33kV(11kV) distribution lines	Selection of wire types and routes that keep the voltage drop within the scope stipulated in Electricity Supply Regulations in Malawi (i.e., plus or minus 6% against rated voltage ²)
	Curtailement of the distance of new distribution line installation to the minimum requisite in order to hold down construction costs
	Selection of routes along access roads that facilitate construction and maintenance
	Confirmation of the presence or absence of electrification plans in the nearest phase (after Phase 5) in un-electrified TCs other than those targeted along roads; if there is more than one candidate route for distribution line extension, precedence should be accorded to that to TCs for which there are electrification plans, in order to hold down construction costs in phases after Phase 5.
400/230V distribution lines	Selection of wire types and routes that keep the voltage drop within the scope stipulated in Electricity Supply Regulations in Malawi (i.e., plus or minus 6% against rated voltage)
	Curtailement of the distance of new distribution line installation to the minimum requisite in order to hold down construction costs
	Extension of lines to public facilities and maize mills, markets which will be surely electrified
	Notation of obstacles (e.g., trees, telephone lines, and transmission lines) on drawings, and assurance of sufficient distribution line distance from them, in order to hold down construction costs (due to the incidence of additional costs for tree-felling, etc., in distribution line construction)
	Installation of distribution-use transformers close to maize mills which have the biggest electricity demand in order to reduce the influence of the voltage drop of new distribution line
	Avoidance of installation of aerials across school grounds and graveyards because it is basically not approved

(c) Effects

The counterparts became capable of selecting distribution line routes in accordance with the procedure presented in Table 2-8. As a result, construction costs were expectedly reduced.

² In the Electricity Supply Regulations in Malawi, the permissible range of voltage fluctuation in supply to 400/230 V customers is set at within plus or minus 6 %. It was assumed that, in conformance with this range, the same rate of plus or minus 6 % would also be applied for fluctuation in supply through 33kV (11kV) distribution lines.

(3) Voltage drop calculation procedure

(a) Problems

The counterparts did not have a full understanding of the basic idea behind voltage drop calculation, and consequently were not able to cope with applied cases not covered by the voltage drop calculation system like that load are dispersed [e.g. electrification of more than two separate TCs with the same 33kV (11kV) distribution line].

(b) Methods of instruction

The JICA Study Team instructed the counterparts not only in the calculation of voltage drop on the Microsoft Excel sheet but also in the underlying perspective on the distribution of line current and the equation for calculating the voltage drop at distribution lines.

(c) Effects

The counterparts became able to understand the basic concept behind voltage drop calculation, and became able to handle applied cases, such as calculation of voltage drop in the event of electrification of more than two separate TCs with the same 33kV (11kV) distribution line. As a result, they were able to include more exact values of the voltage drop in FS reports.

(4) Procedure for determination of the number and capacity of transformer

(a) Problems

Transformers cost more than other distribution equipment, and the procedure for determining the number and capacity therefore has a substantial influence on the cost calculation results. As noted in Section 2.2.1, however, the procedure for determining the transformer number and capacity was not clearly defined, and this raised the risk of inappropriate determinations of this number and capacity.

(b) Methods of instruction

(i) The JICA Study Team furnished guidance in the procedure for determination of the requisite transformer number and capacity on the basis of the unit demand for the electrified target facilities. It was decided to apply the following as basic premises in the determination of the requisite number and capacity of transformers.

- The results from the Socio-Economic Survey in the Master Plan study were used as the standard values for the unit demand among public facilities, shops, and ordinary homes³ as well as for the estimated initial rate of connection.

³ Shops, and ordinary household aren't the target for electrification on MAREP phase 5, however they are counted for electricity demand forecast because they will be electrified in the future.

- Because the distribution facilities will be operated by ESCOM after completion of the Phase 5 construction, the ESCOM design standard values were applied for the diversity factor⁴ (diversity factor = 0.7).
- ESCOM design standard values were also applied for the unit demand of maize mill and the estimated initial connection rate. (The unit demand of maize mill =25kVA /40kVA, the estimated initial connection rate= 1.0)
- The results from the Master Plan study were used as the standard values for maximum-operating rate⁵ of transformers. (The standard values for maximum-operating rate = 80 %)

Table 2-9 shows the values for unit demand and estimated initial connection rate per type of facility.

Table 2-9 Unit demand and estimated initial connection rate per type of facility

Type of facility	Unit demand (kVA/facility)	Estimated initial connection rate
Maize mill (without sheller)	25	1.0
Maize mill (with sheller)	40	1.0
Public facility (school, church, police station, etc.)	3	1.0
Public facility staff housing	1	1.0
Shop	1	0.5
Ordinary household	1	0.4

- (ii) In cases entailing installation of more than one distribution-use transformer, the JICA Study Team asked the counterparts to confirm the supply area of each transformer and repeatedly perform the work of determining the requisite capacity based on the number of facilities, maize mill, etc. within the area.

Figure 2-9 shows example of the drawings of site situation for the procedure determining the supply area of transformer.

(c) Effects

The counterparts realized the importance of the appropriate number and capacity of transformer and came to understand the method of determining the number and capacity of transformers. As a result, they became able to determine the appropriate number and capacity of transformer, and thereby curtail the degree of error in cost calculation to the minimum.

⁴ The factor that indicates the dispersed level of maximum electric power used by customers

⁵ The ratio that indicates the allowable load for transformer against the nominal capacity in operation



Figure 2-9 Example of Drawing of site situation at Mkanda TC (the procedure determining the supply area of transformer)

(5) Cost calculation procedure

(a) Problems

Cost calculation has a big impact on the results of IRR calculation and is also of crucial importance for ascertaining the Phase 5 project cost. It therefore is necessary to calculate cost with a higher degree of accuracy. The following problems were identified in this regard.

- (i) The counterparts were not able to grasp exact construction costs because there was a bill of quantities (i.e., reckoning table) for 33kV (11kV) distribution lines, but not for 400/230V distribution lines.
- (ii) Most of the distribution equipment was procured from other countries, however the cost calculation results did not note amounts in foreign currency (US\$). As a result the counterparts did not have the consciousness for controlling limited project funds properly by grasping exact costs in foreign currency.

(b) Methods of instruction

- (i) It was decided to use mutually different construction cost calculation tools for 33kV(11kV) distribution lines and 400/230V lines in preparing bills of quantity. The JICA Study Team instructed counterparts on how to use these.
- (ii) It was also decided to note amounts in both foreign currency (US\$) and local currency (MK). The JICA Study Team also instructed counterparts on how to control project funds properly by taking account of exchange rate fluctuation, in cost calculation results.

(c) Effects

The counterparts understood the new cost estimation system including bills of quantity for 33kV(11kV) and 400/230V lines, which enabled the counterparts to assess costs more accurately and with consideration of exchange rate fluctuation. Additionally, the counterparts had the awareness of controlling limited project funds properly by grasping exact costs in foreign and local currencies.

(6) Procedure for data management

(a) Problems

It sometimes took a lot of time to retrieve electric data of FS results before the provision of FS support because there were no rules for keeping that data, in some cases, a single folder contained reports on more than one TC.

(b) Methods of instruction

The JICA Study Team instructed the counterparts to store the electric data file for only one TC in one named TC folder.

(c) Effects

The counterparts became capable of retrieving FS reports more quickly by storing the data file for only one TC in one named TC folder.

2.2.5 Assessment of Results of FS Implemented after Provision of the FS Support, and related Guidance/Instruction

This section sets forth the assessment of the results of FS implemented by the counterparts themselves for 17 TCs after the provision of support, and the items of guidance/instruction provided to the counterparts.

(1) FS reports

As shown in Table 2-10, the drawings prepared on the basis of the FS results required revision in a few places due to factors such as incorrect symbols and misentries.

Table 2-10 Number of places requiring revision in the results of the Phase 5 FS implemented after the first field survey

Category	Type of mistake	Number of points
Drawings of site situation	Omission of candidate sites for installation of distribution-use transformers	0
	Omission of extended distribution line distance	0
	Incorrect symbol	10
	Misentry	7
	Mistaken scale	0
Calculation tools	Voltage drop calculation	1
	Cost calculation	0
	Number and capacity of Transformer	10

Nevertheless, the results reflected the points of guidance/instruction overall, and showed improvement in the following respects.

- Use of symbols stipulated in the FS implementation manual
- Unification of perspectives on selection of distribution line routes
- Notation of obstacles such as trees, telephone lines, and transmission lines
- Input of accurate data into the calculation tools
- Management of each file to be stored in a separate folder

Figure 2-10 shows the example outline map including trees and transmission lines by the effect of instruction.

There were no major errors thought to require a repeat performance of the field survey (on the order of omission of transformer installation locations or extended distribution line distance). Upon consultation with the counterparts, it was therefore decided not to conduct the surveys again. The JICA Study Team provided instruction about the contents requiring revision while going through each such item with the counterparts.

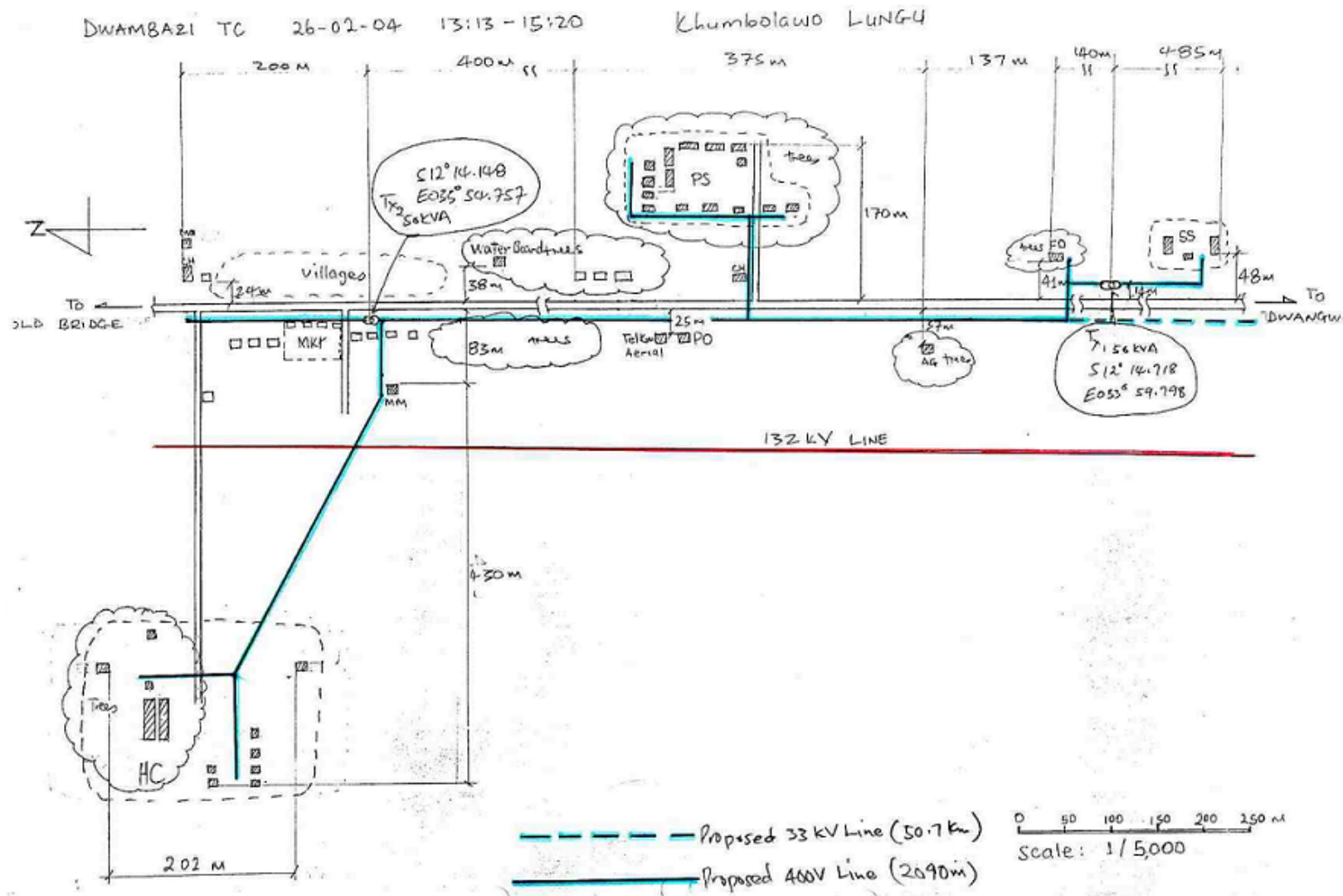


Figure 2-10 The site situation map including trees and transmission lines by the effect of instruction (Dwambani TC)

In determination of the requisite distribution-use transformer capacity, it was decided that the capacity could be calculated by using the newly prepared Electric Power Demand Condition System. For this reason, the JICA Study Team consulted with the counterparts and made a recalculation for the TCs for which surveys were implemented in advance of or during the provision of FS support. This led to revision of the cost calculation results in the case of 10 TCs requiring a change of transformer capacity.

The ability to determine the requisite number and capacity of transformer (in contrast to the former manual calculations) by using Electric Power Demand Condition System contributed to making deskwork more efficient.

(2) Field surveys

Contraction of the time required for field surveys would leave more time for meetings on the site, help to prevent measurement omissions and enable counterparts to finish survey fast and to go back before sunset, to finish field survey and deskwork in a day in some cases.

Table 2-11 presents the average time spent on field surveys per TC as derived from an analysis of the time spent on the surveys in all 54 TCs. It can be seen that this time has gradually decreased though the average time spent on field surveys depends on weather conditions and characteristics of the location. This indicates that the transfer of technology for efficient survey performance, such as avoidance of repeating measurement of the same point, is steadily taking effect.

Table 2-11 Average time required for field surveys per TC (Time spent on survey work in TCs)

	Before the provision of FS support	During the provision of FS support	After the provision of FS support
Average time (minutes / 1 TC)	149	137	114
Number of TCs surveyed (TCs)	23	13	18

2.2.6 Calculation Results for Project Cost, etc.

In the Study, the JICA Study Team calculated the distribution line extension and number of transformers in Phase 5, and made an estimate of the construction cost. Table 2-12 and Table 2-13 present the results of the Phase 5 cost estimate, etc. together with counterparts. The construction cost is estimated to average about 110,000 US\$ per trading center. This would be less than half as high as the corresponding cost estimate of 245,000 US\$ calculated in the Master Plan study. The following may be cited as the main factors behind this big decrease in estimated construction cost compared to the time of the Master Plan study.

- (1) In the Master Plan study, estimates were made of the requisite distribution line extension distance using rough maps (on a scale of 1:1,000,000) that did not contain the most recently constructed and planned distribution lines. In the Study, on the other hand, field surveys were conducted at all TC to be electrified in Phase 5. This provided an accurate grasp of the extension distance from the subject TC to the existing distribution line, and the distance was found to be shorter as a result.
- (2) The demand forecast decreased by 28 % relative to that made at the time of the Master Plan study, and this led to a commensurate decline in the requisite transformer number and capacity.

Table 2-12 Outline of calculation results for project cost, etc.

Category		Calculation results
Project costs	Local currency	653,090 × 10 ³ MK
	Foreign currency	5,937 × 10 ³ US\$
Extended distribution line length	33kV(11kV) ⁶	831.0km
	400/230V	82.2km
Number of transformers	100kVA	33
	50kVA	53

⁶ The 11kV voltage is used for 5 TCs in phase 5 TCs. However distribution equipment of 33kV type are used in those TCs because there is a plan for changing the voltage from 11kV to 33kV in the future.

Table 2-13 Calculation results for project cost, etc.

Region	District	Phase by M/P	Name of TC	Num. of TC along the line	Length of 33kV line (km)	Length of 400/230V line (m)	Num. of Trans. (100kVA)	Num. of Trans. (50kVA)	Estimated cost (1,000MK)	Estimated cost (1,000US\$)	Demand Forecast(kW) 2004	Demand Forecast(kW) 2020
Northern	Chitipa	5	Nthalire	3	33.75	3,284	1	1	26,672	242.5	83.8	139.9
	Chitipa	6-1	Wenya	3	72.60	2,470	0	2	55,492	504.5	34.6	82.7
	Karonga	7-2	Mulare	0	7.60	1,475	1	1	6,552	59.6	76.3	82.5
	Karonga	9-1	Hara	0	5.80	1,320	0	1	4,901	44.6	9.9	12.0
	Rumphi	5	Katowo	2	41.00	1,300	1	0	31,360	285.1	76.3	111.5
	Rumphi	5	Chitimba	1	11.00	1,680	0	2	9,076	82.5	25.8	32.2
	Nkhata Bay	6-1	Sanga	0	5.30	1,365	1	0	4,669	42.4	11.2	13.9
	Nkhata Bay	5	Kavuzi	3	16.20	1,140	0	2	12,820	116.5	36.0	63.8
	Mzimba	5	Edingeni	0	11.00	2,400	1	1	9,359	85.1	60.2	62.9
Mzimba	7-1	Mnyamula	2	28.00	1,500	1	0	21,671	197.0	65.1	97.2	
Central	Kasungu	5	Chamama	3	17.00	3,450	1	2	14,332	130.3	136.6	148.2
	Kasungu	5	Mpepa	2	21.00	1,800	1	0	16,510	150.1	61.0	65.4
	Nkhotakota	5	Mkaika	0	2.00	2,100	2	0	2,602	23.7	130.9	216.2
	Nkhotakota	5	Dwambadzi	4	50.70	2,090	1	1	38,956	354.1	66.9	122.5
	Ntchisi	5	Nthesa	2	20.30	1,385	1	0	5,370	48.8	49.0	52.1
	Ntchisi	5	Khuwi	1	14.00	1,440	1	1	11,333	103.0	52.3	58.5
	Dowa	5	Thambwe	0	0.70	2,000	1	1	1,523	13.8	104.2	145.5
	Dowa	5	Bowe	5	32.00	2,800	2	0	25,293	229.9	144.7	188.1
	Salima	5	Kandulu	0	1.80	240	0	1	1,593	14.5	37.0	85.6
	Salima	5	Chilambula	0	1.60	1,780	0	2	1,600	14.5	29.9	34.4
	Lilongwe	5	Chilobwe	5	25.00	1,140	0	1	19,232	174.8	32.2	79.6
	Lilongwe	5	Nyanja	2	7.60	580	0	1	6,044	54.9	22.9	26.3
	Mchinji	5	Mkanda	5	26.50	2,700	2	0	21,392	194.5	130.9	216.2
	Mchinji	5	Chiosya	0	17.00	2,900	1	1	14,000	127.3	106.4	141.6
	Dedza	5	Kabwazi	3	22.40	985	1	1	17,504	159.1	86.9	93.1
	Dedza	5	Golomoti	0	17.80	3,770	0	3	14,956	136.0	89.9	95.8
	Ntcheu	5	Ntonda	1	9.00	1,380	0	1	7,322	66.6	24.1	30.1
Ntcheu	5	Kasinje	0	14.00	2,460	1	1	11,386	103.5	56.1	86.5	
Southern	Mangochi	5	Makanjira	4	80.00	1,830	2	2	61,341	557.6	142.9	183.8
	Mangochi	5	Chilipa	0	11.00	750	1	1	8,901	80.9	67.2	69.6
	Machinga	5	Chikwewu	1	13.20	1,885	1	0	10,691	97.2	60.6	116.1
	Machinga	5	Nampeya	3	13.80	1,754	0	1	11,035	100.3	29.9	97.7
	Balaka	5	Chendausiku	0	18.10	1,849	0	2	14,427	131.2	28.8	56.1
	Balaka	5	Kwitanda	0	6.20	1,600	0	1	5,281	48.0	37.9	44.0
	Zomba	5	Jenale	0	2.40	1,160	0	1	2,317	21.1	33.7	61.1
	Zomba	5	Sunuzi	0	6.60	329	0	1	5,208	47.3	15.1	19.0
	Chiradzulu	5	Kanje	0	1.70	287	0	1	1,535	14.0	9.9	32.5
	Chiradzulu	6-1	Chimwawa	1	4.30	266	0	1	3,484	31.7	12.2	15.4
	Blantyre	5	Chikuli	0	3.10	1,654	1	1	3,236	29.4	43.5	51.9
	Blantyre	5	Mombo	1	2.65	572	0	1	2,333	21.2	19.1	23.6
	Mwanza	8-2	Tulonkohdo	0	16.60	1,975	0	1	13,192	119.9	21.7	25.8
	Mwanza	5	Thambani	1	21.00	1,930	1	0	16,538	150.3	71.7	105.0
	Neno	Mwanza 6-2	Kam'mwamba	0	10.00	1,380	0	1	8,072	73.4	23.4	26.3
	Neno	Mwanza 7-1	Matope	0	8.40	1,100	0	1	6,787	61.7	35.8	63.6
	Thyolo	5	Nansadi	0	3.80	456	1	0	3,243	29.5	43.7	93.6
	Thyolo	6-1	Lalakani	0	4.20	283	0	1	3,409	31.0	4.3	5.2
	Mulanje	5	Chinyama	2	20.20	568	0	2	15,664	142.4	37.5	45.0
	Mulanje	6-1	Nanthombozi	0	5.20	526	1	0	4,292	39.0	35.4	41.5
	Phalombe	6-1	Phaloni	0	12.60	880	0	2	9,954	90.5	27.0	28.3
	Phalombe	5	Mlomba	1	14.40	1,355	1	1	11,621	105.6	66.8	76.4
Chikwawa	5	Mitondo	2	10.20	919	1	1	8,330	75.7	140.0	143.6	
Chikwawa	5	Lin vunzu	2	7.90	2,141	1	1	6,949	63.2	84.0	86.9	
Nsanje	5	Tengani	0	0.80	1,300	1	1	1,397	12.7	49.8	102.6	
Nsanje	5	Mankhokwe	0	0.02	500	0	1	333	3.0	19.8	43.8	
Total				65	831.02	82,183	33	53	653,090	5,937		

Chapter 3. Revision of Rural Electrification Plan

3.1 Improvement of Electricity Demand Forecast Method

The electricity demands of the un-electrified TCs were forecasted in the Master Plan using correlation between the number of household in the TC and the electricity demand in the electrified TCs acquired through Socio-Economic Survey. The electricity demand forecast method, however, has the following discussion points.

- (1) In electricity demand forecast methods, there are two major approaches, the macro approach and the micro approach (the end-user approach). The macro approach is a method in electricity demand forecasts using statistics of the macro economic data, and the micro approach is a method in electricity demand forecasts using unit demands estimated from the power consumption of customers. The electricity demand forecast used in the Master Plan is the macro approach using the number of households as a variable. Although it is imagined that this was because of the unavailability of macro economic indicators in un-electrified TCs, the electricity demand forecast by only one variable, the number of households, does not include the influence of electricity demand caused by other economic activities and it lacks flexibility.
- (2) The number of households used in Master Plan electricity demand forecast for un-electrified TCs was “the number of households using the TC”, not “the number of households in the TC.”
- (3) Although the results of the electricity consumption survey in Socio-Economic Survey is useful for electricity demand forecasts of un-electrified TCs, it was used only for understanding present demand conditions of electrified TCs.

Therefore, the JICA Study Team determined to improve the electricity demand forecast method through discussions with the DOE staff.

In the Study, the demand forecast method is divided into a method for Phase 5, a method for Phase 6 and for later. This is because of a shortage in time to analyze the results of Socio-Economic Survey in detail since the results of the electricity demand forecast for Phase 5 would be needed by the end of March 2004, for the first task in Malawi. Therefore, the JICA Study Team decided to establish a simple version for Phase 5 and a full version for Phase 6 and later which the results of Socio-Economic Survey would reflect as much as possible.

3.1.1 Basic Policies for Electricity Demand Forecast

Through discussions with the DOE staff, the JICA Study Team decided the basic policies for the electricity demand forecast for un-electrified TCs as follows. The policies for Phase 5 and Phase 6 and later are mentioned in their respective sections.

- (1) The forecast duration is until 2020 along with the Master Plan
- (2) The end-user method that can easily reflect electricity demand conditions in un-electrified TCs is adopted.
- (3) Although the target facilities for electrification by the DOE are public facilities, shops and households are also targets since a part of these facilities will be also connected after electrification.

3.1.2 Basic Assumptions for Electricity Demand Forecast

Through discussions with the DOE staff, the JICA Study Team decided the basic assumptions for the electricity demand forecast for un-electrified TCs as follows. The policies for Phase 5 and Phase 6 and later are mentioned in their respective sections.

- (1) The base of calculation is the Socio-Economic Survey conducted in 2001.
- (2) All public facilities in TCs immediately connected after electrification.
- (3) Existing maize mills in TCs immediately connected after electrification.
- (4) "The number of households using the TC" which was used in Master Plan is used for calculation of maize mill increment.
- (5) The ratio increase (1.27%/year) of the number of households in Master Plan is used for increment calculation of the number of households.
- (6) The increase in the number of maize mills (1set/30.5 households) in Master Plan is used for increment calculation of the number of maize mills.
- (7) The sheller⁸⁾ of maize mill is not considered because of uncertainty of the number in the future
- (8) The electric devices for the electricity demand forecast are shown in Table 3-1. The average power consumption of each device was calculated from the results of the Socio-Economic Survey.

Table 3-1 Electric devices used in demand forecast

Electric Device	Power Consumption (W)
1) Incandescent Light	100
2) Fluorescent Light	40
3) Cooking Device	2,500 ⁷⁾
4) Refrigerator	280
5) Radio	10
6) Cassette/CD Player	30
7) Television	80
8) Video Cassette Recorder	20
9) Electric Iron	1,000
10) Electric Heater	1,200
11) Electric Fan	50
12) Air Conditioner	1,000
13) Mill	20,000
14) Computer	200
15) Others	200

⁷ 1,600W was used in the electricity demand forecast system for Phase 6 and later because of later analysis.

⁸ A peeler of maize mill. The power consumption is 15kW. Although there are many in urban areas, there are relatively less in rural areas.

3.1.3 Electricity Demand Forecast for Phase 5

(1) Policies

From the results of discussions with the DOE staff, the policies of the electricity demand forecast for Phase 5 are as follows.

- The completion year of electrification constructions of Phase 5 is 2004, and the electricity demand is forecasted from that year.
- The target TCs for the electricity demand forecast are 54 TCs. The list of target TCs is shown in Table 3-2.
- The unit demands are assumed through discussions with the DOE staff based on the results of the electric device usage survey of electrified TCs in Socio-Economic Survey. 3 sheets of results in each facility are random-sampled for analysis.

Table 3-2 List of Target TCs in Electricity Demand Forecast for Phase 5

Region	District	TC Name	Region	District	TC Name	
Northern	Chitipa	Nthalire	Southern	Mangochi	Makanjira	
		Wenya			Chilipa	
	Karonga	Mulare		Machinga	Chikwewu	
		Hara			Nampeya	
	Rumphi	Katowo		Balaka	Chendausiku	
		Chitimba			Kwitanda	
	Nkhata Bay	Khondowe		Zomba	Jenale	
		Kavuzi			Sunuzi	
	Mzinba	Edingeni		Chiradzulu	Kanje	
		Mnyamula			Chimwawa	
	Central	Kasungu		Chamama	Blantyre	Chikuli
				Mpepa		Mombo
Nkhotakota		Mkaika	Mwanza	Tulonkondo		
		Dwambadzi		Thambani		
Ntchisi		Nthesa	Neno	Kam'mwamba		
		Khuwi		Matope		
Dowa		Thambwe	Thyolo	Nansadi		
		Bowe		Lalakani		
Salima		Kandulu	Mulanje	Chinyama		
		Chilambula		Nanthombozi		
Lilongwe		Chilobwe	Phalombe	Phaloni		
		Nyanja		Mlomba		
Mchinji		Mkanda	Chikwawa	Mitondo		
		Chiosya		Linvunzu		
Dedza		Kabwazi	Nsanje	Tengani		
	Golomoti	Mankhokwe				
Ntcheu	Ntonda					
	Kasinje					

(d) The target facilities for the electricity demand forecast are as follows. From discussions with the DOE staff, Teacher's Development Center, Staff House, Police Post and Admarc are added since they are important facilities in a TC. Police facilities are divided into three categories; Police Station, Police Post and Police Unit because of significant differences in facility scale and the number of police persons present. In addition, Under Five Clinic and Maternity are unified into "Clinic" since the electricity demand patterns of both facilities are almost the same.

As for the business entities, there were 12 categories in total in Master Plan such as Grocery Retail Shop and Bottle Store. Since the JICA Study Team could not find obvious differences among them except Maize mill in the power consumption study, the business entities are divided into 2 categories; "Maize Mill" and "Shop."

- Public Facility (17 facilities)

Secondary School	Police Post
Primary School	Police Unit
Teacher's Development Center	Admarc
Staff House	Government Office
Hospital	Church
Health Center	Mosque
Clinic	Court
Post Office	Other Public Facilities
Police Station	

- Business Entity (2 facilities)

Maize Mill	Shop
------------	------

- Household

(e) The JICA Study Team calculates an electricity demand forecast considering a maize mill increment and not considering the increment for a TC.

(2) Assumptions

Through discussions with the DOE staff, the JICA Study Team decided to make the electricity demands forecast system for Phase 5 based on the basic assumptions in 3.1.3 and the following assumptions.

- The JICA Study Team calculates electricity demand forecasts using the demand unit for each facility as a complete power consumption pattern for 2020, and then decreases the demand to 2004 using a household increase ratio from viewpoints of a lack of time and utilization of the results of Socio-Economic Survey in Master Plan as much as possible.
- The JICA Study Team sets the power factors at 0.8 for a maize mill and 0.9 for the other facilities in the transformer calculation.
- Although the results of electrified TCs in Socio-Economic Survey indicate that the connection ratio of shops was about 53.9% in average and that of households was 40.7% in average, the JICA Study Team set the connection ratios of both types 50% for easy understanding.

(3) Supposition of Unit Demand

Based on the results of Socio-Economic Survey and discussions with the DOE staff, the JICA Study Team assumed the unit demands for 17 public facilities, maize mill, shop and household. The unit demands were assumed by average utilization forms of each facility analyzed based on the results of Socio-Economic Survey and discussions with the DOE staff. The unit demands are shown in Appendix 1.

(4) Electricity Demand Forecast System for Phase 5

Based on the mentioned policies and assumptions, the JICA Study Team established the electricity demand forecast system for Phase 5 on Microsoft Excel using the assumed unit demands. For easy usage of the system after the Study for the DOE staff, complicated operations were omitted. All inputting operation is only the number of targeted facilities on the sheet also used in FS, and the system automatically calculates the electricity demand forecasts until 2020 and a necessary transformer capacity. In addition, the graph of yearly change of electricity demand visually makes easier understanding. These results will be used for the determination of a transmission capacity.

To avoid confusion, the JICA Study Team used the same sheet as the Master Plan's for input as much as possible and revised only a part of the sheet.

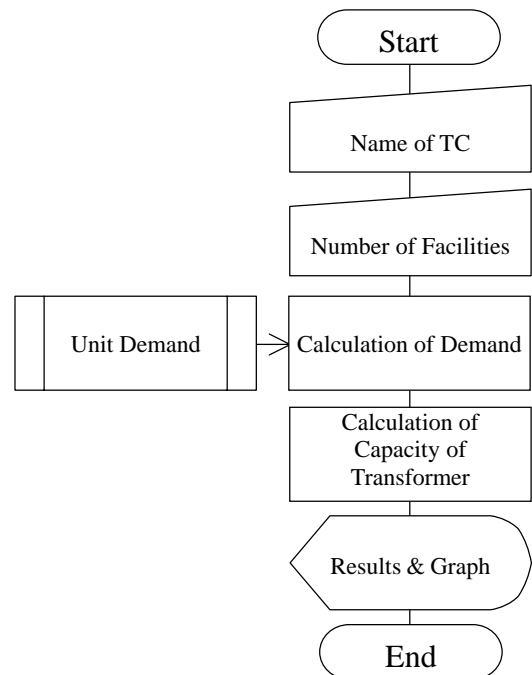


Figure 3-1 Flow Chart of Electricity Demand Forecast System for Phase5

The system flow chart, the data input sheet and the example of the electricity demand forecast result are respectively shown in Figure 3-1, Figure 3-2 and Figure 3-3.

(5) Results of Electricity Demand Forecast

The results of the electricity demand forecast for 54 TCs calculated by the electricity demand forecast system for Phase 5 are shown in Table 3-3.

(6) Verification of Results

Compared with the results of the system and the Master Plan at the year 2020, the average maximum demand is 27.9% less and the average power consumption is 29.3% less. Since the DOE staff and ESCOM staff have felt that the results in the Master Plan were too high they judged that the results in Follow-up Study were more realistic.

Check Sheet for Demand Forecast (Public Facility and Business Entity)

TC DATA FORM: FEASIBILITY STUDY FOR MAREP PHASE V DATE: _____

DISTRICT: _____ TA: _____ TC NAME: _____ DISTANCE FROM DL: _____

LOCATION BY GPS: _____ Market Fee: _____ IRR: _____

No. Of PUBLIC FACILITIES

Facility	Number			Number			Number			Number			
	M/P	Survey	Planned	M/P	Survey	Planned	M/P	Survey	Planned	M/P	Survey	Planned	
Secondary School:		1		Health Center:		0	Police Unit:		0	Court:		0	
Primary School:		1		Under Five Clinic:		0	Admarc:		1	Other Public Facilities:		1	
Teacher's Training Center:		2		Post Office:		1	Government Offices:		1				
Staff House:		1		Police Station:		0	Church:		2				
Hospital:		1		Police Post:		1	Mosque:		0				
TOTAL PUBLIC FACILITIES: 0 13 0													
Facility	Number			Number			Number			Number			
	M/P	Survey	Planned	M/P	Survey	Planned	M/P	Survey	Planned	M/P	Survey	Planned	
Markets:				Maize Mills:	1	1	Restaurants:				Rest Houses:		
Battery Charge Stations:				Shops:		20	Other BE:						
TOTAL BUSINESS ENTITIES: 1 21 0 Total Number for Demand Forecast without Maize Mills: 20 (A rest house is counted as 5 business entities)													
Type	Number												
	Census	Survey											
Number of Household:	300	20											

Figure 3-2 Sheet for Inputting the Number of Facilities

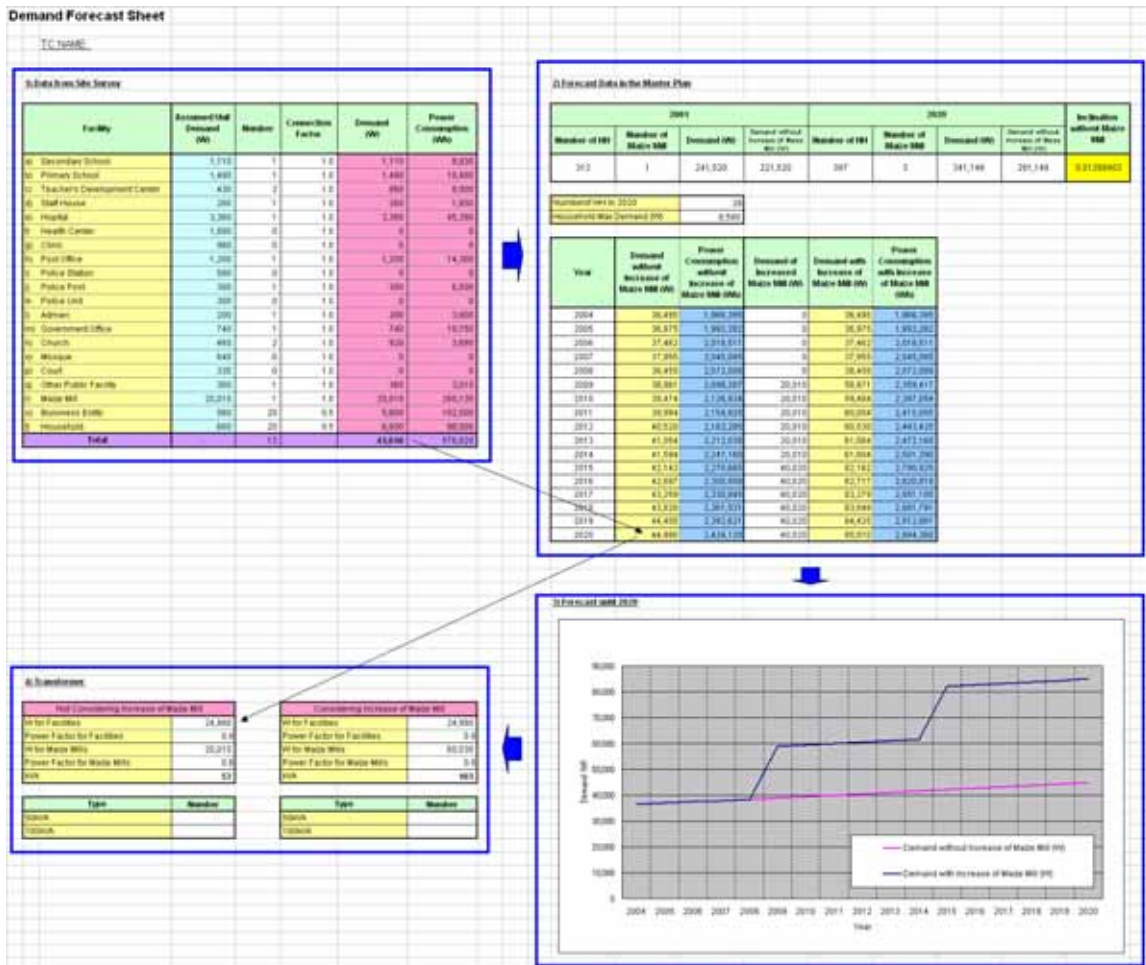


Figure 3-3 Electricity Demand Forecast Sheet for Phase 5

Table 3-3 Results of Electricity Demand Forecast for Phase 5 (1/6)

Region	District	TC	Maize Mill Increase		2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	
Northern	Chitipa	Nthalire	Included	kW	83.8	84.7	85.6	86.6	87.5	108.5	109.5	110.5	111.5	112.5	113.5	114.5	135.6	136.7	137.7	138.8	139.9	
				MWh/y	404.6	409.0	413.5	418.1	422.7	522.4	527.1	531.9	536.7	541.6	546.5	551.5	651.5	656.6	661.8	667.0	672.2	
			Excluded	kW	83.8	84.7	85.6	86.6	87.5	88.5	89.5	90.5	91.5	92.5	93.5	94.5	95.6	96.6	97.7	98.8	99.9	
		MWh/y		404.6	409.0	413.5	418.1	422.7	427.4	432.1	436.9	441.7	446.6	451.6	456.6	461.6	466.7	471.9	477.1	482.3		
		Wenya	Included	kW	34.6	35.0	35.5	36.0	36.4	36.9	37.4	37.9	38.4	38.9	39.4	39.9	40.5	41.0	41.5	42.1	42.6	
				MWh/y	164.3	166.5	168.7	170.9	268.1	270.4	272.7	275.1	277.5	279.9	282.3	379.8	382.3	384.8	387.4	390.0	392.6	
	Excluded		kW	34.6	35.0	35.5	36.0	36.4	36.9	37.4	37.9	38.4	38.9	39.4	39.9	40.5	41.0	41.5	42.1	42.6		
		MWh/y	164.3	166.5	168.7	170.9	173.2	175.5	177.8	180.1	182.5	184.9	187.4	189.9	192.4	194.9	197.5	200.1	202.7			
	Karonga	Mulare	Included	kW	76.3	76.7	77.0	77.4	77.8	78.2	78.5	78.9	79.3	79.7	80.1	80.5	80.9	81.3	81.7	82.1	82.5	
				MWh/y	364.1	365.9	367.7	369.5	371.3	373.1	374.9	376.7	378.6	380.4	382.3	384.1	386.0	387.9	389.8	391.7	393.6	
			Excluded	kW	76.3	76.7	77.0	77.4	77.8	78.2	78.5	78.9	79.3	79.7	80.1	80.5	80.9	81.3	81.7	82.1	82.5	
		MWh/y		364.1	365.9	367.7	369.5	371.3	373.1	374.9	376.7	378.6	380.4	382.3	384.1	386.0	387.9	389.8	391.7	393.6		
		Hara	Included	kW	9.9	10.0	10.1	10.2	10.3	10.5	10.6	10.7	10.9	11.0	11.1	11.3	11.4	11.5	11.7	11.8	12.0	
				MWh/y	42.7	43.2	43.7	44.2	44.8	45.3	45.9	46.4	47.0	47.6	48.1	48.7	49.3	49.9	50.5	51.1	51.7	
	Excluded		kW	9.9	10.0	10.1	10.2	10.3	10.5	10.6	10.7	10.9	11.0	11.1	11.3	11.4	11.5	11.7	11.8	12.0		
		MWh/y	42.7	43.2	43.7	44.2	44.8	45.3	45.9	46.4	47.0	47.6	48.1	48.7	49.3	49.9	50.5	51.1	51.7			
	Rumphi	Katowo	Included	kW	76.3	77.2	78.1	79.0	79.9	80.8	81.7	82.6	103.6	104.5	105.5	106.5	107.5	108.5	109.5	110.5	111.5	
				MWh/y	387.5	391.9	396.4	400.9	405.4	410.0	414.7	419.4	424.2	429.0	433.9	438.9	443.9	448.9	454.0	459.2	464.4	
			Excluded	kW	76.3	77.2	78.1	79.0	79.9	80.8	81.7	82.6	83.6	84.5	85.5	86.5	87.4	88.4	89.5	90.5	91.5	
				MWh/y	387.5	391.9	396.4	400.9	405.4	410.0	414.7	419.4	424.2	429.0	433.9	438.9	443.9	448.9	454.0	459.2	464.4	
		Chitimba	Included	kW	25.8	26.1	26.5	26.9	27.2	27.6	28.0	28.4	28.8	29.2	29.6	30.0	30.5	30.9	31.3	31.8	32.2	
				MWh/y	127.3	129.1	130.9	132.7	134.6	136.5	138.4	140.4	142.3	144.3	146.4	148.4	150.5	152.6	154.8	156.9	159.1	
			Excluded	kW	25.8	26.1	26.5	26.9	27.2	27.6	28.0	28.4	28.8	29.2	29.6	30.0	30.5	30.9	31.3	31.8	32.2	
				MWh/y	127.3	129.1	130.9	132.7	134.6	136.5	138.4	140.4	142.3	144.3	146.4	148.4	150.5	152.6	154.8	156.9	159.1	
		Nkhata Bay	Sanga	Included	kW	11.2	11.4	11.5	11.7	11.8	12.0	12.2	12.3	12.5	12.7	12.8	13.0	13.2	13.4	13.5	13.7	13.9
					MWh/y	54.4	55.1	55.9	56.6	57.4	58.1	58.9	59.7	60.5	61.3	62.2	63.0	63.9	64.7	65.6	66.5	67.4
				Excluded	kW	11.2	11.4	11.5	11.7	11.8	12.0	12.2	12.3	12.5	12.7	12.8	13.0	13.2	13.4	13.5	13.7	13.9
			MWh/y		54.4	55.1	55.9	56.6	57.4	58.1	58.9	59.7	60.5	61.3	62.2	63.0	63.9	64.7	65.6	66.5	67.4	
	Kavuzi		Included	kW	36.0	36.5	36.9	37.4	37.8	38.3	38.8	39.2	39.7	40.2	40.7	41.2	41.7	42.2	42.7	43.2	43.8	
				MWh/y	168.9	170.9	173.0	175.1	177.3	179.5	181.7	183.9	186.1	188.4	190.7	193.0	195.4	197.8	200.2	202.7	205.1	
		Excluded	kW	36.0	36.5	36.9	37.4	37.8	38.3	38.8	39.2	39.7	40.2	40.7	41.2	41.7	42.2	42.7	43.2	43.8		
	MWh/y		168.9	170.9	173.0	175.1	177.3	179.5	181.7	183.9	186.1	188.4	190.7	193.0	195.4	197.8	200.2	202.7	205.1			
	Mzinba	Edingeni	Included	kW	60.2	60.4	60.5	60.7	60.9	61.0	61.2	61.4	61.5	61.7	61.9	62.1	62.2	62.4	62.6	62.7	62.9	
				MWh/y	280.8	281.5	282.3	283.1	283.9	284.6	285.4	286.2	287.0	287.8	288.6	289.4	290.2	291.0	291.8	292.6	293.4	
			Excluded	kW	60.2	60.4	60.5	60.7	60.9	61.0	61.2	61.4	61.5	61.7	61.9	62.1	62.2	62.4	62.6	62.7	62.9	
		MWh/y		280.8	281.5	282.3	283.1	283.9	284.6	285.4	286.2	287.0	287.8	288.6	289.4	290.2	291.0	291.8	292.6	293.4		
Manyamula		Included	kW	65.1	65.8	66.5	67.2	67.9	68.6	69.4	70.1	70.8	71.6	72.4	73.2	73.9	74.7	75.5	76.3	77.1		
			MWh/y	311.6	314.9	318.3	321.7	325.1	328.6	332.1	335.6	339.2	342.9	346.5	445.2	448.9	452.7	456.5	460.4	464.3		
	Excluded	kW	65.1	65.8	66.5	67.2	67.9	68.6	69.4	70.1	70.8	71.6	72.4	73.1	73.9	74.7	75.5	76.3	77.1			
MWh/y		311.6	314.9	318.3	321.7	325.1	328.6	332.1	335.6	339.2	342.9	346.5	350.2	354.0	357.8	361.6	365.5	369.4				

Table 3-3 Results of Electricity Demand Forecast for Phase 5 (2/6)

Region	District	TC	Maize Mill Increase		2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Central	Kasungu	Chamama	Included	kW	136.6	137.3	138.0	138.7	139.4	140.1	140.8	141.6	142.3	143.0	143.7	144.5	145.2	145.9	146.7	147.4	148.2
				MWh/y	701.2	704.8	708.3	711.9	715.6	719.2	722.9	726.5	730.2	733.9	737.7	741.4	745.2	749.0	752.8	756.6	760.4
			Excluded	kW	136.6	137.3	138.0	138.7	139.4	140.1	140.8	141.6	142.3	143.0	143.7	144.5	145.2	145.9	146.7	147.4	148.2
		MWh/y		701.2	704.8	708.3	711.9	715.6	719.2	722.9	726.5	730.2	733.9	737.7	741.4	745.2	749.0	752.8	756.6	760.4	
		Mpepa		Included	kW	61.0	61.3	61.5	61.8	62.1	62.3	62.6	62.9	63.2	63.4	63.7	64.0	64.3	64.6	64.8	65.1
			MWh/y		285.0	286.2	287.5	288.7	290.0	291.3	292.5	293.8	295.1	296.4	297.7	299.0	300.3	301.6	302.9	304.2	305.5
	Excluded		kW	61.0	61.3	61.5	61.8	62.1	62.3	62.6	62.9	63.2	63.4	63.7	64.0	64.3	64.6	64.8	65.1	65.4	
		MWh/y	285.0	286.2	287.5	288.7	290.0	291.3	292.5	293.8	295.1	296.4	297.7	299.0	300.3	301.6	302.9	304.2	305.5		
		Nkhotakota	Mkaika	Included	kW	130.9	132.3	133.8	135.3	136.8	138.3	139.8	141.4	143.0	144.6	146.2	147.8	149.4	151.1	152.8	154.5
	MWh/y				667.6	675.0	682.6	690.2	697.8	705.6	713.4	721.4	729.4	737.5	745.7	754.0	762.4	770.9	779.5	788.1	796.9
	Excluded			kW	130.9	132.3	133.8	135.3	136.8	138.3	139.8	141.4	143.0	144.6	146.2	147.8	149.4	151.1	152.8	154.5	156.2
			MWh/y	667.6	675.0	682.6	690.2	697.8	705.6	713.4	721.4	729.4	737.5	745.7	754.0	762.4	770.9	779.5	788.1	796.9	
			Dwambadzi	Included	kW	66.9	67.8	68.7	69.6	70.5	71.4	72.3	73.3	74.3	75.2	76.2	77.2	78.2	79.3	80.3	81.4
	MWh/y				343.7	348.2	352.8	357.4	362.1	366.9	371.7	376.6	381.6	386.6	391.7	396.9	402.1	407.4	412.7	418.2	423.7
	Excluded	kW		66.9	67.8	68.7	69.6	70.5	71.4	72.3	73.3	74.3	75.2	76.2	77.2	78.2	79.3	80.3	81.4	82.5	
		MWh/y	343.7	348.2	352.8	357.4	362.1	366.9	371.7	376.6	381.6	386.6	391.7	396.9	402.1	407.4	412.7	418.2	423.7		
		Ntchisi	Nthesa	Included	kW	49.0	49.2	49.4	49.6	49.8	50.0	50.2	50.4	50.6	50.8	50.9	51.1	51.3	51.5	51.7	51.9
	MWh/y				249.4	250.4	251.3	252.3	253.3	254.3	255.2	256.2	257.2	258.2	259.2	260.2	261.2	262.2	263.2	264.2	265.2
	Excluded			kW	49.0	49.2	49.4	49.6	49.8	50.0	50.2	50.4	50.6	50.8	50.9	51.1	51.3	51.5	51.7	51.9	52.1
			MWh/y	249.4	250.4	251.3	252.3	253.3	254.3	255.2	256.2	257.2	258.2	259.2	260.2	261.2	262.2	263.2	264.2	265.2	
			Khuwi	Included	kW	52.3	52.7	53.0	53.4	53.8	54.2	54.6	54.9	55.3	55.7	56.1	56.5	56.9	57.3	57.7	58.1
	MWh/y				246.3	248.1	249.8	251.6	253.3	255.1	256.9	258.7	260.6	262.4	264.3	266.1	268.0	269.9	271.8	273.7	275.6
	Excluded	kW		52.3	52.7	53.0	53.4	53.8	54.2	54.6	54.9	55.3	55.7	56.1	56.5	56.9	57.3	57.7	58.1	58.5	
		MWh/y	246.3	248.1	249.8	251.6	253.3	255.1	256.9	258.7	260.6	262.4	264.3	266.1	268.0	269.9	271.8	273.7	275.6		
Dowa		Thambwe	Included	kW	104.2	105.5	106.7	107.9	109.2	110.5	111.8	113.1	114.4	115.7	117.1	118.4	119.8	121.2	122.6	124.1	125.5
	MWh/y			571.6	578.3	585.1	591.9	598.8	605.8	612.9	620.0	627.2	634.6	642.0	649.4	657.0	664.7	672.4	680.3	688.2	
	Excluded		kW	104.2	105.5	106.7	107.9	109.2	110.5	111.8	113.1	114.4	115.7	117.1	118.4	119.8	121.2	122.6	124.1	125.5	
		MWh/y	571.6	578.3	585.1	591.9	598.8	605.8	612.9	620.0	627.2	634.6	642.0	649.4	657.0	664.7	672.4	680.3	688.2		
		Bowe	Included	kW	144.7	146.1	147.5	148.9	150.3	151.7	153.1	154.5	156.0	157.5	158.9	160.4	161.9	163.5	165.0	166.6	168.1
	MWh/y			758.1	765.2	772.4	779.7	787.0	794.4	801.9	809.4	817.0	824.7	832.4	840.3	848.2	856.1	864.2	872.3	880.5	
Excluded	kW		144.7	146.1	147.5	148.9	150.3	151.7	153.1	154.5	156.0	157.5	158.9	160.4	161.9	163.5	165.0	166.6	168.1		
	MWh/y	758.1	765.2	772.4	779.7	787.0	794.4	801.9	809.4	817.0	824.7	832.4	840.3	848.2	856.1	864.2	872.3	880.5			
	Salima	Kandulu	Included	kW	37.0	37.5	38.0	38.5	39.0	39.5	40.0	40.5	41.1	41.6	42.2	42.7	43.3	43.8	44.4	45.0	45.6
MWh/y				182.5	184.9	187.3	189.8	192.3	194.8	197.4	200.0	202.6	205.3	208.0	210.7	213.5	216.3	219.1	222.0	224.9	
Excluded			kW	37.0	37.5	38.0	38.5	39.0	39.5	40.0	40.5	41.1	41.6	42.2	42.7	43.3	43.8	44.4	45.0	45.6	
		MWh/y	182.5	184.9	187.3	189.8	192.3	194.8	197.4	200.0	202.6	205.3	208.0	210.7	213.5	216.3	219.1	222.0	224.9		
		Chilambula	Included	kW	29.9	30.1	30.4	30.7	30.9	31.2	31.5	31.8	32.1	32.3	32.6	32.9	33.2	33.5	33.8	34.1	34.4
MWh/y				142.8	144.1	145.4	146.6	148.0	149.3	150.6	152.0	153.3	154.7	156.1	157.5	158.9	160.3	161.7	163.2	164.6	
Excluded	kW		29.9	30.1	30.4	30.7	30.9	31.2	31.5	31.8	32.1	32.3	32.6	32.9	33.2	33.5	33.8	34.1	34.4		
	MWh/y	142.8	144.1	145.4	146.6	148.0	149.3	150.6	152.0	153.3	154.7	156.1	157.5	158.9	160.3	161.7	163.2	164.6			

Table 3-3 Results of Electricity Demand Forecast for Phase 5 (3/6)

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Region	District	TC	Maize Mill Increase		2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	
Central	Lilongwe	Chilobwe	Included	kW	32.2	32.7	33.1	33.5	33.9	34.4	34.8	55.3	55.7	56.2	56.7	57.1	57.6	58.1	58.6	79.1	79.6	
				MWh/y	147.0	148.9	150.8	152.7	154.7	156.7	158.7	255.7	257.8	259.9	262.0	264.2	266.3	268.5	270.8	368.0	370.3	
			Excluded	kW	32.2	32.7	33.1	33.5	33.9	34.4	34.8	35.3	35.7	36.2	36.6	37.1	37.6	38.1	38.6	39.1	39.6	
		Mchinji	Nyanja	Included	kW	22.9	23.1	23.3	23.5	23.7	23.9	24.1	24.3	24.5	24.8	25.0	25.2	25.4	25.6	25.8	26.0	26.3
					MWh/y	107.3	108.2	109.1	110.0	110.9	111.9	112.8	113.8	114.7	115.7	116.7	117.7	118.7	119.7	120.7	121.7	122.7
				Excluded	kW	22.9	23.1	23.3	23.5	23.7	23.9	24.1	24.3	24.5	24.8	25.0	25.2	25.4	25.6	25.8	26.0	26.3
	Mkanda		Included	kW	130.9	132.3	133.8	135.3	136.8	138.3	139.8	141.4	143.0	144.6	146.2	147.8	149.4	151.1	152.8	154.5	156.2	
				MWh/y	667.6	675.0	682.6	690.2	697.8	705.6	713.4	721.4	729.4	737.5	745.7	754.0	762.4	770.9	779.5	788.1	796.9	
				Excluded	kW	106.4	107.3	108.2	109.1	110.0	110.9	111.9	112.8	113.7	114.7	115.7	116.6	117.6	118.6	119.6	140.6	141.6
		Chiosya	Included	MWh/y	538.3	542.8	547.4	551.9	556.6	561.2	565.9	570.6	575.4	580.2	585.1	590.0	594.9	599.9	604.9	704.9	710.0	
				Excluded	kW	106.4	107.3	108.2	109.1	110.0	110.9	111.9	112.8	113.7	114.7	115.7	116.6	117.6	118.6	119.6	120.6	121.6
			MWh/y	538.3	542.8	547.4	551.9	556.6	561.2	565.9	570.6	575.4	580.2	585.1	590.0	594.9	599.9	604.9	610.0	615.1		
	Dedza	Kabwazi	Included	kW	86.9	87.3	87.7	88.0	88.4	88.8	89.2	89.5	89.9	90.3	90.7	91.1	91.5	91.9	92.3	92.7	93.1	
				MWh/y	429.5	431.4	433.2	435.1	437.0	438.8	440.7	442.6	444.5	446.4	448.3	450.2	452.2	454.1	456.0	458.0	460.0	
			Excluded	kW	86.9	87.3	87.7	88.0	88.4	88.8	89.2	89.5	89.9	90.3	90.7	91.1	91.5	91.9	92.3	92.7	93.1	
		Golomoti	Included	MWh/y	429.5	431.4	433.2	435.1	437.0	438.8	440.7	442.6	444.5	446.4	448.3	450.2	452.2	454.1	456.0	458.0	460.0	
				Excluded	kW	89.9	90.3	90.7	91.0	91.4	91.7	92.1	92.4	92.8	93.2	93.5	93.9	94.3	94.6	95.0	95.4	95.8
			MWh/y	437.3	439.0	440.7	442.5	444.2	446.0	447.7	449.5	451.2	453.0	454.8	456.5	458.3	460.1	461.9	463.7	465.6		
	Ntcheu	Ntonda	Included	kW	24.1	24.5	24.8	25.1	25.5	25.8	26.2	26.6	26.9	27.3	27.7	28.1	28.5	28.8	29.2	29.7	30.1	
				MWh/y	113.8	115.3	116.9	118.6	120.2	121.9	123.5	125.2	127.0	128.7	130.5	132.3	134.1	136.0	137.9	139.8	141.7	
			Excluded	kW	24.1	24.5	24.8	25.1	25.5	25.8	26.2	26.6	26.9	27.3	27.7	28.1	28.5	28.8	29.2	29.7	30.1	
		Kasinje	Included	MWh/y	113.8	115.3	116.9	118.6	120.2	121.9	123.5	125.2	127.0	128.7	130.5	132.3	134.1	136.0	137.9	139.8	141.7	
				Excluded	kW	56.1	56.7	57.3	57.9	58.5	59.2	59.8	60.4	61.1	61.7	62.4	63.1	63.7	64.4	65.1	65.8	66.5
			MWh/y	260.8	263.6	266.4	269.3	272.1	275.1	278.0	281.0	284.0	287.0	290.1	293.2	296.3	299.5	302.7	305.9	309.2		
	Southern	Mangochi	Makanjira	Included	kW	142.9	144.1	145.4	146.6	147.9	149.1	150.4	151.7	153.0	154.3	155.6	156.9	158.3	159.6	161.0	162.4	163.8
					MWh/y	707.9	713.9	720.0	726.2	732.4	738.6	744.9	751.3	757.7	764.2	770.7	777.3	783.9	790.6	797.4	804.2	811.0
				Excluded	kW	142.9	144.1	145.4	146.6	147.9	149.1	150.4	151.7	153.0	154.3	155.6	156.9	158.3	159.6	161.0	162.4	163.8
			Chilipa	Included	MWh/y	707.9	713.9	720.0	726.2	732.4	738.6	744.9	751.3	757.7	764.2	770.7	777.3	783.9	790.6	797.4	804.2	811.0
					Excluded	kW	67.2	67.3	67.5	67.6	67.8	67.9	68.1	68.2	68.4	68.5	68.7	68.8	69.0	69.1	69.3	69.4
				MWh/y	339.8	340.6	341.3	342.1	342.8	343.6	344.3	345.1	345.9	346.6	347.4	348.1	348.9	349.7	350.4	351.2	352.0	

Table 3-3 Results of Electricity Demand Forecast for Phase 5 (4/6)

Region	District	TC	Maize Mill Increase		2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020		
Southern	Machinga	Chikwewu	Included	kW	60.6	61.4	62.3	63.2	64.1	85.0	86.0	86.9	87.9	88.8	89.8	110.8	111.9	112.9	113.9	115.0	116.1		
				MWh/y	323.1	327.7	332.4	337.2	342.0	441.8	446.8	451.8	457.0	462.1	467.4	567.7	573.1	578.6	584.2	589.8	595.5		
			Excluded	kW	60.6	61.4	62.3	63.2	64.1	65.0	66.0	66.9	67.9	68.8	69.8	70.8	71.8	72.9	73.9	75.0	76.0		
		MWh/y		323.1	327.7	332.4	337.2	342.0	346.9	351.9	356.9	362.0	367.2	372.5	377.8	383.2	388.7	394.3	399.9	405.6			
		Nampeya	Included	kW	29.9	30.4	30.8	31.2	51.7	52.2	52.6	53.1	53.6	54.1	74.6	75.1	75.6	76.1	76.6	97.1	97.7		
				MWh/y	154.1	156.3	158.6	160.9	258.1	260.5	262.9	265.3	267.8	270.3	367.7	370.3	372.9	375.6	378.2	475.9	478.7		
	Excluded		kW	29.9	30.4	30.8	31.2	31.7	32.2	32.6	33.1	33.6	34.1	34.5	35.0	35.6	36.1	36.6	37.1	37.7			
		MWh/y	154.1	156.3	158.6	160.9	163.2	165.6	167.9	170.4	172.8	175.3	177.9	180.4	183.0	185.7	188.4	191.1	193.8				
	Balaka	Chendausiku	Included	kW	28.8	29.2	29.6	30.0	30.4	30.9	31.3	31.8	52.2	52.7	53.2	53.6	54.1	54.6	55.1	55.6	56.1		
				MWh/y	151.8	154.0	156.2	158.4	160.7	163.0	165.3	167.6	170.0	172.5	174.9	177.4	179.9	182.5	185.1	187.8	190.4		
			Excluded	kW	28.8	29.2	29.6	30.0	30.4	30.9	31.3	31.8	32.2	32.7	33.1	33.6	34.1	34.6	35.1	35.6	36.1		
		MWh/y		151.8	154.0	156.2	158.4	160.7	163.0	165.3	167.6	170.0	172.5	174.9	177.4	179.9	182.5	185.1	187.8	190.4			
		Kwitanda	Included	kW	37.9	38.3	38.6	39.0	39.3	39.7	40.1	40.4	40.8	41.2	41.6	42.0	42.4	42.8	43.2	43.6	44.0		
				MWh/y	178.0	179.6	181.3	183.0	184.7	186.4	188.2	189.9	191.7	193.5	195.3	197.1	199.0	200.8	202.7	204.6	206.5		
	Excluded		kW	37.9	38.3	38.6	39.0	39.3	39.7	40.1	40.4	40.8	41.2	41.6	42.0	42.4	42.8	43.2	43.6	44.0			
		MWh/y	178.0	179.6	181.3	183.0	184.7	186.4	188.2	189.9	191.7	193.5	195.3	197.1	199.0	200.8	202.7	204.6	206.5				
	Zomba	Jenale	Included	kW	33.7	34.1	34.5	35.0	35.4	35.9	36.3	36.8	37.2	37.7	38.2	38.6	39.1	39.6	40.1	40.6	41.1		
				MWh/y	168.3	170.4	172.6	174.7	176.9	179.1	181.4	183.6	185.9	188.2	190.6	193.0	195.4	197.8	200.3	202.8	205.3		
			Excluded	kW	33.7	34.1	34.5	35.0	35.4	35.9	36.3	36.8	37.2	37.7	38.2	38.6	39.1	39.6	40.1	40.6	41.1		
		MWh/y		168.3	170.4	172.6	174.7	176.9	179.1	181.4	183.6	185.9	188.2	190.6	193.0	195.4	197.8	200.3	202.8	205.3			
		Sunuzi	Included	kW	15.1	15.3	15.6	15.8	16.0	16.2	16.5	16.7	16.9	17.2	17.4	17.7	17.9	18.2	18.4	18.7	19.0		
				MWh/y	87.9	89.1	90.4	91.7	93.0	94.3	95.6	97.0	98.4	99.8	101.2	102.6	104.1	105.6	107.1	108.6	110.1		
	Excluded		kW	15.1	15.3	15.6	15.8	16.0	16.2	16.5	16.7	16.9	17.2	17.4	17.7	17.9	18.2	18.4	18.7	19.0			
		MWh/y	87.9	89.1	90.4	91.7	93.0	94.3	95.6	97.0	98.4	99.8	101.2	102.6	104.1	105.6	107.1	108.6	110.1				
	Chiradzulu	Kanje	Included	kW	9.9	10.1	10.2	10.4	10.5	10.7	10.8	11.0	11.1	11.3	11.5	11.6	11.8	12.0	12.1	12.3	12.5		
				MWh/y	51.0	51.7	52.5	53.2	54.0	54.8	55.6	56.4	57.2	58.0	58.8	59.7	60.5	61.4	62.3	63.2	64.1		
			Excluded	kW	9.9	10.1	10.2	10.4	10.5	10.7	10.8	11.0	11.1	11.3	11.5	11.6	11.8	12.0	12.1	12.3	12.5		
		MWh/y		51.0	51.7	52.5	53.2	54.0	54.8	55.6	56.4	57.2	58.0	58.8	59.7	60.5	61.4	62.3	63.2	64.1			
		Chimwawa	Included	kW	12.2	12.4	12.6	12.8	13.0	13.1	13.3	13.5	13.7	13.9	14.1	14.3	14.5	14.7	14.9	15.1	15.4		
				MWh/y	65.5	66.4	67.4	68.4	69.3	70.3	71.3	72.4	73.4	74.4	75.5	76.6	77.7	78.8	79.9	81.1	82.2		
Excluded	kW		12.2	12.4	12.6	12.8	13.0	13.1	13.3	13.5	13.7	13.9	14.1	14.3	14.5	14.7	14.9	15.1	15.4				
	MWh/y	65.5	66.4	67.4	68.4	69.3	70.3	71.3	72.4	73.4	74.4	75.5	76.6	77.7	78.8	79.9	81.1	82.2					
Blantyre	Chikuli	Included	kW	43.5	44.0	44.5	45.0	45.5	46.0	46.5	47.0	47.5	48.0	48.6	49.1	49.7	50.2	50.8	51.3	51.9			
			MWh/y	214.3	216.6	219.0	221.4	223.9	226.4	228.9	231.4	233.9	236.5	239.1	241.8	244.4	247.1	249.8	252.6	255.4			
		Excluded	kW	43.5	44.0	44.5	45.0	45.5	46.0	46.5	47.0	47.5	48.0	48.6	49.1	49.7	50.2	50.8	51.3	51.9			
	MWh/y		214.3	216.6	219.0	221.4	223.9	226.4	228.9	231.4	233.9	236.5	239.1	241.8	244.4	247.1	249.8	252.6	255.4				
	Mombo	Included	kW	19.1	19.3	19.6	19.9	20.1	20.4	20.7	20.9	21.2	21.5	21.8	22.1	22.4	22.7	23.0	23.3	23.6			
			MWh/y	106.7	108.2	109.6	111.1	112.6	114.1	115.7	117.2	118.8	120.4	122.0	123.7	125.3	127.0	128.7	130.5	132.2			
Excluded		kW	19.1	19.3	19.6	19.9	20.1	20.4	20.7	20.9	21.2	21.5	21.8	22.1	22.4	22.7	23.0	23.3	23.6				
	MWh/y	106.7	108.2	109.6	111.1	112.6	114.1	115.7	117.2	118.8	120.4	122.0	123.7	125.3	127.0	128.7	130.5	132.2					

Table 3-3 Results of Electricity Demand Forecast for Phase 5 (5/6)

Region	District	TC	Maize Mill Increase		2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	
Southern	Mwanza	Tulonkondo	Included	kW	21.7	21.9	22.2	22.4	22.7	22.9	23.2	23.4	23.7	23.9	24.2	24.4	24.7	25.0	25.2	25.5	25.8	
				MWh/y	95.8	96.8	97.8	98.9	100.0	101.1	102.2	103.3	104.4	105.5	106.7	107.8	109.0	110.2	111.4	112.6	113.8	
			Excluded	kW	21.7	21.9	22.2	22.4	22.7	22.9	23.2	23.4	23.7	23.9	24.2	24.4	24.7	25.0	25.2	25.5	25.8	
		MWh/y		95.8	96.8	97.8	98.9	100.0	101.1	102.2	103.3	104.4	105.5	106.7	107.8	109.0	110.2	111.4	112.6	113.8		
		Neno	Thambani	Included	kW	71.7	72.5	73.2	74.0	74.8	75.6	76.4	77.2	78.1	78.9	99.8	100.6	101.5	102.4	103.2	104.1	105.0
					MWh/y	353.5	357.3	361.1	365.0	368.9	372.9	376.8	380.9	384.9	389.1	488.2	492.4	496.6	500.9	505.3	509.6	514.1
	Excluded			kW	71.7	72.5	73.2	74.0	74.8	75.6	76.4	77.2	78.1	78.9	79.8	80.6	81.5	82.3	83.2	84.1	85.0	
			MWh/y	353.5	357.3	361.1	365.0	368.9	372.9	376.8	380.9	384.9	389.1	393.2	397.4	401.7	406.0	410.3	414.7	419.1		
	Thyolo		Kam'mwamba	Included	kW	23.4	23.5	23.7	23.9	24.1	24.2	24.4	24.6	24.8	25.0	25.1	25.3	25.5	25.7	25.9	26.1	26.3
					MWh/y	108.4	109.2	110.0	110.8	111.6	112.4	113.2	114.0	114.9	115.7	116.6	117.4	118.3	119.1	120.0	120.9	121.8
		Excluded		kW	23.4	23.5	23.7	23.9	24.1	24.2	24.4	24.6	24.8	25.0	25.1	25.3	25.5	25.7	25.9	26.1	26.3	
			MWh/y	108.4	109.2	110.0	110.8	111.6	112.4	113.2	114.0	114.9	115.7	116.6	117.4	118.3	119.1	120.0	120.9	121.8		
		Matope	Included	kW	35.8	36.3	36.7	37.2	37.6	38.1	38.5	39.0	39.5	40.0	40.5	61.0	61.5	62.0	62.5	63.0	63.6	
				MWh/y	167.1	169.1	171.2	173.3	175.5	177.6	179.8	182.0	184.2	186.5	188.8	286.0	288.4	290.8	293.2	295.6	298.1	
	Excluded		kW	35.8	36.3	36.7	37.2	37.6	38.1	38.5	39.0	39.5	40.0	40.5	41.0	41.5	42.0	42.5	43.0	43.5		
		MWh/y	167.1	169.1	171.2	173.3	175.5	177.6	179.8	182.0	184.2	186.5	188.8	191.1	193.4	195.8	198.2	200.7	203.1			
	Mulanje	Thyolo	Nansadi	Included	kW	43.7	44.3	44.8	45.4	46.0	46.6	47.2	67.8	68.4	69.0	69.6	70.3	70.9	71.6	72.2	72.9	93.6
					MWh/y	222.1	225.0	227.8	230.8	233.7	236.7	239.7	337.7	340.8	343.9	347.1	350.3	353.6	356.9	360.2	363.6	462.0
			Excluded	kW	43.7	44.3	44.8	45.4	46.0	46.6	47.2	47.8	48.4	49.0	49.6	50.3	50.9	51.6	52.2	52.9	53.6	
		MWh/y		222.1	225.0	227.8	230.8	233.7	236.7	239.7	242.8	245.9	249.0	252.2	255.4	258.7	262.0	265.3	268.7	272.1		
		Lalakani	Included	kW	4.3	4.3	4.4	4.5	4.5	4.6	4.6	4.7	4.7	4.8	4.9	4.9	5.0	5.0	5.1	5.2	5.2	
				MWh/y	22.0	22.3	22.6	22.9	23.2	23.4	23.7	24.0	24.3	24.6	24.9	25.3	25.6	25.9	26.2	26.5	26.9	
	Excluded		kW	4.3	4.3	4.4	4.5	4.5	4.6	4.6	4.7	4.7	4.8	4.9	4.9	5.0	5.0	5.1	5.2	5.2		
		MWh/y	22.0	22.3	22.6	22.9	23.2	23.4	23.7	24.0	24.3	24.6	24.9	25.3	25.6	25.9	26.2	26.5	26.9			
	Phalombe	Chinyama	Included	kW	37.5	38.0	38.4	38.8	39.3	39.7	40.2	40.6	41.1	41.5	42.0	42.5	43.0	43.5	43.9	44.4	45.0	
				MWh/y	176.8	178.8	180.8	182.8	184.9	187.0	189.1	191.3	193.4	195.6	197.8	200.1	202.3	204.6	206.9	209.3	211.7	
			Excluded	kW	37.5	38.0	38.4	38.8	39.3	39.7	40.2	40.6	41.1	41.5	42.0	42.5	43.0	43.5	43.9	44.4	45.0	
		MWh/y		176.8	178.8	180.8	182.8	184.9	187.0	189.1	191.3	193.4	195.6	197.8	200.1	202.3	204.6	206.9	209.3	211.7		
		Namthombozi	Included	kW	35.4	35.8	36.2	36.5	36.9	37.2	37.6	38.0	38.4	38.8	39.1	39.5	39.9	40.3	40.7	41.1	41.5	
				MWh/y	179.5	181.3	183.1	185.0	186.8	188.7	190.6	192.5	194.4	196.3	198.3	200.2	202.2	204.3	206.3	208.4	210.4	
	Excluded		kW	35.4	35.8	36.2	36.5	36.9	37.2	37.6	38.0	38.4	38.8	39.1	39.5	39.9	40.3	40.7	41.1	41.5		
		MWh/y	179.5	181.3	183.1	185.0	186.8	188.7	190.6	192.5	194.4	196.3	198.3	200.2	202.2	204.3	206.3	208.4	210.4			
	Phalombe	Phaloni	Included	kW	27.0	27.1	27.2	27.2	27.3	27.4	27.5	27.5	27.6	27.7	27.8	27.9	28.0	28.1	28.2	28.3		
				MWh/y	126.8	127.2	127.5	127.9	128.3	128.6	129.0	129.4	129.7	130.1	130.5	130.8	131.2	131.6	131.9	132.3	132.7	
			Excluded	kW	27.0	27.1	27.2	27.2	27.3	27.4	27.5	27.5	27.6	27.7	27.8	27.9	28.0	28.1	28.2	28.3		
		MWh/y		126.8	127.2	127.5	127.9	128.3	128.6	129.0	129.4	129.7	130.1	130.5	130.8	131.2	131.6	131.9	132.3	132.7		
Mlomba		Included	kW	66.8	67.4	68.0	68.5	69.1	69.7	70.3	70.9	71.5	72.1	72.7	73.3	73.9	74.5	75.2	75.8	76.4		
			MWh/y	328.4	331.1	333.9	336.7	339.6	342.4	345.3	348.2	351.2	354.1	357.1	360.1	363.2	366.2	369.3	372.4	375.6		
	Excluded	kW	66.8	67.4	68.0	68.5	69.1	69.7	70.3	70.9	71.5	72.1	72.7	73.3	73.9	74.5	75.2	75.8	76.4			
MWh/y		328.4	331.1	333.9	336.7	339.6	342.4	345.3	348.2	351.2	354.1	357.1	360.1	363.2	366.2	369.3	372.4	375.6				

Table 3-3 Results of Electricity Demand Forecast for Phase 5 (6/6)

Region	District	TC	Maize Mill Increase		2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Southern	Chikwawa	Mitondo	Included	kW	140.0	140.2	140.4	140.6	140.9	141.1	141.3	141.5	141.8	142.0	142.2	142.5	142.7	142.9	143.1	143.4	143.6
				MWh/y	667.0	668.1	669.1	670.2	671.3	672.4	673.4	674.5	675.6	676.7	677.8	678.9	680.0	681.1	682.2	683.3	684.3
		Excluded	kW	140.0	140.2	140.4	140.6	140.9	141.1	141.3	141.5	141.8	142.0	142.2	142.5	142.7	142.9	143.1	143.4	143.6	
			MWh/y	667.0	668.1	669.1	670.2	671.3	672.4	673.4	674.5	675.6	676.7	677.8	678.9	680.0	681.1	682.2	683.3	684.3	
		Linvunzu	Included	kW	84.0	84.2	84.4	84.6	84.7	84.9	85.1	85.3	85.4	85.6	85.8	86.0	86.2	86.3	86.5	86.7	86.9
				MWh/y	398.3	399.1	399.9	400.8	401.6	402.4	403.3	404.1	404.9	405.8	406.6	407.5	408.3	409.2	410.0	410.9	411.7
	Excluded	kW	84.0	84.2	84.4	84.6	84.7	84.9	85.1	85.3	85.4	85.6	85.8	86.0	86.2	86.3	86.5	86.7	86.9		
		MWh/y	398.3	399.1	399.9	400.8	401.6	402.4	403.3	404.1	404.9	405.8	406.6	407.5	408.3	409.2	410.0	410.9	411.7		
	Nsanje	Tengani	Included	kW	49.8	50.5	51.2	52.0	52.7	73.5	74.3	75.0	75.8	76.6	77.5	98.3	99.1	100.0	100.8	101.7	102.6
				MWh/y	279.9	283.9	288.0	292.1	296.3	395.5	399.9	404.2	408.7	413.2	417.8	517.4	522.1	526.8	531.7	536.6	541.6
			Excluded	kW	49.8	50.5	51.2	52.0	52.7	53.5	54.3	55.0	55.8	56.6	57.4	58.3	59.1	60.0	60.8	61.7	62.6
		MWh/y		279.9	283.9	288.0	292.1	296.3	300.6	304.9	309.3	313.7	318.3	322.8	327.5	332.2	336.9	341.8	346.7	351.7	
Mankhokwe		Included	kW	19.8	20.0	20.2	20.5	20.7	20.9	21.2	21.4	21.7	21.9	22.2	22.5	22.7	23.0	43.3	43.5	43.8	
			MWh/y	87.2	88.2	89.3	90.3	91.3	92.4	93.5	94.6	95.7	96.8	97.9	99.1	100.2	101.4	197.5	198.7	199.9	
	Excluded	kW	19.8	20.0	20.2	20.5	20.7	20.9	21.2	21.4	21.7	21.9	22.2	22.5	22.7	23.0	23.3	23.5	23.8		
MWh/y		87.2	88.2	89.3	90.3	91.3	92.4	93.5	94.6	95.7	96.8	97.9	99.1	100.2	101.4	102.6	103.8	105.0			

3.1.4 Electricity Demand Forecast for Phase 6 and later

(1) Policies

From the results of discussions with the DOE staff, the policies of the electricity demand forecast for Phase 6 and later are as follows.

- (a) The completion year of electrification constructions of Phase 6 is 2007, and the electricity demand is forecasted from that year.
- (b) The target TCs for the electrification demand forecast are 171 TCs. The TCs which have been electrified after the Master Plan are excluded.
- (c) In the Socio-Economic Survey, all 104 sheets of the results of the power consumption survey for public facilities in the electrified TCs are analyzed. As for business entities and households, each random-selected 50 sheets are analyzed. The JICA Study Team assumes the unit demands based on the analyses and discussion with the DOE staff.
- (d) In addition to the facilities in the electricity demand forecast for Phase 5, wealthy households are included along with ordinary households.
- (e) The increment of electricity demand is calculated based on household growth and increase in the number of electric devices in a facility.

(2) Assumptions

Through discussions with the DOE staff, the JICA Study Team decided to make the electricity demand forecast system for Phase 6 and later based on the basic assumptions in 3.1.2 and following assumptions.

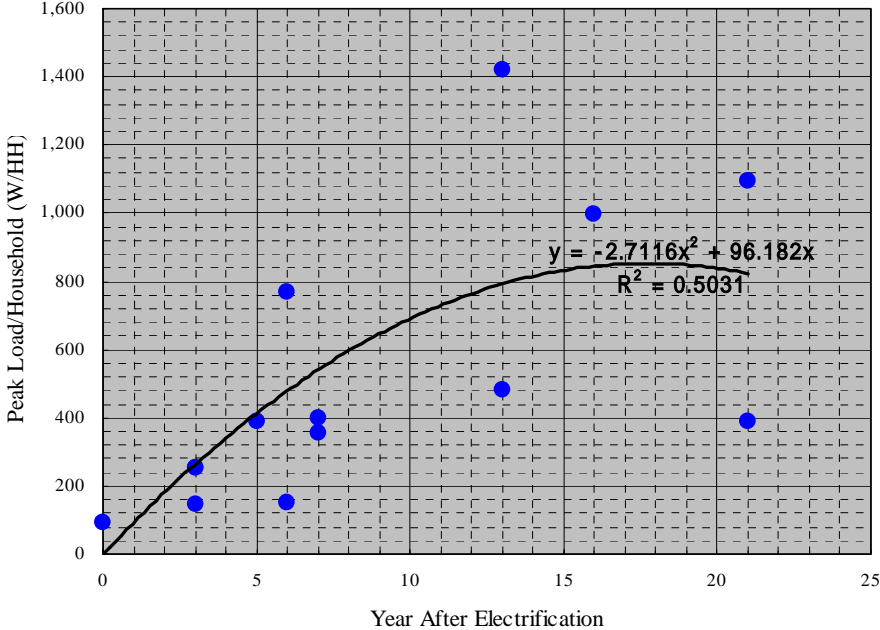


Figure 3-4 Change of Peak Load in Electrified TCs

(a) From the results of Socio-Economic Survey, the power consumptions in electrified TCs are balanced almost 17 years after electrification as shown in Figure 3-4. Therefore, the final form of unit demand for each facility is assumed as a state at 17 years after electrification.

(b) The assumptions of each facility are as follows

(i) Public Facilities

- The ministry concerned allocates electric device(s) every three years.
- The yearly allocation of each facility are determined based on discussions with the DOE staff. The yearly allocation of electric devices in a secondary school is shown in Table 3-4.
- From the results of Socio-Economic Survey, there was no correlation between the number of households and the number of public facilities. Therefore, the number of public facilities will not increase until 2020.

Table 3-4 Yearly Allocation of Electric Device in Secondary School

Year	Electric Device
1st year	Incandescent Light
4th year	Fluorescent Light
7th year	Cassette/CD Player
10th year	Electric Fan
13th year	Computer

(ii) Maize Mill

- An electric device is purchased every year.

(iii) Business Entity

- An electric device is purchased every year.
- Although there was no correlation between the number of business entities and the number of households in a TC from the analyses of the results of Socio-Economic Survey, the number of business entities increases in the same ratio of the household ratio based on discussions with the DOE staff.

(iv) Household

- The ratio between the number of ordinary households and the number of wealthy households is 95:5 based on the analyses of the results of Socio-Economic Survey and discussions. In a normal situation, the ratio should be set from an analysis of results of the power consumption survey in detail, but it is set if they possess a cooking device or not because of time limitation.
- An electric device is purchased every three years in an ordinary household and every year in a wealthy household.

- (c) The JICA Study Team set the connection ratios of business entities and households at 50% and 40% respectively.
- (d) Since the data of the number of households that the JICA Study Team were able to acquire is "the number of household which use the TC" only at the time of Follow-up Study, the JICA Study Team uses the data for the electricity demand forecast.
- (e) The yearly power consumptions are calculated by multiplying assumed working days in a week of each facility, the assumed daily power consumption and 52 weeks.

(3) Supposition of Unit Demand

Based on the results of Socio-Economic Survey and discussions with the DOE staff, the JICA Study Team assumed the unit demands for 17 public facilities, maize mills, shops, ordinary households and wealthy households. The difference from the unit demand for Phase 5 is that the electricity demands can be forecasted more accurately by piling up the yearly demand considering the increase of the electric device in each facility. The unit demands are shown in Appendix 2.

(4) Electricity Demand Forecast System for Phase 6 and Later

Based on the mentioned policies and assumptions, the JICA Study Team established the electricity demand forecast system for Phase 6 and later on Microsoft Excel using the assumed unit demands. In the same way as the electricity demand forecast system for Phase 5, all inputting operation is only the number of targeted facilities on the sheet and the system automatically calculates the electricity demand forecasts until 2020. In addition, the graph of yearly change of electricity demand visually makes easier understanding.

The example of the electricity demand forecast result is shown in Figure 3-6.

(5) Results of Electricity Demand Forecast

The results of the electricity demand forecast for 152 TCs calculated by the electricity demand forecast system for Phase 6 and later are shown in Table 3-5. The JICA Study Team excluded 19 TCs in 171 TCs, which were targets at the beginning, since the necessary data for calculation such as the number of public facilities and business entities was not collected in the Socio-Economic Survey. Therefore, the data collection of these TCs by additional socio-economic surveys by the DOE or consultants will be needed.

Since the TCs in Neno District which was independent of Mwanza District, which were targets for electrification in the Master Plan, have been already electrified after Master Plan, the target TCs are not indicated.

The daily load curve at 2020 of Chawantha TC in Lilongwe District calculated using the electricity demand forecast system for Phase 6 and later is shown in Figure 3-5.

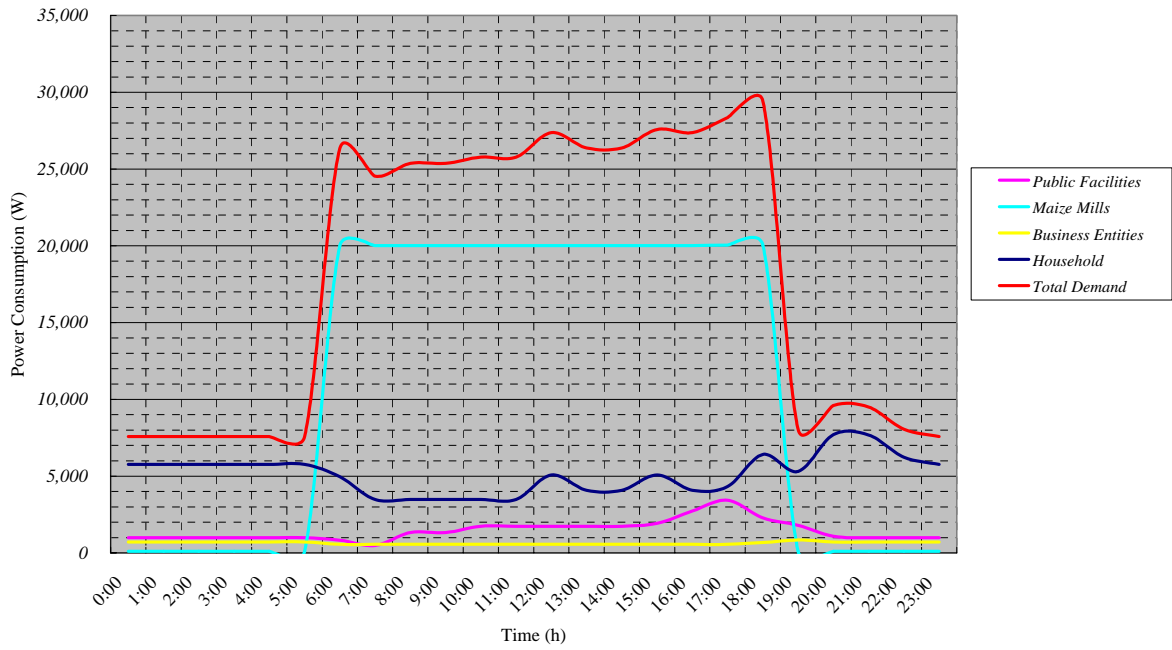


Figure 3-5 Daily Load Curve of Chawantha TC in Lilongwe District

(6) Verification of Results

Comparing the results of the system and the Master Plan in the year 2020, the average maximum demand is 28.0% less and the average power consumption is 39.1% less alike the verification of results of Phase 5.



Figure 3-6 Electricity Demand Forecast Sheet for Phase 6 and Later

Table 3-5 Results of Electricity Demand Forecast for Phase 6 and Later (1/9)

Region	District	TC		2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020		
Northern	Chitipa	Kameme	kW	73.3	96.9	97.4	112.0	119.0	130.5	131.3	134.0	154.6	168.8	169.5	170.2	217.9	239.2		
			MWh/y	231.7	302.8	305.8	340.0	397.9	413.6	436.0	443.8	503.9	534.3	536.5	538.8	945.0	1,009.7		
		Chesenan	kW																
			MWh/y																
		Kapoka	kW	41.4	42.8	43.0	52.7	55.9	84.4	85.0	85.4	85.7	94.4	95.1	95.5	126.5	127.8		
			MWh/y	134.0	138.8	140.2	161.2	185.2	254.1	269.4	270.5	271.9	289.0	291.2	292.3	555.6	562.7		
	Chisenga	kW																	
		MWh/y																	
	Mwenemulembe	kW																	
		MWh/y																	
	Kronga	Tilora	kW	5.3	5.8	5.8	9.2	9.7	11.4	11.4	11.5	11.5	13.1	13.5	13.5	19.6	19.6		
			MWh/y	18.7	20.3	20.5	32.2	37.0	39.6	43.0	43.1	43.1	46.3	47.4	47.4	96.0	96.0		
		Lupembe	kW	29.5	30.4	30.5	35.6	37.0	40.0	40.1	40.2	40.4	44.1	44.5	44.5	56.3	56.3		
			MWh/y	90.8	94.5	94.9	110.7	122.9	127.3	133.0	133.1	134.2	144.0	145.1	145.1	241.2	241.2		
	Rumphi	Lara	kW	29.1	30.2	30.3	34.8	36.5	40.0	40.3	40.3	40.6	43.8	44.2	44.2	56.0	56.0		
			MWh/y	88.9	93.4	93.9	103.7	118.4	126.5	132.0	132.1	133.2	139.2	140.3	140.3	236.4	236.4		
		Muhuju	kW	57.2	59.9	60.2	68.2	72.6	78.1	79.2	79.6	99.9	106.4	106.8	107.2	130.0	133.2		
			MWh/y	173.5	184.2	185.9	205.2	242.7	249.7	264.9	265.9	324.8	337.4	338.5	339.6	529.7	542.8		
		Mwasisi	kW	29.0	29.9	30.0	35.0	36.4	39.4	39.5	39.5	39.8	42.9	43.3	43.3	55.1	55.1		
			MWh/y	88.8	92.5	92.8	108.2	120.5	124.8	130.5	130.6	131.7	137.6	138.7	138.7	234.8	234.8		
		Nchenachena	kW																
			MWh/y																
		Nkhozho	kW	28.8	29.6	29.6	33.8	35.2	38.2	38.3	38.6	38.6	44.1	44.1	44.5	56.1	56.7		
			MWh/y	88.9	91.8	92.2	101.2	113.4	117.7	122.9	123.9	124.0	136.8	136.8	137.9	236.7	240.3		
		Ng'onga	kW	24.9	25.6	25.8	28.8	29.9	31.2	31.3	31.3	31.6	33.6	33.6	33.6	38.6	38.6		
			MWh/y	73.9	76.7	77.7	88.0	97.8	99.5	102.3	102.3	103.4	109.8	109.8	109.8	148.6	148.6		
		Kamphenda	kW	28.8	29.6	29.6	33.8	35.2	38.2	38.3	38.6	38.6	44.1	44.1	44.5	56.1	56.7		
			MWh/y	88.9	91.8	92.2	101.2	113.4	117.7	122.9	123.9	124.0	136.8	136.8	137.9	236.7	240.3		
		Mphompha	kW	29.7	30.4	30.5	35.6	36.7	39.7	39.8	39.8	40.1	43.5	43.8	43.8	55.6	55.6		
			MWh/y	91.7	94.6	94.9	111.5	121.2	125.6	131.5	131.5	132.6	139.2	140.3	140.3	236.4	236.4		
	Nkhata Bay	Usisya	kW	78.6	81.3	81.7	91.1	95.6	101.3	102.3	102.7	102.9	129.7	130.1	130.5	153.8	155.0		
			MWh/y	234.9	245.9	247.7	272.7	310.2	318.1	332.9	334.0	335.2	406.2	407.3	408.4	598.2	605.5		
		Nthongwa	kW	33.3	34.6	34.8	41.0	43.5	47.8	47.9	48.2	48.5	53.6	53.6	56.0	93.9	93.9		
			MWh/y	105.0	109.7	111.0	129.1	149.6	155.6	163.8	164.8	166.0	176.0	176.0	182.9	390.7	390.7		
		Ruarwe	kW	23.3	24.9	25.3	35.5	58.9	67.6	68.2	68.6	69.1	80.8	81.5	81.9	137.2	137.8		
			MWh/y	83.1	88.5	90.9	109.7	195.0	207.2	223.3	224.4	226.8	250.9	253.2	254.3	612.3	615.9		
Chituka		kW	30.6	33.7	33.7	38.7	42.9	45.9	46.3	46.3	47.1	50.5	50.9	50.9	63.1	63.1			
		MWh/y	92.2	103.9	104.8	119.4	156.0	160.4	166.2	166.3	171.1	177.5	178.6	178.6	275.8	275.8			
Maula		kW	28.6	31.7	31.8	36.9	41.1	42.7	43.1	43.7	43.7	45.8	46.2	46.2	54.1	54.1			
		MWh/y	83.5	96.0	96.8	115.7	152.4	155.0	159.4	163.1	163.2	167.4	168.5	168.5	223.9	223.9			

Table 3-5 Results of Electricity Demand Forecast for Phase 6 and Later (2/9)

Region	District	TC		2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020		
Northern	Nkhata Bay	Lwazi	kW	9.0	11.8	11.8	17.6	22.0	23.7	25.1	25.1	25.1	27.4	28.3	28.3	36.0	36.0		
			MWh/y	27.9	39.2	39.9	60.9	98.9	101.5	107.1	107.1	107.2	112.6	117.4	117.4	117.4	170.2	170.2	
		Nkhondowe	kW	6.5	8.3	8.3	12.2	14.4	16.1	16.4	16.4	16.4	16.4	16.4	18.2	18.5	18.5	25.0	25.0
			MWh/y	21.5	28.0	28.5	41.0	60.6	63.2	66.9	66.9	67.0	70.4	71.5	71.5	71.5	121.1	121.1	
	Mzimba	Eswazini	kW	45.9	48.8	48.9	52.3	56.5	57.9	58.2	58.8	58.8	58.8	60.0	60.0	60.0	64.9	64.9	
			MWh/y	131.6	143.7	144.5	162.4	199.1	200.9	204.1	207.8	207.9	210.4	210.4	210.4	210.4	242.8	242.8	
		Luwelezi	kW	48.2	52.3	52.6	56.5	62.7	64.0	66.4	67.0	67.0	67.0	69.0	69.6	69.9	76.6	76.6	
			MWh/y	139.7	156.5	158.3	180.2	234.0	235.8	246.2	250.0	250.2	254.3	258.1	259.2	312.6	312.6		
		Emfeni	kW	27.6	31.1	31.1	34.8	39.6	41.5	42.1	42.1	42.1	42.1	44.0	44.5	44.9	50.9	50.9	
			MWh/y	80.2	94.2	95.1	114.3	155.9	161.3	166.3	166.3	166.4	170.3	174.0	175.1	219.8	219.8		
		Engutwini	kW	30.3	32.9	33.2	38.3	42.2	45.2	45.3	45.3	45.6	49.5	49.8	49.8	49.8	61.6	61.6	
			MWh/y	91.9	102.0	103.6	123.7	158.0	162.3	168.2	168.3	169.4	179.5	180.6	180.6	276.7	276.7		
Central	Kasungu	Matenje	kW	24.3	26.0	26.0	28.2	30.7	32.0	32.3	32.4	32.4	33.0	33.0	33.6	35.2	35.2		
			MWh/y	70.4	77.3	77.8	90.1	112.1	113.9	116.3	116.3	116.3	118.2	118.2	121.9	131.3	131.3		
		Simlemba	kW	30.1	31.1	31.3	36.3	38.0	41.0	41.3	41.6	41.6	45.4	45.4	47.8	59.5	60.1		
			MWh/y	92.6	96.4	97.5	114.0	128.7	133.1	139.6	140.6	140.8	148.6	148.6	155.4	252.9	256.5		
		Kamboni	kW	27.2	28.3	28.4	32.3	34.2	36.9	37.0	37.3	37.3	39.6	39.9	39.9	48.3	48.9		
			MWh/y	81.6	86.2	86.7	100.0	117.1	120.6	124.8	125.8	125.9	130.3	131.4	131.4	198.4	201.9		
		Kapheni	kW	26.5	27.4	27.5	31.2	32.6	34.0	34.3	34.3	34.6	36.5	36.5	36.5	45.3	45.3		
			MWh/y	79.4	83.0	83.3	98.3	110.6	112.3	116.5	116.5	117.5	121.4	121.4	121.4	179.3	179.3		
	Nkhotakota	Msenjere	kW	23.5	25.1	25.2	27.1	29.6	30.9	31.2	31.2	31.2	31.9	31.9	32.4	34.6	34.6		
			MWh/y	66.8	73.6	74.1	83.3	105.3	107.0	109.0	109.1	109.1	110.6	110.6	114.3	128.7	128.7		
		Kasitu	kW	23.5	25.8	26.1	27.7	31.4	32.7	32.8	32.9	32.9	34.1	34.1	34.1	36.3	36.3		
			MWh/y	66.9	76.1	77.7	86.4	118.2	119.9	121.5	121.5	121.6	126.8	126.8	126.8	141.1	141.1		
	Ntchisi	Kamsonga	kW	101.9	106.1	106.8	116.8	123.5	130.6	151.6	152.0	152.3	160.4	161.1	162.0	192.5	193.1		
			MWh/y	304.1	321.1	324.2	353.2	410.3	419.9	495.1	496.1	497.5	513.4	515.6	520.4	765.2	768.7		
		Chinguluwe	kW	114.3	117.0	117.5	124.3	128.7	132.8	133.2	135.5	135.8	141.4	141.8	162.2	180.7	180.7		
			MWh/y	335.3	346.8	348.7	370.7	408.3	413.5	422.8	429.5	430.8	444.2	445.3	504.0	658.8	658.8		
		Bumphula	kW	51.6	54.2	54.3	59.2	63.2	67.5	68.4	68.5	68.7	72.9	73.3	73.6	88.9	90.1		
			MWh/y	153.9	164.5	165.4	177.0	211.2	217.3	228.5	228.6	229.8	237.7	238.8	239.9	370.6	377.8		
		Malambo	kW	70.6	73.4	73.8	78.7	83.8	87.9	88.2	88.3	89.1	92.5	92.9	92.9	105.3	105.3		
			MWh/y	208.7	220.5	222.1	244.9	286.0	291.2	299.2	299.3	304.2	310.7	311.8	311.8	418.0	418.0		
		Ng'ombe	kW	22.3	24.2	24.3	25.2	28.9	30.2	30.2	30.3	30.3	30.7	30.7	30.7	32.8	32.8		
			MWh/y	63.4	71.1	71.7	76.1	105.2	106.9	107.8	107.8	107.9	108.7	108.7	108.7	123.2	123.2		
		Kasakula	kW	9.0	11.8	11.8	17.6	22.0	23.7	25.1	25.1	25.1	27.4	28.3	28.3	36.0	36.0		
			MWh/y	27.9	39.2	39.9	60.9	98.9	101.5	107.1	107.1	107.2	112.6	117.4	117.4	170.2	170.2		
Mzandu	kW	45.3	47.0	47.0	50.2	53.0	54.4	54.5	54.5	54.5	55.8	56.2	56.7	61.4	61.4				
	MWh/y	131.5	138.7	139.2	153.2	176.1	177.8	180.7	180.7	180.8	183.3	184.5	188.2	224.5	224.5				
Nthondo	kW	50.7	55.4	55.5	60.3	67.0	70.3	70.8	70.9	71.4	74.7	74.7	75.1	85.7	85.7				
	MWh/y	148.7	167.2	168.5	190.9	248.0	255.2	262.0	262.0	265.9	272.9	272.9	274.0	360.5	360.5				

Table 3-5 Results of Electricity Demand Forecast for Phase 6 and Later (3/9)

Region	District	TC		2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	
Central	Ntchisi	Kayoyo	kW	46.8	47.5	47.6	50.8	52.2	54.9	55.0	55.3	55.3	58.1	58.4	58.4	66.2	66.9	
			MWh/y	137.7	141.1	141.5	147.8	160.1	163.6	167.1	168.1	168.2	176.3	177.4	177.4	240.6	244.2	
	Chiseflo	kW	55.9	59.7	60.3	68.2	74.4	80.1	81.3	81.4	81.7	87.3	87.7	108.7	128.2	128.8		
		MWh/y	166.3	181.7	184.5	206.9	260.7	268.5	282.5	282.6	283.9	295.3	296.4	358.8	519.5	523.1		
	Bibanzi	kW	3.5	5.0	5.0	7.2	9.5	10.8	11.2	11.8	11.8	12.6	12.6	12.6	15.6	15.6		
		MWh/y	10.4	16.1	16.5	27.1	46.6	48.4	51.2	55.0	55.0	56.6	56.6	56.6	78.3	78.3		
	Msalanyama	kW	23.9	25.4	25.4	27.0	29.2	30.6	30.6	31.5	31.5	32.6	32.6	32.6	36.7	37.3		
		MWh/y	69.3	75.4	75.8	80.6	100.2	101.9	103.7	108.4	108.5	110.7	110.7	110.7	143.6	147.1		
	Kachigamba	kW	33.0	35.3	35.5	41.4	45.0	49.4	49.7	50.3	52.6	57.7	58.1	58.1	96.0	96.6		
		MWh/y	101.9	110.6	112.1	128.3	160.1	166.1	174.7	178.5	185.4	195.5	196.6	196.6	405.5	409.1		
	Chinkhwiri	kW	12.6	14.9	15.1	21.1	25.0	29.3	29.8	29.9	30.2	35.1	35.7	36.0	75.1	75.1		
		MWh/y	42.8	51.2	52.7	69.9	104.2	110.3	119.0	119.1	120.3	130.0	133.7	134.8	342.2	342.2		
	Lipri	kW	30.3	32.8	32.8	37.8	41.7	46.1	46.1	46.5	46.5	50.3	50.3	50.7	64.2	64.8		
		MWh/y	93.3	102.6	103.4	119.7	152.8	158.9	165.0	166.1	166.3	174.1	174.1	175.2	288.4	291.9		
	Kasuntha	kW	41.5	44.3	44.5	53.8	59.5	88.0	89.1	89.5	90.0	98.7	99.1	99.8	130.5	131.7		
		MWh/y	132.2	142.7	144.5	166.3	210.6	279.6	298.1	299.2	301.6	318.4	319.5	321.7	585.6	592.9		
	Chankhunga	kW	12.5	15.9	16.1	21.5	27.1	31.7	32.1	32.4	32.4	36.8	37.4	37.7	53.2	53.2		
		MWh/y	41.0	54.2	56.0	73.2	120.5	129.5	137.1	138.2	138.4	147.2	150.9	152.0	279.9	279.9		
	Nalunga	kW	24.4	26.3	26.4	28.6	32.0	33.3	33.6	33.6	33.6	34.7	35.1	35.1	39.7	39.7		
		MWh/y	70.7	78.4	78.9	89.7	117.9	119.6	122.3	122.3	122.4	124.5	125.6	125.6	162.2	162.2		
	Dzoole	kW	29.0	31.8	32.1	36.1	40.3	43.3	43.6	43.6	44.4	47.3	47.6	47.6	57.7	58.3		
		MWh/y	86.0	97.1	98.7	112.8	149.5	153.8	159.0	159.0	163.8	169.3	170.4	170.4	253.2	256.7		
	Kalonga	kW	6.5	8.0	8.2	11.5	14.0	16.8	17.1	17.7	17.7	19.7	20.1	20.1	27.6	28.3		
		MWh/y	21.0	26.8	28.1	38.6	60.6	64.1	68.6	72.4	72.6	76.4	77.5	77.5	138.3	141.8		
	Kalumbu	kW	72.4	80.8	81.2	86.6	99.4	102.2	103.1	104.0	104.0	108.2	108.2	108.8	121.1	121.6		
		MWh/y	203.8	237.8	240.9	263.4	373.1	376.6	385.6	390.3	390.5	401.8	401.8	405.5	496.0	499.7		
	Mkukula	kW	37.3	39.7	39.9	49.4	53.9	59.6	61.5	61.8	62.1	88.5	88.9	89.2	113.1	113.8		
		MWh/y	114.2	122.9	124.5	145.4	181.8	189.6	202.4	203.4	204.7	275.2	276.3	277.4	465.7	469.2		
	Chakadza	kW	7.7	7.9	8.1	11.5	12.3	15.1	15.3	15.6	15.6	19.0	19.0	19.4	30.4	33.1		
		MWh/y	27.2	27.5	28.4	33.3	39.1	42.6	47.7	48.7	48.9	55.7	55.7	56.8	150.8	160.1		
	Chimungu	kW																
		MWh/y																
	Thonje	kW																
		MWh/y																
	Kayembe	kW																
		MWh/y																
Simbi	kW																	
	MWh/y																	
Bweya	kW																	
	MWh/y																	

Table 3-5 Results of Electricity Demand Forecast for Phase 6 and Later (4/9)

Region	District	TC		2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	
Central	Dowa	Ntiti	kW															
			MWh/y															
	Salima	Kambiri Sch.	kW	27.6	28.5	28.6	32.2	33.6	36.6	36.6	36.6	36.9	39.9	40.2	40.2	51.6	51.6	
			MWh/y	83.5	87.2	87.6	94.1	106.4	110.7	115.3	115.4	116.5	122.1	123.2	123.2	218.3	218.3	
		Khwidzi	kW	27.8	28.8	28.8	32.7	34.1	37.1	37.1	37.2	37.4	40.4	40.8	40.8	52.2	52.2	
			MWh/y	84.7	88.4	88.8	97.4	109.6	113.9	118.9	118.9	120.0	125.7	126.8	126.8	221.9	221.9	
		Thavite	kW	28.9	30.6	30.7	35.1	37.6	40.6	40.7	41.3	41.6	44.7	45.1	45.1	56.9	56.9	
			MWh/y	86.8	93.7	94.3	107.4	129.4	133.7	138.9	142.7	143.8	149.8	150.9	150.9	247.0	247.0	
		Makioni	kW	21.6	22.2	22.3	23.4	24.6	25.9	26.0	26.0	26.0	26.7	26.7	26.7	27.4	27.4	
			MWh/y	61.7	64.5	64.8	71.0	80.8	82.6	83.5	83.5	83.6	87.7	87.7	87.7	91.2	91.2	
		Michulu	kW	27.6	28.3	28.4	32.0	33.1	36.1	36.1	36.2	36.4	39.4	39.8	39.8	39.8	51.2	51.2
			MWh/y	83.8	86.7	87.0	93.2	103.0	107.4	112.0	112.1	113.2	118.8	119.9	119.9	215.0	215.0	
		Chikombe	kW	44.5	46.4	46.5	48.3	51.1	52.7	52.9	53.0	53.0	54.8	54.8	55.1	59.7	59.7	
			MWh/y	128.2	136.2	136.7	142.7	167.1	169.7	172.3	172.3	172.4	178.7	178.7	179.8	217.5	217.5	
		Mnema	kW	21.8	22.4	22.5	23.4	24.5	25.8	26.1	26.1	26.1	26.4	26.4	26.4	27.4	27.4	
			MWh/y	62.2	65.0	65.3	67.6	77.4	79.1	80.3	80.4	80.4	81.1	81.1	81.1	87.0	87.0	
		Chitala	kW	75.6	76.9	77.2	84.4	87.0	93.2	93.3	93.7	94.0	120.3	120.6	121.0	143.1	143.8	
			MWh/y	226.3	231.7	233.1	249.1	269.5	281.1	290.7	291.8	293.0	362.9	364.0	365.1	551.7	555.3	
		Chinguluwe	kW	27.9	28.5	28.5	32.6	33.4	36.4	36.5	36.5	36.8	39.8	40.1	40.1	51.5	51.5	
			MWh/y	85.2	87.3	87.6	97.8	105.1	109.5	114.5	114.5	115.6	121.4	122.5	122.5	217.6	217.6	
		Siyasiya	kW	29.5	32.7	32.7	37.5	42.2	45.2	45.3	45.4	45.6	49.3	49.7	49.7	61.5	61.5	
			MWh/y	87.6	100.1	101.0	118.1	159.7	164.0	169.2	169.2	170.3	180.0	181.2	181.2	277.3	277.3	
	Matenje	kW	3.9	4.4	4.4	6.3	6.8	8.5	8.5	8.5	8.5	10.1	10.4	10.4	16.2	16.2		
		MWh/y	13.3	15.0	15.1	18.0	22.9	25.5	27.9	27.9	28.0	30.9	32.0	32.0	79.5	79.5		
	Chagunda	kW	28.5	29.2	29.3	33.7	34.8	37.8	37.9	37.9	38.2	41.3	41.7	41.7	53.5	53.5		
		MWh/y	86.6	89.5	89.8	100.8	110.6	115.0	120.0	120.1	121.2	127.1	128.2	128.2	224.4	224.4		
	Pemba	kW	74.7	76.0	76.3	83.0	85.5	91.3	91.3	91.7	91.9	118.1	118.5	118.8	140.6	141.2		
		MWh/y	223.9	229.3	230.8	243.9	264.3	272.1	281.5	282.6	283.8	353.4	354.5	355.6	541.2	544.8		
	Mphenzi	kW	4.6	4.9	4.9	7.2	7.5	9.1	9.2	9.2	9.2	10.9	11.2	11.2	17.4	17.4		
		MWh/y	15.7	16.6	16.7	19.9	22.4	25.0	27.6	27.6	27.7	30.9	32.0	32.0	80.5	80.5		
	Lilongwe	Kasiya	kW	84.6	87.3	87.8	99.2	124.0	132.7	133.3	134.3	134.8	144.3	144.6	145.3	178.7	199.4	
			MWh/y	258.4	268.8	271.5	298.9	396.5	408.7	424.8	429.6	431.9	450.2	451.3	453.5	734.9	796.1	
		Chawantha	kW	23.4	23.9	23.9	25.6	26.4	27.8	28.0	28.3	28.3	29.3	29.3	29.3	32.6	32.6	
			MWh/y	67.8	69.9	70.1	73.1	80.5	82.2	84.2	85.2	85.3	87.3	87.3	87.3	111.4	111.4	
		Malembo	kW	67.0	67.6	67.7	71.3	72.4	75.2	75.3	75.6	75.6	77.8	78.2	78.2	86.2	86.8	
			MWh/y	196.9	199.7	200.1	210.0	219.8	223.3	227.3	228.3	228.5	233.0	234.1	234.1	298.1	301.7	
Nsaru		kW	94.5	119.9	120.5	135.1	144.9	158.3	159.0	180.4	180.9	194.6	195.9	196.6	245.1	267.0		
		MWh/y	291.8	370.4	373.9	410.4	491.6	512.6	535.3	598.7	601.3	628.1	634.0	636.2	1,049.8	1,118.2		
Kabudula		kW	5.7	7.2	7.2	10.5	12.8	14.4	15.7	16.3	16.3	17.9	18.3	18.3	24.1	27.3		
		MWh/y	18.7	24.5	24.9	39.2	58.8	61.4	66.2	70.0	70.0	74.1	75.2	75.2	121.3	139.1		

Table 3-5 Results of Electricity Demand Forecast for Phase 6 and Later (5/9)

Region	District	TC		2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	
Central	Lilongwe	Hiunjiza	kW	55.6	56.9	57.2	65.1	67.6	73.9	75.4	75.8	76.1	102.0	102.3	102.7	124.0	124.6	
			MWh/y	169.8	174.8	176.2	199.8	220.2	231.8	244.3	245.4	246.6	316.1	317.2	318.4	497.7	501.2	
		Phirilanjuli	kW	26.5	27.2	27.3	30.1	31.8	34.5	34.6	34.9	34.9	37.7	38.1	38.1	38.1	46.2	46.8
			MWh/y	79.0	82.0	82.4	87.6	100.7	104.2	107.8	108.8	108.9	117.0	118.1	118.1	183.7	187.3	
		Kachale	kW	83.0	84.0	84.2	85.8	87.5	88.8	88.9	88.9	88.9	89.6	89.6	89.9	89.9	93.1	93.1
			MWh/y	237.7	243.2	243.6	251.4	266.1	267.8	269.4	269.4	269.5	270.9	270.9	272.0	296.3	296.3	
		Chimbalanga	kW	29.7	31.6	31.7	36.7	39.5	42.7	43.1	43.1	43.4	46.6	46.9	46.9	60.8	60.8	
			MWh/y	91.4	99.1	99.7	119.1	143.5	150.7	157.5	157.5	158.6	164.8	165.9	165.9	270.0	270.0	
		Mtema	kW	34.7	35.8	36.1	43.2	45.2	50.9	51.5	51.8	51.8	57.6	78.0	78.4	98.6	99.2	
			MWh/y	109.2	113.1	114.5	131.6	148.8	156.6	167.1	168.2	168.5	179.9	238.6	239.7	409.2	412.7	
		Bisai	kW	28.6	29.5	29.8	33.9	35.9	38.6	39.0	39.0	39.0	42.4	42.4	42.8	54.1	54.8	
			MWh/y	87.4	91.2	92.3	102.9	118.4	121.9	128.0	128.0	128.2	135.1	135.1	136.2	229.5	233.1	
		Mbg'ombe	kW	50.4	51.8	52.1	57.4	60.2	64.3	64.6	64.6	64.9	68.7	69.1	69.4	83.3	83.9	
			MWh/y	150.9	156.6	158.0	173.3	196.2	201.4	209.0	209.0	210.2	217.4	218.5	219.6	338.0	341.6	
		Sinumbe	kW	22.1	22.7	22.8	24.3	25.5	26.8	26.9	26.9	26.9	27.3	27.3	27.3	28.6	28.6	
			MWh/y	62.9	65.8	66.1	72.5	82.3	84.1	85.1	85.1	85.2	85.9	85.9	85.9	92.9	92.9	
		Kang'oma	kW	51.1	52.2	52.2	58.0	59.6	64.0	64.5	64.6	64.9	68.9	69.3	69.7	84.2	84.8	
			MWh/y	153.3	157.5	158.0	172.8	187.5	193.6	201.8	201.9	203.1	210.7	211.8	212.9	334.8	338.4	
		Chiwamba	kW	9.7	10.4	10.4	15.2	16.6	21.6	21.7	22.0	22.0	25.8	25.8	26.2	38.8	39.4	
			MWh/y	33.5	36.1	36.5	48.5	60.8	70.4	76.3	77.4	77.6	85.2	85.2	86.3	191.1	194.6	
	Chadza	kW	19.1	19.7	19.9	28.8	30.4	37.5	57.9	58.3	58.8	66.8	67.2	67.5	97.6	98.9		
		MWh/y	68.6	69.9	71.2	88.0	101.1	110.6	181.1	182.2	184.5	199.9	201.0	202.1	445.9	453.0		
	Kalumbu	kW	16.2	17.5	17.7	24.8	27.3	33.1	33.6	34.0	54.3	60.9	61.2	63.6	86.6	89.3		
		MWh/y	57.1	61.5	62.8	76.3	96.7	104.6	115.8	116.8	175.6	188.5	189.6	196.4	390.4	399.7		
	Kalima	kW	23.0	23.1	23.1	24.2	24.5	25.9	26.3	26.4	26.4	27.4	27.4	27.4	30.8	31.4		
		MWh/y	68.0	68.5	68.6	70.7	73.1	74.9	78.0	78.0	78.1	80.2	80.2	80.2	109.6	113.1		
	Mchinji	Mikundi	kW	26.2	28.9	29.0	31.9	36.1	37.5	37.8	37.8	38.4	39.7	39.7	39.7	43.9	43.9	
			MWh/y	76.6	87.5	88.2	105.5	140.6	142.3	145.7	145.7	149.5	152.3	152.3	152.3	182.4	182.4	
		Nkhwazi	kW	23.7	25.6	25.7	27.7	30.5	31.9	32.0	32.0	32.0	33.0	33.0	33.0	34.3	34.3	
			MWh/y	69.2	76.9	77.4	91.2	115.7	117.4	119.3	119.3	119.4	124.2	124.2	124.2	132.6	132.6	
		Gumba	kW	29.0	30.6	30.6	34.9	37.2	40.2	40.2	40.3	40.5	44.2	44.6	44.6	56.0	56.0	
			MWh/y	88.9	95.0	95.5	108.4	127.9	132.3	137.7	137.7	138.8	148.5	149.6	149.6	244.7	244.7	
Kazyozyo		kW	24.8	25.9	26.1	29.1	31.1	32.4	32.5	32.5	32.5	34.1	34.1	34.1	37.8	37.8		
		MWh/y	74.1	78.5	79.6	94.3	111.5	113.2	116.1	116.1	116.2	119.7	119.7	119.7	150.1	150.1		
Gumulira		kW	22.7	24.2	24.2	25.6	27.9	29.2	29.3	29.9	29.9	30.4	30.8	30.8	33.2	33.2		
		MWh/y	65.4	71.4	71.9	77.8	97.4	99.1	100.5	104.3	104.3	105.4	106.5	106.5	124.7	124.7		
Kabzyala		kW	2.8	4.1	4.1	5.7	7.6	9.0	9.1	9.4	9.4	10.6	10.6	10.6	12.8	12.8		
		MWh/y	8.2	13.1	13.5	19.6	36.7	38.5	39.8	40.8	40.8	45.9	45.9	45.9	60.2	60.2		
Kalulu		kW	23.5	25.1	25.2	26.8	29.3	30.7	30.7	30.7	30.7	31.4	31.4	31.9	33.7	33.7		
		MWh/y	67.7	74.6	75.1	84.5	106.5	108.3	109.7	109.7	109.8	111.2	111.2	114.9	128.2	128.2		

Table 3-5 Results of Electricity Demand Forecast for Phase 6 and Later (6/9)

Region	District	TC		2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	
Central	Dedza	Chimoto	kW	30.4	33.4	33.5	38.7	42.9	45.9	46.0	46.1	46.9	50.2	50.6	50.6	62.6	62.6	
			MWh/y	92.6	104.4	105.3	127.2	163.9	168.2	174.1	174.2	179.0	185.3	186.4	186.4	283.3	283.3	
		Chiluzi	kW	108.9	110.7	111.1	115.0	118.1	120.8	121.1	121.2	121.2	124.4	124.4	124.4	125.4	136.1	136.8
			MWh/y	317.0	325.3	326.7	336.6	361.9	365.4	371.2	371.2	371.4	377.9	377.9	377.9	382.7	474.3	477.8
		Mphati	kW	28.8	30.8	30.8	35.3	38.1	41.1	41.2	41.2	41.5	44.5	44.8	44.8	45.4	56.8	56.8
			MWh/y	87.5	95.2	95.8	110.6	135.1	139.4	144.6	144.7	145.8	151.3	152.4	152.4	156.2	251.3	251.3
	Magomelo	kW	197.7	201.9	202.4	210.3	217.3	223.1	223.2	223.5	224.4	250.9	251.2	251.6	274.3	274.9		
		MWh/y	575.1	593.7	596.0	622.4	680.7	688.6	698.9	700.0	705.0	775.2	776.3	777.4	967.8	971.4		
	Ntcheu	Kadzakalowa	kW	82.4	85.7	86.2	96.1	101.4	130.6	130.9	131.6	132.4	141.0	141.4	142.1	172.3	172.9	
			MWh/y	251.0	263.8	266.4	293.7	338.6	411.0	425.9	427.9	433.0	449.8	450.9	453.1	712.1	715.7	
		Kandeu	kW	106.5	109.8	110.3	113.4	118.7	120.1	120.4	121.0	121.0	122.3	122.3	122.3	127.3	127.3	
			MWh/y	306.4	321.0	322.9	343.2	388.1	389.8	393.2	397.0	397.1	399.8	399.8	399.8	434.5	434.5	
		Sharpvalle	kW															
			MWh/y															
		Bilila	kW	57.6	60.2	60.4	68.4	72.6	78.4	78.7	79.6	79.9	106.4	106.8	107.1	129.3	129.9	
			MWh/y	176.0	185.9	187.5	211.5	246.6	254.4	265.4	270.2	271.4	342.1	343.2	344.4	531.0	534.5	
		Pengapenga	kW	85.7	87.8	88.1	90.7	93.8	95.1	97.4	98.0	98.0	99.7	99.7	100.1	106.4	106.4	
			MWh/y	247.3	256.8	258.2	266.9	293.8	295.5	305.0	308.7	308.9	312.1	312.1	313.2	365.6	365.6	
Kaloga		kW	138.1	140.8	141.2	150.5	155.0	160.7	162.7	163.1	163.4	190.0	190.4	190.7	212.9	214.1		
		MWh/y	406.3	418.3	420.1	454.9	492.4	500.3	517.2	518.3	519.5	591.0	592.1	593.2	779.9	787.1		
Masasa	kW																	
	MWh/y																	
Southern	Mangochi	Chiponde	kW	96.7	99.8	100.2	107.1	112.7	118.4	118.5	118.9	119.1	145.6	146.5	146.9	169.0	169.7	
			MWh/y	285.8	298.8	300.6	316.8	363.0	370.8	380.3	381.3	382.6	452.8	457.6	458.7	645.3	648.9	
		Majuni	kW	29.5	30.7	30.7	36.0	37.7	40.7	40.9	41.0	41.2	44.5	44.8	44.8	56.6	56.6	
			MWh/y	90.4	94.9	95.4	111.5	126.2	130.6	136.7	136.8	137.9	143.9	145.0	145.0	241.2	241.2	
		Mvumba	kW	45.9	47.4	47.5	50.9	53.2	54.5	54.9	55.4	55.4	57.1	57.1	57.1	61.4	61.4	
			MWh/y	133.3	139.7	140.2	155.0	174.6	176.3	179.7	183.5	183.6	187.4	187.4	187.4	217.4	217.4	
		Katuli	kW	64.3	67.0	67.1	69.8	74.3	75.7	75.8	75.8	75.8	76.3	76.9	76.9	78.6	78.6	
			MWh/y	183.4	195.0	195.8	210.9	248.9	250.7	252.6	252.6	252.7	253.8	257.6	257.6	265.6	265.6	
		Mkumba	kW	62.4	64.6	65.4	75.3	79.5	108.0	108.5	109.2	109.5	118.5	119.2	120.1	151.1	172.4	
			MWh/y	193.9	202.3	205.7	230.0	265.0	334.0	349.4	351.5	352.9	370.2	372.4	377.3	643.6	708.3	
		Katema	kW	53.4	55.4	55.5	62.1	65.5	69.5	69.9	70.2	70.2	75.3	75.6	76.2	115.7	116.3	
			MWh/y	160.8	168.9	169.7	189.6	217.3	222.6	231.6	232.6	232.9	242.8	243.9	247.6	456.0	459.5	
		Lungwena	kW	56.3	58.3	58.6	66.6	70.0	75.7	75.8	76.1	76.4	102.9	103.2	103.6	125.7	126.4	
			MWh/y	172.0	179.5	181.0	202.7	230.4	238.3	248.4	249.5	250.7	320.8	321.9	323.0	509.6	513.2	
		Malombe	kW	57.0	59.0	59.3	67.7	71.1	76.8	76.9	77.3	77.5	104.1	104.5	104.8	127.4	128.0	
	MWh/y		174.0	181.6	183.1	205.5	233.3	241.1	251.5	252.5	253.8	324.2	325.3	326.4	514.1	517.6		
Machinga	Ngokwe	kW	31.8	44.5	44.9	49.8	68.9	70.8	71.6	72.1	72.7	74.3	74.9	75.4	81.8	82.4		
		MWh/y	83.6	134.5	138.5	176.2	339.8	345.3	352.2	355.9	359.7	363.1	366.9	370.6	408.6	412.3		

Table 3-5 Results of Electricity Demand Forecast for Phase 6 and Later (7/9)

Region	District	TC		2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020		
Southern	Machinga	Mposa	kW	23.3	25.4	25.4	26.7	29.8	31.2	31.2	31.7	31.7	32.5	32.5	32.5	34.2	34.2		
			MWh/y	67.6	76.1	76.7	85.9	112.8	114.6	115.8	119.6	119.6	119.7	121.7	121.7	121.7	136.4	136.4	
		Nayuchi	kW	47.2	51.3	51.4	54.7	60.6	62.5	64.0	64.0	64.0	64.0	66.1	66.1	66.1	66.5	71.3	71.9
			MWh/y	136.9	153.8	154.9	176.7	228.1	233.5	239.3	239.3	239.4	239.4	247.4	247.4	247.4	248.5	288.7	292.4
		Msosa	kW	6.9	8.4	8.4	12.1	14.6	17.4	18.9	19.5	19.5	19.5	22.1	22.1	22.1	30.7	30.7	
			MWh/y	23.2	29.0	29.6	43.4	65.4	68.9	75.4	79.2	79.3	79.3	85.8	85.8	85.8	156.4	156.4	
		Ngwepele	kW	68.0	72.7	72.8	76.1	82.8	86.1	86.1	86.4	87.0	89.2	89.6	89.6	89.6	98.1	98.7	
			MWh/y	196.0	214.8	216.1	232.1	289.3	296.5	300.3	301.3	305.2	309.4	310.5	310.5	310.5	381.3	384.9	
		Mangamba	kW	47.1	50.6	51.0	55.3	60.6	62.0	62.7	62.7	62.7	62.7	63.9	63.9	64.5	69.0	69.0	
			MWh/y	136.1	150.5	152.3	178.3	224.8	226.5	233.2	233.2	233.3	236.1	236.1	239.8	239.8	269.3	269.3	
		Likhonyowa	kW	30.0	33.6	33.6	37.9	42.9	46.5	46.7	46.8	47.0	50.2	51.1	51.1	51.1	62.5	62.5	
			MWh/y	90.1	104.2	105.2	119.9	163.9	172.0	177.5	177.6	178.7	184.7	189.5	189.5	189.5	284.6	284.6	
		Malundani	kW	60.1	67.2	67.7	77.0	88.5	94.2	94.6	95.5	95.8	123.0	123.3	124.3	147.6	148.8		
			MWh/y	177.8	206.1	209.8	238.3	335.8	343.6	354.2	358.9	360.2	434.3	435.4	440.3	630.0	637.3		
		Nanyumbu	kW	5.9	7.0	7.0	10.5	11.9	13.6	15.0	15.0	15.0	16.8	17.2	17.2	22.9	22.9		
			MWh/y	20.8	24.8	25.1	40.8	53.0	55.6	61.3	61.3	61.4	65.9	67.0	67.0	114.5	114.5		
		Molipa	kW	28.9	30.9	30.9	35.1	37.9	40.9	40.9	41.0	41.3	44.2	44.6	45.2	56.6	56.6		
			MWh/y	88.1	95.8	96.4	107.2	131.6	136.0	140.9	140.9	142.0	147.6	148.7	152.4	247.5	247.5		
	Balaka	Phimbi	kW	5.0	5.8	5.8	8.8	9.9	11.6	11.6	11.6	11.6	13.3	13.6	13.6	19.3	19.3		
			MWh/y	17.2	20.4	20.7	33.1	42.9	45.5	48.9	48.9	49.0	52.1	53.2	53.2	100.7	100.7		
	Zomba	Zaone	kW	97.4	102.0	102.4	110.1	117.1	123.3	123.4	123.8	124.0	151.0	151.4	151.7	173.9	175.1		
			MWh/y	287.4	306.1	308.3	332.8	392.3	403.9	413.8	414.8	416.0	489.8	490.9	492.0	678.7	686.0		
		Muwa	kW	44.1	45.2	45.3	47.4	49.3	50.7	50.7	51.0	51.0	52.2	52.2	52.2	56.2	56.8		
			MWh/y	128.3	133.1	133.5	138.9	156.0	157.8	159.6	160.5	160.6	162.8	162.8	162.8	195.6	199.1		
		Mpyyuyu	kW	76.8	80.4	80.7	88.9	94.8	100.5	100.6	100.9	101.8	128.1	128.4	128.8	151.0	152.2		
			MWh/y	229.3	243.5	245.4	270.6	320.4	328.2	338.3	339.3	344.3	414.0	415.1	416.2	602.8	610.1		
		Masaula	kW	77.9	81.0	81.3	89.6	95.2	100.9	102.2	102.6	102.9	129.4	130.3	130.7	152.8	153.5		
			MWh/y	234.1	246.7	248.5	275.8	321.9	329.8	341.9	343.0	344.2	415.9	420.7	421.9	608.5	612.0		
		Nachuma	kW	28.5	30.3	30.4	34.3	36.8	39.8	39.9	39.9	40.2	43.4	43.8	43.8	55.6	55.6		
			MWh/y	85.7	92.6	93.2	102.2	124.2	128.6	133.4	133.4	134.5	140.6	141.7	141.7	237.8	237.8		
		Khonjeni	kW	5.5	6.7	6.7	9.9	11.6	13.2	13.3	13.3	13.3	14.9	15.3	15.3	22.0	22.0		
			MWh/y	18.2	23.0	23.3	34.4	49.1	51.7	54.8	54.8	54.9	58.0	59.1	59.1	111.3	111.3		
		Kachulu	kW	57.7	61.3	61.5	69.5	75.1	80.8	81.6	82.0	82.3	108.9	109.2	110.1	132.3	132.9		
			MWh/y	175.0	188.9	190.8	216.4	263.7	271.6	286.2	287.2	288.4	359.1	360.2	365.0	551.7	555.2		
		Sakata	kW	3.0	4.4	4.4	5.7	7.9	9.3	9.4	10.0	10.0	10.4	10.4	10.4	11.8	11.8		
			MWh/y	8.5	14.2	14.6	19.6	39.1	40.9	41.9	45.7	45.7	46.8	46.8	46.8	53.8	53.8		
Makina		kW	55.3	57.7	57.9	64.3	68.3	74.0	74.0	74.4	74.7	101.6	102.0	102.3	124.1	124.7			
		MWh/y	167.7	176.7	178.4	192.4	225.0	232.8	242.0	243.1	244.3	318.0	319.1	320.2	505.8	509.4			
Ngwelero	kW	77.6	80.8	81.1	89.6	94.6	100.4	100.5	100.8	101.7	128.2	128.5	128.9	151.4	152.1				
	MWh/y	232.3	245.0	246.8	271.2	313.6	321.5	331.7	332.8	337.7	408.1	409.2	410.3	598.0	601.5				

Table 3-5 Results of Electricity Demand Forecast for Phase 6 and Later (8/9)

Region	District	TC		2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	
Southern	Zomba	Chisunzi	kW	28.7	30.0	30.1	34.5	36.7	39.7	39.8	39.8	40.1	43.1	43.5	43.5	54.9	54.9	
			MWh/y	87.9	93.2	93.7	104.9	124.5	128.8	133.9	133.9	135.0	140.7	141.8	141.8	236.9	236.9	
		Ngondole	kW	57.2	58.8	59.0	67.5	70.6	76.3	76.5	76.9	77.2	103.7	104.1	104.4	104.4	126.6	127.2
			MWh/y	175.7	181.5	183.0	205.9	231.2	239.1	249.8	250.8	252.1	322.5	323.6	324.7	511.4	514.9	
	Chiradzulu	Ndunde	kW	59.4	61.4	61.7	71.0	74.6	81.7	82.2	83.1	83.4	111.1	111.5	111.8	138.6	139.9	
			MWh/y	183.3	190.9	192.6	216.4	246.6	256.2	269.9	274.7	276.0	348.4	349.5	350.6	580.3	587.4	
	Blantyre	Dziwe	kW	5.4	6.3	6.3	9.4	10.5	12.1	12.2	12.3	12.3	14.6	15.0	15.0	21.5	21.5	
			MWh/y	17.6	20.8	21.1	27.9	37.7	40.3	43.3	43.3	43.4	50.5	51.6	51.6	101.2	101.2	
		Mudi	kW	27.4	27.9	28.0	31.9	33.1	35.8	36.1	36.2	36.4	39.1	39.1	39.4	48.9	48.9	
			MWh/y	82.6	84.7	85.1	95.3	105.1	108.6	113.8	113.9	115.0	119.9	119.9	121.0	199.0	199.0	
		Mlenje	kW	23.1	23.8	23.8	25.9	27.0	28.4	28.4	28.7	28.7	29.5	29.5	29.5	32.4	32.4	
			MWh/y	67.6	70.5	70.7	79.6	89.4	91.1	93.0	94.0	94.1	95.6	95.6	95.6	118.7	118.7	
		Domwe	kW	27.3	28.3	28.3	31.7	33.1	36.1	36.1	36.1	36.4	39.9	40.2	40.2	51.2	51.2	
			MWh/y	83.4	87.1	87.4	95.6	107.8	112.1	117.0	117.0	118.1	127.2	128.3	128.3	222.4	222.4	
		Chigwaja	kW	27.9	29.0	29.1	33.0	34.6	38.2	38.2	38.3	38.6	41.6	41.9	41.9	53.3	53.3	
			MWh/y	84.7	89.2	89.7	98.8	113.4	121.5	126.5	126.5	127.6	133.3	134.4	134.4	229.5	229.5	
		Linjidzi	kW	28.3	29.5	29.5	33.7	35.4	38.4	38.7	38.7	39.0	42.0	42.4	42.4	53.8	53.8	
			MWh/y	85.9	90.4	90.8	102.4	117.1	121.4	127.0	127.0	128.1	133.8	134.9	134.9	230.0	230.0	
	Mwanza	Kasuzi	kW	64.0	65.7	65.8	68.3	71.1	72.4	72.5	72.5	72.5	73.3	73.3	73.8	76.2	76.2	
			MWh/y	183.5	191.1	191.6	203.2	226.1	227.8	229.6	229.6	229.7	231.2	231.2	234.9	247.8	247.8	
	Neno		kW															
			MWh/y															
	Thyolo	Thomasi	kW	56.3	57.8	58.1	66.3	69.4	75.1	76.6	76.9	77.2	103.7	104.1	104.5	126.6	127.3	
			MWh/y	172.0	177.9	179.3	202.0	227.3	235.2	247.4	248.4	249.6	321.0	322.1	323.2	509.8	513.4	
		Makapwa	kW	5.4	6.5	6.5	10.1	11.5	13.2	14.4	14.4	14.4	16.2	16.6	16.6	22.7	22.7	
			MWh/y	18.5	22.6	22.9	38.0	50.3	52.8	58.0	58.0	58.1	62.4	63.5	63.5	112.1	112.1	
		Sandama	kW	28.8	30.0	30.0	34.5	36.2	39.2	40.4	40.5	40.7	44.0	44.3	44.3	55.7	55.7	
			MWh/y	88.4	92.9	93.3	108.1	122.8	127.1	134.1	134.1	135.2	142.4	143.5	143.5	238.6	238.6	
		Chipho	kW	32.9	34.1	34.1	40.9	43.1	47.2	48.7	49.1	49.1	54.2	54.5	54.5	94.0	94.6	
			MWh/y	102.3	106.9	107.4	128.2	146.2	151.4	161.8	162.9	163.1	174.1	175.2	175.2	383.6	387.2	
	Mulanje	Chambe	kW															
			MWh/y															
Mathambi		kW																
		MWh/y																
Chinakanaka		kW																
		MWh/y																
Msikawanjala		kW																
		MWh/y																
Namphungo		kW																
		MWh/y																

Table 3-5 Results of Electricity Demand Forecast for Phase 6 and Later (9/9)

Region	District	TC		2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020		
Southern	Mulanje	Kambenje	kW																
			MWh/y																
		Kamwendo	kW																
			MWh/y																
	Phalombe	Chitekesa	kW	29.9	31.8	31.9	37.2	40.0	43.0	43.3	43.4	43.6	46.8	47.2	47.7	59.5	59.5		
			MWh/y	90.9	98.6	99.2	117.1	141.5	145.9	152.2	152.3	153.4	159.5	160.6	164.3	260.4	260.4		
		Mpassa	kW	7.1	8.2	8.2	13.0	14.4	16.6	16.9	16.9	16.9	18.9	19.2	19.2	26.3	26.3		
			MWh/y	24.3	28.3	28.6	44.4	56.6	62.9	67.1	67.1	67.2	71.0	72.2	72.2	123.6	123.6		
		Nambazo	kW	29.3	30.2	30.3	35.1	36.5	39.5	39.8	39.8	40.1	43.3	43.6	43.6	55.4	55.4		
			MWh/y	89.4	93.1	93.5	105.6	117.8	122.2	128.0	128.0	129.1	135.3	136.4	136.4	232.5	232.5		
	Chikwawa	Kakoma	kW	56.0	57.6	57.8	65.9	69.0	74.7	74.8	75.2	75.4	101.8	102.2	102.6	125.1	125.8		
			MWh/y	170.3	176.2	177.6	195.5	220.8	228.6	238.2	239.2	240.4	310.4	311.5	312.6	500.3	503.9		
		Tomali	kW	24.1	24.7	24.8	27.3	28.4	29.7	30.1	30.1	30.1	31.4	31.4	31.4	34.7	34.7		
			MWh/y	69.1	71.9	72.2	76.6	86.4	88.1	90.0	90.0	90.1	93.3	93.3	93.3	112.1	112.1		
		Ndakwera	kW	83.6	84.6	84.8	87.3	89.0	90.4	90.4	90.4	90.4	91.4	91.4	91.4	95.9	95.9		
			MWh/y	239.6	245.0	245.5	254.3	269.0	270.7	272.6	272.6	272.6	274.4	274.4	274.4	305.8	305.8		
		Kanyinda	kW	108.0	110.4	110.6	114.4	118.0	120.7	121.6	121.7	121.7	124.4	124.4	124.4	133.4	133.9		
			MWh/y	312.0	322.8	323.6	337.4	369.2	372.7	381.5	381.5	381.7	387.5	387.5	387.5	459.2	463.0		
	Nsanje	Masenjere	kW	57.5	61.1	61.3	69.9	75.8	81.5	81.7	82.0	82.9	109.5	109.8	110.2	133.1	134.3		
			MWh/y	172.8	186.7	188.6	211.2	261.0	268.8	278.6	279.7	284.6	354.9	356.0	357.1	545.9	553.1		
		Kampata	kW	5.0	5.9	5.9	8.8	10.2	11.6	11.8	12.1	12.1	13.8	13.8	13.8	20.3	20.3		
			MWh/y	16.0	19.3	19.6	27.0	39.3	41.0	44.2	45.2	45.3	48.6	48.6	48.6	98.2	98.2		
		Lulwe	kW	43.6	44.7	44.8	47.3	49.2	50.6	50.7	51.0	51.0	51.9	51.9	51.9	55.3	55.3		
			MWh/y	125.3	130.1	130.5	140.2	157.3	159.1	160.9	161.9	162.0	163.8	163.8	163.8	187.9	187.9		
		Chididi	kW	75.5	77.1	77.4	84.6	87.4	93.1	93.2	93.6	93.8	120.1	120.5	120.9	143.6	144.2		
			MWh/y	226.1	232.3	233.7	250.2	273.0	280.9	290.5	291.6	292.8	362.7	363.8	364.9	555.3	558.9		
		Sankhulani	kW	55.6	59.0	59.3	66.4	71.7	77.4	78.6	79.6	79.8	106.1	106.5	106.8	129.2	129.8		
			MWh/y	167.7	180.8	182.7	204.2	249.1	256.9	268.1	272.9	274.1	344.8	345.9	347.0	536.4	539.9		

3.2 Revision of Method for TC Electrification Prioritization

The TCs were prioritized for electrification for Phase 5 and later in the Master Plan and the DOE conducted FS at selected TCs in Phase 5 along with Master Plan. In Master Plan, a market fee was used as a criterion for prioritization of electrification and the higher the market fee was, the higher the priority was. The prioritization method, however has the following discussion points.

- (1) Although a market fee can be one of the indexes which indicates economic activities, it does not always link with a TC scale and electricity demand. Therefore, other indexes are needed to express these values.
- (2) The market fee data of TC was collected from each district. However, it was ascertained that the data was intentionally manipulated in district offices because of discordances based on the results of market fee survey in FS in Phase 5. Therefore, the data itself has no credibility.
- (3) Electrification conditions of vicinal TCs and accessibility are not considered.

Therefore, the JICA Study Team determined to revise the method for TC electrification prioritization through discussions with the DOE staff.

3.2.1 Criteria for TC Prioritization

The JICA Study Team examined the criteria to determine un-electrified TC prioritization for electrification. Through discussions with the DOE staff, the JICA Study Team and the DOE staff agreed on the following points.

- Although there are physical ways such as areas and length of a TC to express TC scale, the electricity demand can, in addition to physical scale, express immanent scales such as the number of public facility and household in a TC.
- It is imagined that a market fee indicates a social position in a district or an area other than economic activities. It is, however, difficult to quantitatively indicate the correlation between a market fee and both economic activities and a social position. Therefore, the JICA Study Team uses an electricity demand as an index to express "TC scale." Meanwhile, if it is possible to indicate these correlations by later examination, using a market fee as a criterion will again be examined.
- The electricity demand as a criterion is yearly power consumption (MWh/year) which directly reflects future income, not maximum power (kW).
- Since the targets of the DOE are public facilities, the ratio of the electricity demand in public facility towards the total electricity demand in a TC becomes one of the criteria.

- Because distance from existing distribution line influences difficulty of a construction and increase and decrease of construction cost, this becomes one of the criteria.
- Each criterion has a different weight. In the Study, amount of the electricity demand in a TC is given the highest weight based on the DOE policy.

Through discussions with the DOE staff, the criteria used for the prioritization of un-electrified TCs in the Follow-up Study were determined. The criteria and weights are shown in Table 3-6.

Table 3-6 Criteria and weights for prioritization of un-electrified TC

Criterion	Weight
Amount of electricity demand (kWh)	10
Distance from existing distribution line (km)	2
Public facility demand ratio (%) ⁹⁾	1

3.2.2 Method of Prioritization

The un-electrified TCs are prioritized by following steps.

STEP 1 Rank TCs in each district in each criterion

STEP 2 Give points to TCs from top to bottom

STEP 3 Multiply each weight of the criterion to the point

STEP 4 Add up the points

STEP 5 Prioritize TCs from higher points to lower points

Although the weights were determined through discussions with the DOE staff, these weights will be changed based on social and economic changes and actual situations of TCs. The example of prioritization for TC electrification is shown in Table 3-7.

Table 3-7 Example of Prioritization for TC Electrification

Criteria		A TC	B TC	C TC
Amount of Electricity Demand	Value	200kWh	250kWh	180kWh
	Rank	2 nd	1 st	3 rd
	Point	<u>20 points</u> (2 points × 10 = 20 points)	<u>30 points</u> (3 points × 10 = 30 points)	<u>10 points</u> (1 points × 10 = 10 points)
Distance from existing distribution line	Value	12km	20km	3km
	Rank	2 nd	3 rd	1 st
	Point	<u>4 points</u> (2 points × 2 = 4 points)	<u>2 points</u> (1 points × 2 = 2 points)	<u>6 points</u> (3 points × 2 = 6 points)
Public Facility Demand Ratio	Value	10%	12%	6%
	Rank	2 nd	1 st	3 rd
	Point	<u>2 points</u> (2 points × 1 = 2 points)	<u>3 points</u> (3 points × 1 = 2 points)	<u>1 points</u> (1 points × 1 = 1 points)
Total Point		26	35	17
Priority		2	1	3

⁹⁾ Electricity demand in public facilities / Total electricity demand in the TC

3.2.3 Result

Using the mentioned criteria, the JICA Study Team prioritized 171 TCs which would be targets in Phase 6 and later. The amounts of the electricity demand and the public facility electricity demand ratios of TCs were calculated by the electricity demand forecast system for Phase 6 and later, and the distances from existing distribution lines were used from the results of Socio-Economic Survey. The results are shown in Table 3-8. Meanwhile, since 19 TCs do not have the necessary data for calculation as mentioned in 3.1.4 (5), it was impossible to evaluate them in the same level as other TCs, the JICA Study Team assumed 60.9% (100%-39.1%) (refer to 3.1.4 (6)) of the results in Master Plan as yearly power consumptions in these 19 TCs. The detail results are shown in Appendix 3.

3.2.4 TCs for Phase 6

From the mentioned results, the JICA Study Team determined TCs for Phase 6. Because of the DOE policy, the 2 highest TCs in each district, 49 TCs in total, were selected. The list of TCs for Phase 6 is shown in Table 3-9, and Figure 3-7 shows the location of trading TCs studied at Phase 6.

Comparing the 53 TCs which were selected in Phase 6 in the Master Plan, the same 19 TCs were selected but the remaining 34 TCs were different. The JICA Study Team thinks the reasons for this are as follows:

- (1) There are TCs which have been electrified by ESCOM.
- (2) Some TCs under new distribution lines in Phase 4 have been electrified.
- (3) Since amount of electricity demand was given a bigger weight, almost all TCs are prioritized by the scale of the demand.

Table 3-8 Results of Prioritization for TC Electrification

Region	District	No.1	No.2	No.3	No.4	No.5	No.6	No.7	No.8	No.9	No.10	No.11	No.12	No.13	No.14	No.15	No.16	No.17	No.18	No.19	No.20	
Northern	Chitipa	Kamene	Chesenan	Kapoka	Chisenga	Mwenemulembe																
	Karonga	Lupembe	Titora																			
	Rumphi	Nchenachena	Muhuju	Nkhozo	Kamphenda	Lara	Mphompha	Ng'onga	Mwasisi													
	Nkhata Bay	Ruarwe	Usisya	Nihungwa	Chituka	Maula	Lwazi	Nkhondowe														
	Mzimba	Luwelezi	Engutwini	Eswazini	Emfeni																	
Central	Kasungu	Simlemba	Kamboni	Kapheni	Matenje																	
	Nkhotakota	Kasitu	Msenjere																			
	Ntchisi	Kamsonga	Chinguluwe	Malambo	Bumphula	Nthondo	Kasakula	Kayoyo	Ng'ombe	Mzandu												
	Dowa	Kasuntha	Mukukula	Kalumbu	Kachigamba	Chisefo	Nititi	Kayambe	Lipri	Chinkhwiri	Chankhunga	Thonje	Simbi	Chimungu	Bweya	Dzoole	Chakadza	Nalunga	Masalanyama	Kalonga	Bibanzi	
	Salima	Siyasiya	Chitala	Pemba	Chagunda	Thavite	Khwidzi	Kambiri Sch.	Chinguluwe	Chikombe	Makioni	Michulu	Mnema	Mphinzi	Matenje							
	Lilongwe	Kasiya	Nsaru	Hiunjiza	Chadza	Mtema	Kalumbu	Kang'oma	Malembo	Mbng'ombe	Kachale	Chiwamba	Chiimbalanga	Bisai	Kabudula	Kalima	Phirilanjuli	Chawantha	Sinumbe			
	Mchinji	Gumba	Mikundi	Kazyozyo	Nkhwazi	Kalulu	Kabzyala	Gumulira														
	Dedza	Magomelo	Chiluzi	Chimoto	Mphati																	
	Ntcheu	Sharpvalle	Kaloga	Kadzakalowa	Bilila	Kandeu	Pengapenga	Masasa														
Southern	Mangochi	Mkumba	Chiponde	Malombe	Lungwena	Katema	Majuni	Katuli	Mvumba													
	Machinga	Malundani	Ngokwe	Ngwepele	Likhonyawa	Nayuchi	Mangamba	Molipa	Msosa	Nanyumbu	Mposa											
	Balaka	Phimbi																				
	Zomba	Zaone	Mpyupyu	Masaula	Ngweleru	Kachulu	Ngondole	Makina	Nachuma	Chisunzi	Muwa	Khonjeni	Sakata									
	Chiradzulu	Ndunde																				
	Blantyre	Linjidzi	Chigwaja	Domwe	Mudi	Mlenje	Dziwe															
	Mwanza	Kasuzi																				
	Neno																					
	Thyolo	Thomasi	Chipho	Sandama	Makapwa																	
	Mulanje	Chambe	Mathambi	Chinakakana	Kamwendo	Namphungo	Msikawanjala	Kambenje														
	Phalombe	Chitekesa	Nambazo	Mpsa																		
	Chikwawa	Kakoma	Kanyinda	Ndakwera	Tomali																	
Nsanje	Chididi	Masenjere	Sankhulani	Lulwe	Kampata																	

Table 3-9 List of Target TCs for Phase6

Region	District	TC Name	Region	District	TC Name	
Northern	Chitipa	Kameme	Southern	Mangochi	Mkumba	
		Chesenan			Chiponde	
	Karonga	Lupembe		Machinga	Malundani	
		Tilora			Ngokwe	
	Rumphhi	Nchenachena		Balaka	Phimbi	
		Muluju				
	Nkhata Bay	Ruarwe		Zomba	Zaone	
		Usisya			Mpyupyu	
	Mzinba	Luwelezi		Chiradzulu	Ndunde	
		Engutwini				
	Central	Kasungu		Simlemba	Blantyre	Linjidzi
				Kamboni		Chigwaja
Nkhotakota		Kasitu	Mwanza	Kasuzi		
		Msenjere				
Ntchisi		Kamsonga	Neno			
		Chinguluwe				
Dowa		Kasuntha	Thyolo	Thomasi		
		Mukukula		Chipho		
Salima		Siyasiya	Mulanje	Chambe		
		Chitala		Mathambi		
Lilongwe		Kasiya	Phalombe	Chitekesa		
		Nsaru		Nambazo		
Mchinji		Gumba	Chikwawa	Kakoma		
		Mikundi		Kanyinda		
Dedza		Magomelo	Nsanje	Chididi		
		Chiluzi		Masenjere		
Ntcheu		Sharpvalle				
		Kaloga				

Meanwhile, since the distances from existing distribution lines are changed along with the electrification progression, it will be necessary to reexamine the target TCs before each phase. In addition, the DOE is planning to add new TCs for Phase 7 and later. Therefore, in the Study, the JICA Study Team only determined TCs for Phase 6. For Phase 7 and later, the DOE staff will determine TCs to electrify by themselves using the electricity demand forecast system and the method for TC priority.

Furthermore, some districts such as Balaka District and Chiradzulu District have only one TC to electrify even in Phase 6. Therefore, the DOE will have to examine to adding new un-electrified TCs or to replace TCs from districts which have many un-electrified TCs like Dowa and Salima.

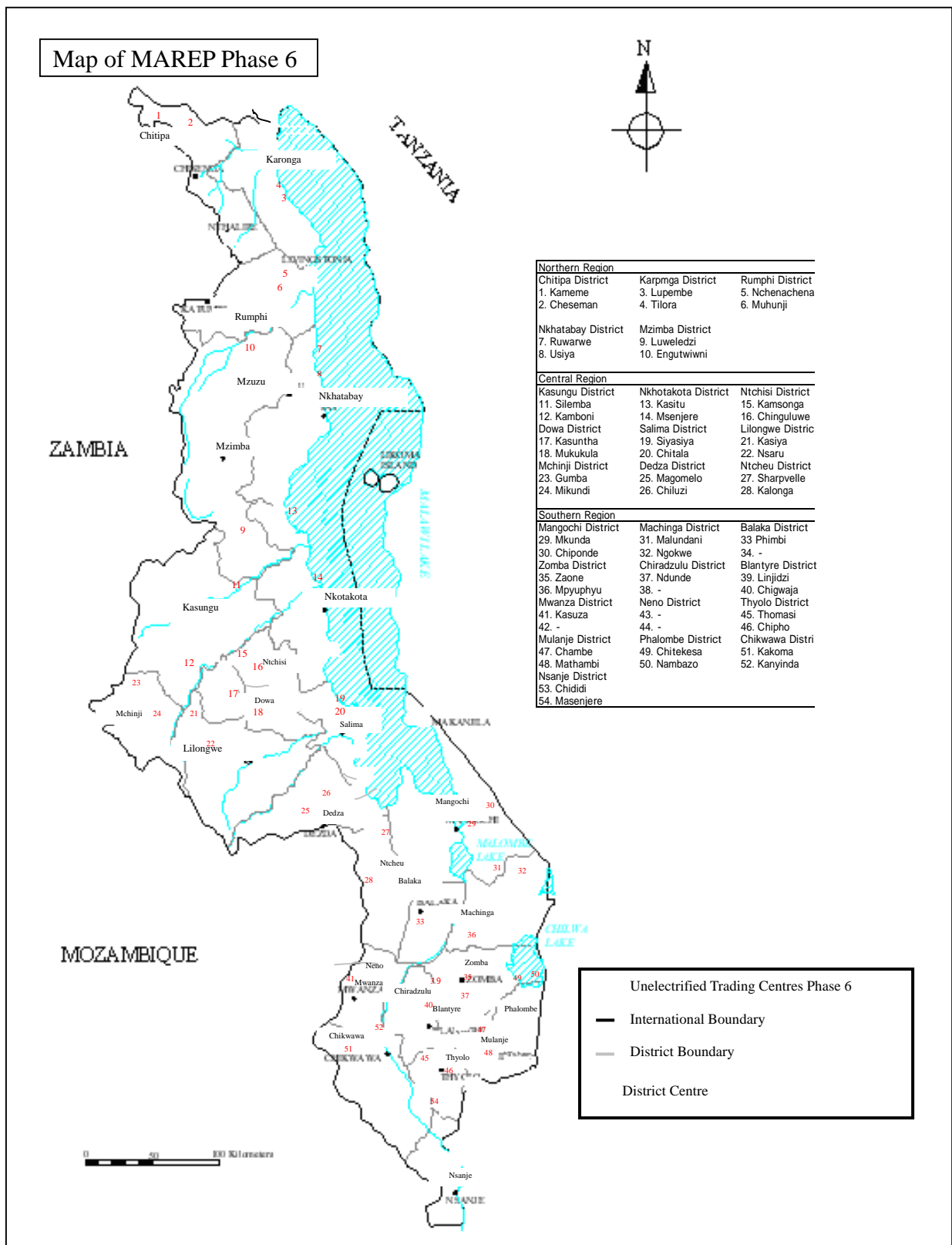


Figure 3-7 The location of TCs studied at Phase 6

3.3 Technical Transfer of Electricity Demand Forecast Method

Besides the FS Implementation Manual, the JICA Study Team gave some lectures and had discussions with the DOE staff.

3.3.1 Outline of Electricity Demand Forecast and Forecast Method

The JICA Study Team lectured the DOE staff on the objectives, concepts, types and each feature of forecast method of the electricity demand forecast, and explanations and indications of problems in the electricity demand forecast method in the Master Plan. Through the lectures and discussions, the DOE staff deeply understood the electricity demand forecast and its method and actively stated their opinions on the new electricity demand forecast method. In addition, they clearly understood the objectives and the contents of the socio-economic survey which will be necessary after Phase 5, such as the necessity of logical viewpoints and the establishment of the survey method considering analyses after surveys.

Moreover, the JICA Study Team lectured on the internal processes in the electricity demand forecast system for Phase 6, and the DOE staff also understood the aims and roles of each worksheet in the system. Therefore, even if the unit demands are revised because of deeper surveys in the future, they will be able to modify the system and recalculate items by themselves.

3.3.2 Method for TC Electrification Prioritization

In the same lecture as the electricity demand forecast, the JICA Study Team lectured the DOE staff on the selection method of un-electrified TCs and problem points and proposed the concepts of the TC prioritization as mentioned in 3.2. Based on the agreement with the DOE staff, the JICA Study Team made the TC selection file and also lectured the system and operation method. Furthermore, since the DOE staff have to select un-electrified TCs after Phase 6 and later by themselves, the JICA Study Team made a work file for practice which is a copy of the TC selection file. The JICA Study Team believes that the DOE staff will be able to accurately select TCs by repeatedly practising the work file.

Meanwhile, the functions and directions of the TC selection file are explained in detail in the FS implementation manual.

Chapter 4. Technical Transfer related to Project Management

This chapter describes the technical transfer related to project management made in the Study.

4.1 Problems with Phase 4 and countermeasures

Project management was divided into five major stages: FS, detailed design, procurement of equipment, construction, and inspection.

Successful RE requires the smooth performance of not only FS but also each of the subsequent stages. This, in turn, demands a firm apprehension of the problems arising in the Phase 4 construction now under way and the preparation of appropriate measures to prevent analogous ones from occurring in Phase 5 and succeeding phases. In response, action was taken to identify the major problems with the Phase 4 project management through both a field survey conducted at a Phase 4 construction site (i.e., Nambuma TC) and interviews with the DOE and ESCOM.

Table 4-1 presents the problems with project management in Phase 4 and items of countermeasure proposal and instruction for the counterparts.

Table 4-1 The Problems with project management in Phase 4 and Items of countermeasure proposal and instruction

Stage	Main problems in Phase 4	Main reason	Items of countermeasure proposal and instruction for the counterparts
FS	The DOE was not able to gain a good grasp of the situation on the site.	FS was not carried out.	<ul style="list-style-type: none"> • Instruction regarding the importance of FS • Technology transfer regarding the implementation of FS • Instruction in basic items of project management • Increase more electrical engineers assigned to the work of Phase 5 examination in RE unit.
Detailed design	The lack of FS also meant that the DOE did not know how much material (and equipment) each TC needed and the level of requisite cost. This led to an imbalance between the material already ordered and that actually needed.	FS was not carried out.	
	The DOE was not able to properly investigate the detailed design prepared by ESCOM as the party in charge of it.	<ul style="list-style-type: none"> • FS was not carried out • Insufficient understanding of basic items of project management • Poor establishment of organization 	
	ESCOM submitted design results to the DOE in the format of its own choice. As a result the DOE can't do examination of the detailed design sufficiently.	A format was not established for the documents submitted to the DOE by ESCOM	
Procurement of material	The Phase 4 material has still not been delivered in its entirety. In fact, construction has been suspended in some places due to the unavailability of some articles for RE project (wire and transformers) in ESCOM warehouses.	<ul style="list-style-type: none"> • Shortage of funds • Selection of less-experienced supplier 	<ul style="list-style-type: none"> • Items of project management using an overall basic flow • Proposal of a format for documents submitted by ESCOM to the DOE • Increase more electrical engineers assigned to the work of Phase 5 examination in RE unit.
Construction	Even when modifications were made in the transition from the stage of detailed design stage to that of construction, in almost all cases, ESCOM went ahead with the construction without notifying the DOE of the changes.	<ul style="list-style-type: none"> • Insufficient understanding of basic items of project management • Poor establishment of organization 	
	A format was not established for the documents submitted to the DOE by ESCOM after the construction. ESCOM submitted design results to the DOE in a format of its own choice. As a result the DOE could not do examination of the construction sufficiently.	A format was not established for the documents submitted to the DOE by ESCOM	
Inspection	The reports on construction results did not contain breakdowns of the construction cost for each TC or other detailed itemizations of the work in the form of drawings, etc. As a result the DOE could not do examination of the construction sufficiently.	<ul style="list-style-type: none"> • Insufficient understanding of basic items of project management • Poor establishment of organization 	

4.2 Countermeasure Proposals and Guidance/Instruction in Phase 5 and Later

In light of the aforementioned problems in Phase 4, the JICA Study Team proposed the countermeasures noted below for subsequent project management in Phase 5 and later to the counterparts, and provided related guidance/instruction.

(1) Guidance/instruction in basic items of project management using the overall basic flow

To lead a project to success, the DOE, as the construction consigner and examining institution, must first and foremost have a full understanding of the overall flow of project management. Nevertheless, as shown in Table 4-1, numerous problems arose at all stages of projects in Phase 4, and this suggests that the DOE did not have a sufficient understanding of the basic items of project management. For this reason, the JICA Study Team compiled the fundamental sequence of steps in project management in the form of a basic overall flow by referring the flow of distribution line construction used in electric power companies in Japan, and also by considering the current situation in Malawi. Through discussion with them utilizing this basic overall flow, the counterparts were instructed in the basic items of project management, as follows.

- The DOE must have the firm carrying out the detailed design submit the design results in a fixed format.
- The construction company must obtain an advance approval from the DOE for any changes from the stage of detailed design in that of construction.
- The construction company must not commence the construction until the design submitted by the detailed design firm has been approved by the DOE because ESCOM will be in charged of the detailed design and construction in Phase 5.
- The DOE must have the construction company submit a bill of quantities, total cost sheet, and drawings after the construction has been completed. After that the DOE must evaluate and approve them.

Figure 4-1 shows the basic overall flow.

(2) Proposal of the format

The construction cost calculations at the stages of detailed design and construction should be performed exactly by using the appropriate format. The format is extremely important because one mistake can make a big impact on the total cost. In Phase 4, nevertheless, such a format was not established. In response, the JICA Study Team prepared a format for the detailed cost estimation report required for detailed design in Phase 5, and explained it to the DOE. The following points were taken into account in preparation of the format.

(a) Detailed cost estimation report (total cost)

- (i) The format was arranged so that the detailed design company could enter values for the construction cost and other items in the FS results below those for the detailed design results, to enable comparison between the two.
- (ii) A "reason for change" box was incorporated to enter the reason for any significant change from the FS results in the detailed design, by the detailed design company, so that the DOE can examine the reason.
- (iii) In the interest of clearly noting the responsibility of the DOE and detailed design company, the format also included a box for signature by the personnel in charge at each by the reason that the construction company can't evaluate unjust the construction cost.

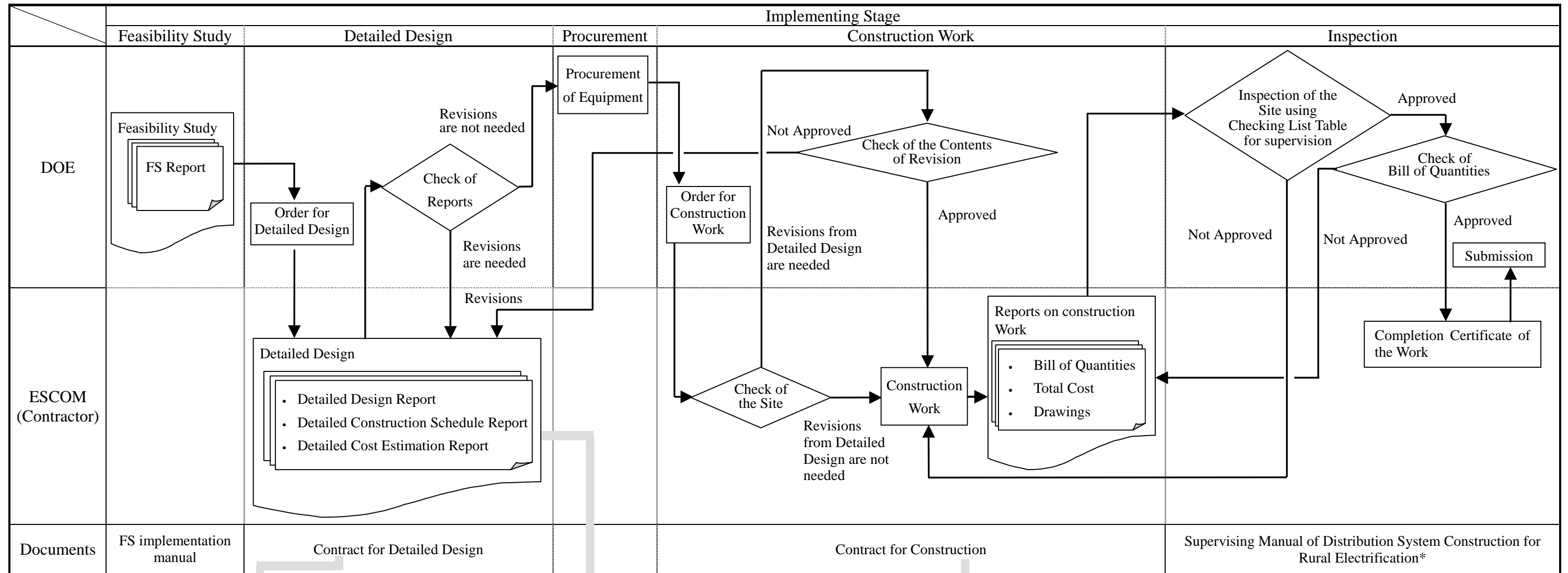
Figure 4-2 shows the format for the detailed cost estimation report (total cost) which the JICA Study Team suggested.

(b) Bill of quantities

- (i) Separate formats were each prepared for 33kV(11kV) and 400/230V lines, 100kVA and 50kVA transformers to enable closer investigation by the DOE.
- (ii) ESCOM is going to implement the detailed design and construction in Phase 5, as it did in Phase 4. Therefore, the latest data obtained from ESCOM were used for the breakdown of material.

Figure 4-3, Figure 4-4, Figure 4-5, and Figure 4-6 show the format for the bill of quantities which the JICA Study Team suggested.

The Basic Flow of Project Management on MAREP Phase V



Contract for Detailed

Contract on Detailed Design should include:

- a) Contract for Consultant's Services
- b) Description of the Services (Scope of works)
- c) Reporting Requirement
- d) Key Personnel and Subcontract
- e) Duties of the Employer
- f) Cost Estimates in Local Currency
- g) Form of Bank Guarantee for Advance Payment

*Cost estimates in foreign currency were omitted in above contract because ESCOM will be selected as the contractor on Phase 5. However that provision should be included in contract after Phase 6 if contractor is foreign company.

Detailed Design Report

Detailed Design Report should include:

- a) Single line connection diagram between the tapping point and the Target TC
- b) Maps between the tapping points and the Target TC
- c) Maps inside the Target TC as well as the Trading Center between the tapping points and Target TC

Detailed Construction Schedule Report should include:

- a) Bar Chart for the 54 Target TCs

Detailed Cost Estimation Report should include:

- a) Total cost
- b) Bill of quantities on 33kV(11kV) lines
- c) Bill of quantities on 400/230V lines
- d) Bill of quantities for substation

Contract for Construction

Contract for Construction should be drafted by ESCOM and DOE, and should include:

- a) Conditions of Contracts
- b) Contract Data
- c) Technical Specifications
- d) Qualification Information
- e) Letter of Acceptance
- f) Bill of quantities-from the Detailed Design Report
- g) Scope of works
- h) Form of Agreement
- i) Security forms (Bank Guarantee)
- j) Drawings

* This manual was made by DOE

Figure 4-1 The Basic Overall Flow of Project Management

Detailed Cost Estimation Report (Total cost)

1 General Information

TC name: _____
Region: _____
District: _____
Date of Survey: _____

2 COST ESTIMATION

Stage	HV(km)	LV(km)	No.of Tx50	No.of Tx 100	50kVA Unit Cost	100kVA Unit Cost	HV COST	LV COST	Tx COST	Compensation Fee	TC COST(Total)
Detail Design											0
FS of DOE											0

3 Reasons for Mainly Changed Points from FS Results

Signatures

DOE _____
ESCOM:Leader _____
ESCOM: Person in Charge _____

Figure 4-2 The format for the Detailed Cost Estimation report (total cost)

Bill of quantities on 33kV(11kV) lines at detail design

Enter information in green column

TC name

Length of the overhead line km

Date of Survey (unit:MK)

	MATERIAL DESCRIPTION	TOTAL QUANTITY	UNIT PRICE	TOTAL PRICE	
Main Material	100mm2 AAAC 'OAK'				
	7/8 GMSW				
	7/8 guy grips				
	Barbed wire				
	33kV 200Kg spindles				
	Binding stirrups (33kV)				
	Pilot spindles				
	33kV pin insulators				
	HV stay insulators				
	Disc insulators				
	Aluminium binding tape				
	M12/150 nuts & bolts				
	M16/150 bolts & nuts				
	M16/260 bolts & nuts				
	M16/300 bolts & nuts				
	M16 flat washers				
	M16 spring washers				
	18mm stay rods				
	M20/400 bolts & nuts				
	M20 flat wahers				
	M20 spring washers				
	M20/400 eye bolts & e/nuts				
	100mm2 Snail clamps				
	Tie straps				
	Clevis adaptors				
	Insulator hooks				
	Danger plates				
	9.0m wood pole				
	10.8m(s) wood pole				
	12.3m(H) wood pole				
X11 cross arms					
Stay baulk					
SP 10 spacer block					
X49 cross arm					
33kV Air Break Switch					
	SUB-TOTAL				
Other Material					
	SUB-TOTAL				
Construction Cost	Manhrs for gang and Cost				
	Manhrs for OHL Supervisor &Cost				
	Hiring for Gang				
	Hiring for Supervisor				
	Allowed for fuel for gang				
	Allowed for fuel for Supervisor				
	SUB-TOTAL				
TOTAL					

Figure 4-3 The format for the Bill of Quantities on 33kV(11kV) lines at detailed design

4.3 Schedule for Phase 5 and Phase 6 after Completion of FS for Phase 5

Table 4-2 shows the schedule for Phase 5 and Phase 6 after completion of FS for Phase 5.

This schedule was made by the JICA expert considering that the construction work for Phase 6 must start immediately after all construction work for Phase 5 is completed.

The DOE must always control the progress of RE project according to the schedule in Table 4-2 and implement each stage after completion of FS for Phase 5.

Table 4-2 The schedule for Phase 5 and Phase 6 after completion of FS for Phase 5

Fiscal year		2004			2005			2006			2007 or later	
Month		7	10	1	7	10	1	7	10	1		
Phase 5	Contract for Detailed design	[Bar from 7/2004 to 10/2004]										
	Detailed design	[Bar from 10/2004 to 1/2005]										
	Procurement	[Bar from 10/2004 to 1/2005]										
	Contract for construction	[Bar from 1/2005 to 7/2005]										
	Construction	[Bar from 7/2005 to 1/2006]										
	Inspection	[Bar from 1/2006 to 7/2006]										
Phase 6	Feasibility study	[Bar from 7/2005 to 1/2006]										
	Contract for Detailed design	[Bar from 1/2006 to 7/2006]										
	Detailed design	[Bar from 7/2006 to 1/2007]										
	Procurement	[Bar from 1/2007 to 7/2007]										
	Contract for construction	[Bar from 7/2007 to 1/2008]										
	Construction	[Bar from 1/2008 to 7/2008]										
	Inspection	[Bar from 7/2008 to 1/2009]										

Chapter 5. Discussion of Institutional Issues and Economic Evaluation of Rural Electrification Project

5.1 Setup of the implementing rules and regulations of the Rural Electrification Act

After three RE-related bills—Rural Electrification, Electricity, and Energy Regulation bills—passed the congress in March 2004, the DOE stepped up its drafting of the Implementing Rules and Regulations.

In this follow-up study, the JICA Study Team pointed out important aspects and drafted the Implementing Rules and Regulations.

5.1.1 Issues to be Discussed in Drafting the Implementing Rules and Regulations

The following articles stipulated in the Rural Electrification Act must be carefully translated and clarified in the Implementing Rules and Regulations.

Part I - Preliminary

Interpretation (Section 2)

Under the definition of the term “Rural Electrification” (RE) in the Act, the internal rate of return (IRR) of the project must be no more than 6% (if the IRR is more than 6%, the project is defined as a non-RE project). But there is no explanation as to whether this IRR is the economic internal rate of return (EIRR) or financial internal rate of return (FIRR). With the Implementing Rules and Regulations, it is necessary to clarify which term must be applied.

If the IRR is calculated in terms of the FIRR, 6% is too stringent as a hurdle rate. Given that the current interest rate of commercial banks is around 50% p.a., no private entity would invest in a project with a 6%-plus FIRR, which is defined as ordinary power distribution business.

It is recommended that the term “internal rate of return” should be used in this interpretation not for the FIRR but for the EIRR. In general, multilateral organizations use 10-12% as a hurdle rate for evaluating infrastructure projects. Unless the inflation rate is extremely low, the 6% IRR is a very stringent restriction.

Part III - Establishment of the Malawi Rural Electrification Fund

Purpose of the Fund (Section 13-(c))

Indicators defining project viability must be stipulated in the Implementing Rules and Regulations. Investor’s interest is the expected return on equity, and project viability is reasonably evaluated by using the FIRR. In addition to calculating the IRR—we recommend that it be the EIRR—in accordance with the definition of RE project, we therefore also propose use of the FIRR as an indicator for evaluating project viability.

Part V- Regulation of Rural Electrification

Rural electrification activities to be licensed (Section 24)

When a concessionaire operates power supply service using a mini-grid system equipped with a generator, it is not clear whether the concessionaire needs to hold both generation and distribution licenses.

On the one hand, Section 4-(1) of the Electricity Act prohibits a licensee from holding more than one type of license. On the other, Section 33 (6) of the Rural Electrification Act stipulates that a concessionaire engaged in an RE project using an off-grid system can hold multiple licenses implicitly.

Meanwhile, Section 23 of the Rural Electrification Act stipulates that if two acts are in conflict, the regulations of the Rural Electrification Act shall prevail over the Electricity or the Energy Regulation acts. However, to avoid the above-mentioned vagueness, it is recommended that the Implementing Rules and Regulations clarify what business model is applied by the RE project using a mini-grid system, and that this business model be based on integration of generator(s) and distribution lines.

Tariffs (Section 25)

The Energy Regulatory Authority is responsible for tariff approval. While the DOE has no authority to regulate tariffs, it can channel subsidies from the Rural Electrification Fund to concessionaires and reduce disparity of tariff levels among concession areas using this subsidy. The DOE must prepare possible policy options in order to assure the equitability of consumer benefit.

The more disparity is reduced, the more subsidies for operation and maintenance (O&M) are needed. From the viewpoint of equitability of tariff levels for consumers, viability of the RE business for concessionaires, and financial burden for the government, the DOE must set guidelines for O&M subsidy in the Implementing Rules and Regulations.

Concession fee (Section 28)

The Rural Electrification Act stipulates that the concedante, i.e., the government, is entitled to be paid a concession fee by the concessionaire. In general, a concession fee is one of the investment costs for receiving the right of concession and considered a sort of intangible asset.

In parallel with collection of concession fees, the government needs to discuss how to recover the depreciation cost of the facilities installed by using the Rural Electrification Fund. Because Section 32 of the Rural Electrification Act stipulates that lines and equipment installed with the money from the fund are owned by the government, the concessionaire cannot depreciate these assets in their balance sheet although they can use the facilities. Therefore, the government may consider recovering all or a part of the depreciation cost by collecting a leasing fee. However, this idea must be carefully discussed from the standpoint of how much the level of the leasing fee pushes up the electricity supply cost as well as other factors, such as O&M subsidy and regulated tariffs.

Ownership of lines and equipment (Section 32) and priority listing of projects (Section 35)

If a concessionaire contributes to capital cost, it is necessary to make a rule to clarify the ownership of individual assets. One difficulty is that the asset, which is constructed by using mixed money, cannot be physically split. In this case, both the government and concessionaire list their own portion of the asset value in individual balance sheets.

During the concession period, the concessionaire will necessarily install additional assets such as new equipment and spare parts. Treatment of the residual value of the assets is also difficult when the concession agreement terminates. In this case, the government ought to pay the concessionaire for the residual value of the assets that belong to the concessionaire. This measure can prevent disputes between the previous and new concessionaires over the ownership of the assets when the renewed concession agreement is transferred to a new concessionaire.

5.1.2 Draft Implementing Rules and Regulations

The Draft Implementing Rules and Regulations shown in this report merely provide ideas for internal discussion in the DOE and do not constitute a completed document.

Table 5-1 Draft Implementing Rules and Regulations

<p>PART I - GENERAL PROVISIONS</p> <p>The succeeding rules and regulations shall include the general provisions to be followed in implementing rural electrification in Malawi.</p> <p style="text-align: center;">Rule 1. Title and Scope</p> <p>Section 1. Title</p> <p>These rules and regulations shall be referred to as the “Implementing Rules and Regulations of the Rural Electrification Act”.</p> <p>Section 2. Scope</p> <p>These rules are promulgated under the authority of the Department of Energy Affairs of the Ministry of Mines, Natural Resources and Environment, in consultation with relevant governmental agencies, ESCOM and other electric power industry participants, and consumers, to formulate such rules and regulations that are necessary to implement the objectives of the Act.</p> <p style="text-align: center;">Rule 2. Declaration of Policy</p> <p>The Government of Malawi is to:</p> <ol style="list-style-type: none"> (1) Pursue electrification in peri-urban and rural areas throughout the country; (2) Diversify schemes for rural electrification projects; (3) Encourage and enhance the private participation in the rural electrification market;
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- (4) Protect public interest in implementing rural electrification;
- (5) Assure socially and environmentally compatible energy sources; and
- (6) Promote use of new and renewable energy resources in power generation to reduce environmental burden.

Rule 3. Definition of Terms

As used in these Rules, the following terms shall have the following respective meanings:

- (1) “Act,” unless otherwise stated, means the Rural Electrification Act;
- (2) “Authority” means the Malawi Energy Regulatory Authority established under Section 3 of the Energy Regulation Act;
- (3) “Beneficiary” means a person who procures a credit guarantee under the Act;
- (4) “Committee” means the Malawi Rural Electrification Management Committee;
- (5) “Concedante” means the Department of Energy Affairs or other body as the Minister may designate by notice published in the Gazette;
- (6) “Concessionaire” means a person or persons who have entered into a Concession Agreement to install, operate or maintain a rural electrification installation on behalf and as agent of a Concedante;
- (7) “Concession Agreement” means an agreement concluded between a Concedante and a Concessionaire whereby the Concessionaire agrees to construct, install, operate or maintain a rural electrification installation on behalf and as an agent of the Concedante as noted in Section 28 of the Act;
- (8) “Concession Area” means an area demarcated in the Concession Agreement over which a Concessionaire is granted exclusive right to construct, install, operate or maintain a rural electrification installation on behalf of a Concedante;
- (9) “Credit Finance Manager” means the Credit Finance Manager to be appointed under Section 19 of the Act;
- (10) “Department of Energy Affairs” of “DOE” means the Department of Energy Affairs of the Ministry of Mines, Natural Resources and Environment;
- (11) “Fund,” unless otherwise stated, means the Malawi Rural Electrification Fund;
- (12) “Government” means the Government of Malawi;
- (13) “Grant and Subsidy Agreement” means the agreement entered into between the Concedante and the Concessionaire for the purposes of channeling funds from the Fund to the Concessionaire for rural electrification and as noted in Section 21 of the Act;
- (14) “Grid Extension Rural Electrification” means rural electrification installation that is connected to the interconnected system;

- (15) “Interconnected System” means the high voltage national electricity system of 66kV and above, (or as may be prescribed by notice in the Gazette) including related substations and associated equipment and generation stations to which they are connected and any distribution system connected thereto;
- (16) “Malawi Bureau of Standards” means the statutory body established under the Malawi Bureau of Standards Act;
- (17) “Management fee” means the fee payable by a Concessionaire to a Concedante in accordance with Section 29 of the Act;
- (18) “Micro hydropower station” means a hydropower station whose installed generation capacity is not less than 2kW but less than 100kW;
- (19) “Mini hydropower station” is a hydropower station whose installed generation capacity is not less than 100kW but less than 500kW;
- (20) “Minister,” unless otherwise stated, means the minister responsible for energy affairs;
- (21) “Off-grid rural electrification” means rural electrification installation that is not connected to the interconnected system.
- (22) “Public institutions” means electrification of government schools, hospitals, clinics, health centers, police stations, and other government offices and institutions;
- (23) “Renewable energy resources” means solar home systems, micro, mini and small hydro electric power stations, and biomass, biogas, wind, and other thermal electricity generation systems and technologies;
- (24) “Rural Electrification” or “RE” means grid extension or off-grid electrification and/or renewable energy resources electrification whose economic internal rate of return (EIRR), which is calculated by economic analysis, is no more than 6% p.a., and line capacity is lower than 66kV, and/or generator capacity is no more than 5MW;
- (25) “Rural electrification program” means the rural electrification program prepared or compiled in accordance with Section 35 of the Act;
- (26) “Rural electrification site” means a site where rural electrification installation is in progress or in commercial operation;
- (27) “Rural Electrification Unit” means the Rural Electrification Unit in the Department of Energy Affairs;
- (28) “Small hydropower station” means a hydropower station whose installed generation capacity is not less than 500kW and no more than 5MW;
- (29) “Solar home system” means photovoltaic solar home system technology as noted in Section 32 of the Act; and
- (30) “Solar Home System Purchase, Guarantee and Service Agreement” means the agreement entered into between the Concessionaire and the supplier of solar home system equipment for the purpose of purchase, guarantee and service of the same as noted in Section 32 of the Act.

PART II - RURAL ELECTRIFICATION MANAGEMENT COMMITTEE

Rule 1. Function and Responsibility of the Rural Electrification Management Committee

Section 1. Responsibility of the Committee

As noted in Section 6 of the Act, the Committee shall supervise all issues related to rural electrification and perform the following functions:

- (1) Formulate policies for the planning and implementation of a comprehensive RE strategy and provide a mechanism for integration, rationalization, and coordination of various energy and electricity programs of the Government;
- (2) Develop the Rural Electrification Master Plan, and update and revise it periodically to facilitate RE projects;
- (3) Set criteria for candidate site selection in the development of the Master Plan, and review the criteria periodically;
- (4) Develop RE programs in accordance with the Master Plan;
- (5) Act as a source of technical, commercial and institutional advice to facilitate RE programs;
- (6) Seek and access donor funding and soft credit for RE;
- (7) Undertake publicity and marketing campaigns on new approaches to RE and related opportunities;
- (8) Contract and oversee the construction and management of RE projects;
- (9) Provide incentives for participation in RE projects by newcomers through its declaration of RE policy;
- (10) Administer the Rural Electrification Fund and decide the allocation of financial sources from the fund;
- (11) Monitor implementation of RE projects by Concessionaires;
- (12) Carry out or commission studies and research to promote the development of RE;
- (13) Advise relevant government agencies and authorities on:
 - a) the specifications, design and safety standards for RE systems, equipment and technologies;
 - b) the prices of SHS equipment, and tariffs and maintenance charges for RE; and
 - c) the appropriate amount to be appropriated by Parliament for the Fund.
- (14) In liaison with the Authority, carry out evaluations and publish periodic reports of the activities and achievement of the Committee;
- (15) Prepare, publish and submit to the Minister audited annual accounts of the Fund; and

(16) Do all such things as are necessary for achieving the purposes for which the Committee and the Fund are established.

Section 2. Function and responsibility of the Department of Energy Affairs

In addition to its existing power and functions, the DOE shall have the following functions and responsibility:

- (1) Act as Secretariat for the Committee;
- (2) Revise the Rural Electrification Master Plan periodically and prioritize un-electrified trading centers (TCs) for energization in each phase of the rural electrification program;
- (3) Carry out feasibility studies for individual RE program phases;
- (4) Evaluate the viability of new RE projects;
- (5) Act as a project supervisor for the design, procurement, and construction stages of each RE project;
- (6) Assess and review the necessary level of subsidies for individual RE projects from the following aspects:
 - a) Applicable concession schemes
 - b) Expected financial internal rate of return (FIRR)
 - c) Expected tariff level of the project and desirable range of tariff disparity among neighboring concession areas
 - d) Necessary level of O&M subsidy
- (7) Develop a program to electrify public institutions using SHS in the Rural Electrification Master Plan and prepare a priority list of institutions from the following aspects:
 - a) Progress of the RE programs to electrify un-electrified trading centers
 - b) Order of application from each institution
 - c) Equitability among institutions
 - d) Cost and benefit

PART III - RURAL ELECTRIFICATION FUND

Rule 1. Management of the Fund

Section 1. Guiding principle

The purpose of the Fund is clearly stipulated in Section 13 of the Act, and the use of the Fund must be transparent and systematically managed.

Section 2. Budget planning

The DOE, as Secretariat for the Committee, shall prepare a budget plan for the next several years to keep a sound balance between necessary expenditure and foreseeable revenue. Also, the DOE must evaluate annual appropriations for RE projects from the following viewpoints:

- (1) Prospect for revenue
 - a) Ordinary revenue for the Fund that is stipulated in Section 13 of the Rural Electrification Act
 - b) Leasing fee imposed on the government-owned assets used by a Concessionaire
- (2) Prospect for outlay
 - a) New investment in the next phase of the RE program
 - b) O&M subsidy for existing RE projects
 - c) Cost of DOE work such as review of the Master Plan, implementation of feasibility studies for the next RE program phase, and supervision of RE projects
 - d) Other expenditure for implementing RE programs, including SHS credit guarantee and governmental monetary contribution to donor-funded RE projects
 - e) Cost and expenditures for managing the Committee and the Fund
 - f) Cost and expenditures for managing RE related research activities

Rule 2. Finance Mechanism of the Fund

Section 1. Guiding principle

Pursuant to Section 13 of the Act, the Fund shall channel monies to RE projects in the following forms.

- (1) Capital cost of RE grid extension and off-grid electrification;
- (2) Capital cost of SHS equipment to be acquired for public institutions; and
- (3) O&M cost subsidy necessary for making an RE project viable.
- (4) Research and consultancy assignment:
- (5) SHS credit guarantee
- (6) Remuneration for the Committee members
- (7) DOE cost and expenditures for carrying out its RE-related works required and authorized by the relevant acts.

Section 2. Financing capital cost of extending the interconnected grid and installing off-grid systems

- (1) The DOE, as a Concedante, shall decide an appropriate electrification method and design the project configuration. However, if a Concessionaire can contribute to the necessary capital cost, the project configuration may be changed through negotiation between the DOE and the Concessionaire.
- (2) The assets which are installed with money from the Fund must be listed in the book of the Fund. However, if the Concessionaire contributes to the capital investment, its portion of the assets must be split and listed in the Concessionaire's book.
- (3) The DOE shall recover the depreciation cost of the assets in the book of the Fund through income from the project operation.

Section 3. Financing capital cost of solar home system equipment installed in public institutions

- (1) The DOE shall provide capital cost necessary for SHS equipment installation, but the ownership of the equipment shall be transferred to the institution in question.
- (2) After the transfer of the ownership to the institution in question, that institution shall be responsible for the equipment, and operate and maintain it appropriately.

Section 4. Subsidizing operation and maintenance (O&M) cost of a rural electrification project carried out by a Concessionaire

- (1) The Fund may subsidize the O&M cost of an RE project so that a Concessionaire can attain a certain level of financial rate of return (FIRR) during the concession period.
- (2) The requisite amount of the O&M subsidy must be decided through negotiation between the DOE and a Concessionaire (or candidate Concessionaire). To prepare this negotiation, the DOE must evaluate a target FIRR as a hurdle rate to judge project viability in advance.
- (3) The target FIRR, however, may vary from project to project because investor's expectation for the return also varies in accordance with the prevailing economic circumstances. Therefore, the DOE must set policies for this evaluation. There are two approaches for evaluating the size of necessary O&M subsidy. One is for the DOE to order the Concessionaire to submit a financial statement annually and evaluate the necessary subsidy based on the statement. Another is for the amount of the O&M subsidy to be fixed in the conditions of the concession upon which the DOE and Concessionaire agree. The DOE shall contemplate the advantages and disadvantages of each prospective approach and apply the best one for individual RE project in question. These policy approaches must be not fixed but flexibly applied for RE program phases and projects, because both market conditions and the economic climate surrounding RE business may change in the future.

Section 5. Providing credit guarantee for the capital cost of SHS equipment other than those to be acquired by Concessionaires.

- (1) The DOE shall construct the detailed scheme for credit guarantee including the following aspects:
 - a) Organization and officials in charge of credit guarantee
 - b) Budget allocation
 - c) Eligible SHS technology and equipment for credit guarantee
- (2) The DOE shall coordinate its activities with those of other institutions promoting the use of SHS, such as the Barrier Removal to Renewable Energy of Malawi (BAREM) and the Malawi Bureau of Standards and give the beneficiaries easier access to credit guarantee.
- (3) The DOE shall encourage potential beneficiaries who have difficulties in accessing the grid to use SHS.

Section 6. Expenses for research and consultancy assignment to RE

(The DOE will draft this section.)

Section 7. Remuneration of the Committee members

(The DOE will draft this section.)

Section 8. DOE's cost of and expenditures for carrying out its RE-related works

- (1) The DOE must separate cost and expenditures for RE-related work from those for other its ordinary work and not be allowed to use any Fund money for other purposes.
- (2) Remuneration for DOE officials engaged in the RE shall be paid not from the Fund but from the ordinary government budget.

PART IV - REGULATION OF RURAL ELECTRIFICATION

Rule 1. License

Section 1. Guiding principle

Any persons who operate RE project under a concession agreement must fulfill all conditions required by the Rural Electrification, Electricity, and Energy Regulation acts.

Section 2. License necessary for a Concessionaire

- (1) A Concessionaire who operates an RE project under a concession agreement must hold (a) necessary license(s) as follows:
 - a) Generation license
 - b) Distribution license
 - c) Renewable-energy-technology license
- (2) In case a concessionaire uses an off-grid system, it must necessarily hold multiple licenses in accordance with the project scheme. With a mini-grid system, power generation and distribution are naturally integrated in the project scheme and the Concessionaire must hold generation and distribution licenses. In addition, if solar technology is used for power generation, the renewable-energy-technology license is also needed.
- (3) As regards renewable energy technologies, the DOE shall evaluate characteristics of individual technologies, set guidelines for the system configuration using renewable technology, and advise the Authority for issuance of licenses.

Rule 2. Tariff-setting

Section 1. Guiding principle

While the Authority is responsible for the regulation and approval of tariffs, the DOE may take measures to reduce tariff disparity among concession areas in order to pursue consumer equitability.

Section 2. Reasonable return on Concessionaire's equity

A Concessionaire is allowed to receive reasonable return on equity through the operation of an RE project under a concession agreement.

Section 3. Measures to reduce disparity of tariff levels

The Concedante can provide necessary measures to reduce tariff level disparity among RE Concessionaires throughout the country as follows:

- (1) Adjustment of the concession fee with the approval of the Committee

- (2) Adjustment of the facility leasing fee
- (3) Adjustment of the O&M subsidy

Rule 3. Concession agreement

Section 1. Guiding principle

The Concedante shall select a Concessionaire through a transparent process, maximize the interest of the Concedante and Concessionaire, and pursue the rationality of the RE project operation.

Section 2. Procedure to select a Concessionaire for a new RE project

The procedure for approval of the project including the selection of the Concessionaire shall be in accordance with the following steps.

- (1) Project identification: The DOE selects RE project areas for the next phase based on the electrification priority list of trading centers (TCs) shown in the Master Plan.
- (2) Recruitment of Concessionaires: The DOE announces the profiles of the projects and requisite operators, i.e., Concessionaires.
- (3) Expression of interest: Persons who are interested in the announced projects express their interest to the DOE, and the DOE prepares the list of candidates.
- (4) The DOE identifies the most promising candidate from the list and defines the detailed conditions for a concession agreement
- (5) Through the negotiation, the DOE and the candidate Concessionaire settle the contract conditions.
- (6) The Concedante and the Concessionaire sign the contract, and Concessionaire commences operation of the project.

Section 3. Concession agreement

- (1) The DOE shall draft a model Concession agreement to facilitate understanding of the Concession scheme among private companies.
- (2) Concession agreements must clearly state the following items:
 - a) Conditions for the Concession including right, duties, and responsibilities.
 - b) Settlement of project failure due to the fault of the Concedante and/or the Concessionaire
 - c) Treatment of accidents caused by force majeure.

Section 4. Concession fee

- (1) A Concessionaire must pay a concession fee in a lump sum to the Concedante once the concession agreement has been completed and approved by the Authority.
- (2) The concession fee consists of various costs incurred by the Concedante and premiums:
 - a) Monitoring and management cost
 - b) Costs of channeling monies from the Fund to the Concessionaire
 - c) Costs of the RE project preparation
 - d) Premium of the project such as potential profit in the future

Section 5. Termination of the Concession Agreement

- (1) As noted in Section 29 of the Act, the period of the Concession Agreement shall not be more than 20 years. However, subject to review of the project performance, agreement of the Concedante, and approval of the Commission, the Concessionaire shall be allowed to renew the Concession Agreement for the next period.
- (2) When the project is interrupted by force majeure such as natural disasters and incidents for which the Concessionaire is not responsible, the Concessionaire shall be allowed to terminate the project without any penalty. Other detailed conditions for termination of the project must be clarified in each Concession Agreement.
- (3) When the project is terminated due to the Concessionaire's failure, the Concedante shall have the right to buy out the project assets owned by the Concessionaire at the price of remaining value and receive reasonable compensation from the Concessionaire. Detailed conditions for termination of the project must be clarified in each Concession Agreement.
- (4) When the project is terminated due to the Concedante's fault, the Concessionaire shall have the right to make the Concedante buy out Concessionaire's project assets at the price of remaining value, receive reasonable compensation from the Concedante, and disengage from the project. Detailed conditions for the termination of the project must be stated in each Concession Agreement.

Rule 4. SHS agreement

Section 1. Guiding principle

The SHS agreement shall set force the conditions for an RE project using SHS equipment and reduce potential project risks for Concedante, Concessionaire, and SHS supplier.

Section 2. Evaluation and establishment of SHS business models applied to RE Projects

The DOE shall evaluate various SHS business models applicable to RE projects, determine the advantages and disadvantages of individual models, and set up a suitable project scheme for a Concessionaire using SHS equipment.

Meanwhile, BAREM is currently conducting renewable energy projects, and the DOE shall absorb good practices and experience from them.

Section 3. SHS Purchase Guarantee and Service Agreement

- (1) The DOE shall draft a model agreement to help the Concedante, the Concessionaire and the SHS supplier to understand the Concession scheme.
- (2) The Concession agreement must state the following items:
 - a) Right and responsibility of the three parties: the Concedante, the Concessionaire and the SHS supplier
 - b) Qualification of the SHS equipment
 - c) Arbitration and settlement of dispute among the three parties.

Rule 5. Ownership of facilities

Section 1. Guiding principle

Except for SHS equipment installed in public institutions with money from the Fund, ownership of individual assets shall belong to the party who provided the money for installation or acquisition.

Section 2. Ownership

- (1) The government holds ownership of the facilities, which were installed and acquired with monies from the Fund.
- (2) The Concessionaire holds ownership of the assets for which it pays money. Some of these assets are those for which the Concessionaire contributed to the initial investment and made additional investment.
- (3) The public institution holds ownership of the SHS equipment installed by the DOE in accordance with the RE programs.

Section 3. Leasing fee for facilities

- (1) The Concedante may impose a leasing fee for the government-owned facilities on a Concessionaire, but the level of the fee must be adjusted with consideration of the project viability and necessary O&M subsidy.

- (2) The leasing fee paid by a Concessionaire should be returned to the Fund and saved for financing projects in the next phase.

Section 4. Buy-out of assets

When the RE project is terminated for any of the following reasons, the Concedante shall buy out the residual value of the assets whose ownership belongs to the Concessionaire.

- (1) Completion of the concession period
- (2) Suspension of the project due to force majeure
- (3) Suspension of the project due to Concessionaire's fault
- (4) Suspension of the project due to Concedante's fault

PART V - OTHER PROVISIONS

Rule 1. Separability Clause

If any provision herein is subsequently declared unconstitutional, the same shall not affect the legality of the other provisions.

Rule 2. Effectuation

These Rules shall take effect beginning on _____.

5.2 Business Models for Rural Electrification

In the previous master plan study, the JICA Study Team proposed the following business models for RE:

- Monopolistic Utility
- Independent Power Distributors (IPDs)
- Energy Service Company (ESCOs)
- Electric Cooperative (ECs)

For the Phase 4 program and the ongoing Phase 5 that is at the stage of feasibility studies, except for the present monopolistic utility—the Electricity Supply Corporation of Malawi (ESCOM) — no other candidate for an operator is expected.

However, due to the passage of three RE-related bills, the power industry will be unbundled into three sub-sectors, i.e., generation, transmission, and distribution. Of these, the distribution sub-sector will be transformed into a power supply business based on concession agreement in both urban and rural areas. Because of this sectoral reform, the institutional and organizational structure to promote RE project will drastically change.

Up to now, the government-owned power company—ESCOM—has carried out RE projects as a quasi-independent business with a separate financial account in the company. Under the new industrial structure, however, if ESCOM were engaged in RE, this business would be a completely independent and separate operation¹⁰.

Due to this structural reform of the power industry, beginning with the Phase 6 program, the government will recruit private companies which have an interest in participating in the RE project, select one company among them, and make a concession agreement with it.

For the Phase 6 program, the expected candidates are not only ESCOM but also newcomers. Because of the above-mentioned sectoral reform, however, with regard to ESCOM, the department that has been carrying out RE projects will be spun off and continue to be engaged in RE. Whoever the future project operators are, their features must be IPD or ESCO (in the case of ESCO, it is ESCOM-ESCO) businesses. Although we must not discard the possibility of organizing ECs over the long term, they are still an unrealistic scenario in the near future because there is no institutional or legal basis for their establishment.

¹⁰ Under the new institutional structure, ESCOM itself must unbundle its business operation to generation, transmission, and distribution. Furthermore, individual businesses must hold licenses necessary for independent operations.

5.3 Procedure for Approval of the RE Project

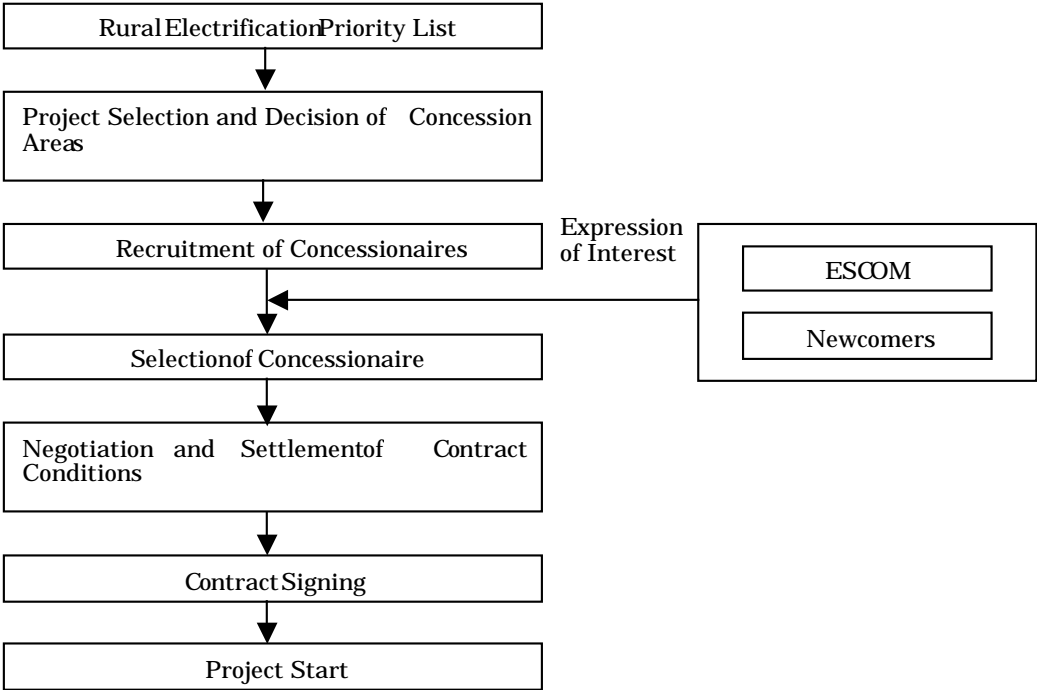
As shown in the Rural Electrification Act, RE business will be a power distribution service with an additional investment based on a concession agreement for 20 years. Although the Rural Electrification Management Committee has the authority of approval of concession, the Rural Electrification Unit of the DOE, as secretariat, must carry out the necessary work.

Figure 5-1 shows the flow of the work that the secretariat must be engaged in.

The first stage extends from project identification to the listing of companies that have an interest in the project. The DOE will select RE project areas for the next phase based on the electrification priority list of trading centers (TCs) which was made in the Master Plan, and announce the profiles of the projects to recruit operators. If private companies are interested in the projects, they would express interest to the DOE, and the DOE will prepare the list of candidate companies.

As the next stage, the DOE must identify the most promising candidate from the list and clarify the detailed conditions for a concession agreement. In evaluating the conditions, the important points are the size, period, and termination of O&M subsidy. Concessionaires are definitely private entities and will assess project risks and expected return from the project carefully. The project risks here are factors of uncertainty, including size of demand, demand growth in the future, tariff levels, rate of tariff collection, and additional investment needed during the project period.

If the government and the private company agree upon all project conditions through this negotiation, a concession agreement would be signed between them.



Source: The JICA Study Team

Figure 5-1 Procedure for Selection of a Concessionaire

5.4 Evaluation Method for Economy of Project

As shown in the Master Plan Study, subsidies not only for the initial investment but also for O&M are prerequisites for running almost all RE projects. To solve this problem, the Rural Electrification Act allows O&M subsidy.

When the DOE selects a concessionaire, it must evaluate the economy of the project and estimate the size of the necessary subsidy. We propose the following bases for procedure and methodology of evaluation.

5.4.1 Approval of an RE Project

The Rural Electrification Act stipulates that the IRR of the project must be no more than 6% under the definition of RE. In the Follow-up Study, this IRR must be calculated as an EIRR. (As regards IRR calculation method, please refer to the attached Feasibility Study Implementation Manual for Grid Extension.)

5.4.2 Concession Fee

The Rural Electrification Act stipulates that the concedante shall be entitled to be paid a concession fee by the concessionaire. The act also stipulates that this fee covers the monitoring and management costs and costs of channeling monies from the Rural Electrification Fund to the concessionaire.

In general, the term “concession fee” refers to the premium cost for receiving concession. In Malawi, however, we cannot expect RE projects to be unconditionally viable as a power business. In the short run, it may not be possible for private companies to pay a lot of premium money for RE projects.

5.4.3 Depreciation of the Facilities Installed by the Rural Electrification Fund

For RE projects, necessary investment in facilities such as lines, poles, and transformers is made with money from the Rural Electrification Fund. While the government holds ownership of these facilities, a concessionaire can use them for project operation. These assets are listed in the book of the Rural Electrification Fund, and their value is devaluated (depreciated) every year. This depreciated value, in principle, must be recovered through income from the project operation and returned to the Rural Electrification Fund. This mechanism will produce capital money for reinvestment in the next project. In other words, the depreciation cost recovered from the project income will be accumulated in the Rural Electrification Fund as a revolving fund.

At the same time, it is very questionable how much of the depreciation cost of the facility can be recovered through income from the project operation, which is unviable without subsidy. As a basis for the RE scheme, on the other hand, it is necessary to transfer the depreciation cost to the concessionaire in the form of leasing fee for the facility when the DOE assesses annual profit and loss of the project. Needless to say, this fee will be offset by the necessary operation subsidy to make the project viable. As a result, the fee cannot cover the depreciation cost and also might be exempted in some cases.

5.4.4 Operation and Maintenance (O&M) Subsidy

There are two policy approaches for evaluating the size of necessary O&M subsidy. One is for the DOE to order the concessionaire to submit a financial statement annually and evaluate the necessary subsidy based on the statement. This method is less risky for the concessionaire, but presents the DOE with the problem of how precisely it can assess the viability of the project. While the concessionaire holds all financial data, the only thing the DOE can do is to trace and examine these data and statement. In this context, the DOE, which is not involved in the project operation directly, has limited power, and the concessionaire has an advantage.

Another approach is for the amount of the O&M subsidy to be fixed in the conditions of the concession upon which the DOE and concessionaire agree. If more than two candidates apply for the auction, the one requesting less subsidy gets higher evaluation points. (Needless to say, the concessionaire must be selected upon consideration of a various factors, and the amount of the requested subsidy is only one of them.) On the one hand, fixing the size of the subsidy provides the concessionaire with an incentive in that, if it improves the efficiency of the operation, it can also increase its profit from the operation. On the other hand, both the government and the concessionaire hold some risks. From the standpoint of the concessionaire, even if it finds itself getting into deficit in revenue, it cannot receive more subsidy than the initially fixed amount. From the standpoint of the government, there is the risk that the concessionaire would abandon the project if it continued to suffer from income deficit.

5.4.5 Separation of Assets Ownership and Settlement when the Project Terminates

During the 20-year concession period, the concessionaire needs to invest additionally in the facility. Even though the government owns the original assets, renovation is necessary if they are completely depreciated. The concessionaire is responsible for this reinvestment, and renewed facilities are to be listed in the concessionaire's balance sheet and depreciated as annual operational cost. When the 20-year concession period is expired, the government must buy out the concessionaire's assets at the price of the residual value and terminate the contract, if the concessionaire does not renew it.

Chapter 6. Recommendations

6.1 Increase in the Staffing of the RE Unit of the DOE

As for the future, the schedule calls for the conclusion of contracts and commencement of the whole series of contract, detailed design, construction and other work in Phase 5. There are two major types of examination work to be performed by the DOE in Phase 5, as follows:

- Examination of design drawings submitted by ESCOM;
- Examination of the calculations made by ESCOM for construction costs and cost breakdowns

The examinations should be made by personnel with knowledge of electric engineering (for distribution lines). However, of the four persons currently in charge of contracting and examination work at the RE unit of the DOE, only one of them is an engineer with a thorough knowledge of electric engineering. A heavy work load is anticipated to arise in connection with examination. It would clearly be hard for the DOE to make accurate examinations with the current setup including only one such engineer. As such, it is considered necessary for the aforementioned the RE unit to be staffed with more electric engineers assigned to the work of Phase 5 examination.

6.2 Electricity Demand Forecast and Continuous Analysis of TC Electrification Prioritization

The recommendations for the electricity demand forecast for the future are shown below:

(1) Electricity demand forecast

All results of Socio-Economic Survey were not analyzed in Study because of the time limitation. Therefore, for assuming more accurate unit demands, the DOE staff should analyze the sheets which could not be analyzed in Study.

Firstly, the JICA Study Team recommends that the DOE staff conduct a socio-economic resurvey and analyze the results for grasping conditions of electricity demand and increase of electricity devices more accurately.

Secondly, the duration of electricity demand forecast should be revised according to the phases.

Thirdly, the accurate number of household demand is required. The household data which were available from the Study was, as mentioned, "the number of households using the TC." Therefore, the DOE staff should grasp "the number of households in the TC" in the socio-economic resurvey and analyze more accurate electricity demand in TCs. For estimating unit demand for households more accurately, the JICA Study Team recommends that the DOE staff analyze the results of household in the electrified TCs in Socio-Economic Survey and review the ratio between the number of ordinary household and the number of rich household.

Fourthly, since the power consumption of the sheller of a maize mill is as big as 20kW, the JICA Study Team recommends that the DOE staff research the ratio of maize mill with or without a sheller and reflect the results to the electricity demand forecast.

(2) Method for TC electrification prioritization

The DOE staff should select TCs for Phase 7 and later. At this point, the JICA Study Team recommends the following five items for TC Electrification Prioritization.

- The DOE staff should recalculate considering the results of distribution expansion in Phase 5 and Phase 6 as for prioritization of Phase 7 and later.
- The DOE staff should revise the weight of each criterion according to the DOE policies.
- A market fee should be included as a criterion if it is clear that a market fee has reasonable indications for correlations between a market fee and both economic activities and social positions.
- The DOE staff should include the 19 TCs which lack TC data in a socio-economic resurvey.
- The DOE staff should decide conditions for adding new TCs for electrification.

6.3 Setup of a New Organizational Structure of RE

(1) Preparation of the Implementing Rules and Regulations and relevant laws

The draft implementing rules and regulations merely provide a basic idea and structure; they do not constitute a completed one. From now on, power experts and lawyers of the DOE must complete it based on this draft. As mentioned in the draft, there must be careful discussion of the possibility that some of the related rules might be available in the existing guidelines of the DOE or of the government, and the need for consistency between these rules and existing rules and guidelines.

In addition, there are many deficiencies as regards the necessary institutional arrangement. Although these are high expectations for the use of renewable energy, law necessary to this end has not yet been prepared. For example, on one side, there is a rule regarding renewable energy licenses, and on the other, there is no clear definition of renewable energy. These problems must be solved as soon as possible.

(2) Implementation of a RE project based on a concession agreement, and the necessity of technical assistance

Several issues remain in implementing an actual RE project. Due to the passage of the three RE-related laws, RE projects will be implemented under a new scheme based on a concession agreement, but no such draft agreement is available yet.

The DOE must draft a model agreement as a template, but needs technical assistance from developed countries to do so. As JICA has already decided to continue its technical assistance by sending JICA experts, a professional who can transfer necessary technique regarding concession agreements must be included among these experts.

Appendix 1 Unit Demands for Phase 5

Table of App.1- 1 Unit Demand for Secondary School

a) Daily Load in an Ordinary Secondary School

Number of Usage				0:00	1:00	2:00	3:00	4:00	5:00	6:00	7:00	8:00	9:00	10:00	11:00	12:00	13:00	14:00	15:00	16:00	17:00	18:00	19:00	20:00	21:00	22:00	23:00			
Place	Electrical Devices	Number	Capacity (W)																											
School	1) Incandescent Light	6	100	4	4	4	4	4	4	4												6	6	4	4	4	4	4		
	2) Fluorescent Light	10	40																			10	10	10						
	3) Cooking Device	0	2,500																											
	4) Refrigerator	0	280																											
	5) Radio	1	10									1	1	1	1	1	1	1	1	1	1	1	1	1	1					
	6) Cassette/CD Player	0	30																											
	7) Television	0	80																											
	8) Video Cassette Recorder	0	20																											
	9) Electric Iron	0	1,000																											
	10) Electric Heater	0	1,200																											
	11) Electric Fan	2	50												2	2	2	2	2	2	2	2	2	2						
	12) Air Conditioner	0	1,000																											
	13) Mill	0	20,000																											
	14) Computer	2	200									2	2																	
	15) Others	0	200																											
Dorm	1) Incandescent Light	0	100																											
	2) Fluorescent Light	0	40																											
	3) Cooking Device	0	2,500																											
	4) Refrigerator	0	280																											
	5) Radio	0	10																											
	6) Cassette/CD Player	0	30																											
	7) Television	0	80																											
	8) Video Cassette Recorder	0	20																											
	9) Electric Iron	0	1,000																											
	10) Electric Heater	0	1,200																											
	11) Electric Fan	0	50																											
	12) Air Conditioner	0	1,000																											
	13) Mill	0	20,000																											
	14) Computer	0	200																											
	15) Others	0	200																											

Power Consumption				0:00	1:00	2:00	3:00	4:00	5:00	6:00	7:00	8:00	9:00	10:00	11:00	12:00	13:00	14:00	15:00	16:00	17:00	18:00	19:00	20:00	21:00	22:00	23:00			
Place	Electrical Devices	Number	Capacity (W)																											
School	1) Incandescent Light	6	100	400	400	400	400	400	400	400	-	-	-	-	-	-	-	-	-	-	600	600	400	400	400	400	400			
	2) Fluorescent Light	10	40	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	400	400	400	-	-	-	-			
	3) Cooking Device	0	2,500	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
	4) Refrigerator	0	280	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
	5) Radio	1	10	-	-	-	-	-	-	-	-	10	10	10	10	10	10	10	10	10	10	10	10	10	-	-	-			
	6) Cassette/CD Player	0	30	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
	7) Television	0	80	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
	8) Video Cassette Recorder	0	20	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
	9) Electric Iron	0	1,000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
	10) Electric Heater	0	1,200	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
	11) Electric Fan	2	50	-	-	-	-	-	-	-	-	-	-	-	100	100	100	100	100	100	100	100	-	-	-	-				
	12) Air Conditioner	0	1,000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
	13) Mill	0	20,000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
	14) Computer	2	200	-	-	-	-	-	-	-	-	400	400	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
	15) Others	0	200	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
	Max Capacity (W)		1,110	400	400	400	400	400	400	400	410	410	10	110	110	110	110	110	110	110	110	1,110	1,010	810	400	400	400			
	Total Consumption (Wh)		8,930	400	400	400	400	400	400	400	410	410	10	110	110	110	110	110	110	110	110	1,110	1,010	810	400	400	400			
Dorm	1) Incandescent Light	0	100	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-				
	2) Fluorescent Light	0	40	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-				
	3) Cooking Device	0	2,500	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-				
	4) Refrigerator	0	280	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-				
	5) Radio	0	10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-				
	6) Cassette/CD Player	0	30	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-				
	7) Television	0	80	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-				
	8) Video Cassette Recorder	0	20	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-				
	9) Electric Iron	0	1,000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-				
	10) Electric Heater	0	1,200	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-				
	11) Electric Fan	0	50	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-				
	12) Air Conditioner	0	1,000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-				
	13) Mill	0	20,000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-				
	14) Computer	0	200	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-				
	15) Others	0	200	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-				
	Max Capacity (W)		0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-				
	Total Consumption (Wh)		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
Total	Max Capacity (W)		1,110	400	400	400	400	400	400	400	410	410	10	110	110	110	110	110	110	110	110	1,110	1,010	810	400	400	400			
	Consumption (Wh)		8,930	400	400	400	400	400	400	400	410	410	10	110	110	110	110	110	110	110	110	1,110	1,010	810	400	400	400			

Table of App.1- 2 Unit Demand for Primary School

b) Daily Load in an Ordinary Primary School

Number of Usage				0:00	1:00	2:00	3:00	4:00	5:00	6:00	7:00	8:00	9:00	10:00	11:00	12:00	13:00	14:00	15:00	16:00	17:00	18:00	19:00	20:00	21:00	22:00	23:00
School	1) Incandescent Light	10	100	6	6	6	6	6	6	6												10	10	6	6	6	6
	2) Fluorescent Light	12	40																			12	12	12			
	3) Cooking Device	0	2,500																								
	4) Refrigerator	0	280																								
	5) Radio	0	10								1	1	1	1	1	1	1	1	1	1	1	1	1	1			
	6) Cassette/CD Player	0	30																								
	7) Television	0	80																								
	8) Video Cassette Recorder	0	20																								
	9) Electric Iron	0	1,000																								
	10) Electric Heater	0	1,200																								
	11) Electric Fan	2	50																								
	12) Air Conditioner	0	1,000																								
	13) Mill	0	20,000																								
	14) Computer	1	200																								
	15) Others	0	200																								
Dorm	1) Incandescent Light	0	100																								
	2) Fluorescent Light	0	40																								
	3) Cooking Device	0	2,500																								
	4) Refrigerator	0	280																								
	5) Radio	0	10																								
	6) Cassette/CD Player	0	30																								
	7) Television	0	80																								
	8) Video Cassette Recorder	0	20																								
	9) Electric Iron	0	1,000																								
	10) Electric Heater	0	1,200																								
	11) Electric Fan	0	50																								
	12) Air Conditioner	0	1,000																								
	13) Mill	0	20,000																								
	14) Computer	0	200																								
	15) Others	0	200																								

Power Consumption				0:00	1:00	2:00	3:00	4:00	5:00	6:00	7:00	8:00	9:00	10:00	11:00	12:00	13:00	14:00	15:00	16:00	17:00	18:00	19:00	20:00	21:00	22:00	23:00
School	1) Incandescent Light	10	100	600	600	600	600	600	600	-	-	-	-	-	-	-	-	-	-	-	-	1,000	1,000	600	600	600	600
	2) Fluorescent Light	12	40	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	480	480	480	-	-	-
	3) Cooking Device	0	2,500	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	4) Refrigerator	0	280	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	5) Radio	0	10	-	-	-	-	-	-	-	10	10	10	10	10	10	10	10	10	10	10	10	10	10	-	-	-
	6) Cassette/CD Player	0	30	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	7) Television	0	80	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	8) Video Cassette Recorder	0	20	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	9) Electric Iron	0	1,000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	10) Electric Heater	0	1,200	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	11) Electric Fan	2	50	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	12) Air Conditioner	0	1,000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	13) Mill	0	20,000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	14) Computer	1	200	-	-	-	-	-	-	-	-	200	200	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	15) Others	0	200	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Max Capacity (W)		1,490	600	600	600	600	600	600	10	210	210	10	10	10	10	110	110	110	110	590	1,490	1,490	600	600	600	600
	Total Consumption (Wh)		10,480	600	600	600	600	600	600	10	210	210	10	10	10	10	110	110	110	110	590	1,490	1,490	600	600	600	600
Dorm	1) Incandescent Light	0	100	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	2) Fluorescent Light	0	40	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	3) Cooking Device	0	2,500	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	4) Refrigerator	0	280	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	5) Radio	0	10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	6) Cassette/CD Player	0	30	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	7) Television	0	80	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	8) Video Cassette Recorder	0	20	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	9) Electric Iron	0	1,000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	10) Electric Heater	0	1,200	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	11) Electric Fan	0	50	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	12) Air Conditioner	0	1,000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	13) Mill	0	20,000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	14) Computer	0	200	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	15) Others	0	200	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Max Capacity (W)		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Total Consumption (Wh)		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	Max Capacity (W)		1,490	600	600	600	600	600	600	10	210	210	10	10	10	10	110	110	110	110	590	1,490	1,490	600	600	600	600
	Consumption (Wh)		10,480	600	600	600	600	600	600	600	10	210	210	10	10	10	10	110	110	110	110	590	1,490	1,490	600	600	600

Table of App.1- 3 Unit Demand for Teacher's Development Center

c) Daily Load in an Ordinary Teacher's Development Center

Number of Usage																										
Electrical Devices	Number	Capacity (W)	0:00	1:00	2:00	3:00	4:00	5:00	6:00	7:00	8:00	9:00	10:00	11:00	12:00	13:00	14:00	15:00	16:00	17:00	18:00	19:00	20:00	21:00	22:00	23:00
1) Incandescent Light	1	100		1	1	1	1	1													1	1	1	1	1	1
2) Fluorescent Light	2	40									2	2	2	2	2	2	2	2	2	2						
3) Cooking Device	0	2,500																								
4) Refrigerator	0	280																								
5) Radio	0	10																								
6) Cassette/CD Player	0	30																								
7) Television	1	80									1	1	1	1	1	1	1	1	1	1						
8) Video Cassette Recorder	1	20									1	1	1	1	1	1	1	1	1	1						
9) Electric Iron	0	1,000																								
10) Electric Heater	0	1,200																								
11) Electric Fan	1	50																1	1	1	1					
12) Air Conditioner	0	1,000																								
13) Mill	0	20,000																								
14) Computer	1	200																1	1	1	1					
15) Others	0	200																								
Power Consumption																										
Electrical Devices	Number	Capacity (W)	0:00	1:00	2:00	3:00	4:00	5:00	6:00	7:00	8:00	9:00	10:00	11:00	12:00	13:00	14:00	15:00	16:00	17:00	18:00	19:00	20:00	21:00	22:00	23:00
1) Incandescent Light	1	100	100	100	100	100	100	100													100	100	100	100	100	100
2) Fluorescent Light	2	40									80	80	80	80	80	80	80	80	80	80						
3) Cooking Device	0	2,500																								
4) Refrigerator	0	280																								
5) Radio	0	10																								
6) Cassette/CD Player	0	30																								
7) Television	1	80									80	80	80	80	80	80	80	80	80	80						
8) Video Cassette Recorder	1	20									20	20	20	20	20	20	20	20	20	20						
9) Electric Iron	0	1,000																								
10) Electric Heater	0	1,200																								
11) Electric Fan	1	50																50	50	50	50					
12) Air Conditioner	0	1,000																								
13) Mill	0	20,000																								
14) Computer	1	200																200	200	200	200					
15) Others	0	200																								
Max Capacity (W)		430	100	100	100	100	100	100			180	180	180	180	180	180	430	430	430	430	100	100	100	100	100	100
Total Consumption (Wh)		4,000	100	100	100	100	100	100	0	0	180	180	180	180	180	180	430	430	430	430	100	100	100	100	100	100

Table of App.1- 4 Unit Demand for Staff House

d) Daily Load in an Ordinary Staff Room

Number of Usage																											
Electrical Devices	Number	Capacity (W)	0:00	1:00	2:00	3:00	4:00	5:00	6:00	7:00	8:00	9:00	10:00	11:00	12:00	13:00	14:00	15:00	16:00	17:00	18:00	19:00	20:00	21:00	22:00	23:00	
1) Incandescent Light	1	100		1	1	1	1	1	1														1	1	1	1	1
2) Fluorescent Light	2	40																					2	2	2		
3) Cooking Device	0	2,500																									
4) Refrigerator	0	280																									
5) Radio	1	10									1	1	1	1	1	1	1	1	1	1	1						
6) Cassette/CD Player	0	30																									
7) Television	1	80																					1	1	1		
8) Video Cassette Recorder	0	20																									
9) Electric Iron	0	1,000																									
10) Electric Heater	0	1,200																									
11) Electric Fan	1	50																									
12) Air Conditioner	0	1,000																									
13) Mill	0	20,000																									
14) Computer	0	200																									
15) Others	0	200																									
Power Consumption																											
Electrical Devices	Number	Capacity (W)	0:00	1:00	2:00	3:00	4:00	5:00	6:00	7:00	8:00	9:00	10:00	11:00	12:00	13:00	14:00	15:00	16:00	17:00	18:00	19:00	20:00	21:00	22:00	23:00	
1) Incandescent Light	1	100	100	100	100	100	100	100															100	100	100	100	100
2) Fluorescent Light	2	40																					80	80	80		
3) Cooking Device	0	2,500																									
4) Refrigerator	0	280																									
5) Radio	1	10									10	10	10	10	10	10	10	10	10	10	10						
6) Cassette/CD Player	0	30																									
7) Television	1	80																					80	80	80		
8) Video Cassette Recorder	0	20																									
9) Electric Iron	0	1,000																									
10) Electric Heater	0	1,200																									
11) Electric Fan	1	50																									
12) Air Conditioner	0	1,000																									
13) Mill	0	20,000																									
14) Computer	0	200																									
15) Others	0	200																									
Max Capacity (W)		260	100	100	100	100	100	100			10	10	10	10	10	10	60	60	60	60	10	10	260	260	260	100	100
Total Consumption (Wh)		1,850	100	100	100	100	100	100	0	0	10	10	10	10	10	10	60	60	60	60	10	10	260	260	260	100	100

Table of App.1- 5 Unit Demand for Hospital

e) Daily Load in an Ordinary Hospital

Number of Usage			0:00	1:00	2:00	3:00	4:00	5:00	6:00	7:00	8:00	9:00	10:00	11:00	12:00	13:00	14:00	15:00	16:00	17:00	18:00	19:00	20:00	21:00	22:00	23:00	
Electrical Devices	Number	Capacity (W)																									
1) Incandescent Light	20	100	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	
2) Fluorescent Light	10	40	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4		
3) Cooking Device	0	2,500																									
4) Refrigerator	2	280	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2		
5) Radio	0	10																									
6) Cassette/CD Player	0	30																									
7) Television	0	80																									
8) Video Cassette Recorder	0	20																									
9) Electric Iron	0	1,000																									
10) Electric Heater	0	1,200																									
11) Electric Fan	1	50																	1	1	1						
12) Air Conditioner	0	1,000																									
13) Mill	0	20,000																									
14) Computer	0	200																									
15) Others	2	200	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2	2	2	2	2	1	1	1	1		

Power Consumption

Electrical Devices		Number	Capacity (W)	0:00	1:00	2:00	3:00	4:00	5:00	6:00	7:00	8:00	9:00	10:00	11:00	12:00	13:00	14:00	15:00	16:00	17:00	18:00	19:00	20:00	21:00	22:00	23:00	
1) Incandescent Light	20	100	1,000	1,000	1,000	1,000	1,000	1,000	1,000	500	500	500	500	500	500	500	500	500	500	500	500	2,000	2,000	2,000	1,000	1,000	1,000	
2) Fluorescent Light	10	40	160	160	160	160	160	160	160	80	80	80	80	80	80	80	80	80	80	80	80	400	400	400	160	160	160	
3) Cooking Device	0	2,500																										
4) Refrigerator	2	280	560	560	560	560	560	560	560	560	560	560	560	560	560	560	560	560	560	560	560	560	560	560	560	560	560	
5) Radio	0	10																										
6) Cassette/CD Player	0	30																										
7) Television	0	80																										
8) Video Cassette Recorder	0	20																										
9) Electric Iron	0	1,000																										
10) Electric Heater	0	1,200																										
11) Electric Fan	1	50																		50	50	50						
12) Air Conditioner	0	1,000																										
13) Mill	0	20,000																										
14) Computer	0	200																										
15) Others	2	200	200	200	200	200	200	200	200	200	400	400	400	400	400	400	400	400	400	400	400	400	200	200	200	200	200	
Max Capacity (W)			3,360	1,920	1,920	1,920	1,920	1,920	1,920	1,340	1,540	1,540	1,540	1,540	1,540	1,540	1,540	1,540	1,590	1,590	1,590	1,540	3,360	3,160	3,160	1,920	1,920	1,920
Total Consumption (Wh)			45,390	1,920	1,920	1,920	1,920	1,920	1,920	1,340	1,540	1,540	1,540	1,540	1,540	1,540	1,540	1,590	1,590	1,590	1,540	3,360	3,160	3,160	1,920	1,920	1,920	

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Table of App.1- 6 Unit Demand for Health Center

f) Daily Load in an Ordinary Health Center

Number of Usage			0:00	1:00	2:00	3:00	4:00	5:00	6:00	7:00	8:00	9:00	10:00	11:00	12:00	13:00	14:00	15:00	16:00	17:00	18:00	19:00	20:00	21:00	22:00	23:00	
Electrical Devices	Number	Capacity (W)																									
1) Incandescent Light	10	100	4	4	4	4	4	4	4												10	10	10	4	4	4	4
2) Fluorescent Light	5	40	2	2	2	2	2	2	2												5	5	5	2	2	2	2
3) Cooking Device	0	2,500																									
4) Refrigerator	1	280	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
5) Radio	0	10																									
6) Cassette/CD Player	0	30																									
7) Television	0	80																									
8) Video Cassette Recorder	0	20																									
9) Electric Iron	0	1,000																									
10) Electric Heater	0	1,200																									
11) Electric Fan	0	50																									
12) Air Conditioner	0	1,000																									
13) Mill	0	20,000																									
14) Computer	0	200																									
15) Others	2	200	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	1	1	1	1

Power Consumption

Electrical Devices		Number	Capacity (W)	0:00	1:00	2:00	3:00	4:00	5:00	6:00	7:00	8:00	9:00	10:00	11:00	12:00	13:00	14:00	15:00	16:00	17:00	18:00	19:00	20:00	21:00	22:00	23:00			
1) Incandescent Light	10	100	400	400	400	400	400	400	400													1,000	1,000	1,000	400	400	400			
2) Fluorescent Light	5	40	80	80	80	80	80	80	80													200	200	200	80	80	80			
3) Cooking Device	0	2,500																												
4) Refrigerator	1	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280			
5) Radio	0	10																												
6) Cassette/CD Player	0	30																												
7) Television	0	80																												
8) Video Cassette Recorder	0	20																												
9) Electric Iron	0	1,000																												
10) Electric Heater	0	1,200																												
11) Electric Fan	0	50																												
12) Air Conditioner	0	1,000																												
13) Mill	0	20,000																												
14) Computer	0	200																												
15) Others	2	200	200	200	200	200	200	200	200	200	400	400	400	400	400	400	400	400	400	400	400	200	200	200	200	200	200			
Max Capacity (W)			1,880	960	960	960	960	960	960	960	480	680	680	680	680	680	680	680	680	680	680	1,880	1,880	1,880	1,880	1,680	1,680	960	960	960
Total Consumption (Wh)			25,720	960	960	960	960	960	960	480	680	680	680	680	680	680	680	680	680	680	680	1,880	1,880	1,880	1,680	1,680	960	960	960	

Table of App.1- 7 Unit Demand for Clinic

g) Daily Load in an Ordinary Clinic

Number of Usage																											
Electrical Devices	Number	Capacity (W)	0:00	1:00	2:00	3:00	4:00	5:00	6:00	7:00	8:00	9:00	10:00	11:00	12:00	13:00	14:00	15:00	16:00	17:00	18:00	19:00	20:00	21:00	22:00	23:00	
1) Incandescent Light	4	100		2	2	2	2	2	2													4	4	4	2	2	2
2) Fluorescent Light	2	40																				2	2	2			
3) Cooking Device	0	2,500																									
4) Refrigerator	1	280	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
5) Radio	0	10																									
6) Cassette/CD Player	0	30																									
7) Television	0	80																									
8) Video Cassette Recorder	0	20																									
9) Electric Iron	0	1,000																									
10) Electric Heater	0	1,200																									
11) Electric Fan	0	50																									
12) Air Conditioner	0	1,000																									
13) Mill	0	20,000																									
14) Computer	0	200									2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
15) Others	1	200	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2	2	2	2	2	1	1	1	1	1	1

Power Consumption																											
Electrical Devices	Number	Capacity (W)	0:00	1:00	2:00	3:00	4:00	5:00	6:00	7:00	8:00	9:00	10:00	11:00	12:00	13:00	14:00	15:00	16:00	17:00	18:00	19:00	20:00	21:00	22:00	23:00	
1) Incandescent Light	4	100	200	200	200	200	200	200														400	400	400	200	200	200
2) Fluorescent Light	2	40																				80	80	80			
3) Cooking Device	0	2,500																									
4) Refrigerator	1	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280
5) Radio	0	10																									
6) Cassette/CD Player	0	30																									
7) Television	0	80																									
8) Video Cassette Recorder	0	20																									
9) Electric Iron	0	1,000																									
10) Electric Heater	0	1,200																									
11) Electric Fan	0	50																									
12) Air Conditioner	0	1,000																									
13) Mill	0	20,000																									
14) Computer	0	200									400	400	400	400	400	400	400	400	400	400	400	200	200	200	200	200	200
15) Others	1	200	200	200	200	200	200	200	200	400	400	400	400	400	400	400	400	400	400	400	400	200	200	200	200	200	200
Max Capacity (W)		960	680	680	680	680	680	680	480	680	680	680	680	680	680	680	680	680	680	680	680	960	960	960	680	680	680
Total Consumption (Wh)		16,960	680	680	680	680	680	680	480	680	680	680	680	680	680	680	680	680	680	680	680	960	960	960	680	680	680

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Table of App.1- 8 Unit Demand for Post Office

h) Daily Load in an Ordinary Post Office

Number of Usage																											
Electrical Devices	Number	Capacity (W)	0:00	1:00	2:00	3:00	4:00	5:00	6:00	7:00	8:00	9:00	10:00	11:00	12:00	13:00	14:00	15:00	16:00	17:00	18:00	19:00	20:00	21:00	22:00	23:00	
1) Incandescent Light	6	100	6	6	6	6	6	6	6													7	7	7	7	7	7
2) Fluorescent Light	10	40								10	10	10	10	10	10	10	10	10	10	10	10						
3) Cooking Device	0	2,500																									
4) Refrigerator	0	280																									
5) Radio	0	10																									
6) Cassette/CD Player	0	30																									
7) Television	0	80																									
8) Video Cassette Recorder	0	20																									
9) Electric Iron	0	1,000																									
10) Electric Heater	0	1,200																									
11) Electric Fan	2	50																2	2	2	2						
12) Air Conditioner	0	1,000																									
13) Mill	0	20,000																									
14) Computer	0	200																									
15) Others	0	200																									

Power Consumption																											
Electrical Devices	Number	Capacity (W)	0:00	1:00	2:00	3:00	4:00	5:00	6:00	7:00	8:00	9:00	10:00	11:00	12:00	13:00	14:00	15:00	16:00	17:00	18:00	19:00	20:00	21:00	22:00	23:00	
1) Incandescent Light	6	100	600	600	600	600	600	600	600													700	700	700	700	700	700
2) Fluorescent Light	10	40								400	400	400	400	400	400	400	400	400	400	400	400						
3) Cooking Device	0	2,500																									
4) Refrigerator	0	280																									
5) Radio	0	10																									
6) Cassette/CD Player	0	30																									
7) Television	0	80																									
8) Video Cassette Recorder	0	20																									
9) Electric Iron	0	1,000																									
10) Electric Heater	0	1,200																									
11) Electric Fan	2	50																100	100	100	100						
12) Air Conditioner	0	1,000																									
13) Mill	0	20,000																									
14) Computer	0	200																									
15) Others	0	200																									
Max Capacity (W)		1,200	600	600	600	600	600	600	1,000	400	400	400	400	400	400	400	400	500	500	500	1,200	700	700	700	700	700	700
Total Consumption (Wh)		14,300	600	600	600	600	600	600	1,000	400	400	400	400	400	400	400	400	500	500	500	1,200	700	700	700	700	700	700

Table of App.1- 9 Unit Demand for Police Station

i) Daily Load in an Ordinary Police Station

Number of Usage																										
Electrical Devices	Number	Capacity (W)	0:00	1:00	2:00	3:00	4:00	5:00	6:00	7:00	8:00	9:00	10:00	11:00	12:00	13:00	14:00	15:00	16:00	17:00	18:00	19:00	20:00	21:00	22:00	23:00
1) Incandescent Light	3	100	3	3	3	3	3	3	3	1	1	1	1	1	1	1	1	1	1	1	3	3	3	3	3	
2) Fluorescent Light	4	40	2	2	2	2	2	2	2	4	4	4	4	4	4	4	4	4	4	4	2	2	2	2	2	
3) Cooking Device	0	2,500																								
4) Refrigerator	0	280																								
5) Radio	0	10																								
6) Cassette/CD Player	0	30																								
7) Television	0	80																								
8) Video Cassette Recorder	0	25																								
9) Electric Iron	0	1,000																								
10) Electric Heater	0	1,200																								
11) Electric Fan	0	50																								
12) Air Conditioner	0	1,000																								
13) Mill	0	20,000																								
14) Computer	0	200																								
15) Others	1	200	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		
Power Consumption																										
Electrical Devices	Number	Capacity (W)	0:00	1:00	2:00	3:00	4:00	5:00	6:00	7:00	8:00	9:00	10:00	11:00	12:00	13:00	14:00	15:00	16:00	17:00	18:00	19:00	20:00	21:00	22:00	23:00
1) Incandescent Light	3	100	300	300	300	300	300	300	300	100	100	100	100	100	100	100	100	100	100	100	300	300	300	300	300	
2) Fluorescent Light	4	40	80	80	80	80	80	80	80	160	160	160	160	160	160	160	160	160	160	160	80	80	80	80	80	
3) Cooking Device	0	2,500	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
4) Refrigerator	0	280	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
5) Radio	0	10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
6) Cassette/CD Player	0	30	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
7) Television	0	80	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
8) Video Cassette Recorder	0	25	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
9) Electric Iron	0	1,000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
10) Electric Heater	0	1,200	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
11) Electric Fan	0	50	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
12) Air Conditioner	0	1,000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
13) Mill	0	20,000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
14) Computer	0	200	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
15) Others	1	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	
Max Capacity (W)			580	580	580	580	580	580	580	460	460	460	460	460	460	460	460	460	460	460	580	580	580	580	580	
Total Consumption (Wh)			12,000	580	580	580	580	580	580	460	460	460	460	460	460	460	460	460	460	460	580	580	580	580	580	

Table of App.1- 10 Unit Demand for Police Post

i) Daily Load in an Ordinary Police Post

Number of Usage																										
Electrical Devices	Number	Capacity (W)	0:00	1:00	2:00	3:00	4:00	5:00	6:00	7:00	8:00	9:00	10:00	11:00	12:00	13:00	14:00	15:00	16:00	17:00	18:00	19:00	20:00	21:00	22:00	23:00
1) Incandescent Light	1	100	1	1	1	1	1	1													1	1	1	1	1	
2) Fluorescent Light	0	40																								
3) Cooking Device	0	2,500																								
4) Refrigerator	0	280																								
5) Radio	0	10																								
6) Cassette/CD Player	0	30																								
7) Television	0	80																								
8) Video Cassette Recorder	0	25																								
9) Electric Iron	0	1,000																								
10) Electric Heater	0	1,200																								
11) Electric Fan	0	50																								
12) Air Conditioner	0	1,000																								
13) Mill	0	20,000																								
14) Computer	0	200																								
15) Others	1	200	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
Power Consumption																										
Electrical Devices	Number	Capacity (W)	0:00	1:00	2:00	3:00	4:00	5:00	6:00	7:00	8:00	9:00	10:00	11:00	12:00	13:00	14:00	15:00	16:00	17:00	18:00	19:00	20:00	21:00	22:00	23:00
1) Incandescent Light	1	100	100	100	100	100	100														100	100	100	100	100	
2) Fluorescent Light	0	40	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
3) Cooking Device	0	2,500	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
4) Refrigerator	0	280	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
5) Radio	0	10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
6) Cassette/CD Player	0	30	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
7) Television	0	80	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
8) Video Cassette Recorder	0	25	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
9) Electric Iron	0	1,000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
10) Electric Heater	0	1,200	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
11) Electric Fan	0	50	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
12) Air Conditioner	0	1,000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
13) Mill	0	20,000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
14) Computer	0	200	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
15) Others	1	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	
Max Capacity (W)			300	300	300	300	300	300	200	200	200	200	200	200	200	200	200	200	200	200	300	300	300	300	300	
Total Consumption (Wh)			6,000	300	300	300	300	300	200	200	200	200	200	200	200	200	200	200	200	200	300	300	300	300	300	

Table of App.1- 11 Unit Demand for Police Unit

K) Daily Load in an Ordinary Police Unit

Number of Usage																											
Electrical Devices	Number	Capacity (W)	0:00	1:00	2:00	3:00	4:00	5:00	6:00	7:00	8:00	9:00	10:00	11:00	12:00	13:00	14:00	15:00	16:00	17:00	18:00	19:00	20:00	21:00	22:00	23:00	
1) Incandescent Light	1	100	1	1	1	1	1	1	1													1	1	1	1	1	1
2) Fluorescent Light	0	40																									
3) Cooking Device	0	2,500																									
4) Refrigerator	0	280																									
5) Radio	0	10																									
6) Cassette/CD Player	0	30																									
7) Television	0	80																									
8) Video Cassette Recorder	0	20																									
9) Electric Iron	0	1,000																									
10) Electric Heater	0	1,200																									
11) Electric Fan	0	50																									
12) Air Conditioner	0	1,000																									
13) Mill	0	20,000																									
14) Computer	0	200																									
15) Wireless radio	1	200	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
Power Consumption																											
Electrical Devices	Number	Capacity (W)	0:00	1:00	2:00	3:00	4:00	5:00	6:00	7:00	8:00	9:00	10:00	11:00	12:00	13:00	14:00	15:00	16:00	17:00	18:00	19:00	20:00	21:00	22:00	23:00	
1) Incandescent Light	1	100	100	100	100	100	100	100														100	100	100	100	100	100
2) Fluorescent Light	0	40	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
3) Cooking Device	0	2,500	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
4) Refrigerator	0	280	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
5) Radio	0	10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
6) Cassette/CD Player	0	30	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
7) Television	0	80	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
8) Video Cassette Recorder	0	20	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
9) Electric Iron	0	1,000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
10) Electric Heater	0	1,200	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
11) Electric Fan	0	50	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
12) Air Conditioner	0	1,000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
13) Mill	0	20,000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
14) Computer	0	200	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
15) Wireless radio	1	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	
Max Capacity (W)		300	300	300	300	300	300	300	200	200	200	200	200	200	200	200	200	200	200	200	300	300	300	300	300	300	
Total Consumption (Wh)		6,000	300	300	300	300	300	300	200	200	200	200	200	200	200	200	200	200	200	200	300	300	300	300	300	300	

Table of App.1- 12 Unit Demand for Admarc

D) Daily Load in an Ordinary Admarc

Number of Usage																											
Electrical Devices	Number	Capacity (W)	0:00	1:00	2:00	3:00	4:00	5:00	6:00	7:00	8:00	9:00	10:00	11:00	12:00	13:00	14:00	15:00	16:00	17:00	18:00	19:00	20:00	21:00	22:00	23:00	
1) Incandescent Light	2	100	2	2	2	2	2	2														2	2	2	2	2	2
2) Fluorescent Light	2	40																									
3) Cooking Device	0	2,500																									
4) Refrigerator	0	280																									
5) Radio	1	10								1	1	1	1	1	1	1	1	1	1	1							
6) Cassette/CD Player	0	30																									
7) Television	1	80								1	1	1	1	1	1	1	1	1	1	1							
8) Video Cassette Recorder	0	20																									
9) Electric Iron	0	1,000																									
10) Electric Heater	0	1,200																									
11) Electric Fan	2	50																2	2	2	2						
12) Air Conditioner	0	1,000																									
13) Mill	0	20,000																									
14) Computer	0	200																									
15) Others	0	200																									
Power Consumption																											
Electrical Devices	Number	Capacity (W)	0:00	1:00	2:00	3:00	4:00	5:00	6:00	7:00	8:00	9:00	10:00	11:00	12:00	13:00	14:00	15:00	16:00	17:00	18:00	19:00	20:00	21:00	22:00	23:00	
1) Incandescent Light	2	100	200	200	200	200	200	200														200	200	200	200	200	200
2) Fluorescent Light	2	40	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
3) Cooking Device	0	2,500	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
4) Refrigerator	0	280	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
5) Radio	1	10	-	-	-	-	-	-	10	10	10	10	10	10	10	10	10	10	10	10							
6) Cassette/CD Player	0	30	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
7) Television	1	80	-	-	-	-	-	-	80	80	80	80	80	80	80	80	80	80	80	80							
8) Video Cassette Recorder	0	20	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
9) Electric Iron	0	1,000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
10) Electric Heater	0	1,200	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
11) Electric Fan	2	50	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	100	100	100	100						
12) Air Conditioner	0	1,000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
13) Mill	0	20,000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
14) Computer	0	200	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
15) Others	0	200	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Max Capacity (W)		200	200	200	200	200	200	200	10	90	90	90	90	90	90	90	90	190	190	190	190	200	200	200	200	200	
Total Consumption (Wh)		3,800	200	200	200	200	200	200	10	90	90	90	90	90	90	90	190	190	190	190	200	200	200	200	200	200	

Table of App.1- 13 Unit Demand for Government Office

m) Daily Load in an Ordinary Government Office

Number of Usage																										
Electrical Devices	Number	Capacity (W)	0:00	1:00	2:00	3:00	4:00	5:00	6:00	7:00	8:00	9:00	10:00	11:00	12:00	13:00	14:00	15:00	16:00	17:00	18:00	19:00	20:00	21:00	22:00	23:00
1) Incandescent Light	3	100	2	2	2	2	2	2													3	3	2	2	2	2
2) Fluorescent Light	4	40																			4	2				
3) Cooking Device	0	2,500																								
4) Refrigerator	1	280	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
5) Radio	1	10																								
6) Cassette/CD Player	0	30																								
7) Television	1	80								1	1	1	1	1	1	1	1	1	1	1						
8) Video Cassette Recorder	0	20																								
9) Electric Iron	0	1,000																								
10) Electric Heater	0	1,200																								
11) Electric Fan	1	50																1	1	1	1					
12) Air Conditioner	0	1,000																								
13) Mill	0	20,000																								
14) Computer	0	200																								
15) Others	0	200																								
Power Consumption																										
Electrical Devices	Number	Capacity (W)	0:00	1:00	2:00	3:00	4:00	5:00	6:00	7:00	8:00	9:00	10:00	11:00	12:00	13:00	14:00	15:00	16:00	17:00	18:00	19:00	20:00	21:00	22:00	23:00
1) Incandescent Light	3	100	200	200	200	200	200	200														300	300	200	200	200
2) Fluorescent Light	4	40																				160	80			
3) Cooking Device	0	2,500																								
4) Refrigerator	1	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280
5) Radio	1	10									10	10	10	10	10	10	10	10	10	10	10					
6) Cassette/CD Player	0	30																								
7) Television	1	80								80	80	80	80	80	80	80	80	80	80	80						
8) Video Cassette Recorder	0	20																								
9) Electric Iron	0	1,000																								
10) Electric Heater	0	1,200																								
11) Electric Fan	1	50																50	50	50	50					
12) Air Conditioner	0	1,000																								
13) Mill	0	20,000																								
14) Computer	0	200																								
15) Others	0	200																								
Max Capacity (W)			740	480	480	480	480	480	480	280	370	370	370	370	370	370	370	420	420	420	420	740	460	480	480	480
Total Consumption (Wh)			10,750	480	480	480	480	480	480	280	370	370	370	370	370	370	370	420	420	420	420	740	660	480	480	480

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Table of App.1- 14 Unit Demand for Church

n) Daily Load in an Ordinary Church

Number of Usage																										
Electrical Devices	Number	Capacity (W)	0:00	1:00	2:00	3:00	4:00	5:00	6:00	7:00	8:00	9:00	10:00	11:00	12:00	13:00	14:00	15:00	16:00	17:00	18:00	19:00	20:00	21:00	22:00	23:00
1) Incandescent Light	3	100																				3	3	3	3	
2) Fluorescent Light	4	40																				4	4	4	4	
3) Cooking Device	0	2,500																								
4) Refrigerator	0	280																								
5) Radio	0	10																								
6) Cassette/CD Player	0	30																								
7) Television	0	80																								
8) Video Cassette Recorder	0	20																								
9) Electric Iron	0	1,000																								
10) Electric Heater	0	1,200																								
11) Electric Fan	0	50																								
12) Air Conditioner	0	1,000																								
13) Mill	0	20,000																								
14) Computer	0	200																								
15) Others	0	200																								
Power Consumption																										
Electrical Devices	Number	Capacity (W)	0:00	1:00	2:00	3:00	4:00	5:00	6:00	7:00	8:00	9:00	10:00	11:00	12:00	13:00	14:00	15:00	16:00	17:00	18:00	19:00	20:00	21:00	22:00	23:00
1) Incandescent Light	3	100																				300	300	300	300	
2) Fluorescent Light	4	40																				160	160	160	160	
3) Cooking Device	0	2,500																								
4) Refrigerator	0	280																								
5) Radio	0	10																								
6) Cassette/CD Player	0	30																								
7) Television	0	80																								
8) Video Cassette Recorder	0	20																								
9) Electric Iron	0	1,000																								
10) Electric Heater	0	1,200																								
11) Electric Fan	0	50																								
12) Air Conditioner	0	1,000																								
13) Mill	0	20,000																								
14) Computer	0	200																								
15) Others	0	200																								
Max Capacity (W)			460																			460	460	460	460	
Total Consumption (Wh)			1,844	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	460	460	460	460	0

Table of App.1- 15 Unit Demand for Mosque

o) Daily Load in an Ordinary Mosque

Number of Usage																										
Electrical Devices	Number	Capacity (W)	0:00	1:00	2:00	3:00	4:00	5:00	6:00	7:00	8:00	9:00	10:00	11:00	12:00	13:00	14:00	15:00	16:00	17:00	18:00	19:00	20:00	21:00	22:00	23:00
1) Incandescent Light	4	100	2	2	2	2	2	2	0	0	0	0	0	0	0	0	0	0	4	4	4	2	2	2	2	2
2) Fluorescent Light	4	40																	6	6	6					
3) Cooking Device	0	2,500																								
4) Refrigerator	0	280																								
5) Radio	0	10																								
6) Cassette/CD Player	0	30																								
7) Television	0	80																								
8) Video Cassette Recorder	0	20																								
9) Electric Iron	0	1,000																								
10) Electric Heater	0	1,200																								
11) Electric Fan	0	50																								
12) Air Conditioner	0	1,000																								
13) Mill	0	20,000																								
14) Computer	0	200																								
15) Others	0	200																								
Power Consumption																										
Electrical Devices	Number	Capacity (W)	0:00	1:00	2:00	3:00	4:00	5:00	6:00	7:00	8:00	9:00	10:00	11:00	12:00	13:00	14:00	15:00	16:00	17:00	18:00	19:00	20:00	21:00	22:00	23:00
1) Incandescent Light	4	100	200	200	200	200	200	200	-	-	-	-	-	-	-	-	-	-	400	400	400	200	200	200	200	200
2) Fluorescent Light	4	40																	240	240	240					
3) Cooking Device	0	2,500																								
4) Refrigerator	0	280																								
5) Radio	0	10																								
6) Cassette/CD Player	0	30																								
7) Television	0	80																								
8) Video Cassette Recorder	0	20																								
9) Electric Iron	0	1,000																								
10) Electric Heater	0	1,200																								
11) Electric Fan	0	50																								
12) Air Conditioner	0	1,000																								
13) Mill	0	20,000																								
14) Computer	0	200																								
15) Others	0	200																								
Max Capacity (W)		640	200	200	200	200	200	200	-	-	-	-	-	-	-	-	-	-	640	640	640	200	200	200	200	200
Total Consumption (Wh)		4,120	200	200	200	200	200	200	0	0	0	0	0	0	0	0	0	0	640	640	640	200	200	200	200	200

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Table of App.1- 16 Unit Demand for Court

p) Daily Load in an Ordinary Court

Number of Usage																										
Electrical Devices	Number	Capacity (W)	0:00	1:00	2:00	3:00	4:00	5:00	6:00	7:00	8:00	9:00	10:00	11:00	12:00	13:00	14:00	15:00	16:00	17:00	18:00	19:00	20:00	21:00	22:00	23:00
1) Incandescent Light	2	100	1	1	1	1	1	1		4	4	4	4	4	4	4	4	4	2	2	1	1	1	1	1	1
2) Fluorescent Light	4	40								160	160	160	160	160	160	160	160	160	80	80						
3) Cooking Device	0	2,500																								
4) Refrigerator	0	280																								
5) Radio	0	10																								
6) Cassette/CD Player	0	30																								
7) Television	0	80																								
8) Video Cassette Recorder	0	20																								
9) Electric Iron	0	1,000																								
10) Electric Heater	0	1,200																								
11) Electric Fan	1	50															50	50	50	50						
12) Air Conditioner	0	1,000																								
13) Mill	0	20,000																								
14) Computer	0	200																								
15) Others	0	200																								
Power Consumption																										
Electrical Devices	Number	Capacity (W)	0:00	1:00	2:00	3:00	4:00	5:00	6:00	7:00	8:00	9:00	10:00	11:00	12:00	13:00	14:00	15:00	16:00	17:00	18:00	19:00	20:00	21:00	22:00	23:00
1) Incandescent Light	2	100	100	100	100	100	100	100		160	160	160	160	160	160	160	160	160	80	80						
2) Fluorescent Light	4	40								160	160	160	160	160	160	160	160	160	80	80						
3) Cooking Device	0	2,500																								
4) Refrigerator	0	280																								
5) Radio	0	10																								
6) Cassette/CD Player	0	30																								
7) Television	0	80																								
8) Video Cassette Recorder	0	20																								
9) Electric Iron	0	1,000																								
10) Electric Heater	0	1,200																								
11) Electric Fan	1	50															50	50	50	50						
12) Air Conditioner	0	1,000																								
13) Mill	0	20,000																								
14) Computer	0	200																								
15) Others	0	200																								
Max Capacity (W)		330	100	100	100	100	100	100		160	160	160	160	160	160	160	210	210	330	330	100	100	100	100	100	100
Total Consumption (Wh)		3,400	100	100	100	100	100	100	0	160	160	160	160	160	160	160	210	210	330	330	100	100	100	100	100	100

Table of App.1- 19 Unit Demand for Business Entity

S) Daily Load in an Ordinary Business Entity

Number of Usage																										
Electrical Devices	Number	Capacity (W)	0:00	1:00	2:00	3:00	4:00	5:00	6:00	7:00	8:00	9:00	10:00	11:00	12:00	13:00	14:00	15:00	16:00	17:00	18:00	19:00	20:00	21:00	22:00	23:00
1) Incandescent Light	2	100	2	2	2	2	2	2														2	2	2	2	2
2) Fluorescent Light	2	40																								
3) Cooking Device	0	2,500																								
4) Refrigerator	1	280	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
5) Radio	0	10																								
6) Cassette/CD Player	0	30																								
7) Television	1	80																								
8) Video Cassette Recorder	0	20																								
9) Electric Iron	0	1,000																								
10) Electric Heater	0	1,200																								
11) Electric Fan	0	50																								
12) Air Conditioner	0	1,000																								
13) Mill	0	20,000																								
14) Computer	0	200																								
15) Others	0	200																								

Power Consumption																										
Electrical Devices	Number	Capacity (W)	0:00	1:00	2:00	3:00	4:00	5:00	6:00	7:00	8:00	9:00	10:00	11:00	12:00	13:00	14:00	15:00	16:00	17:00	18:00	19:00	20:00	21:00	22:00	23:00
1) Incandescent Light	2	100	200	200	200	200	200	200															200	200	200	200
2) Fluorescent Light	2	40																					80	80	80	80
3) Cooking Device	0	2,500																								
4) Refrigerator	1	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280
5) Radio	0	10																								
6) Cassette/CD Player	0	30																								
7) Television	1	80							80	80	80	80	80	80	80	80	80	80	80	80	80					
8) Video Cassette Recorder	0	20																								
9) Electric Iron	0	1,000																								
10) Electric Heater	0	1,200																								
11) Electric Fan	0	50																								
12) Air Conditioner	0	1,000																								
13) Mill	0	20,000																								
14) Computer	0	200																								
15) Others	0	200																								
Total			480	480	480	480	480	480	480	370	370	370	370	370	370	370	370	370	370	370	370	450	560	480	480	480
			10,250	480	480	480	480	480	480	370	370	370	370	370	370	370	370	370	370	370	370	450	560	480	480	480

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Table of App.1- 20 Unit Demand for Household

T) Daily Load in an Ordinary Household

Number of Usage																										
Electrical Devices	Number	Capacity (W)	0:00	1:00	2:00	3:00	4:00	5:00	6:00	7:00	8:00	9:00	10:00	11:00	12:00	13:00	14:00	15:00	16:00	17:00	18:00	19:00	20:00	21:00	22:00	23:00
1) Incandescent Light	2	100	2	2	2	2	2	2																2	2	2
2) Fluorescent Light	2	40																								
3) Cooking Device	0	2,500																								
4) Refrigerator	1	280	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
5) Radio	1	10																								
6) Cassette/CD Player	0	30																								
7) Television	1	80																								
8) Video cassette Recorder	1	20																								
9) Electric Iron	1	1,000																								
10) Electric Heater	0	1,200																								
11) Electric Fan	1	50																								
12) Air Conditioner	0	1,000																								
13) Mill	0	20,000																								
14) Computer	0	200																								
15) Others	0	200																								

Power Consumption																										
Electrical Devices	Number	Capacity (W)	0:00	1:00	2:00	3:00	4:00	5:00	6:00	7:00	8:00	9:00	10:00	11:00	12:00	13:00	14:00	15:00	16:00	17:00	18:00	19:00	20:00	21:00	22:00	23:00
1) Incandescent Light	2	100	200	200	200	200	200	200																200	200	200
2) Fluorescent Light	2	40																					40	80	80	40
3) Cooking Device	0	2,500																								
4) Refrigerator	1	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280
5) Radio	1	10																								
6) Cassette/CD Player	0	30																								
7) Television	1	80																								
8) Video Cassette Recorder	1	20																								
9) Electric Iron	1	1,000																								
10) Electric Heater	0	1,200																								
11) Electric Fan	1	50																								
12) Air Conditioner	0	1,000																								
13) Mill	0	20,000																								
14) Computer	0	200																								
15) Others	0	200																								
Total			480	480	480	480	480	480	280	290	290	290	290	290	290	340	340	340	340	340	360	420	460	660	640	480
			9,800	480	480	480	480	480	280	290	290	290	290	290	290	340	340	340	340	340	360	420	460	660	640	520

Appendix 2 Unit Demands for Phase 6 and Later

Table of App.2- 1 Unit Demand for Secondary School

a) Daily Load in an Ordinary Secondary School

Number of Usage																											
Electrical Devices	Number	Capacity (W)	0:00	1:00	2:00	3:00	4:00	5:00	6:00	7:00	8:00	9:00	10:00	11:00	12:00	13:00	14:00	15:00	16:00	17:00	18:00	19:00	20:00	21:00	22:00	23:00	
1) Incandescent Light	4	100																									
2) Fluorescent Light	8	40	2	2	2	2	2	2												8	8	8	8	2	2	2	2
3) Cooking Device	0	1,600																									
4) Refrigerator	0	280																									
5) Radio	0	10																									
6) Cassette/CD Player	1	30							1	1	1	1	1	1	1	1	1	1	1	1							
7) Television	0	80																									
8) Video Cassette Recorder	0	20																									
9) Electric Iron	0	1,000																									
10) Electric Heater	0	1,200																									
11) Electric Fan	2	50										2	2	2	2	2	2	2	2	2							
12) Air Conditioner	0	1,000																									
13) Mill	0	20,000																									
14) Computer	2	200									2	2	2	2	2	2	2	2	2	2							
15) Others	0	200																									

Electrical Devices	Number	Capacity (W)	0:00	1:00	2:00	3:00	4:00	5:00	6:00	7:00	8:00	9:00	10:00	11:00	12:00	13:00	14:00	15:00	16:00	17:00	18:00	19:00	20:00	21:00	22:00	23:00
1) Incandescent Light	4	100	200	200	200	200	200	200												400	400	400	200	200	200	200
2) Fluorescent Light	8	40																		320	320	320				
3) Cooking Device	0	1,600																								
4) Refrigerator	0	280																								
5) Radio	0	10																								
6) Cassette/CD Player	1	30							30	30	30	30	30	30	30	30	30	30	30	30						
7) Television	0	80																								
8) Video Cassette Recorder	0	20																								
9) Electric Iron	0	1,000																								
10) Electric Heater	0	1,200																								
11) Electric Fan	2	50										100	100	100	100	100	100	100	100							
12) Air Conditioner	0	1,000																								
13) Mill	0	20,000																								
14) Computer	2	200									400	400	400	400	400	400	400	400	400	400						
15) Others	0	200																								
Max Capacity (W)		1,250	200	200	200	200	200	200	30	30	430	430	530	530	530	530	530	530	850	1,250	720	720	200	200	200	200
Total Consumption (Wh)		9,640	200	200	200	200	200	200	30	30	430	430	530	530	530	530	530	530	850	1,250	720	720	200	200	200	200

Table of App.2- 2 Unit Demand for Primary School

b) Daily Load in an Ordinary Primary School

Number of Usage																										
Electrical Devices	Number	Capacity (W)	0:00	1:00	2:00	3:00	4:00	5:00	6:00	7:00	8:00	9:00	10:00	11:00	12:00	13:00	14:00	15:00	16:00	17:00	18:00	19:00	20:00	21:00	22:00	23:00
1) Incandescent Light	4	100	2	2	2	2	2	2	2											4	4	4	2	2	2	2
2) Fluorescent Light	12	40																		12	12	12				
3) Cooking Device	0	1,600																								
4) Refrigerator	0	280																								
5) Radio	0	10																								
6) Cassette/CD Player	1	30								1	1	1	1	1	1	1	1	1	1	1						
7) Television	0	80																								
8) Video Cassette Recorder	0	20																								
9) Electric Iron	0	1,000																								
10) Electric Heater	0	1,200																								
11) Electric Fan	2	50										2	2	2	2	2	2	2	2	2						
12) Air Conditioner	0	1,000																								
13) Mill	0	20,000																								
14) Computer	2	200									2	2	2	2	2	2	2	2	2	2						
15) Others	0	200																								

Electrical Devices	Number	Capacity (W)	0:00	1:00	2:00	3:00	4:00	5:00	6:00	7:00	8:00	9:00	10:00	11:00	12:00	13:00	14:00	15:00	16:00	17:00	18:00	19:00	20:00	21:00	22:00	23:00
1) Incandescent Light	4	100	200	200	200	200	200	200												400	400	400	200	200	200	200
2) Fluorescent Light	12	40																		480	480	480				
3) Cooking Device	0	1,600																								
4) Refrigerator	0	280																								
5) Radio	0	10																								
6) Cassette/CD Player	1	30								30	30	30	30	30	30	30	30	30	30	30						
7) Television	0	80																								
8) Video Cassette Recorder	0	20																								
9) Electric Iron	0	1,000																								
10) Electric Heater	0	1,200																								
11) Electric Fan	2	50										100	100	100	100	100	100	100	100							
12) Air Conditioner	0	1,000																								
13) Mill	0	20,000																								
14) Computer	2	200									400	400	400	400	400	400	400	400	400	400						
15) Others	0	200																								
Max Capacity (W)		1,410	200	200	200	200	200	200	200	30	430	430	530	530	530	530	530	530	1,010	1,410	880	400	200	200	200	200
Total Consumption (Wh)		9,970	200	200	200	200	200	200	200	30	430	430	530	530	530	530	530	530	1,010	1,410	880	400	200	200	200	200

Table of App.2- 3 Unit Demand for Teacher's Development Center

c) Daily Load in an Ordinary Teacher's Development Center

Number of Usage																										
Electrical Devices	Number	Capacity (W)	0:00	1:00	2:00	3:00	4:00	5:00	6:00	7:00	8:00	9:00	10:00	11:00	12:00	13:00	14:00	15:00	16:00	17:00	18:00	19:00	20:00	21:00	22:00	23:00
1) Incandescent Light	2	100								1	2	2	2	2	2	2	2	2	2	2	1					
2) Fluorescent Light	2	40								1	2	2	2	2	2	2	2	2	2	2						
3) Cooking Device	0	1,600																								
4) Refrigerator	0	280																								
5) Radio	0	10																								
6) Cassette/CD Player	0	30																								
7) Television	0	80																								
8) Video Cassette Recorder	0	20																								
9) Electric Iron	0	1,000																								
10) Electric Heater	0	1,200																								
11) Electric Fan	1	50											1	1	1	1	1	1	1							
12) Air Conditioner	0	1,000																								
13) Mill	0	20,000																								
14) Computer	0	200																								
15) Others	0	200																								
Power Consumption																										
Electrical Devices	Number	Capacity (W)	0:00	1:00	2:00	3:00	4:00	5:00	6:00	7:00	8:00	9:00	10:00	11:00	12:00	13:00	14:00	15:00	16:00	17:00	18:00	19:00	20:00	21:00	22:00	23:00
1) Incandescent Light	2	100								100	200	200	200	200	200	200	200	200	200	200	100					
2) Fluorescent Light	2	40								40	80	80	80	80	80	80	80	80	80	80						
3) Cooking Device	0	1,600																								
4) Refrigerator	0	280																								
5) Radio	0	10																								
6) Cassette/CD Player	0	30																								
7) Television	0	80																								
8) Video Cassette Recorder	0	20																								
9) Electric Iron	0	1,000																								
10) Electric Heater	0	1,200																								
11) Electric Fan	1	50											50	50	50	50	50	50	50							
12) Air Conditioner	0	1,000																								
13) Mill	0	20,000																								
14) Computer	0	200																								
15) Others	0	200																								
Max Capacity (W)		330								140	280	280	330	330	330	330	330	330	330	180						
Total Consumption (Wh)		3,190	0	0	0	0	0	0	0	140	280	280	330	330	330	330	330	330	330	180	0	0	0	0	0	0

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Table of App.2- 4 Unit Demand for Staff House

d) Daily Load in an Ordinary Staff Room

Number of Usage																											
Electrical Devices	Number	Capacity (W)	0:00	1:00	2:00	3:00	4:00	5:00	6:00	7:00	8:00	9:00	10:00	11:00	12:00	13:00	14:00	15:00	16:00	17:00	18:00	19:00	20:00	21:00	22:00	23:00	
1) Incandescent Light	1	100	1	1	1	1	1	1														1	1	1	1	1	
2) Fluorescent Light	2	40																				2	2	2			
3) Cooking Device	0	1,600																									
4) Refrigerator	0	280																									
5) Radio	1	10								10	10	10	10	10	10	10	10	10	10	10							
6) Cassette/CD Player	0	30																									
7) Television	1	80																				80	80	80			
8) Video Cassette Recorder	0	20																									
9) Electric Iron	0	1,000																									
10) Electric Heater	0	1,200																									
11) Electric Fan	1	50																50	50	50							
12) Air Conditioner	0	1,000																									
13) Mill	0	20,000																									
14) Computer	0	200																									
15) Others	0	200																									
Max Capacity (W)		260	100	100	100	100	100	100		10	10	10	10	10	10	10	10	60	60	60	10	10	260	260	260	100	100
Total Consumption (Wh)		1,850	100	100	100	100	100	100	0	10	10	10	10	10	10	10	60	60	60	10	10	260	260	260	100	100	

Table of App.2- 5 Unit Demand for Hospital

e) Daily Load in an Ordinary Hospital

Number of Usage																										
Electrical Devices	Number	Capacity (W)	0:00	1:00	2:00	3:00	4:00	5:00	6:00	7:00	8:00	9:00	10:00	11:00	12:00	13:00	14:00	15:00	16:00	17:00	18:00	19:00	20:00	21:00	22:00	23:00
1) Incandescent Light	2	100	2	2	2	2	2	2	2													2	2	2	2	2
2) Fluorescent Light	5	40	2	2	2	2	2	2	2	1	1	1	1	1	1	1	1	1	1	1	1	5	5	5	3	2
3) Cooking Device	0	1,600																								
4) Refrigerator	2	280	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	
5) Wireless Radio	1	10	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
6) Cassette/CD Player	0	30																								
7) Television	1	80								1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
8) Video Cassette Recorder	0	20																								
9) Electric Iron	0	1,000																								
10) Electric Heater	1	1,200																				1	1	1	1	
11) Electric Fan	2	50										2	2	2	2	2	2	2	2	2						
12) Air Conditioner	0	1,000																								
13) Mill	0	20,000																								
14) Computer	1	200								1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
15) Others	1	200	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	

Power Consumption																										
Electrical Devices	Number	Capacity (W)	0:00	1:00	2:00	3:00	4:00	5:00	6:00	7:00	8:00	9:00	10:00	11:00	12:00	13:00	14:00	15:00	16:00	17:00	18:00	19:00	20:00	21:00	22:00	23:00
1) Incandescent Light	2	100	200	200	200	200	200	200	200	-	-	-	-	-	-	-	-	-	-	-	200	200	200	200	200	
2) Fluorescent Light	5	40	80	80	80	80	80	80	80	40	40	40	40	40	40	40	40	40	40	40	200	200	200	120	80	
3) Cooking Device	0	1,600	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
4) Refrigerator	2	280	560	560	560	560	560	560	560	560	560	560	560	560	560	560	560	560	560	560	560	560	560	560	560	
5) Wireless Radio	1	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	
6) Cassette/CD Player	0	30	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
7) Television	1	80	-	-	-	-	-	-	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	
8) Video Cassette Recorder	0	20	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
9) Electric Iron	0	1,000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
10) Electric Heater	1	1,200	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1,200	1,200	1,200	1,200	-	
11) Electric Fan	2	50	-	-	-	-	-	-	-	-	-	100	100	100	100	100	100	100	100	100	-	-	-	-	-	
12) Air Conditioner	0	1,000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
13) Mill	0	20,000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
14) Computer	1	200	-	-	-	-	-	-	200	200	200	200	200	200	200	200	200	200	200	200	-	-	-	-	-	
15) Others	1	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	
Max Capacity (W)		2,250	850	850	850	850	850	850	810	890	890	890	990	990	990	990	990	990	990	990	2,250	2,250	2,250	2,090	850	
Total Consumption (Wh)		27,040	850	850	850	850	850	850	810	890	890	890	990	990	990	990	990	990	990	990	2,250	2,250	2,250	2,090	850	

Table of App.2- 6 Unit Demand for Health Center

e) Daily Load in an Ordinary Health Center

Number of Usage																										
Electrical Devices	Number	Capacity (W)	0:00	1:00	2:00	3:00	4:00	5:00	6:00	7:00	8:00	9:00	10:00	11:00	12:00	13:00	14:00	15:00	16:00	17:00	18:00	19:00	20:00	21:00	22:00	23:00
1) Incandescent Light	1	100	1	1	1	1	1	1	1													1	1	1	1	1
2) Fluorescent Light	5	40	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	5	5	5	2	
3) Cooking Device	0	1,600																								
4) Refrigerator	1	280	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
5) Wireless Radio	1	10	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
6) Cassette/CD Player	0	30																								
7) Television	0	80																								
8) Video Cassette Recorder	0	20																								
9) Electric Iron	0	1,000																								
10) Electric Heater	0	1,200																								
11) Electric Fan	2	50																								
12) Air Conditioner	0	1,000																								
13) Mill	0	20,000																								
14) Computer	0	200																								
15) Others	1	200	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	

Power Consumption																										
Electrical Devices	Number	Capacity (W)	0:00	1:00	2:00	3:00	4:00	5:00	6:00	7:00	8:00	9:00	10:00	11:00	12:00	13:00	14:00	15:00	16:00	17:00	18:00	19:00	20:00	21:00	22:00	23:00
1) Incandescent Light	1	100	100	100	100	100	100	100	100												100	100	100	100	100	
2) Fluorescent Light	5	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	80	200	200	200	80	
3) Cooking Device	0	1,600	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
4) Refrigerator	1	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	
5) Wireless Radio	1	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	
6) Cassette/CD Player	0	30	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
7) Television	0	80	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
8) Video Cassette Recorder	0	20	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
9) Electric Iron	0	1,000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
10) Electric Heater	0	1,200	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
11) Electric Fan	2	50	-	-	-	-	-	-	-	-	-	100	100	100	100	100	100	100	100	100	-	-	-	-	-	
12) Air Conditioner	0	1,000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
13) Mill	0	20,000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
14) Computer	0	200	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
15) Others	1	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	
Max Capacity (W)		700	630	630	630	630	630	630	630	530	530	530	630	630	630	630	630	630	630	630	670	790	790	790	630	
Total Consumption (Wh)		15,380	630	630	630	630	630	630	630	530	530	530	630	630	630	630	630	630	630	630	670	790	790	790	630	

Table of App.2- 7 Unit Demand for Clinic

g) Daily Load in an Ordinary Clinic

Number of Usage																										
Electrical Devices	Number	Capacity (W)	0:00	1:00	2:00	3:00	4:00	5:00	6:00	7:00	8:00	9:00	10:00	11:00	12:00	13:00	14:00	15:00	16:00	17:00	18:00	19:00	20:00	21:00	22:00	23:00
1) Incandescent Light	1	100	1	1	1	1	1	1	1	1										1	1	1	1	1	1	1
2) Fluorescent Light	1	40									1	1	1	1	1	1	1	1	1							
3) Cooking Device	0	1,600																								
4) Refrigerator	0	280																								
5) Wireless Radio	1	10	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
6) Cassette/CD Player	0	30																								
7) Television	0	80																								
8) Video Cassette Recorder	0	20																								
9) Electric Iron	0	1,000																								
10) Electric Heater	0	1,200																								
11) Electric Fan	1	50										1	1	1	1	1	1	1	1							
12) Air Conditioner	0	1,000																								
13) Mill	0	20,000																								
14) Computer	0	200																								
15) Others	1	200	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	

Power Consumption																										
Electrical Devices	Number	Capacity (W)	0:00	1:00	2:00	3:00	4:00	5:00	6:00	7:00	8:00	9:00	10:00	11:00	12:00	13:00	14:00	15:00	16:00	17:00	18:00	19:00	20:00	21:00	22:00	23:00
1) Incandescent Light	1	100	100	100	100	100	100	100	100											100	100	100	100	100	100	100
2) Fluorescent Light	1	40								40	40	40	40	40	40	40	40	40	40	40						
3) Cooking Device	0	1,600																								
4) Refrigerator	0	280																								
5) Wireless Radio	1	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	
6) Cassette/CD Player	0	30																								
7) Television	0	80																								
8) Video Cassette Recorder	0	20																								
9) Electric Iron	0	1,000																								
10) Electric Heater	0	1,200																								
11) Electric Fan	1	50											50	50	50	50	50	50	50	50						
12) Air Conditioner	0	1,000																								
13) Mill	0	20,000																								
14) Computer	0	200																								
15) Others	1	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	
Max Capacity (W)		200	110	110	110	110	110	110	110	50	50	50	100	100	100	100	100	100	200	200	110	110	110	110	110	
Total Consumption (Wh)		2,580	110	110	110	110	110	110	110	50	50	50	100	100	100	100	100	100	200	200	110	110	110	110	110	

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Table of App.2- 8 Unit Demand for Post Office

h) Daily Load in an Ordinary Post Office

Number of Usage																										
Electrical Devices	Number	Capacity (W)	0:00	1:00	2:00	3:00	4:00	5:00	6:00	7:00	8:00	9:00	10:00	11:00	12:00	13:00	14:00	15:00	16:00	17:00	18:00	19:00	20:00	21:00	22:00	23:00
1) Incandescent Light	1	100	1	1	1	1	1	1	1													1	1	1	1	1
2) Fluorescent Light	2	40								2	2	2	2	2	2	2	2	2	2	2						
3) Cooking Device	0	1,600																								
4) Refrigerator	0	280																								
5) Radio	0	10																								
6) Cassette/CD Player	0	30																								
7) Television	0	80																								
8) Video Cassette Recorder	0	20																								
9) Electric Iron	0	1,000																								
10) Electric Heater	0	1,200																								
11) Electric Fan	1	50																								
12) Air Conditioner	0	1,000																								
13) Mill	0	20,000																								
14) Computer	0	200																								
15) Others	0	200																								

Power Consumption																										
Electrical Devices	Number	Capacity (W)	0:00	1:00	2:00	3:00	4:00	5:00	6:00	7:00	8:00	9:00	10:00	11:00	12:00	13:00	14:00	15:00	16:00	17:00	18:00	19:00	20:00	21:00	22:00	23:00
1) Incandescent Light	1	100	100	100	100	100	100	100	100												100	100	100	100	100	100
2) Fluorescent Light	2	40								80	80	80	80	80	80	80	80	80	80	80						
3) Cooking Device	0	1,600																								
4) Refrigerator	0	280																								
5) Radio	0	10																								
6) Cassette/CD Player	0	30																								
7) Television	0	80																								
8) Video Cassette Recorder	0	20																								
9) Electric Iron	0	1,000																								
10) Electric Heater	0	1,200																								
11) Electric Fan	1	50																								
12) Air Conditioner	0	1,000																								
13) Mill	0	20,000																								
14) Computer	0	200																								
15) Others	0	200																								
Max Capacity (W)		130	100	100	100	100	100	100	100	80	80	80	130	130	130	130	130	130	130	130	100	100	100	100	100	
Total Consumption (Wh)		2,580	100	100	100	100	100	100	100	80	80	80	130	130	130	130	130	130	130	130	100	100	100	100	100	

Table of App.2- 9 Unit Demand for Police Station

i) Daily Load in an Ordinary Police Station

Number of Usage																										
Electrical Devices	Number	Capacity (W)	0:00	1:00	2:00	3:00	4:00	5:00	6:00	7:00	8:00	9:00	10:00	11:00	12:00	13:00	14:00	15:00	16:00	17:00	18:00	19:00	20:00	21:00	22:00	23:00
1) Incandescent Light	3	100	3	3	3	3	3	3	3	1	1	1	1	1	1	1	1	1	1	1	3	3	3	3	3	
2) Fluorescent Light	10	40	2	2	2	2	2	2	2	10	10	10	10	10	10	10	10	10	10	10	2	2	2	2		
3) Cooking Device	0	1,600																								
4) Refrigerator	0	280																								
5) Wireless Radio	1	10	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		
6) Cassette/CD Player	0	30																								
7) Television	0	80																								
8) Video Cassette Recorder	0	20																								
9) Electric Iron	0	1,000																								
10) Electric Heater	0	1,200																								
11) Electric Fan	1	50										1	1	1	1	1	1	1	1							
12) Air Conditioner	0	1,000																								
13) Mill	0	20,000																								
14) Computer	1	200							1	1	1	1	1	1	1	1	1	1	1							
15) Others	0	200																								

Power Consumption																										
Electrical Devices	Number	Capacity (W)	0:00	1:00	2:00	3:00	4:00	5:00	6:00	7:00	8:00	9:00	10:00	11:00	12:00	13:00	14:00	15:00	16:00	17:00	18:00	19:00	20:00	21:00	22:00	23:00
1) Incandescent Light	3	100	300	300	300	300	300	300	300	100	100	100	100	100	100	100	100	100	100	100	300	300	300	300		
2) Fluorescent Light	10	40	80	80	80	80	80	80	80	400	400	400	400	400	400	400	400	400	400	400	80	80	80	80		
3) Cooking Device	0	1,600																								
4) Refrigerator	0	280																								
5) Wireless Radio	1	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10		
6) Cassette/CD Player	0	30																								
7) Television	0	80																								
8) Video Cassette Recorder	0	20																								
9) Electric Iron	0	1,000																								
10) Electric Heater	0	1,200																								
11) Electric Fan	1	50										50	50	50	50	50	50	50	50							
12) Air Conditioner	0	1,000																								
13) Mill	0	20,000																								
14) Computer	1	200							200	200	200	200	200	200	200	200	200	200	200	200						
15) Others	0	200																								
Max Capacity (W)		760	390	390	390	390	390	390	390	710	710	710	760	760	760	760	760	760	760	760	390	390	390	390		
Total Consumption (Wh)		13,280	390	390	390	390	390	390	390	710	710	710	760	760	760	760	760	760	760	760	390	390	390	390		

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Table of App.2- 10 Unit Demand for Police Post

i) Daily Load in an Ordinary Police Post

Number of Usage																										
Electrical Devices	Number	Capacity (W)	0:00	1:00	2:00	3:00	4:00	5:00	6:00	7:00	8:00	9:00	10:00	11:00	12:00	13:00	14:00	15:00	16:00	17:00	18:00	19:00	20:00	21:00	22:00	23:00
1) Incandescent Light	1	100	1	1	1	1	1	1	1		5	5	5	5	5	5	5	5	5	5	1	1	1	1		
2) Fluorescent Light	5	40	1	1	1	1	1	1	1		5	5	5	5	5	5	5	5	5	5	1	1	1	1		
3) Cooking Device	0	1,600																								
4) Refrigerator	0	280																								
5) Wireless Radio	1	10	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		
6) Cassette/CD Player	0	30																								
7) Television	0	80																								
8) Video Cassette Recorder	0	20																								
9) Electric Iron	0	1,000																								
10) Electric Heater	0	1,200																								
11) Electric Fan	1	50										50	50	50	50	50	50	50	50							
12) Air Conditioner	0	1,000																								
13) Mill	0	20,000																								
14) Computer	0	200																								
15) Others	0	200																								

Power Consumption																										
Electrical Devices	Number	Capacity (W)	0:00	1:00	2:00	3:00	4:00	5:00	6:00	7:00	8:00	9:00	10:00	11:00	12:00	13:00	14:00	15:00	16:00	17:00	18:00	19:00	20:00	21:00	22:00	23:00
1) Incandescent Light	1	100	100	100	100	100	100	100	100		500	500	500	500	500	500	500	500	500	500	100	100	100	100		
2) Fluorescent Light	5	40	40	40	40	40	40	40	40		200	200	200	200	200	200	200	200	200	200	40	40	40	40		
3) Cooking Device	0	1,600																								
4) Refrigerator	0	280																								
5) Wireless Radio	1	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10		
6) Cassette/CD Player	0	30																								
7) Television	0	80																								
8) Video Cassette Recorder	0	20																								
9) Electric Iron	0	1,000																								
10) Electric Heater	0	1,200																								
11) Electric Fan	1	50										50	50	50	50	50	50	50	50							
12) Air Conditioner	0	1,000																								
13) Mill	0	20,000																								
14) Computer	0	200																								
15) Others	0	200																								
Max Capacity (W)		260	150	150	150	150	150	150	150	210	210	210	260	260	260	260	260	260	260	260	150	150	150	150		
Total Consumption (Wh)		4,660	150	150	150	150	150	150	150	210	210	210	260	260	260	260	260	260	260	260	150	150	150	150		

Table of App.2- 11 Unit Demand for Police Unit

K) Daily Load in an Ordinary Police Unit

Number of Usage																										
Electrical Devices	Number	Capacity (W)	0:00	1:00	2:00	3:00	4:00	5:00	6:00	7:00	8:00	9:00	10:00	11:00	12:00	13:00	14:00	15:00	16:00	17:00	18:00	19:00	20:00	21:00	22:00	23:00
1) Incandescent Light	1	100	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
2) Fluorescent Light	1	40									1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
3) Cooking Device	0	1,600																								
4) Refrigerator	0	280																								
5) Wireless Radio	1	10	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
6) Cassette/CD Player	0	30																								
7) Television	0	80																								
8) Video Cassette Recorder	0	20																								
9) Electric Iron	0	1,000																								
10) Electric Heater	0	1,200																								
11) Electric Fan	1	50										1	1	1	1	1	1	1								
12) Air Conditioner	0	1,000																								
13) Mill	0	20,000																								
14) Computer	0	200																								
15) Others	0	200																								

Power Consumption																										
Electrical Devices	Number	Capacity (W)	0:00	1:00	2:00	3:00	4:00	5:00	6:00	7:00	8:00	9:00	10:00	11:00	12:00	13:00	14:00	15:00	16:00	17:00	18:00	19:00	20:00	21:00	22:00	23:00
1) Incandescent Light	1	100	100	100	100	100	100	100	100													100	100	100	100	100
2) Fluorescent Light	1	40								40	40	40	40	40	40	40	40	40	40	40	40					
3) Cooking Device	0	1,600																								
4) Refrigerator	0	280																								
5) Wireless Radio	1	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
6) Cassette/CD Player	0	30																								
7) Television	0	80																								
8) Video Cassette Recorder	0	20																								
9) Electric Iron	0	1,000																								
10) Electric Heater	0	1,200																								
11) Electric Fan	1	50										50	50	50	50	50	50	50								
12) Air Conditioner	0	1,000																								
13) Mill	0	20,000																								
14) Computer	0	200																								
15) Others	0	200																								
Max Capacity (W)		110	110	110	110	110	110	110	110	50	50	50	100	100	100	100	100	100	100	50	110	110	110	110	110	
Total Consumption (Wh)		2,330	110	110	110	110	110	110	110	50	50	50	100	100	100	100	100	100	100	50	110	110	110	110	110	

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Table of App.2- 12 Unit Demand for Admarc

J) Daily Load in an Ordinary Admarc

Number of Usage																										
Electrical Devices	Number	Capacity (W)	0:00	1:00	2:00	3:00	4:00	5:00	6:00	7:00	8:00	9:00	10:00	11:00	12:00	13:00	14:00	15:00	16:00	17:00	18:00	19:00	20:00	21:00	22:00	23:00
1) Incandescent Light	1	100	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
2) Fluorescent Light	1	40									1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
3) Cooking Device	0	1,600																								
4) Refrigerator	0	280																								
5) Radio	1	10								10	10	10	10	10	10	10	10	10	10	10						
6) Cassette/CD Player	0	30																								
7) Television	0	80																								
8) Video Cassette Recorder	0	20																								
9) Electric Iron	0	1,000																								
10) Electric Heater	0	1,200																								
11) Electric Fan	1	50											50	50	50	50	50	50								
12) Air Conditioner	0	1,000																								
13) Mill	0	20,000																								
14) Computer	0	200																								
15) Others	0	200																								

Power Consumption																										
Electrical Devices	Number	Capacity (W)	0:00	1:00	2:00	3:00	4:00	5:00	6:00	7:00	8:00	9:00	10:00	11:00	12:00	13:00	14:00	15:00	16:00	17:00	18:00	19:00	20:00	21:00	22:00	23:00
1) Incandescent Light	1	100	100	100	100	100	100	100	100													100	100	100	100	100
2) Fluorescent Light	1	40								40	40	40	40	40	40	40	40	40	40	40						
3) Cooking Device	0	1,600																								
4) Refrigerator	0	280																								
5) Radio	1	10								10	10	10	10	10	10	10	10	10	10	10						
6) Cassette/CD Player	0	30																								
7) Television	0	80																								
8) Video Cassette Recorder	0	20																								
9) Electric Iron	0	1,000																								
10) Electric Heater	0	1,200																								
11) Electric Fan	1	50											50	50	50	50	50	50								
12) Air Conditioner	0	1,000																								
13) Mill	0	20,000																								
14) Computer	0	200																								
15) Others	0	200																								
Max Capacity (W)		100	100	100	100	100	100	100	100	50	50	50	100	100	100	100	100	100	100	50	100	100	100	100	100	
Total Consumption (Wh)		2,250	100	100	100	100	100	100	100	50	50	50	100	100	100	100	100	100	100	50	100	100	100	100	100	

Table of App.2- 13 Unit Demand for Government Office

m) Daily Load in an Ordinary Government Office

Number of Usage																										
Electrical Devices	Number	Capacity (W)	0:00	1:00	2:00	3:00	4:00	5:00	6:00	7:00	8:00	9:00	10:00	11:00	12:00	13:00	14:00	15:00	16:00	17:00	18:00	19:00	20:00	21:00	22:00	23:00
1) Incandescent Light	1	100	1	1	1	1	1	1	1	1												1	1	1	1	1
2) Fluorescent Light	2	40									2	2	2	2	2	2	2	2	2	2	2					
3) Cooking Device	0	1,600																								
4) Refrigerator	0	280																								
5) Radio	1	10								1	1	1	1	1	1	1	1	1	1	1						
6) Cassette/CD Player	0	30																								
7) Television	0	80																								
8) Video Cassette Recorder	0	20																								
9) Electric Iron	0	1,000																								
10) Electric Heater	0	1,200																								
11) Electric Fan	1	50											1	1	1	1	1	1	1	1						
12) Air Conditioner	0	1,000																								
13) Mill	0	20,000																								
14) Computer	0	200																								
15) Others	0	200																								
Power Consumption																										
Electrical Devices	Number	Capacity (W)	0:00	1:00	2:00	3:00	4:00	5:00	6:00	7:00	8:00	9:00	10:00	11:00	12:00	13:00	14:00	15:00	16:00	17:00	18:00	19:00	20:00	21:00	22:00	23:00
1) Incandescent Light	1	100	100	100	100	100	100	100	100													100	100	100	100	100
2) Fluorescent Light	2	40								80	80	80	80	80	80	80	80	80	80	80						
3) Cooking Device	0	1,600																								
4) Refrigerator	0	280																								
5) Radio	1	10								10	10	10	10	10	10	10	10	10	10	10						
6) Cassette/CD Player	0	30																								
7) Television	0	80																								
8) Video Cassette Recorder	0	20																								
9) Electric Iron	0	1,000																								
10) Electric Heater	0	1,200																								
11) Electric Fan	1	50											50	50	50	50	50	50	50							
12) Air Conditioner	0	1,000																								
13) Mill	0	20,000																								
14) Computer	0	200																								
15) Others	0	200																								
Max Capacity (W)		140	100	100	100	100	100	100	100	90	90	90	140	140	140	140	140	140	140	90	100	100	100	100	100	
Total Consumption (Wh)		2,640	100	100	100	100	100	100	100	90	90	90	140	140	140	140	140	140	140	90	100	100	100	100	100	

Table of App.2- 14 Unit Demand for Church

n) Daily Load in an Ordinary Church

Number of Usage																										
Electrical Devices	Number	Capacity (W)	0:00	1:00	2:00	3:00	4:00	5:00	6:00	7:00	8:00	9:00	10:00	11:00	12:00	13:00	14:00	15:00	16:00	17:00	18:00	19:00	20:00	21:00	22:00	23:00
1) Incandescent Light	1	100	1	1	1	1	1	1	1	1												1	1	1	1	1
2) Fluorescent Light	1	40																								
3) Cooking Device	0	1,600																								
4) Refrigerator	0	280																								
5) Radio	0	10																								
6) Cassette/CD Player	0	30																								
7) Television	0	80																								
8) Video Cassette Recorder	0	20																								
9) Electric Iron	0	1,000																								
10) Electric Heater	0	1,200																								
11) Electric Fan	0	50																								
12) Air Conditioner	0	1,000																								
13) Mill	0	20,000																								
14) Computer	0	200																								
15) Others	0	200																								
Power Consumption																										
Electrical Devices	Number	Capacity (W)	0:00	1:00	2:00	3:00	4:00	5:00	6:00	7:00	8:00	9:00	10:00	11:00	12:00	13:00	14:00	15:00	16:00	17:00	18:00	19:00	20:00	21:00	22:00	23:00
1) Incandescent Light	1	100	100	100	100	100	100	100	100													100	100	100	100	100
2) Fluorescent Light	1	40																				40	40	40		
3) Cooking Device	0	1,600																								
4) Refrigerator	0	280																								
5) Radio	0	10																								
6) Cassette/CD Player	0	30																								
7) Television	0	80																								
8) Video Cassette Recorder	0	20																								
9) Electric Iron	0	1,000																								
10) Electric Heater	0	1,200																								
11) Electric Fan	0	50																								
12) Air Conditioner	0	1,000																								
13) Mill	0	20,000																								
14) Computer	0	200																								
15) Others	0	200																								
Max Capacity (W)		140	100	100	100	100	100	100	100													140	140	140	100	100
Total Consumption (Wh)		1,420	100	100	100	100	100	100	100	0	0	0	0	0	0	0	0	0	0	0	0	140	140	140	100	100

Table of App.2- 15 Unit Demand for Mosque

q) Daily Load in an Ordinary Mosque

Number of Usage																										
Electrical Devices	Number	Capacity (W)	0:00	1:00	2:00	3:00	4:00	5:00	6:00	7:00	8:00	9:00	10:00	11:00	12:00	13:00	14:00	15:00	16:00	17:00	18:00	19:00	20:00	21:00	22:00	23:00
1) Incandescent Light	1	100		1	1	1	1	1	1	1												1	1	1	1	1
2) Fluorescent Light	1	40																				1	1	1	1	1
3) Cooking Device	0	1,600																								
4) Refrigerator	0	280																								
5) Radio	0	10																								
6) Cassette/CD Player	0	30																								
7) Television	0	80																								
8) Video Cassette Recorder	0	20																								
9) Electric Iron	0	1,000																								
10) Electric Heater	0	1,200																								
11) Electric Fan	0	50																								
12) Air Conditioner	0	1,000																								
13) Mill	0	20,000																								
14) Computer	0	200																								
15) Others	0	200																								
Power Consumption																										
Electrical Devices	Number	Capacity (W)	0:00	1:00	2:00	3:00	4:00	5:00	6:00	7:00	8:00	9:00	10:00	11:00	12:00	13:00	14:00	15:00	16:00	17:00	18:00	19:00	20:00	21:00	22:00	23:00
1) Incandescent Light	1	100	100	100	100	100	100	100	100	-	-	-	-	-	-	-	-	-	-	-	-	100	100	100	100	100
2) Fluorescent Light	1	40	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	40	40	40	-	-
3) Cooking Device	0	1,600	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4) Refrigerator	0	280	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
5) Radio	0	10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
6) Cassette/CD Player	0	30	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
7) Television	0	80	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
8) Video Cassette Recorder	0	20	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
9) Electric Iron	0	1,000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
10) Electric Heater	0	1,200	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
11) Electric Fan	0	50	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
12) Air Conditioner	0	1,000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
13) Mill	0	20,000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
14) Computer	0	200	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
15) Others	0	200	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Max Capacity (W)			140	100	100	100	100	100	100	0	0	0	0	0	0	0	0	0	0	0	0	140	140	140	100	100
Total Consumption (Wh)			1,420	100	100	100	100	100	100	0	0	0	0	0	0	0	0	0	0	0	0	140	140	140	100	100

Table of App.2- 16 Unit Demand for Court

p) Daily Load in an Ordinary Court

Number of Usage																										
Electrical Devices	Number	Capacity (W)	0:00	1:00	2:00	3:00	4:00	5:00	6:00	7:00	8:00	9:00	10:00	11:00	12:00	13:00	14:00	15:00	16:00	17:00	18:00	19:00	20:00	21:00	22:00	23:00
1) Incandescent Light	2	100	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2	2	2	2	1	1	1	1	1	
2) Fluorescent Light	2	40								40	80	80	80	80	80	80	80	200	200	200	100	100	100	100	100	
3) Cooking Device	0	1,600																								
4) Refrigerator	0	280																								
5) Radio	0	10																								
6) Cassette/CD Player	0	30																								
7) Television	0	80																								
8) Video Cassette Recorder	0	20																								
9) Electric Iron	0	1,000																								
10) Electric Heater	0	1,200																								
11) Electric Fan	1	50										50	50	50	50	50	50	50	50	50						
12) Air Conditioner	0	1,000																								
13) Mill	0	20,000																								
14) Computer	1	200								200	200	200	200	200	200	200	200	200	200	200						
15) Others	0	200																								
Power Consumption																										
Electrical Devices	Number	Capacity (W)	0:00	1:00	2:00	3:00	4:00	5:00	6:00	7:00	8:00	9:00	10:00	11:00	12:00	13:00	14:00	15:00	16:00	17:00	18:00	19:00	20:00	21:00	22:00	23:00
1) Incandescent Light	2	100	100	100	100	100	100	100	100	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2) Fluorescent Light	2	40	-	-	-	-	-	-	-	40	80	80	80	80	80	80	80	200	200	200	100	100	100	100	100	100
3) Cooking Device	0	1,600	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4) Refrigerator	0	280	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
5) Radio	0	10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
6) Cassette/CD Player	0	30	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
7) Television	0	80	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
8) Video Cassette Recorder	0	20	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
9) Electric Iron	0	1,000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
10) Electric Heater	0	1,200	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
11) Electric Fan	1	50	-	-	-	-	-	-	-	-	-	50	50	50	50	50	50	50	50	50						
12) Air Conditioner	0	1,000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
13) Mill	0	20,000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
14) Computer	1	200	-	-	-	-	-	-	-	200	200	200	200	200	200	200	200	200	200	200						
15) Others	0	200	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Max Capacity (W)			530	100	100	100	100	100	100	240	280	280	330	330	330	330	330	530	530	530	530	100	100	100	100	100
Total Consumption (Wh)			5,340	100	100	100	100	100	100	240	280	280	330	330	330	330	330	530	530	530	530	100	100	100	100	100

Table of App.2- 19 Unit Demand for Business Entity

s) Daily Load in an Ordinary Business Entity

Number of Usage																										
Electrical Devices	Number	Capacity (W)	0:00	1:00	2:00	3:00	4:00	5:00	6:00	7:00	8:00	9:00	10:00	11:00	12:00	13:00	14:00	15:00	16:00	17:00	18:00	19:00	20:00	21:00	22:00	23:00
1) Incandescent Light	2	100		2	2	2	2	2	2														2	2	2	2
2) Fluorescent Light	2	40																				2	2			
3) Cooking Device	1	1,600																								
4) Refrigerator	1	280	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
5) Radio	1	10							1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
6) Cassette/CD Player	0	30																								
7) Television	1	80							1	1	1	1	1	1	1	1	1	1	1	1	1	1				
8) Video Cassette Recorder	0	20																								
9) Electric Iron	0	1,000																								
10) Electric Heater	0	1,200																								
11) Electric Fan	0	50																								
12) Air Conditioner	0	1,000																								
13) Mill	0	20,000																								
14) Computer	0	200																								
15) Others	0	200																								

Power Consumption																										
Electrical Devices	Number	Capacity (W)	0:00	1:00	2:00	3:00	4:00	5:00	6:00	7:00	8:00	9:00	10:00	11:00	12:00	13:00	14:00	15:00	16:00	17:00	18:00	19:00	20:00	21:00	22:00	23:00
1) Incandescent Light	2	100	200	200	200	200	200	200															200	200	200	200
2) Fluorescent Light	2	40																				80	80			
3) Cooking Device	0	1,600																								
4) Refrigerator	1	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	
5) Radio	1	10																								
6) Cassette/CD Player	0	30																								
7) Television	1	80							80	80	80	80	80	80	80	80	80	80	80	80	80	80				
8) Video Cassette Recorder	0	20																								
9) Electric Iron	0	1,000																								
10) Electric Heater	0	1,200																								
11) Electric Fan	0	50																								
12) Air Conditioner	0	1,000																								
13) Mill	0	20,000																								
14) Computer	0	200																								
15) Others	0	200																								
Total			560	480	480	480	480	480	480	370	370	370	370	370	370	370	370	370	370	370	370	450	560	480	480	
Max Capacity (W)			480	480	480	480	480	480	370	370	370	370	370	370	370	370	370	370	370	370	370	450	560	480	480	
Consumption (Wh)			10,250	480	480	480	480	480	480	370	370	370	370	370	370	370	370	370	370	370	370	450	560	480	480	

Table of App.2- 20 Unit Demand for Ordinary Household

t) Daily Load in an Ordinary Household

Number of Usage																										
Electrical Devices	Number	Capacity (W)	0:00	1:00	2:00	3:00	4:00	5:00	6:00	7:00	8:00	9:00	10:00	11:00	12:00	13:00	14:00	15:00	16:00	17:00	18:00	19:00	20:00	21:00	22:00	23:00
1) Incandescent Light	2	100		2	2	2	2	2	2														2	2	2	2
2) Fluorescent Light	2	40																				1	2	2	1	
3) Cooking Device	0	1,600																								
4) Refrigerator	1	280	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
5) Radio	1	10										1	1	1	1	1	1	1	1	1	1	1	1	1	1	
6) Cassette/CD Player	0	30																								
7) Television	1	80																			1	1	1	1		
8) Video Cassette Recorder	0	20																								
9) Electric Iron	0	1,000																								
10) Electric Heater	0	1,200																								
11) Electric Fan	1	50														1	1	1	1	1						
12) Air Conditioner	0	1,000																								
13) Mill	0	20,000																								
14) Computer	0	200																								
15) Others	0	200																								

Power Consumption																										
Electrical Devices	Number	Capacity (W)	0:00	1:00	2:00	3:00	4:00	5:00	6:00	7:00	8:00	9:00	10:00	11:00	12:00	13:00	14:00	15:00	16:00	17:00	18:00	19:00	20:00	21:00	22:00	23:00
1) Incandescent Light	2	100	200	200	200	200	200	200															200	200	200	200
2) Fluorescent Light	2	40																				40	80	80	40	
3) Cooking Device	0	1,600																								
4) Refrigerator	1	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	
5) Radio	1	10										10	10	10	10	10	10	10	10	10	10	10	10	10	10	
6) Cassette/CD Player	0	30																								
7) Television	1	80																			80	80	80	80		
8) Video Cassette Recorder	0	20																								
9) Electric Iron	0	1,000																								
10) Electric Heater	0	1,200																								
11) Electric Fan	1	50														50	50	50	50							
12) Air Conditioner	0	1,000																								
13) Mill	0	20,000																								
14) Computer	0	200																								
15) Others	0	200																								
Total			640	480	480	480	480	480	280	290	290	290	290	290	290	290	340	340	340	340	360	400	440	640	520	
Max Capacity (W)			640	480	480	480	480	480	280	290	290	290	290	290	290	340	340	340	340	360	400	440	640	640	520	
Consumption (Wh)			9,740	480	480	480	480	480	280	290	290	290	290	290	290	340	340	340	340	360	400	440	640	640	520	

Table of App.2- 21 Unit Demand for Rich Household

u) Daily Load in a Rich Household

Number of Usage

Electrical Devices	Number	Capacity (W)	0:00	1:00	2:00	3:00	4:00	5:00	6:00	7:00	8:00	9:00	10:00	11:00	12:00	13:00	14:00	15:00	16:00	17:00	18:00	19:00	20:00	21:00	22:00	23:00
1) Incandescent Light	2	100	2	2	2	2	2	2															2	2	2	2
2) Fluorescent Light	2	40																				1	2	2	2	1
3) Cooking Device	1	1,600							1						1											
4) Refrigerator	1	280	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
5) Radio	1	10								1	1	1	1	1	1	1	1	1	1							
6) Cassette/CD Player	0	30																								
7) Television	1	80																			1	1	1	1	1	
8) Video Cassette Record	1	20																			1	1	1			
9) Electric Iron	1	1,000																								
10) Electric Heater	0	1,200																								
11) Electric Fan	1	50																								
12) Air Conditioner	0	1,000																								
13) Mill	0	20,000																								
14) Computer	0	200																								
15) Others	0	200																								

Power Consumption

Electrical Devices	Number	Capacity (W)	0:00	1:00	2:00	3:00	4:00	5:00	6:00	7:00	8:00	9:00	10:00	11:00	12:00	13:00	14:00	15:00	16:00	17:00	18:00	19:00	20:00	21:00	22:00	23:00
1) Incandescent Light	2	100	200	200	200	200	200	200															200	200	200	200
2) Fluorescent Light	2	40																				40	80	80	80	40
3) Cooking Device	1	1,600							1,600						1,600							1,600				
4) Refrigerator	1	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280	280
5) Radio	1	10								10	10	10	10	10	10	10	10	10	10							
6) Cassette/CD Player	0	30																								
7) Television	1	80																			80	80	80	80	80	
8) Video Cassette Record	1	20																				20	20	20		
9) Electric Iron	1	1,000																								
10) Electric Heater	0	1,200																1,000								
11) Electric Fan	1	50																								
12) Air Conditioner	0	1,000																								
13) Mill	0	20,000																								
14) Computer	0	200																								
15) Others	0	200																								
Max Capacity (W)		2,020	480	480	480	480	480	480	1,880	290	290	290	290	290	1,890	340	340	1,340	340	360	2,020	460	660	640	520	480
Total Consumption (Wh)		15,600	480	480	480	480	480	480	1,880	290	290	290	290	290	1,890	340	340	1,340	340	360	2,020	460	660	640	520	480

Appendix 3 Results of Prioritization

Table of App.3- 1 Result of Prioritization of Chitipa District

DISTRICTS TC DATA COLLECTION

NAME OF DISTRICT: CHITIPA

TC Number	4			5			6			252			253		
	Kameme			Chesenan			Kapoka			Chisenga			Mwenemulembe		
1. Name of Trading Center	Number	kW at 2020	kWh at 2020	Number	kW at 2020	kWh at 2020	Number	kW at 2020	kWh at 2020	Number	kW at 2020	kWh at 2020	Number	kW at 2020	kWh at 2020
2. Traditional Authority	Kameme						Mwakulambya								
3. Distance from the Existing Distribution Line (km)	23			8			2			20			8		
4. Market Fee															
a) Monthly Market Fee per Person (MK/month)															
b) Total Collected Annual Market Fee in TC (MK/year)	45,000			35,000			35,000			0			0		
5. a) Population in TC	1,710			806			1,110								
b) Population in CA [inc. the TC]	6,840			3,223			4,440								
6. Number of Existing Public Facilities															
a) Secondary School	1	1,250	2,551				1	1,250	2,551						
b) Primary School	1	1,410	2,592				1	1,410	2,592						
c) Teacher's Development Center	0	0.000	0				0	0.000	0						
d) Staff House	0	0.000	0				0	0.000	0						
e) Hospital	0	0.000	0				0	0.000	0						
f) Health Center	1	0.790	5,584				1	0.790	5,584						
g) Clinic	0	0.000	0				0	0.000	0						
h) Post Office	0	0.000	0				0	0.000	0						
i) Police Station	1	0.760	4,834				1	0.760	4,834						
j) Police Post	0	0.000	0				0	0.000	0						
k) Police Unit	0	0.000	0				0	0.000	0						
l) Admarc	0	0.000	0				0	0.000	0						
m) Government Office	2	0.280	1,378				0	0.000	0						
n) Church	1	0.140	517				1	0.140	517						
o) Mosque	0	0.000	0				0	0.000	0						
p) Court	1	0.530	1,277				0	0.000	0						
q) Other Public Facility	4	0.400	2,392				4	0.400	2,392						
Total	12	5,560	21,124	0	0	0	9	5	18,469	0	0	0	0	0	0
7. Targeted Business Entities in 2020															
r) Maize Mills	5	100,250	287,937				2	40,100	115,175						
s) Business Entity	16	8,960	59,696				3	1,680	11,193						
Total	21	109,210	347,633	0	0	0	5	42	126,368	0	0	0	0	0	0
8. Targeted Household in 2020															
t) Ordinary Household	168	106,240	589,134	0.0			108	69,120	383,292	0.0			0.0		
u) Rich Household	9	18,180	51,794	0.0			6	12,120	34,529	0.0			0.0		
Total	175	124,420	640,928	0	0	0	114	81	417,821	0	0	0	0	0	0
Grand Total	239	1,009,685		0	0	0	128	562,658		0	0	0	0	0	0

	MP	Follow-up	MP	Follow-up	MP	Follow-up	MP	Follow-up	MP	Follow-up	MP	Follow-up
kW	391	239	208	127	263	128	94	58	35	21		
kWh	1,960,000	1,009,685	1,042,000	638,544	1,318,000	562,658	472,000	289,245	174,000	106,628		

Ranking

Amount of Demand	1	2	3	4	5
Distance from Tapping Point	5	2	1	4	2
Public Electricity Demand Ratio	5	2	1	2	2

Points

Amount of Demand	50	40	30	20	10
Distance from Tapping Point	2	8	10	4	8
Public Electricity Demand Ratio	1	4	5	4	4
Total	53	52	45	28	22
Priority	1	2	3	4	5

App-26

Table of App.3- 2 Result of Prioritization of Karonga District

DISTRICTS TC DATA COLLECTION

NAME OF DISTRICT: KARONGA

TC Number	15			17		
	Tilora			Lupembe		
1. Name of Trading Center	Number	kW at 2020	kWh at 2020	Number	kW at 2020	kWh at 2020
2. Traditional Authority	Wasambo			Kyungu		
3. Distance from the Existing Distribution Line (km)	2			20		
4. Market Fee						
a) Monthly Market Fee per Person (MK/month)						
b) Total Collected Annual Market Fee in TC (MK/year)	350			0		
5. a) Population in TC						
b) Population in CA [inc. the TC]						
6. Number of Existing Public Facilities						
a) Secondary School	1	1,250	2,551	1	1,250	2,551
b) Primary School	1	1,410	2,592	1	1,410	2,592
c) Teacher's Development Center	0	0.000	0	0	0.000	0
d) Staff House	0	0.000	0	0	0.000	0
e) Hospital	0	0.000	0	0	0.000	0
f) Health Center	1	0.790	5,584	1	0.790	5,584
g) Clinic	2	0.860	6,101	2	0.860	6,101
h) Post Office	0	0.000	0	1	0.130	671
i) Police Station	0	0.000	0	0	0.000	0
j) Police Post	0	0.000	0	0	0.000	0
k) Police Unit	0	0.000	0	0	0.000	0
l) Admarc	0	0.000	0	1	0.100	585
m) Government Office	1	0.140	689	4	0.140	689
n) Church	3	0.420	1,551	2	0.560	2,068
o) Mosque	0	0.000	0	0	0.280	886
p) Court	0	0.000	0	0	0.000	0
q) Other Public Facility	0	0.000	0	1	0.100	598
Total	9	4.870	19,067	14	5.620	22,324
7. Targeted Business Entities in 2020						
r) Maize Mills	0	0.000	0	1	20.050	57,587
s) Business Entity	1	0.560	3,731	5	2,240	14,924
Total	1	0.560	3,731	6	22,290	72,511
8. Targeted Household in 2020						
r) Ordinary Household	19.0	12,160	67,431	38.0	24,320	134,862
u) Rich Household	1.0	2,020	5,755	2.0	4,040	11,510
Total	20	14	73,186	40	28	146,372
Grand Total	20	14	95,984	56	241,207	

	MP	Follow-up	MP	Follow-up
kW	38	20	113	56
kWh	190,000	95,984	567,000	241,207

Ranking

Amount of Demand	2	1
Distance from Tapping Point	1	2
Public Electricity Demand Ratio	1	2

Points

Amount of Demand	10	20
Distance from Tapping Point	4	2
Public Electricity Demand Ratio	2	1
Total	16	23
Priority	2	1

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Table of App.3- 3 Result of Prioritization of Rumphhi District

DISTRICTS TC DATA COLLECTION

NAME OF DISTRICT: RUMPHI

TC Number	20			21			22			254			23			24			25			26		
	Lara			Muhuju			Mwasisi			Nchenachena			Nkhozo			Ng'onga			Kamphenda			Mphompha		
1. Name of Trading Center	Number	kW at 2020	kWh at 2020	Number	kW at 2020	kWh at 2020	Number	kW at 2020	kWh at 2020	Number	kW at 2020	kWh at 2020	Number	kW at 2020	kWh at 2020	Number	kW at 2020	kWh at 2020	Number	kW at 2020	kWh at 2020	Number	kW at 2020	kWh at 2020
2. Traditional Authority	Meshweni			Mahenga			Chikulamayembe						Chikulamayembe			Chikulamayembe			Chikulamayembe			Mwankunkika		
3. Distance from the Existing Distribution Line (km)	2			3			5			2			2			2			4			13		
4. Market Fee																								
a) Monthly Market Fee per Person (MK/month)																								
b) Total Collected Annual Market Fee in TC (MK/year)	5,005			3,961			1,203			-			-			53,915			-			-		
5. a) Population in TC																								
b) Population in CA [inc. the TC]																653								
6. Number of Existing Public Facilities																								
a) Secondary School	1	1,250	2,551	2	2,500	5,101	1	1,250	2,551				0	0,000	0	1	1,250	2,551	0	0,000	0	1	1,250	2,551
b) Primary School	1	1,410	2,592	1	1,410	2,592	1	1,410	2,592				1	1,410	2,592	1	1,410	2,592	1	1,410	2,592	1	1,410	2,592
c) Teacher's Development Center	0	0,000	0	0	0,000	0	0	0,000	0				0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0
d) Staff House	0	0,000	0	0	0,000	0	0	0,000	0				0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0
e) Hospital	0	0,000	0	0	0,000	0	0	0,000	0				0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0
f) Health Center	0	0,000	0	0	0,000	0	1	0,790	5,584				0	0,000	0	1	0,790	5,584	0	0,000	0	1	0,790	5,584
g) Clinic	1	0,430	3,050	2	0,860	6,101	2	0,860	6,101				1	0,430	3,050	1	0,430	3,050	0	0,000	0	2	0,860	6,101
h) Post Office	0	0,000	0	1	0,130	671	1	0,130	671				0	0,000	0	1	0,130	671	0	0,000	0	1	0,130	671
i) Police Station	0	0,000	0	0	0,000	0	0	0,000	0				0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0
j) Police Post	0	0,000	0	0	0,000	0	0	0,000	0				0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0
k) Police Unit	0	0,000	0	0	0,000	0	0	0,000	0				0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0
l) Adhmarc	0	0,000	0	0	0,000	0	0	0,000	0				0	0,000	0	0	0,000	0	0	0,000	0	1	0,100	585
m) Government Office	1	0,140	888	1	0,140	888	0	0,000	0				0	0,000	0	0	0,000	0	0	0,000	0	7	0,980	4,823
n) Church	7	0,980	3,618	5	0,700	2,584	3	0,420	1,551				6	0,840	3,101	4	0,560	2,068	0	0,000	0	4	0,560	2,068
o) Mosque	0	0,000	0	1	0,140	443	0	0,000	0				0	0,000	0	0	0,000	0	4	0,000	0	0	0,000	0
p) Court	1	0,530	1,277	1	0,530	1,277	0	0,000	0				0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0
q) Other Public Facility	0	0,000	0	0	0,000	0	1	0,100	588				0	0,000	0	1	0,100	588	0	0,000	0	0	0,000	0
Total	12	4,740	13,777	14	6,410	19,458	10	4,960	19,647	0	0	0	8	2,680	8,744	10	4,670	17,113	5	2,680	8,744	18	6,080	24,974
7. Targeted Business Entities in 2020																								
r) Maize Mills	1	20,050	57,587	2	60,150	172,762	1	20,050	57,587				1	20,050	57,587	1	20,050	57,587	1	20,050	57,587	1	20,050	57,587
a) Business Entity	7	2,800	18,655	19	7,280	48,503	4	1,680	11,193				4	1,680	11,193	5	2,240	14,824	3	1,680	11,193	3	1,120	7,462
Total	8	22,850	76,242	21	67,430	221,265	5	21,730	68,780	0	0	5	21,730	68,780	6	22,290	72,511	4	21,730	68,780	4	21,170	65,049	
b. Targeted Household in 2020																								
r) Ordinary Household	38.0	24,320	134,862	77.0	49,280	273,273	38.0	24,320	134,862				41.0	26,240	145,509	15.0	9,600	53,235	41	26,240	145,509	38.0	24,320	134,862
u) Rich Household	2.0	4,040	11,510	5.0	10,100	28,774	2.0	4,040	11,510				3.0	6,060	17,265	1.0	2,020	5,755	3	6,060	17,265	2.0	4,040	11,510
Total	40	28,360	146,372	82	59,380	302,047	40	28,360	146,372	0	0	44	32,300	162,774	16	11,620	58,990	44	32,300	162,774	40	28,360	146,372	
Grand Total	56	236,391	742,119	133	542,770	1,644,315	55	234,799	742,119	0	0	57	240,298	742,119	39	148,614	542,119	57	240,298	742,119	56	236,395	742,119	

	MP	Follow-up	MP	Follow-up	MP	Follow-up	MP	Follow-up	MP	Follow-up	MP	Follow-up	MP	Follow-up	MP	Follow-up	MP	Follow-up
kW	113	56	204	133	113	55	189	117	117	57	51	39	113	57	113	56		
kWh	567,000	236,391	1,021,000	542,770	567,000	234,799	948,000	580,940	587,000	240,298	254,000	148,614	567,000	240,298	567,000	236,395		

Ranking

Amount of Demand	6	2	7	1	3	8	3	5
Distance from Tapping Point	1	5	7	1	1	8	6	8
Public Electricity Demand Ratio	5	8	3	4	6	1	6	2

Points

Amount of Demand	30	70	20	80	60	10	60	40
Distance from Tapping Point	16	8	4	16	16	16	6	2
Public Electricity Demand Ratio	4	1	6	5	3	8	3	7
Total	50	79	30	101	79	34	69	49
Priority	5	2	8	1	2	7	4	6

Table of App.3- 4 Result of Prioritization of Nkhata Bay District

DISTRICTS TC DATA COLLECTION

NAME OF DISTRICT: NKHATA BAY

TC Number	30			31			32			33			34			35			36		
	Sanga			Usisya			Nthungwa			Ruarwe			Chituka			Maula			Lwazi		
	Number	kW at 2020	kWh at 2020	Number	kW at 2020	kWh at 2020	Number	kW at 2020	kWh at 2020	Number	kW at 2020	kWh at 2020	Number	kW at 2020	kWh at 2020	Number	kW at 2020	kWh at 2020	Number	kW at 2020	kWh at 2020
1. Name of Trading Center	Mankhambira			Mmwana			Kabunduli			Boghoyo			Maleng-Mzoma			Mankhambira			Timbiri		
2. Traditional Authority																					
3. Distance from the Existing Distribution Line (km)	4			20			20			100			7			2			5		
4. Market Fee																					
a) Monthly Market Fee per Person (MK/month)																					
b) Total Collected Annual Market Fee in TC (MK/year)	58,845			58,842			50,247			17,137			14,500			14,282			12,000		
5. a) Population in TC	697			70						422											
b) Population in CA [inc. the TC]																					
6. Number of Existing Public Facilities																					
a) Secondary School	1	1,250	2,551	1	1,250	2,551	0	0,000	0	0	0,000	0	1	1,250	2,551	1	1,250	2,551	2	2,500	5,101
b) Primary School	3	4,230	7,777	4	5,640	10,369	1	1,410	2,592	1	1,410	2,592	2	2,820	5,184	4	5,640	10,369	4	5,640	10,369
c) Teacher's Development Center	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0
d) Staff House	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0
e) Hospital	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0	1	2,450	11,517
f) Health Center	1	0,790	5,584	1	0,790	5,584	1	0,790	5,584	0	0,000	0	0	0,000	0	1	0,790	5,584	0	0,000	0
g) Clinic	2	0,860	6,101	2	0,860	6,101	2	0,860	6,101	1	0,430	3,050	1	0,430	3,050	2	0,860	6,101	2	0,860	6,101
h) Post Office	1	0,130	671	1	0,130	671	1	0,130	671	1	0,130	671	1	0,130	671	1	0,130	671	0	0,000	0
i) Police Station	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0
j) Police Post	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0
k) Police Unit	0	0,000	0	1	0,110	870	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0
l) Admarc	1	0,100	585	1	0,100	585	1	0,100	585	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0
m) Government Office	4	0,560	2,756	4	0,560	2,756	3	0,420	2,067	0	0,000	0	4	0,560	2,756	4	0,560	2,756	4	0,560	2,756
n) Church	8	1,120	4,135	6	0,840	3,101	6	0,840	3,101	2	0,280	1,034	8	1,120	4,135	8	1,120	4,135	10	1,400	5,169
o) Mosque	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0
p) Court	1	0,530	1,277	1	0,530	1,277	0	0,000	0	1	0,530	1,277	1	0,530	1,277	1	0,530	1,277	0	0,000	0
q) Other Public Facility	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0
Total	22	9,570	31,435	22	10,810	33,863	15	4,550	20,701	6	2,780	8,624	18	6,840	19,624	22	10,880	33,442	23	13,410	41,012
7. Targeted Business Entities in 2020																					
r) Maize Mills	0	0,000	0	3	80,200	230,350	1	40,100	115,175	0	40,100	115,175	1	20,050	57,587	1	20,050	57,587	0	0,000	0
s) Business Entity	14	5,040	33,579	19	7,280	48,503	8	3,360	22,386	8	3,360	22,386	14	7,840	52,234	16	8,960	59,696	15	8,400	55,965
Total	14	5,040	33,579	22	87,480	278,853	9	43,460	137,561	8	43,460	137,561	15	27,890	109,821	17	29,010	117,283	15	8,400	55,965
8. Targeted Household in 2020				156			122			250			78			39			39		
r) Ordinary Household	8.0	5,120	28,392	125	48,640	269,724	97.6	37,760	209,391	200.0	77,440	429,429	38.0	24,320	134,862	31.2	12,160	67,431	31.2	12,160	67,431
u) Rich Household	1.0	2,020	5,755	31	8,080	23,019	24.4	8,080	23,019	50.0	14,140	40,284	2.0	4,040	11,510	7.8	2,020	5,755	7.8	2,020	5,755
Total	9	7,140	34,147	156	56,720	292,743	122	45,840	232,410	250	91,580	469,713	40	28,360	146,372	39	14,180	73,186	39	14,180	73,186
Grand Total	22	99,161	314,435	155	605,459	1,617,000	94	390,672	1,344,000	138	615,897	2,164,427	63	275,817	1,000,000	54	223,911	800,000	36	170,163	580,163
		MP	Follow-up		MP	Follow-up		MP	Follow-up		MP	Follow-up		MP	Follow-up		MP	Follow-up		MP	Follow-up
kW	16	22	22	323	155	155	153	94	94	268	138	138	113	63	63	38	54	54	38	38	36
kWh	81,000	99,161	99,161	1,617,000	605,459	605,459	765,000	390,672	390,672	1,344,000	615,897	615,897	567,000	275,817	275,817	190,000	223,911	223,911	190,000	170,163	170,163

Ranking

Amount of Demand	7	2	3	1	4	5	6
Distance from Tapping Point	2	5	5	7	4	1	3
Public Electricity Demand Ratio	1	5	6	7	4	3	2

Points

Amount of Demand	10	60	50	70	40	30	20
Distance from Tapping Point	12	6	6	2	8	14	10
Public Electricity Demand Ratio	7	3	2	1	4	5	6
Total	29	69	58	73	52	49	36
Priority	7	2	3	1	4	5	6

Table of App.3- 5 Result of Prioritization of Mzimba District

DISTRICTS TC DATA COLLECTION

NAME OF DISTRICT: MZIMBA

TC Number	8			6			7			9		
	Eswazini			Luwelezi			Emfeni			Engutwini		
1. Name of Trading Center	Number	KW at 2020	KWh at 2020	Number	KW at 2020	KWh at 2020	Number	KW at 2020	KWh at 2020	Number	KW at 2020	KWh at 2020
2. Traditional Authority	Kampingo			Mabilabo			Mabilabo			Mwalo		
3. Distance from the Existing Distribution Line (km)	2			4			4			8		
4. Market Fee												
a) Monthly Market Fee per Person (MK/month)												
b) Total Collected Annual Market Fee in TC (MK/Year)	144,000			60,000			60,000			48,000		
5. a) Population in TC	114			209			224					
b) Population in CA (inc. the TC)							5,000					
6. Number of Existing Public Facilities												
a) Secondary School	2	2,500	5,101	1	1,250	2,551	2	2,500	5,101	1	1,250	2,551
b) Primary School	1	1,410	2,592	1	1,410	2,592	1	1,410	2,592	1	1,410	2,592
c) Teacher's Development Center	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0
d) Staff House	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0
e) Hospital	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0
f) Health Center	1	0,790	5,584	1	0,790	5,584	1	0,790	5,584	1	0,790	5,584
g) Clinic	2	0,860	6,101	2	0,860	6,101	2	0,860	6,101	2	0,860	6,101
h) Post Office	1	0,130	671	1	0,130	671	1	0,130	671	1	0,130	671
i) Police Station	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0
j) Police Post	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0
k) Police Unit	0	0,000	0	1	0,110	870	1	0,110	870	0	0,000	0
l) Admarc	1	0,100	585	1	0,100	585	1	0,100	585	1	0,100	585
m) Government Office	4	0,560	2,756	5	0,700	3,445	6	0,840	4,134	7	0,840	4,134
n) Church	4	0,560	2,068	5	0,700	2,584	4	0,560	2,068	4	0,560	2,068
o) Mosque	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0
p) Court	1	0,530	1,277	0	0,000	0	1	0,530	1,277	0	0,000	0
q) Other Public Facility	0	0,000	0	1	0,100	598	0	0,000	0	0	0,000	0
Total	17	7,440	26,734	19	6,150	25,580	20	7,830	28,982	18	5,940	24,285
7. Targeted Business Entities in 2020												
r) Maize Mills	2	40,100	115,175	2	40,100	115,175	1	20,050	57,587	1	20,050	57,587
s) Business Entity	16	8,960	59,696	23	12,880	85,813	18	10,080	67,158	13	7,280	48,503
Total	18	49,060	174,871	25	52,980	200,988	19	30,130	124,745	14	27,330	106,090
8. Targeted Household in 2020												
t) Ordinary Household	10	6,400	35,490	21	13,440	74,529	17	10,880	60,333	38	24,320	134,862
u) Rich Household	1	2,020	5,755	2	4,040	11,510	1	2,020	5,755	2	4,040	11,510
Total	11	8,420	41,245	23	17,480	86,039	18	12,900	66,088	40	28,360	146,372
Grand Total		65	242,849		77	312,607		51	219,815		62	276,747

	MP	Follow-up	MP	Follow-up	MP	Follow-up	MP	Follow-up
kW	60	65	81	77	53	51	113	62
kWh	299,000	242,849	408,000	312,607	267,000	219,815	567,000	276,747

Ranking

Amount of Demand	3	1	4	2
Distance from Tapping Point	1	2	2	4
Public Electricity Demand Ratio	2	4	1	3

Points

Amount of Demand	20	40	10	30
Distance from Tapping Point	8	6	6	2
Public Electricity Demand Ratio	3	1	4	2
Total	31	47	20	34
Priority	3	1	4	2

Table of App.3- 6 Result of Prioritization of Kasungu District

DISTRICTS TC DATA COLLECTION

NAME OF DISTRICT: KASUNGU

TC Number	51			52			53			54		
	Matenje			Simiamba			Kamboni			Kapheni		
1. Name of Trading Center	Number	kW at 2020	kWh at 2020	Number	kW at 2020	kWh at 2020	Number	kW at 2020	kWh at 2020	Number	kW at 2020	kWh at 2020
2. Traditional Authority	Chulu			Simiamba			Kawamba			Kapelula		
3. Distance from the Existing Distribution Line (km)	9			21			14			2		
4. Market Fee												
a) Monthly Market Fee per Person (MK/month)												
b) Total Collected Annual Market Fee in TC (MK/year)	30,000			20,000			17,000			8,000		
5. a) Population in TC	45			407			191			200		
b) Population in CA [inc. the TC]							5,000					
6. Number of Existing Public Facilities												
a) Secondary School	1	1,250	2,551	1	1,250	2,551	1	1,250	2,551	1	1,250	2,551
b) Primary School	1	1,410	2,592	1	1,410	2,592	1	1,410	2,592	1	1,410	2,592
c) Teacher's Development Center	0	0.000	0	0	0.000	0	0	0.000	0	0	0.000	0
d) Staff House	0	0.000	0	0	0.000	0	0	0.000	0	0	0.000	0
e) Hospital	0	0.000	0	0	0.000	0	0	0.000	0	0	0.000	0
f) Health Center	1	0.790	5,584	1	0.790	5,584	1	0.790	5,584	1	0.790	5,584
g) Clinic	1	0.430	3,050	2	0.860	6,101	1	0.430	3,050	2	0.860	6,101
h) Post Office	1	0.130	671	1	0.130	671	0	0.000	0	1	0.130	671
i) Police Station	0	0.000	0	0	0.000	0	0	0.000	0	0	0.000	0
j) Police Post	0	0.000	0	0	0.000	0	0	0.000	0	0	0.000	0
k) Police Unit	1	0.110	870	1	0.110	870	1	0.110	870	0	0.000	0
l) Admarc	0	0.000	0	0	0.000	0	0	0.000	0	1	0.100	585
m) Government Office	4	0.560	2,756	5	0.700	3,445	3	0.420	2,067	5	0.700	3,445
n) Church	3	0.420	1,551	2	0.280	1,034	2	0.280	1,034	2	0.280	1,034
o) Mosque	1	0.140	443	0	0.000	0	1	0.140	443	1	0.140	443
p) Court	1	0.530	1,277	1	0.530	1,277	0	0.000	0	1	0.530	1,277
q) Other Public Facility	4	0.400	2,392	1	0.100	598	0	0.000	0	0	0.000	0
Total	19	6.170	23,736	16	6.160	24,721	11	4.830	18,191	16	6.190	24,281
7. Targeted Business Entities in 2020												
r) Maize Mills	1	20,050	57,587	1	20,050	57,587	1	20,050	57,587	1	20,050	57,587
s) Business Entity	9	5,040	33,579	4	2,240	14,924	6	3,360	22,386	4	2,240	14,924
Total	10	25,090	91,166	5	22,290	72,511	7	23,410	79,973	5	22,290	72,511
8. Targeted Household in 2020												
t) Ordinary Household	3	1,920	10,647	40	25,600	141,960	26	16,640	92,274	20	12,800	70,980
u) Rich Household	1	2,020	5,755	3	6,060	17,265	2	4,040	11,510	2	4,040	11,510
Total	4	3,940	16,402	43	31,660	159,225	28	20,680	103,784	22	16,840	82,490
Grand Total	35	131,304		60	256,457		49	201,948		45	179,282	

	MP	Follow-up	MP	Follow-up	MP	Follow-up	MP	Follow-up	MP	Follow-up
kW	28	35	116	60	57	49	59	45		
kWh	141,000	131,304	580,000	256,457	285,000	201,948	294,000	179,282		

Ranking

Amount of Demand	4	1	2	3
Distance from Tapping Point	2	4	3	1
Public Electricity Demand Ratio	1	3	4	2

Points

Amount of Demand	10	40	30	20
Distance from Tapping Point	6	2	4	8
Public Electricity Demand Ratio	4	2	1	3
Total	20	44	35	31
Priority	4	1	2	3

Table of App.3- 7 Result of Prioritization of Nkhotakota District

DISTRICTS TC DATA COLLECTION

NAME OF DISTRICT: NKHOTAKOTA

TC Number	57			58		
	Msenjere			Kasitu		
1. Name of Trading Center	Number	kW at 2020	kWh at 2020	Number	kW at 2020	kWh at 2020
2. Traditional Authority	Kanyenda			Kafuzile		
3. Distance from the Existing Distribution Line (km)	2			8		
4. Market Fee						
a) Monthly Market Fee per Person (MK/month)	450			450		
b) Total Collected Annual Market Fee in TC (MK/year)	60,000			40,000		
5. a) Population in TC	950			600		
b) Population in CA [inc. the TC]	1,900			1,200		
6. Number of Existing Public Facilities						
a) Secondary School	1	1,250	2,551	1	1,250	2,551
b) Primary School	1	1,410	2,592	1	1,410	2,592
c) Teacher's Development Center	0	0.000	0	0	0.000	0
d) Staff House	0	0.000	0	0	0.000	0
e) Hospital	0	0.000	0	0	0.000	0
f) Health Center	1	0.790	5,584	0	0.000	0
g) Clinic	0	0.000	0	1	0.430	3,050
h) Post Office	0	0.000	0	1	0.130	671
i) Police Station	0	0.000	0	0	0.000	0
j) Police Post	0	0.000	0	0	0.000	0
k) Police Unit	1	0.110	870	1	0.110	870
l) Admarc	0	0.000	0	0	0.000	0
m) Government Office	0	0.000	0	1	0.140	689
n) Church	1	0.140	517	1	0.140	517
o) Mosque	0	0.000	0	0	0.000	0
p) Court	1	0.530	1,277	0	0.000	0
q) Other Public Facility	1	0.100	598	1	0.100	598
Total	7	4.330	13,988	8	4	11,538
7. Targeted Business Entities in 2020						
r) Maize Mills	1	20,050	57,587	1	20,050	57,587
s) Business Entity	9	5,040	33,579	13	7,280	48,503
Total	10	25,090	91,166	14	27,330	106,090
8. Targeted Household in 2020						
t) Ordinary Household	5	3,200	17,745	5	3,200	17,745
u) Rich Household	1	2,020	5,755	1	2,020	5,755
Total	6	5,220	23,500	6	5	23,500
Grand Total	35	128,654		36	141,128	

	MP	Follow-up	MP	Follow-up
kW	28	35	32	36
kWh	141,000	128,654	159,000	141,128

Ranking

Amount of Demand	2	1
Distance from Tapping Point	1	2
Public Electricity Demand Ratio	1	2

Points

Amount of Demand	10	20
Distance from Tapping Point	4	2
Public Electricity Demand Ratio	2	1
Total	16	23
Priority	2	1

Table of App.3- 8 Result of Prioritization of Ntchisi District

DISTRICTS TC DATA COLLECTION

NAME OF DISTRICT: NTCHISI

TC Number	61			62			63			64			65			68			69		
	Kamsonga			Chinguluwe			Bumphula			Malambo			Ng'ombe			Nthondo			Kayoyo		
1. Name of Trading Center	Number	kW at 2020	kWh at 2020	Number	kW at 2020	kWh at 2020	Number	kW at 2020	kWh at 2020	Number	kW at 2020	kWh at 2020	Number	kW at 2020	kWh at 2020	Number	kW at 2020	kWh at 2020	Number	kW at 2020	kWh at 2020
2. Traditional Authority	Malenga			Chilowoko			Chilowoko			Chilowoko			Kalumo			Nthondo			Nthondo		
3. Distance from the Existing Distribution Line (km)	8			2			9			9			2			6			9		
4. Market Fee																					
a) Monthly Market Fee per Person (MK/month)																					
b) Total Collected Annual Market Fee in TC (MK/year)	11,400			9,600			6,300			6,000			5,400			2,400			2,400		
5. a) Population in TC	1,000			350			503			321			37			376			600		
b) Population in CA [inc. the TC]	4,000			2,400									44						2,300		
6. Number of Existing Public Facilities																					
a) Secondary School	1	1,250	2,551	1	1,250	2,551	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0	1	1,250	2,551
b) Primary School	2	2,820	5,184	1	1,410	2,592	1	1,410	2,592	0	0,000	0	1	1,410	2,592	2	2,820	5,184	1	1,410	2,592
c) Teacher's Development Center	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0
d) Staff House	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0
e) Hospital	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0
f) Health Center	1	0,790	5,584	1	0,790	5,584	0	0,000	0	1	0,790	5,584	0	0,000	0	1	0,790	5,584	0	0,000	0
g) Clinic	2	0,860	6,101	2	0,860	6,101	0	0,000	0	4	1,720	12,201	0	0,000	0	2	0,860	6,101	0	0,000	0
h) Post Office	1	0,130	671	0	0,000	0	0	0,000	0	1	0,130	671	0	0,000	0	0	0,000	0	0	0,000	0
i) Police Station	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0
j) Police Post	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0
k) Police Unit	1	0,110	870	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0	1	0,110	870	0	0,000	0
l) Admarc	1	0,100	585	0	0,000	0	0	0,000	0	1	0,100	585	0	0,000	0	1	0,100	585	0	0,000	0
m) Government Office	4	0,560	2,756	4	0,560	2,756	0	0,000	0	3	0,420	2,067	0	0,000	0	5	0,700	3,445	2	0,280	1,378
n) Church	6	0,840	3,101	3	0,420	1,551	4	0,560	2,068	4	0,560	2,068	4	0,560	2,068	6	0,840	3,101	5	0,700	2,584
o) Mosque	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0	1	0,140	443	0	0,000	0
p) Court	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0	1	0,530	1,277	0	0,000	0
q) Other Public Facility	0	0,000	0	1	0,100	598	1	0,100	598	0	0,000	0	0	0,000	0	1	0,100	598	2	0,200	1,196
Total	19	7,460	27,402	13	5,390	21,732	6	2,070	5,258	14	3,720	23,175	5	1,970	4,660	21	6,990	27,188	11	3,840	10,301
7. Targeted Business Entities in 2020																					
r) Maize Mills	5	100,250	287,937	6	120,300	345,524	2	40,100	115,175	3	60,150	172,762	1	20,050	57,587	2	40,100	115,175	2	40,100	115,175
s) Business Entity	20	11,200	74,620	13	7,280	48,503	13	7,280	48,503	14	7,840	52,234	11	6,160	41,041	37	13,440	89,544	5	2,240	14,924
Total	25	111,450	362,557	19	127,580	394,027	15	47,380	163,678	17	67,990	224,996	12	26,210	98,628	39	53,540	204,719	7	42,340	130,099
8. Targeted Household in 2020																					
r) Ordinary Household	97	62,080	344,253	62	39,680	220,038	54	34,560	191,646	43	27,520	152,607	4	2,560	14,196	54	21,120	117,117	42	16,640	92,274
u) Rich Household	6	12,120	34,529	4	8,080	23,019	3	6,060	17,265	3	6,060	17,265	1	2,020	5,755	14	4,040	11,510	10	4,040	11,510
Total	103	74,200	378,782	66	47,760	243,057	57	40,620	208,911	46	33,580	169,872	5	4,580	19,951	68	25,160	128,627	52	20,680	103,784
Grand Total		193	768,741	181	658,817		90	377,846		105	418,043		33	123,239		86	360,533		67	244,184	

	MP	Follow-up	MP	Follow-up	MP	Follow-up	MP	Follow-up	MP	Follow-up	MP	Follow-up	MP	Follow-up	MP	Follow-up	MP	Follow-up
kW	303	193	128	181	163	90	163	105	29	33	124	86	67					
kWh	1,519,000	768,741	639,000	658,817	816,000	377,846	816,000	418,043	145,000	123,239	621,000	360,533	449,000	244,184				

Ranking

Amount of Demand	1	2	4	3	9	5	7
Distance from Tapping Point	5	1	6	6	1	4	6
Public Electricity Demand Ratio	7	8	9	4	6	3	5

Points

Amount of Demand	90	80	60	70	10	50	30
Distance from Tapping Point	10	18	8	8	18	12	8
Public Electricity Demand Ratio	3	2	1	6	4	7	5
Total	103	100	69	84	32	69	43
Priority	1	2	4	3	8	4	7

Table of App.3- 9 Result of Prioritization of Dowa District (1/3)

DISTRICTS TC DATA COLLECTION

NAME OF DISTRICT: DOWA

TC Number	73			74			75			76			77			80			81					
	Chiseflo			Bibanzi			Msalanyama			Kachigamba			Chinkhwiri			Chankhunga			Nalunga					
	Number	kW at 2020	kWh at 2020	Number	kW at 2020	kWh at 2020	Number	kW at 2020	kWh at 2020	Number	kW at 2020	kWh at 2020	Number	kW at 2020	kWh at 2020	Number	kW at 2020	kWh at 2020	Number	kW at 2020	kWh at 2020			
1. Name of Trading Center	Kayembe			Msakambewa			Msakambewa			Chakhadza			Chakhadza			Nikukula			Chewere					
2. Traditional Authority	Kayembe			Msakambewa			Msakambewa			Chakhadza			Chakhadza			Nikukula			Chewere					
3. Distance from the Existing Distribution Line (km)	19			8			5			3			13			6			9					
4. Market Fee	300			300			300			300			300			300			300					
a) Monthly Market Fee per Person (MK/month)	300			300			300			300			300			300			300					
b) Total Collected Annual Market Fee in TC (MK/year)	72,000			72,000			56,160			52,560			52,560			47,520			47,520					
5. a) Population in TC	537			80			129			654			80			50			30					
b) Population in CA [inc. the TC]	2,000						700			1,200														
6. Number of Existing Public Facilities																								
a) Secondary School	1	1,250	2,551	1	1,250	2,551	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0	1	1,250	2,551	1	1,250	2,551
b) Primary School	3	4,230	7,777	1	1,410	2,592	1	1,410	2,592	1	1,410	2,592	1	1,410	2,592	1	1,410	2,592	1	1,410	2,592	1	0,000	0
c) Teacher's Development Center	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0
d) Staff House	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0
e) Hospital	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0
f) Health Center	1	0,790	5,584	1	0,790	5,584	0	0,000	0	1	0,790	5,584	1	0,790	5,584	1	0,790	5,584	1	0,790	5,584	1	0,790	5,584
g) Clinic	0	0,000	0	1	0,430	3,050	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0
h) Post Office	1	0,130	671	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0	1	0,130	671	1	0,130	671	1	0,130	671
i) Police Station	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0
j) Police Post	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0
k) Police Unit	1	0,110	870	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0
l) Admarc	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0
m) Government Office	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0
n) Church	4	0,560	2,068	1	0,140	517	2	0,280	1,034	2	0,280	1,034	0	0,000	0	4	0,560	2,068	3	0,420	1,551	1	0,420	1,551
o) Mosque	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0	2	0,280	886	1	0,140	443	0	0,000	0	0	0,000	0
p) Court	1	0,530	1,277	0	0,000	0	0	0,000	0	0	0,000	0	1	0,530	1,277	0	0,000	0	1	0,530	1,277	0	0,000	0
q) Other Public Facility	2	0,200	1,196	0	0,000	0	1	0,100	598	1	0,100	598	1	0,100	598	2	0,100	598	2	0,100	598	0	0,000	0
Total	14	7,800	21,992	5	4,020	14,294	4	1,790	4,224	5	2,580	9,808	6	3,110	10,937	11	4,380	14,506	8	3,120	11,632			
7. Targeted Business Entities in 2020																								
r) Maize Mills	3	60,150	172,762	0	0,000	0	1	20,050	57,587	2	40,100	115,175	0	20,050	57,587	0	0,000	0	1	20,050	57,587	0	0,000	0
s) Business Entity	20	11,200	74,620	8	4,480	29,848	8	4,480	29,848	11	6,160	41,041	18	6,720	44,772	18	10,080	67,158	11	6,160	41,041			
Total	23	71,350	247,382	8	4,480	29,848	9	24,530	87,435	13	46,260	156,216	18	26,770	102,359	18	10,080	67,158	12	26,210	98,628			
8. Targeted Household in 2020																								
t) Ordinary Household	65	41,600	230,685	8	5,120	28,392	14	8,960	49,686	62	39,680	220,038	96	37,120	205,842	51	32,640	180,999	13	8,320	46,137			
u) Rich Household	4	8,080	23,019	1	2,020	5,755	1	2,020	5,755	4	8,080	23,019	24	8,080	23,019	3	6,060	17,265	1	2,020	5,755			
Total	69	49,680	253,704	9	7,140	34,147	15	10,980	55,441	66	47,760	243,057	120	45,200	228,861	54	38,700	198,264	14	10,340	51,892			
Grand Total	129	523,076		16	78,289		37	147,100		97	409,081		75	342,157		53	279,927		40	162,153				

	MP	Follow-up	MP	Follow-up	MP	Follow-up	MP	Follow-up	MP	Follow-up	MP	Follow-up	MP	Follow-up	MP	Follow-up
kW	184	129	17	16	47	37	157	97	131	75	117	53	45	40		
kWh	920,000	523,076	86,000	78,289	236,000	147,100	888,000	409,081	856,000	342,157	588,000	279,927	226,000	162,153		

Ranking

Amount of Demand	2	20	18	5	8	10	16
Distance from Tapping Point	20	13	6	3	18	9	15
Public Electricity Demand Ratio	14	1	17	19	16	13	3

Points

Amount of Demand	190	10	30	160	130	110	50
Distance from Tapping Point	2	16	30	36	6	24	12
Public Electricity Demand Ratio	7	20	4	2	5	8	18
Total	192	26	60	196	136	134	62
Priority	5	20	18	4	9	10	17

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Table of App.3- 9 Result of Prioritization of Dowa District(2/3)

NAME OF DISTRICT: DOWA

TC Number	82			83			84			85			86			87			88		
	Dzoole			Kalonga			Kalumbu			Mkukula			Chakadza			Chimungu			Thonje		
1. Name of Trading Center	Number	kW at 2020	kWh at 2020	Number	kW at 2020	kWh at 2020	Number	kW at 2020	kWh at 2020	Number	kW at 2020	kWh at 2020	Number	kW at 2020	kWh at 2020	Number	kW at 2020	kWh at 2020	Number	kW at 2020	kWh at 2020
2. Traditional Authority	Dzoole			Dzoole			Msakambewa			Msakambewa			Msakambewa			Msakambewa			Msakambewa		
3. Distance from the Existing Distribution Line (km)	9			2			7			3			3			8			5		
4. Market Fee																					
a) Monthly Market Fee per Person (MK/month)	300			300			300			300			300			300			300		
b) Total Collected Annual Market Fee in TC (MK/year)	28,800			36,000																	
5. a) Population in TC	80			80			80			80			80			80			80		
b) Population in CA [inc. the TC]																					
6. Number of Existing Public Facilities																					
a) Secondary School	1	1,250	2,551	1	1,250	2,551	1	1,250	2,551	1	1,250	2,551	0	0,000	0						
b) Primary School	1	1,410	2,592	1	1,410	2,592	5	7,050	12,961	6	8,460	15,553	1	1,410	2,592						
c) Teacher's Development Center	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0						
d) Staff House	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0						
e) Hospital	0	0,000	0	0	0,000	0	0	0,000	0	1	2,450	11,517	0	0,000	0						
f) Health Center	1	0,790	5,584	1	0,790	5,584	0	0,000	0	0	0,000	0	0	0,000	0						
g) Clinic	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0						
h) Post Office	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0						
i) Police Station	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0						
j) Police Post	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0						
k) Police Unit	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0						
l) Admarc	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0						
m) Government Office	0	0,000	0	0	0,000	0	3	0,420	2,067	0	0,000	0	0	0,000	0						
n) Church	3	0,420	1,551	2	0,280	1,034	0	0,000	0	0	0,000	0	0	0,000	0						
o) Mosque	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0						
p) Court	1	0,530	1,277	0	0,000	0	1	0,530	1,277	1	0,530	1,277	1	0,530	1,277						
q) Other Public Facility	2	0,200	1,196	0	0,000	0	1	0,100	598	0	0,000	0	1	0,100	598						
Total	9	4,600	14,750	5	3,730	11,760	11	9,350	19,453	9	12,690	30,897	3	2,040	4,467	0	0	0	0	0	0
7. Targeted Business Entities in 2020																					
r) Maize Mills	1	20,050	57,587	0	0,000	0	3	60,150	172,762	2	40,100	115,175	0	0,000	0						
s) Business Entity	14	7,840	52,234	8	4,480	29,848	47	26,320	175,357	11	6,160	41,041	0	0,000	0						
Total	15	27,890	109,821	8	4,480	29,848	50	86,470	348,119	13	46,260	156,216	1331194	0,000	0	0	0	0	0	0	0
8. Targeted Household in 2020																					
r) Ordinary Household	34	21,760	120,666	25	16,000	88,725	34	21,760	120,666	73	46,720	259,077	39	24,960	138,411	36					
u) Rich Household	2	4,040	11,510	2	4,040	11,510	2	4,040	11,510	4	8,080	23,019	3	6,060	17,265	9					
Total	36	25,800	132,176	27	20,040	100,235	36	25,800	132,176	77	54,800	282,096	42	31,020	155,676	45	0	0	0	70	0
Grand Total		58	256,747	28	141,843		122	499,748		114	469,210		33	160,142		0	0		0	0	0

	MP	Follow-up	MP	Follow-up	MP	Follow-up	MP	Follow-up	MP	Follow-up	MP	Follow-up	MP	Follow-up	MP	Follow-up	MP	Follow-up
kW	105	58	48	28	146	122	124	114	158	33	86	86						
kWh	526,000	256,747	239,000	141,843	730,000	499,748	621,000	469,210	792,000	160,142	430,000	263,507	430,000	263,507				

Ranking

Amount of Demand	14	19	3	4	17	11	11
Distance from Tapping Point	15	1	11	3	3	13	6
Public Electricity Demand Ratio	5	2	15	4	18	7	7

Points

Amount of Demand	70	20	180	170	40	100	100
Distance from Tapping Point	12	40	20	36	36	16	30
Public Electricity Demand Ratio	16	19	6	17	3	14	14
Total	82	60	200	206	76	116	130
Priority	15	18	3	2	16	13	11

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Table of App.3- 9 Result of Prioritization of Dowa District(3/3)

NAME OF DISTRICT: DOWA

TC Number	89			90			91			92		
	Kayembe			Simbi			Bweya			Niti		
1. Name of Trading Center	Number	kW at 2020	kWh at 2020	Number	kW at 2020	kWh at 2020	Number	kW at 2020	kWh at 2020	Number	kW at 2020	kWh at 2020
2. Traditional Authority	Msakambewa			Msakambewa			Msakambewa			Msakambewa		
3. Distance from the Existing Distribution Line (km)	13			6			5			2		
4. Market Fee												
a) Monthly Market Fee per Person (MK/month)												
b) Total Collected Annual Market Fee in TC (MK/year)												
5. a) Population in TC	80			80			80			80		
b) Population in CA (inc. the TC)												
6. Number of Existing Public Facilities												
a) Secondary School												
b) Primary School												
c) Teacher's Development Center												
d) Staff House												
e) Hospital												
f) Health Center												
g) Clinic												
h) Post Office												
i) Police Station												
j) Police Post												
k) Police Unit												
l) Admarc												
m) Government Office												
n) Church												
o) Mosque												
p) Court												
q) Other Public Facility												
Total	0	0	0	0	0	0	0	0	0	0	0	0
7. Targeted Business Entities in 2020												
r) Maize Mills												
s) Business Entity												
Total	0	0	0	0	0	0	0	0	0	0	0	0
8. Targeted Household in 2020	80			70			65			80		
t) Ordinary Household	64			56			52			64		
u) Rich Household	16			14			13			16		
Total	80	0	0	70	0	0	65	0	0	80	0	0
Grand Total	0			0			0			0		

	MP	Follow-up	MP	Follow-up	MP	Follow-up	MP	Follow-up
kW	115		86		81		115	
kWh	575,000	352,364	430,000	263,507	407,000	249,412	575,000	352,364

Ranking

Amount of Demand	6	11	15	6
Distance from Tapping Point	18	9	6	1
Public Electricity Demand Ratio	7	7	7	7

Points

Amount of Demand	150	100	60	150
Distance from Tapping Point	6	24	30	40
Public Electricity Demand Ratio	14	14	14	14
Total	156	124	90	190
Priority	7	12	14	6

Table of App.3- 10 Result of Prioritization of Salima District (1/2)

DISTRICTS TC DATA COLLECTION

NAME OF DISTRICT: SALIMA

TC Number	95			96			97			98			99			100			101					
	Kambiri Sch.			Khwidzi			Thavite			Makioni			Michulu			Chikombe			Mnema					
	Number	KW at 2020	KWh at 2020	Number	KW at 2020	KWh at 2020	Number	KW at 2020	KWh at 2020	Number	KW at 2020	KWh at 2020	Number	KW at 2020	KWh at 2020	Number	KW at 2020	KWh at 2020	Number	KW at 2020	KWh at 2020			
1. Name of Trading Center																								
2. Traditional Authority	Ndindi			STA Kambalame			Mwanza			Mwanza			Mwanza			Mwosa			Mwosa					
3. Distance from the Existing Distribution Line (km)	2			2			14			8			20			2			9					
4. Market Fee																								
a) Monthly Market Fee per Person (MK/month)	300			300			300			300			300			300			300					
b) Total Collected Annual Market Fee in TC (MK/Year)	57,450			51,450			23,200			23,200			23,200			14,477			14,417					
5. a) Population in TC																								
b) Population in CA (inc. the TC)																								
6. Number of Existing Public Facilities																								
a) Secondary School	0	0.000	0	0	0.000	0	1	1.250	2,551	0	0.000	0	0	0.000	0	0	0.000	0	0	0.000	0	0	0.000	0
b) Primary School	1	1.410	2,592	1	1.410	2,592	1	1.410	2,592	1	1.410	2,592	1	1.410	2,592	1	1.410	2,592	1	1.410	2,592	1	1.410	2,592
c) Teacher's Development Center	0	0.000	0	0	0.000	0	0	0.000	0	0	0.000	0	0	0.000	0	0	0.000	0	0	0.000	0	0	0.000	0
d) Staff House	0	0.000	0	0	0.000	0	0	0.000	0	0	0.000	0	0	0.000	0	0	0.000	0	0	0.000	0	0	0.000	0
e) Hospital	0	0.000	0	0	0.000	0	0	0.000	0	0	0.000	0	0	0.000	0	0	0.000	0	0	0.000	0	0	0.000	0
f) Health Center	0	0.000	0	0	0.000	0	1	0.790	5,584	1	0.790	5,584	0	0.000	0	0	0.000	0	0	0.000	0	0	0.000	0
g) Clinic	0	0.000	0	1	0.430	3,050	0	0.000	0	0	0.000	0	0	0.000	0	0	0.000	0	0	0.000	0	0	0.000	0
h) Post Office	0	0.000	0	0	0.000	0	1	0.130	671	1	0.130	671	0	0.000	0	0	0.000	0	0	0.000	0	0	0.000	0
i) Police Station	0	0.000	0	0	0.000	0	0	0.000	0	0	0.000	0	0	0.000	0	0	0.000	0	0	0.000	0	0	0.000	0
j) Police Post	0	0.000	0	0	0.000	0	0	0.000	0	0	0.000	0	0	0.000	0	0	0.000	0	0	0.000	0	0	0.000	0
k) Police Unit	0	0.000	0	0	0.000	0	0	0.000	0	0	0.000	0	0	0.000	0	0	0.000	0	0	0.000	0	0	0.000	0
l) Admarc	0	0.000	0	1	0.100	585	1	0.100	585	1	0.000	0	1	0.100	585	1	0.100	585	1	0.100	585	1	0.100	585
m) Government Office	0	0.000	0	0	0.000	0	1	0.140	889	0	0.000	0	0	0.000	0	0	0.000	0	0	0.000	0	0	0.000	0
n) Church	1	0.140	517	1	0.140	517	1	0.140	517	1	0.140	517	0	0.000	0	1	0.140	517	1	0.140	517	1	0.140	517
o) Mosque	0	0.000	0	0	0.000	0	0	0.000	0	0	0.000	0	1	0.140	443	1	0.140	443	1	0.140	443	1	0.140	443
p) Court	0	0.000	0	0	0.000	0	0	0.000	0	0	0.000	0	0	0.000	0	1	0.530	1,277	1	0.530	1,277	1	0.530	1,277
q) Other Public Facility	0	0.000	0	0	0.000	0	0	0.000	0	0	0.000	0	0	0.000	0	0	0.100	598	0	0.000	0	0	0.000	0
Total	2	1.550	3,109	4	2.080	6,744	7	3.960	13,188	5	2.470	9,364	3	1.650	3,620	5	2.420	6,012	5	2.420	6,012	5	2.320	5,414
7. Targeted Business Entities in 2020																								
r) Maize Mills	1	20,050	57,587	1	20,050	57,587	1	20,050	57,587	1	20,050	57,587	1	20,050	57,587	2	40,100	115,175	1	20,050	57,587	2	40,100	115,175
s) Business Entity	3	1,680	11,193	3	1,680	11,193	8	4,480	29,848	4	2,240	14,924	2	1,120	7,462	10	5,600	37,310	3	1,680	11,193	4	2,320	15,412
Total	4	21,730	68,780	4	21,730	68,780	9	24,530	87,435	5	22,290	72,511	3	21,170	65,049	12	45,700	152,485	4	21,730	68,780	6	27,720	91,587
8. Targeted Household in 2020																								
t) Ordinary Household	38	24,320	134,862	38	24,320	134,862	38	24,320	134,862	1	0.640	3,549	38	24,320	134,862	15	9,600	53,235	2	1,280	7,098	2	1,280	7,098
u) Rich Household	2	4,040	11,510	2	4,040	11,510	2	4,040	11,510	1	2,020	5,755	2	4,040	11,510	1	2,020	5,755	1	2,020	5,755	1	2,020	5,755
Total	40	28,360	146,372	40	28,360	146,372	40	28,360	146,372	2	2,660	9,304	40	28,360	146,372	16	11,620	58,990	3	3,300	12,853	3	3,300	12,853
Grand Total	52	218,261		52	221,896		57	246,995		27	91,179		51	215,041		60	217,486		27	87,047				

	MP	Follow-up	MP	Follow-up	MP	Follow-up	MP	Follow-up	MP	Follow-up	MP	Follow-up	MP	Follow-up	MP	Follow-up	MP	Follow-up
kW	113	52	113	52	113	57	44	27	113	51	70	26	27	70	26	27	113	51
kWh	567,000	218,261	567,000	221,896	567,000	246,995	222,000	91,179	567,000	215,041	349,000	217,486	132,000	87,047				

Ranking

Amount of Demand	7	6	4	11	10	9	12
Distance from Tapping Point	1	1	13	10	14	1	11
Public Electricity Demand Ratio	13	9	5	1	12	10	3

Points

Amount of Demand	80	90	110	40	50	60	30
Distance from Tapping Point	28	28	4	10	2	28	8
Public Electricity Demand Ratio	2	6	10	14	3	5	12
Total	110	124	124	64	55	93	50
Priority	7	5	5	10	11	9	12

Table of App.3- 10 Result of Prioritization of Salima District(2/2)

NAME OF DISTRICT: SALIMA

TC Number	102			103			104			105			106			107			108		
	Chitala			Chinguluwe			Siyasiya			Matenje			Chagunda			Pemba			Mphinzi		
1. Name of Trading Center	Number	kW at 2020	kWh at 2020	Number	kW at 2020	kWh at 2020	Number	kW at 2020	kWh at 2020	Number	kW at 2020	kWh at 2020	Number	kW at 2020	kWh at 2020	Number	kW at 2020	kWh at 2020	Number	kW at 2020	kWh at 2020
2. Traditional Authority	Mwanza			Khombeza			Khombedza			Khombedza			Kambwiri			STA Pemba					
3. Distance from the Existing Distribution Line (km)	6			2			2			5			2			5			13		
4. Market Fee																					
a) Monthly Market Fee per Person (MK/month)	300			300			300			300			300			300			300		
b) Total Collected Annual Market Fee in TC (MK/year)	14,417			14,417			14,417			14,417			3,600			3,600			3,600		
5. a) Population in TC																					
b) Population in CA [inc. the TC]																					
6. Number of Existing Public Facilities																					
a) Secondary School	1	1,250	2,551	0	0,000	0	1	1,250	2,551	0	0,000	0	1	1,250	2,551	0	0,000	0	1	1,250	2,551
b) Primary School	1	1,410	2,592	1	1,410	2,592	1	1,410	2,592	1	1,410	2,592	1	1,410	2,592	1	1,410	2,592	1	1,410	2,592
c) Teacher's Development Center	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0
d) Staff House	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0
e) Hospital	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0
f) Health Center	1	0,790	5,584	1	0,790	5,584	1	0,790	5,584	0	0,000	0	1	0,790	5,584	0	0,000	0	0	0,000	0
g) Clinic	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0	1	0,430	3,050	0	0,000	0
h) Post Office	1	0,130	671	0	0,000	0	1	0,130	671	1	0,000	0	0	0,000	0	0	0,000	0	1	0,130	671
i) Police Station	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0
j) Police Post	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0
k) Police Unit	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0
l) Admarc	1	0,100	585	1	0,100	585	1	0,100	585	0	0,000	0	1	0,100	585	1	0,100	585	1	0,100	585
m) Government Office	0	0,000	0	0	0,000	0	1	0,140	689	0	0,000	0	1	0,140	689	0	0,000	0	0	0,000	0
n) Church	1	0,140	517	1	0,140	517	1	0,140	517	0	0,000	0	1	0,140	517	1	0,140	517	1	0,140	517
o) Mosque	1	0,140	443	0	0,000	0	1	0,140	443	0	0,000	0	1	0,140	443	0	0,000	0	1	0,140	443
p) Court	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0
q) Other Public Facility	1	0,100	598	1	0,100	598	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0
Total	8	4,060	13,540	5	2,540	9,876	8	4,100	13,631	2	1,410	2,592	7	3,970	12,960	4	2,080	6,744	6	3,170	7,359
7. Targeted Business Entities in 2020																					
r) Maize Mills	4	80,200	230,350	1	20,050	57,587	1	20,050	57,587	0	0,000	0	1	20,050	57,587	4	80,200	230,350	0	0,000	0
s) Business Entity	5	2,900	18,655	1	0,560	3,731	16	8,960	59,696	1	0,560	3,731	2	1,120	7,462	4	2,240	14,924	0	0,000	0
Total	9	83,000	249,005	2	20,610	61,318	17	29,010	117,283	1	0,560	3,731	3	21,170	65,049	8	82,440	245,274	0	0,000	0
8. Targeted Household in 2020							78												39		
r) Ordinary Household	76	48,640	269,724	38	24,320	134,862	38	24,320	134,862	19	12,160	67,431	38	24,320	134,862	76	48,640	269,724	19	12,160	67,431
u) Rich Household	4	8,080	23,019	2	4,040	11,510	2	4,040	11,510	1	2,020	5,755	2	4,040	11,510	4	8,080	23,019	1	2,020	5,755
Total	80	56,720	292,743	40	28,360	146,372	40	28,360	146,372	20	14,180	73,186	40	28,360	146,372	80	56,720	292,743	20	14,180	73,186
Grand Total	144	555,288	1,121,000	52	217,566	567,000	61	277,286	567,000	16	79,509	190,000	54	224,382	567,000	141	544,761	1,121,000	17	80,544	190,000

	MP	Follow-up	MP	Follow-up	MP	Follow-up	MP	Follow-up	MP	Follow-up	MP	Follow-up	MP	Follow-up	MP	Follow-up	MP	Follow-up	MP	Follow-up
kW	224	144	113	52	113	61	38	16	113	54	224	141	38	17	113	54	224	141	38	17
kWh	1,121,000	555,288	567,000	217,566	567,000	277,286	190,000	79,509	567,000	224,382	1,121,000	544,761	190,000	80,544	567,000	224,382	1,121,000	544,761	190,000	80,544

Ranking

Amount of Demand	1	8	3	14	5	2	13
Distance from Tapping Point	9	1	1	7	1	7	12
Public Electricity Demand Ratio	11	7	6	8	4	14	2

Points

Amount of Demand	140	70	120	10	100	130	20
Distance from Tapping Point	12	28	28	16	28	16	6
Public Electricity Demand Ratio	4	8	9	7	11	1	13
Total	156	106	157	33	139	147	39
Priority	2	8	1	14	4	3	13

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Table of App.3- 11 Result of Prioritization of Lilongwe District (1/3)

DISTRICTS TC DATA COLLECTION

NAME OF DISTRICT: LILONGWE

TC Number	111			112			113			114			115			116			117		
	Kasiya			Chawantha			Malembo			Nsaru			Kabudula			Hiunjiza			Phirianjuli		
	Number	kW at 2020	kWh at 2020	Number	kW at 2020	kWh at 2020	Number	kW at 2020	kWh at 2020	Number	kW at 2020	kWh at 2020	Number	kW at 2020	kWh at 2020	Number	kW at 2020	kWh at 2020	Number	kW at 2020	kWh at 2020
1. Name of Trading Center	Khongoni			Katolo			Khongoni			Kabundula			Kabudula			Masufa			Chiseka		
2. Traditional Authority	2			11			6			14			10			29			15		
3. Distance from the Existing Distribution Line (km)	2			11			6			14			10			29			15		
4. Market Fee																					
a) Monthly Market Fee per Person (MK/month)																					
b) Total Collected Annual Market Fee in TC (MK/year)																					
5. a) Population in TC	1,121			77			243			1,615			203			1,500			279		
b) Population in CA [inc. the TC]										404			749								
6. Number of Existing Public Facilities																					
a) Secondary School	1	1,250	2,551	1	1,250	2,551	1	1,250	2,551	1	1,250	2,551	1	1,250	2,551	1	1,250	2,551	1	1,250	2,551
b) Primary School	2	2,820	5,184	1	1,410	2,592	1	1,410	2,592	1	1,410	2,592	1	1,410	2,592	1	1,410	2,592	1	1,410	2,592
c) Teacher's Development Center	0	0.000	0	0	0.000	0	0	0.000	0	0	0.000	0	0	0.000	0	0	0.000	0	0	0.000	0
d) Staff House	0	0.000	0	0	0.000	0	0	0.000	0	0	0.000	0	0	0.000	0	0	0.000	0	0	0.000	0
e) Hospital	0	0.000	0	0	0.000	0	0	0.000	0	0	0.000	0	1	2,450	11,517	0	2,450	11,517	0	0.000	0
f) Health Center	1	0.790	5,584	0	0.000	0	0	0.000	0	1	0.790	5,584	0	0.000	0	1	0.790	5,584	0	0.000	0
g) Clinic	1	0.430	3,050	0	0.000	0	1	0.430	3,050	0	0.000	0	1	0.430	3,050	1	0.430	3,050	0	0.000	0
h) Post Office	1	0.130	671	0	0.000	0	1	0.130	671	1	0.130	671	1	0.130	671	1	0.130	671	0	0.000	0
i) Police Station	1	0.760	4,834	0	0.000	0	1	0.760	4,834	0	0.760	4,834	0	0.000	0	0	0.000	0	0	0.000	0
j) Police Post	0	0.000	0	0	0.000	0	0	0.000	0	0	0.000	0	0	0.000	0	0	0.000	0	0	0.000	0
k) Police Unit	0	0.000	0	0	0.000	0	0	0.000	0	1	0.110	870	0	0.000	0	0	0.000	0	0	0.000	0
l) Admarc	1	0.100	585	1	0.100	585	1	0.100	585	1	0.100	585	0	0.000	0	0	0.000	0	1	0.100	585
m) Government Office	1	0.140	689	0	0.000	0	1	0.140	689	1	0.140	689	0	0.000	0	1	0.140	689	1	0.140	689
n) Church	6	0.840	3,101	2	0.280	1,034	2	0.280	1,034	3	0.420	1,551	2	0.280	1,034	2	0.280	1,034	2	0.280	1,034
o) Mosque	1	0.140	443	0	0.000	0	1	0.140	443	1	0.140	443	1	0.140	443	0	0.000	0	0	0.000	0
p) Court	1	0.530	1,277	1	0.530	1,277	0	0.000	0	0	0.000	0	0	0.000	0	0	0.000	0	0	0.000	0
q) Other Public Facility	0	0.000	0	1	0.100	598	2	0.200	1,196	0	0.000	0	0	0.000	0	0	0.000	0	0	0.000	0
Total	17	7.930	27,969	7	3.670	8,636	12	4.840	17,645	11	5.250	20,369	8	6.090	21,858	8	6.880	27,687	6	3.180	7,451
7. Targeted Business Entities in 2020																					
r) Maize Mills	5	100.250	287,937	1	20.050	57,587	3	60.150	172,762	6	120.300	345,524	0	0.000	0	3	60.150	172,762	1	20.050	57,587
s) Business Entity	11	6.160	41,041	2	1.120	7,462	3	1.120	7,462	27	15.120	100,737	8	4.480	29,848	5	2.900	18,655	4	2.240	14,924
Total	16	106.410	328,978	3	21.170	65,049	6	61.270	180,224	33	135.420	446,261	8	4.480	29,848	8	62.950	191,417	5	22.290	72,511
8. Targeted Household in 2020																					
t) Ordinary Household	114.0	72,960	404,586	9	5,760	31,941	0.0	16,640	92,274	169.0	108,160	599,781	23	14,720	81,627	73	46,720	259,077	27	17,280	95,823
u) Rich Household	6.0	12,120	34,529	1	2,020	5,755	0.0	4,040	11,510	9.0	18,180	51,794	1	2,020	5,755	4	8,080	23,019	2	4,040	11,510
Total	120	85,080	439,115	10	7,780	37,696	0	20,680	103,784	178	126,340	651,575	24	16,740	87,382	77	54,800	282,096	29	21,320	107,333
Grand Total	199	796,062		33	111,381		87	301,653		287	1,118,205		27	139,088		125	501,201		47	187,295	

	MP	Follow-up	MP	Follow-up	MP	Follow-up	MP	Follow-up	MP	Follow-up	MP	Follow-up	MP	Follow-up	MP	Follow-up	MP	Follow-up
kW	316	199	39	33	110	87	36	27	438	267	36	27	198	125	91	47		
kWh	1,581,000	796,062	195,000	111,381	549,000	301,653	2,192,000	1,118,205	181,000	139,088	992,000	501,201	458,000	187,295				

Ranking

Amount of Demand	2	17	9	1	15	3	14
Distance from Tapping Point	1	11	4	14	9	18	15
Public Electricity Demand Ratio	13	4	7	18	1	8	11

Points

Amount of Demand	170	20	100	180	40	160	50
Distance from Tapping Point	36	16	30	10	20	2	8
Public Electricity Demand Ratio	6	15	12	1	18	11	8
Total	212	51	142	191	78	173	66
Priority	1	17	8	2	14	3	16

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Table of App.3- 11 Result of Prioritization of Lilongwe District(2/3)

NAME OF DISTRICT: LILONGWE

TC Number	118			119			120			121			122			123			124		
	Kachale			Chimbalanga			Mtema			Bisal			Mbing'ombe			Sinumbe			Kang'oma		
	Number	kW at 2020	KWh at 2020	Number	kW at 2020	KWh at 2020	Number	kW at 2020	KWh at 2020	Number	kW at 2020	KWh at 2020	Number	kW at 2020	KWh at 2020	Number	kW at 2020	KWh at 2020	Number	kW at 2020	KWh at 2020
1. Name of Trading Center	Chadzha			Chitwele			Mema			Kalumbu			Mema			Kalolo			Tsabango		
2. Traditional Authority	Chadzha			Chitwele			Mema			Kalumbu			Mema			Kalolo			Tsabango		
3. Distance from the Existing Distribution Line (km)	8			15			11			10			16			9			8		
4. Market Fee																					
a) Monthly Market Fee per Person (MK/month)																					
b) Total Collected Annual Market Fee in TC (MK/year)																					
5. a) Population in TC	200			800			842			299			1,000			22			724		
b) Population in CA [inc. the TC]																					
6. Number of Existing Public Facilities																					
a) Secondary School	0	0.000	0	0	0.000	0	1	1.250	2,551	1	1.250	2,551	0	0.000	0	1	1.250	2,551	1	1.250	2,551
b) Primary School	1	1.410	2,592	1	1.410	2,592	1	1.410	2,592	1	1.410	2,592	1	1.410	2,592	1	1.410	2,592	1	1.410	2,592
c) Teacher's Development Center	0	0.000	0	0	0.000	0	0	0.000	0	0	0.000	0	0	0.000	0	0	0.000	0	0	0.000	0
d) Staff House	0	0.000	0	0	0.000	0	0	0.000	0	0	0.000	0	0	0.000	0	0	0.000	0	0	0.000	0
e) Hospital	0	0.000	0	0	0.000	0	0	0.000	0	0	0.000	0	0	0.000	0	0	0.000	0	0	0.000	0
f) Health Center	1	0.790	5,584	1	0.790	5,584	1	0.790	5,584	0	0.000	0	1	0.790	5,584	1	0.790	5,584	1	0.790	5,584
g) Clinic	0	0.000	0	2	0.860	6,101	1	0.430	3,050	1	0.430	3,050	1	0.430	3,050	0	0.000	0	1	0.430	3,050
h) Post Office	0	0.000	0	1	0.130	671	0	0.000	0	1	0.130	671	0	0.000	0	0	0.000	0	0	0.000	0
i) Police Station	0	0.000	0	1	0.760	4,834	0	0.000	0	1	0.760	4,834	0	0.000	0	0	0.000	0	0	0.000	0
j) Police Post	0	0.000	0	0	0.000	0	0	0.000	0	0	0.000	0	0	0.000	0	0	0.000	0	0	0.000	0
k) Police Unit	0	0.000	0	0	0.000	0	0	0.000	0	0	0.000	0	0	0.000	0	0	0.000	0	0	0.000	0
l) Admarc	1	0.100	585	1	0.100	585	1	0.100	585	0	0.000	0	1	0.100	585	0	0.000	0	0	0.000	0
m) Government Office	1	0.140	689	1	0.140	689	1	0.140	689	0	0.000	0	0	0.000	0	0	0.000	0	1	0.140	689
n) Church	0	0.000	0	2	0.280	1,034	3	0.420	1,551	1	0.140	517	2	0.280	1,034	1	0.140	517	3	0.420	1,551
o) Mosque	0	0.000	0	1	0.140	443	0	0.000	0	0	0.000	0	0	0.000	0	0	0.000	0	0	0.000	0
p) Court	0	0.000	0	0	0.000	0	1	0.530	1,277	0	0.000	0	0	0.000	0	0	0.000	0	1	0.530	1,277
q) Other Public Facility	0	0.000	0	1	0.100	598	1	0.100	598	0	0.000	0	0	0.000	0	0	0.000	0	0	0.000	0
Total	4	2.440	9,450	12	4.710	23,130	11	5.170	18,476	6	4.120	14,215	6	3.010	12,845	4	3.590	11,243	9	4.970	17,293
7. Targeted Business Entities in 2020																					
r) Maize Mills	4	80.200	230,350	1	20.050	57,587	2	40.100	115,175	1	20.050	57,587	2	40.100	115,175	1	20.050	57,587	2	40.100	115,175
s) Business Entity	6	3.360	22,386	9	5.040	33,579	3	1.680	11,193	4	2.240	14,924	6	3.360	22,386	3	1.680	11,193	3	1.680	11,193
Total	10	83.560	252,736	10	25.090	91,166	5	41.780	126,368	5	22.290	72,511	8	43.460	137,561	4	21.730	68,780	5	41.780	126,368
8. Targeted Household in 2020																					
r) Ordinary Household	8	5.120	28,392	39	24.960	138,411	69	44.160	244,881	38	24.320	134,862	49	31.360	173,901	2	1.280	7,098	50	32.000	177,450
u) Rich Household	1	2.020	5,755	3	6.060	17,265	4	8.080	23,019	2	4.040	11,510	3	6.060	17,265	1	2.020	5,755	3	6.060	17,265
Total	9	7.140	34,147	42	31.020	155,676	73	52.240	267,900	40	28.360	146,372	52	37.420	191,166	3	3.300	12,853	53	38.060	194,715
Grand Total	93	296,332		61	269,972		99	412,744		55	233,098		84	341,571		29	92,877		85	338,375	
kW	96	93		115	61		170	99		112	55		153	84		26	29		27	85	
kWh	482,000	296,332		575,000	269,972		851,000	412,744		562,000	233,098		766,000	341,571		132,000	92,877		1,137,000	338,375	

Ranking

Amount of Demand	10	11	5	12	7	18	8
Distance from Tapping Point	6	15	11	9	17	8	6
Public Electricity Demand Ratio	15	3	10	6	12	2	9

Points

Amount of Demand	90	80	140	70	120	10	110
Distance from Tapping Point	26	8	16	20	4	22	26
Public Electricity Demand Ratio	4	16	9	13	7	17	10
Total	120	104	165	103	131	49	146
Priority	10	12	5	13	9	18	7

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Table of App.3- 11 Result of Prioritization of Lilongwe District(3/3)

NAME OF DISTRICT: LILONGWE

TC Number	125			126			127			128		
	Chiwamba			Chadza			Kalumbu			Kalima		
1. Name of Trading Center	Number	KW at 2020	KWh at 2020	Number	KW at 2020	KWh at 2020	Number	KW at 2020	KWh at 2020	Number	KW at 2020	KWh at 2020
2. Traditional Authority	Chimutu			Chadza			Kalumbu			Malli		
3. Distance from the Existing Distribution Line (km)	2			11			6			4		
4. Market Fee												
a) Monthly Market Fee per Person (MK/month)												
b) Total Collected Annual Market Fee in TC (MK/year)												
5. a) Population in TC	402			867			698			130		
b) Population in CA (inc. the TC)	2,000									198		
6. Number of Existing Public Facilities												
a) Secondary School	1	1,250	2,551	1	1,250	2,551	1	1,250	2,551	0	0,000	0
b) Primary School	1	1,410	2,592	1	1,410	2,592	1	1,410	2,592	0	0,000	0
c) Teacher's Development Center	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0
d) Staff House	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0
e) Hospital	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0
f) Health Center	1	0,790	5,584	1	0,790	5,584	0	0,000	0	0	0,000	0
g) Clinic	0	0,000	0	0	0,000	0	1	0,430	3,050	0	0,000	0
h) Post Office	1	0,130	671	0	0,000	0	0	0,000	0	0	0,000	0
i) Police Station	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0
j) Police Post	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0
k) Police Unit	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0
l) Admarc	0	0,000	0	1	0,100	585	1	0,100	585	1	0,100	585
m) Government Office	1	0,140	689	1	0,140	689	1	0,140	689	1	0,140	689
n) Church	2	0,280	1,034	2	0,280	1,034	3	0,420	1,551	1	0,140	517
o) Mosque	1	0,140	443	0	0,000	0	0	0,000	0	0	0,000	0
p) Court	0	0,000	0	0	0,000	0	1	0,530	1,277	1	0,530	1,277
q) Other Public Facility	0	0,000	0	0	0,000	0	0	0,000	0	1	0,100	598
Total	8	4,140	13,563	7	3,970	13,034	9	4,280	12,294	5	1,010	3,665
7. Targeted Business Entities in 2020												
r) Maize Mills	0	0,000	0	1	20,050	57,587	1	20,050	57,587	1	20,050	57,587
s) Business Entity	3	1,680	11,193	0	0,000	0	4	2,240	14,924	0	0,000	0
Total	3	1,680	11,193	1	20,050	57,587	5	22,290	72,511	1	20,050	57,587
8. Targeted Household in 2020												
t) Ordinary Household	43	27,520	152,607	98	62,720	347,802	79	50,560	280,371	13	8,320	46,137
u) Rich Household	3	6,960	17,265	6	12,120	34,529	6	12,120	34,529	1	2,020	5,755
Total	46	33,580	169,872	104	74,840	382,331	85	62,680	314,900	14	10,340	51,892
Grand Total	39	194,628	194,628	99	452,953	452,953	89	399,706	399,706	31	113,145	113,145
		MP	Follow-up		MP	Follow-up		MP	Follow-up		MP	Follow-up
kW		102	39		224	99		169	89		45	31
kWh		511,000	194,628		1,122,000	452,953		946,000	399,706		226,000	113,145

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Ranking

Amount of Demand	13	4	6	16
Distance from Tapping Point	1	11	4	3
Public Electricity Demand Ratio	5	17	16	14

Points

Amount of Demand	60	150	130	30
Distance from Tapping Point	36	16	30	32
Public Electricity Demand Ratio	14	2	3	5
Total	110	168	163	67
Priority	11	4	6	15

Table of App.3- 12 Result of Prioritization of Mchinji District (1/2)

DISTRICTS TC DATA COLLECTION

NAME OF DISTRICT: MCHINJI

TC Number	131			132			133			134			135			136			137		
	Mikundi			Nkhwazi			Gumba			Kazyozyo			Gumulira			Kabzyala			Kalulu		
	Number	kW at 2020	kWh at 2020	Number	kW at 2020	kWh at 2020	Number	kW at 2020	kWh at 2020	Number	kW at 2020	kWh at 2020	Number	kW at 2020	kWh at 2020	Number	kW at 2020	kWh at 2020	Number	kW at 2020	kWh at 2020
1. Name of Trading Center	Mouwa			Mwvere			Mkanda			Mkanda			Mlonyeni			Mwvere			Kapondo		
2. Traditional Authority	Mouwa			Mwvere			Mkanda			Mkanda			Mlonyeni			Mwvere			Kapondo		
3. Distance from the Existing Distribution Line (km)	10			3			11			10			13			6			6		
4. Market Fee																					
a) Monthly Market Fee per Person (MK/month)																					
b) Total Collected Annual Market Fee in TC (MK/year)	165,000			50,000			50,000			45,000			40,000			12,000			1,080		
5. a) Population in TC	105			25						129			67			46			50		
b) Population in CA [inc. the TC]										905											
6. Number of Existing Public Facilities																					
a) Secondary School	1	1,250	2,551	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0	1	1,250	2,551	0	0,000	0
b) Primary School	1	1,410	2,592	1	1,410	2,592	1	1,410	2,592	1	1,410	2,592	1	1,410	2,592	1	1,410	2,592	1	1,410	2,592
c) Teacher's Development Center	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0
d) Staff House	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0
e) Hospital	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0
f) Health Center	1	0,790	5,584	1	0,790	5,584	0	0,000	0	1	0,790	5,584	0	0,000	0	0	0,000	0	0	0,790	5,584
g) Clinic	2	0,860	6,101	2	0,860	6,101	2	0,860	6,101	2	0,860	6,101	1	0,430	3,050	1	0,430	3,050	1	0,000	0
h) Post Office	1	0,130	671	1	0,130	671	1	0,130	671	1	0,130	671	0	0,000	0	0	0,000	0	0	0,000	0
i) Police Station	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0
j) Police Post	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0
k) Police Unit	0	0,000	0	0	0,000	0	0	0,000	0	1	0,110	870	0	0,000	0	0	0,000	0	0	0,000	0
l) Admarc	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0
m) Government Office	7	0,980	4,823	4	0,560	2,756	4	0,560	2,756	5	0,700	3,445	0	0,000	0	2	0,280	1,378	4	0,560	2,756
n) Church	5	0,700	2,584	5	0,700	2,584	4	0,560	2,068	4	0,560	2,068	2	0,280	1,034	2	0,280	1,034	3	0,420	1,551
o) Mosque	1	0,140	443	1	0,140	443	1	0,140	443	1	0,140	443	0	0,000	0	0	0,000	0	0	0,140	443
p) Court	1	0,530	1,277	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0
q) Other Public Facility	2	0,200	1,196	1	0,100	598	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0	1	0,100	598
Total	22	6,990	27,821	16	4,690	21,329	13	3,660	14,630	16	4,700	21,773	4	2,120	6,676	7	3,650	10,605	11	3,420	13,524
7. Targeted Business Entities in 2020																					
r) Maize Mills	1	20,050	57,587	1	20,050	57,587	1	20,050	57,587	1	20,050	57,587	1	20,050	57,587	0	0,000	0	1	20,050	57,587
s) Business Entity	14	7,840	52,234	10	5,600	37,310	7	3,920	26,117	6	3,360	22,386	8	4,480	29,848	7	3,920	26,117	9	5,040	33,579
Total	15	27,890	109,821	11	25,650	94,897	8	23,970	83,704	7	23,410	79,973	9	24,530	87,435	7	3,920	26,117	10	25,090	91,166
8. Targeted Household in 2020																					
r) Ordinary Household	11	7,040	39,039	3	1,920	10,647	38	24,320	134,862	12	7,680	42,588	7	4,480	24,843	5	3,200	17,745	5	3,200	17,745
u) Rich Household	1	2,020	5,755	1	2,020	5,755	2	4,040	11,510	1	2,020	5,755	1	2,020	5,755	1	2,020	5,755	1	2,020	5,755
Total	12	9,060	44,794	4	3,940	16,402	40	28,360	146,372	13	9,700	48,343	8	6,500	30,598	6	5,220	23,500	6	5,220	23,500
Grand Total	44	182,436		34	132,628		56	244,706		38	150,089		33	124,710		13	60,222		34	128,190	

	MP	Follow-up	MP	Follow-up	MP	Follow-up	MP	Follow-up	MP	Follow-up	MP	Follow-up	MP	Follow-up	MP	Follow-up	MP	Follow-up
kW	42	44	27	34	113	56	44	38	34	33	11	13	32	34				
kWh	208,000	182,436	136,000	132,628	567,000	244,706	222,000	150,089	172,000	124,710	54,000	60,222	159,000	128,190				

Ranking

Amount of Demand	2	4	1	3	6	7	5
Distance from Tapping Point	4	1	6	4	7	2	2
Public Electricity Demand Ratio	3	2	6	4	7	1	5

Points

Amount of Demand	60	40	70	50	20	10	30
Distance from Tapping Point	8	14	4	8	2	12	12
Public Electricity Demand Ratio	5	6	2	4	1	7	3
Total	73	60	76	62	23	29	45
Priority	2	4	1	3	7	6	5

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Table of App.3- 12 Result of Prioritization of Mchinji District(2/2)

DISTRICTS TC DATA COLLECTION

NAME OF DISTRICT: MCHINJI

TC Number	131			132			133			134			135			136			137		
	Mikundi			Nkhwazi			Gumba			Kazyozyo			Gumulira			Kabzyala			Kalulu		
	Number	kW at 2020	kWh at 2020	Number	kW at 2020	kWh at 2020	Number	kW at 2020	kWh at 2020	Number	kW at 2020	kWh at 2020	Number	kW at 2020	kWh at 2020	Number	kW at 2020	kWh at 2020	Number	kW at 2020	kWh at 2020
1. Name of Trading Center	Mouwa			Mwvere			Mkanda			Mkanda			Mlonyeni			Mavvere			Kapondo		
2. Traditional Authority	Mouwa			Mwvere			Mkanda			Mkanda			Mlonyeni			Mavvere			Kapondo		
3. Distance from the Existing Distribution Line (km)	10			3			11			10			13			6			6		
4. Market Fee																					
a) Monthly Market Fee per Person (MK/month)																					
b) Total Collected Annual Market Fee in TC (MK/year)	165,000			50,000			50,000			45,000			40,000			12,000			1,080		
5. a) Population in TC	105			25			67			129			67			46			50		
b) Population in CA [inc. the TC]										905											
6. Number of Existing Public Facilities																					
a) Secondary School	1	1,250	2,551	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0	1	1,250	2,551	0	0,000	0
b) Primary School	1	1,410	2,592	1	1,410	2,592	1	1,410	2,592	1	1,410	2,592	1	1,410	2,592	1	1,410	2,592	1	1,410	2,592
c) Teacher's Development Center	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0
d) Staff House	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0
e) Hospital	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0
f) Health Center	1	0,790	5,584	1	0,790	5,584	0	0,000	0	1	0,790	5,584	0	0,000	0	0	0,000	0	0	0,790	5,584
g) Clinic	2	0,860	6,101	2	0,860	6,101	2	0,860	6,101	2	0,860	6,101	1	0,430	3,050	1	0,430	3,050	1	0,000	0
h) Post Office	1	0,130	671	1	0,130	671	1	0,130	671	1	0,130	671	0	0,000	0	0	0,000	0	0	0,000	0
i) Police Station	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0
j) Police Post	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0
k) Police Unit	0	0,000	0	0	0,000	0	0	0,000	0	1	0,110	870	0	0,000	0	0	0,000	0	0	0,000	0
l) Admarc	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0
m) Government Office	7	0,980	4,823	4	0,560	2,756	4	0,560	2,756	5	0,700	3,445	0	0,000	0	2	0,280	1,378	4	0,560	2,756
n) Church	5	0,700	2,584	5	0,700	2,584	4	0,560	2,068	4	0,560	2,068	2	0,280	1,034	2	0,280	1,034	3	0,420	1,551
o) Mosque	1	0,140	443	1	0,140	443	1	0,140	443	1	0,140	443	0	0,000	0	0	0,000	0	1	0,140	443
p) Court	1	0,530	1,277	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0
q) Other Public Facility	2	0,200	1,196	1	0,100	598	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0	1	0,100	598
Total	22	6,990	27,821	16	4,690	21,329	13	3,660	14,630	16	4,700	21,773	4	2,120	6,676	7	3,650	10,605	11	3,420	13,524
7. Targeted Business Entities in 2020																					
r) Maize Mills	1	20,050	57,587	1	20,050	57,587	1	20,050	57,587	1	20,050	57,587	1	20,050	57,587	0	0,000	0	1	20,050	57,587
s) Business Entity	14	7,840	52,234	10	5,600	37,310	7	3,920	26,117	6	3,360	22,386	8	4,480	29,848	7	3,920	26,117	9	5,040	33,579
Total	15	27,890	109,821	11	25,650	94,897	8	23,970	83,704	7	23,410	79,973	9	24,530	87,435	7	3,920	26,117	10	25,090	91,166
8. Targeted Household in 2020																					
r) Ordinary Household	11	7,040	39,039	3	1,920	10,647	38	24,320	134,862	12	7,680	42,588	7	4,480	24,843	5	3,200	17,745	5	3,200	17,745
u) Rich Household	1	2,020	5,755	1	2,020	5,755	2	4,040	11,510	1	2,020	5,755	1	2,020	5,755	1	2,020	5,755	1	2,020	5,755
Total	12	9,060	44,794	4	3,940	16,402	40	28,360	146,372	13	9,700	48,343	8	6,500	30,598	6	5,220	23,500	6	5,220	23,500
Grand Total	44	182,436		34	132,628		56	244,706		38	150,089		33	124,710		13	60,222		34	128,190	

	MP	Follow-up	MP	Follow-up	MP	Follow-up	MP	Follow-up	MP	Follow-up	MP	Follow-up	MP	Follow-up	MP	Follow-up	MP	Follow-up
kW	42	44	27	34	113	56	44	38	34	33	11	13	32	34				
kWh	208,000	182,436	136,000	132,628	567,000	244,706	222,000	150,089	172,000	124,710	54,000	60,222	159,000	128,190				

Ranking

Amount of Demand	2	4	1	3	6	7	5
Distance from Tapping Point	4	1	6	4	7	2	2
Public Electricity Demand Ratio	3	2	6	4	7	1	5

Points

Amount of Demand	60	40	70	50	20	10	30
Distance from Tapping Point	8	14	4	8	2	12	12
Public Electricity Demand Ratio	5	6	2	4	1	7	3
Total	73	60	76	62	23	29	45
Priority	2	4	1	3	7	6	5

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Table of App.3- 13 Result of Prioritization of Dedza District

DISTRICTS TC DATA COLLECTION

NAME OF DISTRICT: DEDZA

TC Number	140			141			142			143		
	Chimoto			Chiluzi			Mphati			Magomelo		
1. Name of Trading Center	Number	kW at 2020	kWh at 2020	Number	kW at 2020	kWh at 2020	Number	kW at 2020	kWh at 2020	Number	kW at 2020	kWh at 2020
2. Traditional Authority	Kachere			Kasumbu			Kachere			Chilikumwendo		
3. Distance from the Existing Distribution Line (km)	2			3			10			6		
4. Market Fee												
a) Monthly Market Fee per Person (MK/month)												
b) Total Collected Annual Market Fee in TC (MK/year)	143,000			130,000			100,000			78,000		
5. a) Population in TC				1,418								
b) Population in CA (inc. the TC)												
6. Number of Existing Public Facilities												
a) Secondary School	1	1,250	2,551	0	0,000	0	0	0,000	0	1	1,250	2,551
b) Primary School	1	1,410	2,592	1	1,410	2,592	1	1,410	2,592	1	1,410	2,592
c) Teacher's Development Center	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0
d) Staff House	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0
e) Hospital	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0
f) Health Center	1	0,790	5,584	0	0,000	0	1	0,790	5,584	1	0,790	5,584
g) Clinic	2	0,860	6,101	1	0,430	3,050	1	0,430	3,050	2	0,860	6,101
h) Post Office	1	0,130	671	0	0,000	0	0	0,000	0	1	0,130	671
i) Police Station	1	0,760	4,834	0	0,000	0	0	0,000	0	0	0,000	0
j) Police Post	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0
k) Police Unit	0	0,000	0	0	0,000	0	0	0,000	0	1	0,110	870
l) Admarc	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0
m) Government Office	4	0,560	2,756	0	0,000	0	0	0,000	0	5	0,700	3,445
n) Church	4	0,560	2,068	4	0,560	2,068	4	0,560	2,068	5	0,700	2,584
o) Mosque	0	0,000	0	5	0,700	2,215	1	0,140	443	0	0,000	0
p) Court	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0
q) Other Public Facility	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0
Total	15	6,320	27,155	11	3,100	9,925	8	3,330	13,737	17	5,950	24,397
7. Targeted Business Entities in 2020												
r) Maize Mills	1	20,050	57,587	5	100,250	287,937	1	20,050	57,587	10	200,500	575,874
s) Business Entity	14	7,840	52,234	9	5,040	33,579	9	5,040	33,579	21	11,760	78,351
Total	15	27,890	109,821	14	105,290	321,516	10	25,090	91,166	31	212,260	654,225
8. Targeted Household in 2020												
v) Ordinary Household	38	24,320	134,862	38	24,320	134,862	38	24,320	134,862	76	48,640	269,724
u) Rich Household	2	4,040	11,510	2	4,040	11,510	2	4,040	11,510	4	8,080	23,019
Total	40	28,360	146,372	40	28,360	146,372	40	28,360	146,372	80	56,720	292,743
Grand Total	63 283,349			137 477,813			57 251,275			275 971,366		

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	MP	Follow-up	MP	Follow-up	MP	Follow-up	MP	Follow-up
kW	113	63	192	137	113	57	344	275
kWh	567,000	283,349	961,000	477,813	567,000	251,275	1,722,000	971,366

Ranking

Amount of Demand	3	2	4	1
Distance from Tapping Point	1	2	4	3
Public Electricity Demand Ratio	1	4	2	3

Points

Amount of Demand	20	30	10	40
Distance from Tapping Point	8	6	2	4
Public Electricity Demand Ratio	4	1	3	2
Total	32	37	15	46
Priority	3	2	4	1

Table of App.3- 14 Result of Prioritization of Ncheu District

DISTRICTS TC DATA COLLECTION

NAME OF DISTRICT: NTCHEU

TC Number	146			147			148			149			150			151			152		
	Kadzakalowa			Kandeu			Sharpvalle			Billia			Pengapenga			Kaloga			Masasa		
	Number	kW at 2020	kWh at 2020	Number	kW at 2020	kWh at 2020	Number	kW at 2020	kWh at 2020	Number	kW at 2020	kWh at 2020	Number	kW at 2020	kWh at 2020	Number	kW at 2020	kWh at 2020	Number	kW at 2020	kWh at 2020
1. Name of Trading Center	Njolomole			Ganya						Makwangwala			Makwangwala			Mpsando			Masasa		
2. Traditional Authority																					
3. Distance from the Existing Distribution Line (km)	2			9			10			16			6			9			14		
4. Market Fee																					
a) Monthly Market Fee per Person (MK/month)																					
b) Total Collected Annual Market Fee in TC (MK/year)	250,000			148,700			115,600			110,000			110,000			58,900					
5. a) Population in TC	982			122			230						202						4		
b) Population in CA [inc. the TC]																					
6. Number of Existing Public Facilities																					
a) Secondary School	0	0.000	0	1	1,250	2,551				1	1,250	2,551	0	0.000	0	1	1,250	2,551			
b) Primary School	1	1,410	2,592	1	1,410	2,592				1	1,410	2,592	1	1,410	2,592	1	1,410	2,592			
c) Teacher's Development Center	0	0.000	0	0	0.000	0				0	0.000	0	0	0.000	0	0	0.000	0			
d) Staff House	0	0.000	0	0	0.000	0				0	0.000	0	0	0.000	0	0	0.000	0			
e) Hospital	0	0.000	0	0	0.000	0				0	0.000	0	0	0.000	0	1	2,450	11,517			
f) Health Center	1	0.790	5,584	1	0.790	5,584				1	0.790	5,584	0	0.000	0	2	1,580	11,168			
g) Clinic	2	0.860	6,101	2	0.860	6,101				2	0.860	6,101	1	0.430	3,050	2	0.860	6,101			
h) Post Office	1	0.130	671	1	0.130	671				1	0.130	671	0	0.000	0	1	0.130	671			
i) Police Station	0	0.000	0	1	0.760	4,834				0	0.000	0	0	0.000	0	0	0.000	0			
j) Police Post	0	0.000	0	0	0.000	0				0	0.000	0	0	0.000	0	0	0.000	0			
k) Police Unit	0	0.000	0	0	0.000	0				1	0.110	870	0	0.000	0	1	0.110	870			
l) Admarc	0	0.000	0	0	0.000	0				0	0.000	0	0	0.000	0	0	0.000	0			
m) Government Office	3	0.420	2,067	5	0.700	3,445				5	0.700	3,445	0	0.000	0	5	0.700	3,445			
n) Church	6	0.840	3,101	5	0.700	2,584				4	0.560	2,068	4	0.560	2,068	5	0.700	2,584			
o) Mosque	1	0.140	443	0	0.000	0				1	0.140	443	1	0.140	443	0	0.000	0			
p) Court	0	0.000	0	1	0.530	1,277				1	0.530	1,277	0	0.000	0	1	0.530	1,277			
q) Other Public Facility	3	0.300	1,794	2	0.200	1,196				4	0.400	2,392	0	0.000	0	0	0.000	0			
Total	18	4,890	22,353	20	7,330	30,834	0	0	0	22	6,880	27,992	7	2,540	8,153	20	9,720	42,775	0	0	0
7. Targeted Business Entities in 2020																					
f) Maize Mills	4	80,200	230,350	5	100,250	287,937				3	60,150	172,762	4	80,200	230,350	7	140,350	403,112			
s) Business Entity	14	7,840	52,234	19	10,640	70,889				11	6,160	41,041	11	6,160	41,041	13	7,280	48,503			
Total	18	88,040	282,584	24	110,890	358,826	0	0	0	14	66,310	213,803	15	86,360	271,391	20	147,630	451,615	0	0	0
8. Targeted Household in 2020																					
r) Ordinary Household	106	67,840	376,194	11	7,040	39,039				76	48,640	269,724	21	13,440	74,529	76	48,640	269,724			
u) Rich Household	6	12,120	34,529	1	2,020	5,755				4	8,080	23,019	2	4,040	11,510	4	8,080	23,019			
Total	112	79,960	410,723	12	9,060	44,794	0	0	0	80	56,720	292,743	23	17,480	86,039	80	56,720	292,743	1	0	0
Grand Total		173	715,659	127	434,454		0	0		130	534,539		106	365,582		214	787,133		0	0	

	MP	Follow-up	MP	Follow-up	MP	Follow-up	MP	Follow-up	MP	Follow-up	MP	Follow-up	MP	Follow-up	MP	Follow-up	MP	Follow-up
kW	300	173	111	127	518	204	130	121	106	284	214	4						
kWh	1,504,000	715,659	556,000	434,454	2,593,000	1,589,006	1,021,000	534,539	608,000	365,582	1,422,000	787,133	18,000	11,031				

Ranking

Amount of Demand	3	5	1	4	6	2	7
Distance from Tapping Point	1	3	5	7	2	3	6
Public Electricity Demand Ratio	5	1	4	3	6	2	7

Points

Amount of Demand	50	30	70	40	20	60	10
Distance from Tapping Point	14	10	6	2	12	10	4
Public Electricity Demand Ratio	3	7	4	5	2	6	1
Total	67	47	80	47	34	76	15
Priority	3	4	1	4	6	2	7

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Table of App.3- 15 Result of Prioritization of Mangochi District (1/2)

DISTRICTS TC DATA COLLECTION

NAME OF DISTRICT: MANGOCHI

TC Number	155			156			157			158			159			160			161		
	Chiponde			Majuni			Mvumba			Katuli			Mkumba			Katema			Lungwena		
1. Name of Trading Center	Number	kW at 2020	kWh at 2020	Number	kW at 2020	kWh at 2020	Number	kW at 2020	kWh at 2020	Number	kW at 2020	kWh at 2020	Number	kW at 2020	kWh at 2020	Number	kW at 2020	kWh at 2020	Number	kW at 2020	kWh at 2020
2. Traditional Authority	Jalasi			Jalasi			Nankumba			Katuli			Nyambi			Mponda			Makanjira		
3. Distance from the Existing Distribution Line (km)	2			2			2			18			6			15			9		
4. Market Fee																					
a) Monthly Market Fee per Person (MK/month)																					
b) Total Collected Annual Market Fee in TC (MK/year)	130,000			100,000			94,158			80,000			38,788			38,630			20,000		
5. a) Population in TC							212			10						514					
b) Population in CA [inc. the TC]										10			977								
6. Number of Existing Public Facilities																					
a) Secondary School	1	1,250	2,551	1	1,250	2,551	1	1,250	2,551	1	1,250	2,551	0	0,000	0	1	1,250	2,551	0	0,000	0
b) Primary School	1	1,410	2,592	1	1,410	2,592	2	2,820	5,184	2	2,820	5,184	1	1,410	2,592	1	1,410	2,592	2	2,820	5,184
c) Teacher's Development Center	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0
d) Staff House	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0
e) Hospital	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0
f) Health Center	0	0,000	0	1	0,790	5,584	1	0,790	5,584	1	0,790	5,584	1	0,790	5,584	1	0,790	5,584	1	0,790	5,584
g) Clinic	0	0,000	0	2	0,860	6,101	2	0,860	6,101	2	0,860	6,101	1	0,430	3,050	2	0,860	6,101	2	0,860	6,101
h) Post Office	1	0,130	671	0	0,000	0	1	0,130	671	1	0,130	671	1	0,130	671	1	0,130	671	0	0,000	0
i) Police Station	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0
j) Police Post	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0
k) Police Unit	1	0,110	870	0	0,000	0	1	0,110	870	1	0,110	870	1	0,110	870	0	0,000	0	0	0,000	0
l) Admarc	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0
m) Government Office	4	0,560	2,756	2	0,280	1,378	4	0,560	2,756	0	0,000	0	5	0,700	3,445	2	0,280	1,378	4	0,560	2,756
n) Church	2	0,280	1,034	2	0,280	1,034	5	0,700	2,584	3	0,420	1,551	2	0,280	1,034	2	0,280	1,034	2	0,280	1,034
o) Mosque	4	0,560	1,772	4	0,560	1,772	0	0,000	0	2	0,280	886	2	0,280	886	2	0,280	886	2	0,280	886
p) Court	0	0,000	0	1	0,530	1,277	1	0,530	1,277	0	0,000	0	1	0,530	1,277	0	0,000	0	0	0,000	0
q) Other Public Facility	0	0,000	0	0	0,000	0	0	0,000	0	1	0,100	598	0	0,000	0	0	0,000	0	0	0,000	0
Total	14	4,300	12,245	14	5,960	22,288	18	7,750	27,577	14	6,760	23,995	15	4,660	19,408	12	5,280	20,796	13	5,590	21,545
7. Targeted Business Entities in 2020																					
f) Maize Mills	5	100,250	287,937	1	20,050	57,587	2	40,100	115,175	3	60,150	172,762	4	80,200	230,350	3	60,150	172,762	3	60,150	172,762
s) Business Entity	15	8,400	55,965	4	2,240	14,924	8	4,480	29,848	15	8,400	55,965	9	5,040	33,579	9	5,040	33,579	7	3,920	26,117
Total	20	108,650	343,902	5	22,290	72,511	10	44,580	145,023	18	68,550	228,727	13	85,240	263,929	12	65,190	206,341	10	64,070	198,879
8. Targeted Household in 2020																					
r) Ordinary Household	76	48,640	269,724	38	24,320	134,862	11	7,040	39,039	2	1,280	7,098	110	70,400	390,390	59	37,760	209,391	76	48,640	269,724
u) Rich Household	4	8,080	23,019	2	4,040	11,510	1	2,020	5,755	1	2,020	5,755	6	12,120	34,529	4	8,080	23,019	4	8,080	23,019
Total	80	56,720	292,743	40	28,360	146,372	12	9,060	44,794	3	3,300	12,853	116	82,520	424,919	63	45,840	232,410	80	56,720	292,743
Grand Total		170	648,891		57	241,171		61	217,394		79	285,575		172	708,256		116	459,547		126	513,167

	MP	Follow-up	MP	Follow-up	MP	Follow-up	MP	Follow-up	MP	Follow-up	MP	Follow-up	MP	Follow-up	MP	Follow-up	MP	Follow-up
kW	244	170	113	57	63	61	65	79	287	172	176	116	204	126				
kWh	1,221,000	648,891	567,000	241,171	313,000	217,394	327,000	285,575	1,436,000	708,256	882,000	459,547	1,021,000	513,167				

Ranking

Amount of Demand	2	7	8	6	1	5	4
Distance from Tapping Point	1	1	1	8	4	7	5
Public Electricity Demand Ratio	8	2	1	3	7	5	6

Points

Amount of Demand	70	20	10	30	80	40	50
Distance from Tapping Point	16	16	16	2	10	4	8
Public Electricity Demand Ratio	1	7	8	6	2	4	3
Total	87	43	34	38	92	48	61
Priority	2	6	8	7	1	5	4

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Table of App.3- 15 Result of Prioritization of Mangochi District(2/2)

NAME OF DISTRICT: MANGOCHI			
TC Number	255		
1. Name of Trading Center	Malombe		
	Number	kW at 2020	kWh at 2020
2. Traditional Authority	Chowe		
3. Distance from the Existing Distribution Line (km)	11		
4. Market Fee			
a) Monthly Market Fee per Person (MK/month)			
b) Total Collected Annual Market Fee in TC (MK/year)	15,790		
5. a) Population in TC			
b) Population in CA (inc. the TC)			
6. Number of Existing Public Facilities			
a) Secondary School	1	1,250	2,551
b) Primary School	2	2,820	5,184
c) Teacher's Development Center	0	0,000	0
d) Staff House	0	0,000	0
e) Hospital	0	0,000	0
f) Health Center	1	0,790	5,584
g) Clinic	2	0,860	6,101
h) Post Office	1	0,130	671
i) Police Station	0	0,000	0
j) Police Post	0	0,000	0
k) Police Unit	0	0,110	870
l) Admarc	0	0,000	0
m) Government Office	4	0,560	2,756
n) Church	1	0,140	517
o) Mosque	4	0,560	1,772
p) Court	0	0,000	0
q) Other Public Facility	0	0,000	0
Total	16	7,220	26,005
7. Targeted Business Entities in 2020			
r) Maize Mills	3	60,150	172,762
s) Business Entity	7	3,920	26,117
Total	10	64,070	198,879
8. Targeted Household in 2020			
t) Ordinary Household	76	48,640	269,724
u) Rich Household	4	8,080	23,019
Total	80	56,720	292,743
Grand Total	128	128	517,628

	MP	Follow-up
kW	94	128
kWh	472,000	517,628

Ranking

Amount of Demand	3
Distance from Tapping Point	6
Public Electricity Demand Ratio	4

Points

Amount of Demand	60
Distance from Tapping Point	6
Public Electricity Demand Ratio	5
Total	71
Priority	3

Table of App.3- 16 Result of Prioritization of Machinga District (1/2)

DISTRICTS TC DATA COLLECTION

NAME OF DISTRICT: MACHINGA

TC Number	164			165			166			167			168			169			170		
	Ngokwe			Mposa			Nayuchi			Msosa			Ngwepele			Mangamba			Likhonyowa		
1. Name of Trading Center	Number	kW at 2020	kWh at 2020	Number	kW at 2020	kWh at 2020	Number	kW at 2020	kWh at 2020	Number	kW at 2020	kWh at 2020	Number	kW at 2020	kWh at 2020	Number	kW at 2020	kWh at 2020	Number	kW at 2020	kWh at 2020
2. Traditional Authority	Ngokwe			Mposa			Kawinga			Sitola			Ngwepele			Liwonde			Nikoola		
3. Distance from the Existing Distribution Line (km)	15			15			23			8			16			11			2		
4. Market Fee																					
a) Monthly Market Fee per Person (MK/month)																					
b) Total Collected Annual Market Fee in TC (MK/year)	158,705			142,938			136,297			116,617			114,578			92,108			81,077		
5. a) Population in TC	74																				
b) Population in CA [inc. the TC]				212			466			944			848			257					
6. Number of Existing Public Facilities																					
a) Secondary School	1	1,250	2,551	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0
b) Primary School	5	7,050	12,961	0	0,000	0	1	1,410	2,592	1	1,410	2,592	1	1,410	2,592	3	4,230	7,777	1	1,410	2,592
c) Teacher's Development Center	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0
d) Staff House	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0
e) Hospital	0	0,000	0	0	0,000	0	1	2,450	11,517	1	2,450	11,517	0	0,000	0	0	0,000	0	0	0,000	0
f) Health Center	1	0,790	5,584	1	0,790	5,584	0	0,000	0	0	0,000	0	1	0,790	5,584	3	2,370	16,751	0	0,000	0
g) Clinic	2	0,860	6,101	0	0,000	0	2	0,860	6,101	0	0,000	0	0	0,000	0	0	0,000	0	1	0,430	3,050
h) Post Office	1	0,130	671	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0	1	0,130	671	0	0,000	0
i) Police Station	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0	1	0,760	4,834	0	0,000	0
j) Police Post	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0
k) Police Unit	0	0,110	870	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0	1	0,110	870	0	0,000	0
l) Admarc	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0
m) Government Office	5	0,700	3,445	0	0,000	0	4	0,560	2,756	0	0,000	0	1	0,140	689	3	0,420	2,067	3	0,420	2,067
n) Church	5	0,700	2,584	5	0,700	2,584	6	0,840	3,101	1	0,140	517	2	0,280	1,034	5	0,700	2,584	5	0,700	2,584
o) Mosque	5	0,700	2,215	3	0,420	1,329	1	0,140	443	1	0,140	443	4	0,560	1,772	2	0,280	886	3	0,420	1,329
p) Court	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0	1	0,530	1,277
q) Other Public Facility	1	0,100	598	2	0,200	1,196	4	0,400	2,392	1	0,100	598	0	0,000	0	3	0,300	1,794	1	0,100	598
Total	26	12,390	37,579	11	2,110	10,693	19	6,660	28,902	5	4,240	15,667	9	3,180	11,671	22	9,300	38,234	15	4,010	13,498
7. Targeted Business Entities in 2020																					
r) Maize Mills	1	20,050	57,587	1	20,050	57,587	2	40,100	115,175	0	0,000	0	3	60,150	172,762	2	40,100	115,175	1	20,050	57,587
s) Business Entity	73	40,880	272,363	11	6,160	41,041	23	12,880	85,813	8	4,480	29,848	24	13,440	89,544	20	11,200	74,620	28	10,080	67,158
Total	74	60,930	329,950	12	26,210	98,628	25	52,980	200,988	8	4,480	29,848	27	73,590	262,306	22	51,300	189,795	29	30,130	124,745
8. Targeted Household in 2020																					
r) Ordinary Household	11	7,040	39,039	6	3,840	21,294	16	10,240	56,784	28	17,920	99,372	28	17,920	99,372	10	6,400	35,490	0	24,320	134,862
u) Rich Household	1	2,020	5,755	1	2,020	5,755	1	2,020	5,755	2	4,040	11,510	2	4,040	11,510	1	2,020	5,755	0	4,040	11,510
Total	12	9,060	44,794	7	5,860	27,049	17	12,260	62,539	30	21,960	110,882	30	21,960	110,882	11	8,420	41,245	0	28,360	146,372
Grand Total	82	412,324		34	136,371		72	292,429		31	156,397		99	384,859		69	269,274		63	284,615	

	MP	Follow-up	MP	Follow-up	MP	Follow-up	MP	Follow-up	MP	Follow-up	MP	Follow-up	MP	Follow-up	MP	Follow-up	MP	Follow-up
kW	42	82	33	34	72	72	74	31	133	99	60	69	113	63				
kWh	208,000	412,324	163,000	136,371	358,000	292,429	371,000	156,397	667,000	384,859	299,000	269,274	567,000	284,615				

Ranking

Amount of Demand	2	9	4	8	3	6	5
Distance from Tapping Point	7	7	10	4	9	6	1
Public Electricity Demand Ratio	5	6	4	3	10	2	7

Points

Amount of Demand	90	20	70	30	80	50	60
Distance from Tapping Point	8	8	2	14	4	10	20
Public Electricity Demand Ratio	6	5	7	8	1	9	4
Total	104	33	79	52	85	69	84
Priority	2	10	5	8	3	6	4

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Table of App.3- 16 Result of Prioritization of Machinga District(2/2)

NAME OF DISTRICT: MACHINGA

TC Number	171			172			173		
	Malundani			Nanyumbu			Molipa		
1. Name of Trading Center	Number	kW at 2020	kWh at 2020	Number	kW at 2020	kWh at 2020	Number	kW at 2020	kWh at 2020
2. Traditional Authority	Nyambi			Kawinga			Nsanama		
3. Distance from the Existing Distribution Line (km)	9			2			2		
4. Market Fee									
a) Monthly Market Fee per Person (MK/month)									
b) Total Collected Annual Market Fee in TC (MK/year)	24,066								
5. a) Population in TC									
b) Population in CA (inc. the TC)									
6. Number of Existing Public Facilities									
a) Secondary School	1	1,250	2,551	0	0,000	0	0	0,000	0
b) Primary School	4	5,640	10,369	1	1,410	2,592	1	1,410	2,592
c) Teacher's Development Center	0	0,000	0	0	0,000	0	0	0,000	0
d) Staff House	0	0,000	0	0	0,000	0	0	0,000	0
e) Hospital	0	0,000	0	1	2,450	11,517	0	0,000	0
f) Health Center	0	0,000	0	0	0,000	0	0	0,000	0
g) Clinic	2	0,860	6,101	2	0,860	6,101	1	0,430	3,050
h) Post Office	0	0,000	0	0	0,000	0	0	0,000	0
i) Police Station	0	0,000	0	0	0,000	0	0	0,000	0
j) Police Post	0	0,000	0	0	0,000	0	0	0,000	0
k) Police Unit	0	0,000	0	0	0,000	0	0	0,000	0
l) Admarc	0	0,000	0	0	0,000	0	0	0,000	0
m) Government Office	0	0,000	0	3	0,420	2,067	0	0,000	0
n) Church	3	0,420	1,551	0	0,000	0	5	0,700	2,584
o) Mosque	10	1,400	4,430	5	0,700	2,215	4	0,560	1,772
p) Court	1	0,530	1,277	1	0,530	1,277	0	0,000	0
q) Other Public Facility	0	0,000	0	1	0,100	598	0	0,000	0
Total	21	10,100	26,278	14	6,470	26,367	11	3,100	9,999
7. Targeted Business Entities in 2020									
r) Maize Mills	3	60,150	172,762	0	0,000	0	1	20,050	57,587
s) Business Entity	39	21,840	145,509	4	2,240	14,924	9	5,040	33,579
Total	42	81,990	318,271	4	2,240	14,924	10	25,090	91,166
8. Targeted Household in 2020									
t) Ordinary Household	76	48,640	269,724	19	12,160	67,431	38	24,320	134,862
u) Rich Household	4	8,080	23,019	1	2,020	5,755	2	4,040	11,510
Total	80	56,720	292,743	20	14,180	73,186	40	28,360	146,372
Grand Total	149	637,292	1,021,000	23	114,476	190,000	57	567,000	247,537

	MP	Follow-up	MP	Follow-up	MP	Follow-up
kW	204	149	38	23	113	57
kWh	1,021,000	637,292	190,000	114,476	567,000	247,537

Ranking

Amount of Demand	1	10	7
Distance from Tapping Point	5	1	1
Public Electricity Demand Ratio	8	1	9

Points

Amount of Demand	100	10	40
Distance from Tapping Point	12	20	20
Public Electricity Demand Ratio	3	10	2
Total	115	40	62
Priority	1	9	7

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Table of App.3- 17 Result of Prioritization of Balaka District

DISTRICTS TC DATA COLLECTION

NAME OF DISTRICT: BALAKA			
TC Number	176		
1. Name of Trading Center	Phimbi		
	Number	kW at 2020	kWh at 2020
2. Traditional Authority	Samala		
3. Distance from the Existing Distribution Line (km)	21		
4. Market Fee			
a) Monthly Market Fee per Person (MK/month)	350		
b) Total Collected Annual Market Fee in TC (MK/year)	18,000		
5. a) Population in TC			
b) Population in CA (inc. the TC)			
6. Number of Existing Public Facilities			
a) Secondary School	0	0.000	0
b) Primary School	1	1,410	2,582
c) Teacher's Development Center	0	0.000	0
d) Staff House	0	0.000	0
e) Hospital	0	0.000	0
f) Health Center	1	0.790	5,584
g) Clinic	2	0.860	6,101
h) Post Office	1	0.130	671
i) Police Station	0	0.000	0
j) Police Post	0	0.000	0
k) Police Unit	0	0.000	0
l) Admarc	0	0.000	0
m) Government Office	2	0.280	1,378
n) Church	0	0.000	0
o) Mosque	0	0.000	0
p) Court	0	0.000	0
q) Other Public Facility	0	0.000	0
Total	7	3,470	16,325
7. Targeted Business Entities in 2020			
r) Maize Mills	0	0.000	0
s) Business Entity	3	1,680	11,193
Total	3	1,680	11,193
8. Targeted Household in 2020			
t) Ordinary Household	19	12,160	67,431
u) Rich Household	1	2,020	5,755
Total	20	14,180	73,186
Grand Total	19	100,704	

	MP	Follow-up
kW	38	19
kWh	190,000	100,704

Ranking

Amount of Demand	1
Distance from Tapping Point	1
Public Electricity Demand Ratio	1

Points

Amount of Demand	10
Distance from Tapping Point	2
Public Electricity Demand Ratio	1
Total	13
Priority	1

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Table of App.3- 18 Result of Prioritization of Zomba District (1/2)

DISTRICTS TC DATA COLLECTION

NAME OF DISTRICT: ZOMBA

TC Number	179			180			181			182			183			184			185		
	Zaone			Muwa			Mpyupy			Masaula			Nachuma			Khonjeni			Kachulu		
	Number	kW at 2020	kWh at 2020	Number	kW at 2020	kWh at 2020	Number	kW at 2020	kWh at 2020	Number	kW at 2020	kWh at 2020	Number	kW at 2020	kWh at 2020	Number	kW at 2020	kWh at 2020	Number	kW at 2020	kWh at 2020
1. Name of Trading Center	Chikowi			Mwambo			Mwambo			Mlumbwe			Chikowi			Chikowi			Nkumbira		
2. Traditional Authority	Chikowi			Mwambo			Mwambo			Mlumbwe			Chikowi			Chikowi			Nkumbira		
3. Distance from the Existing Distribution Line (km)	2			6			2			9			5			6			2		
4. Market Fee																			350		
a) Monthly Market Fee per Person (MK/month)																					
b) Total Collected Annual Market Fee in TC (MK/year)	192,000			192,000			144,000			115,200			96,000			96,000			94,000		
5. a) Population in TC				426																	
b) Population in CA [inc. the TC]																					
6. Number of Existing Public Facilities																					
a) Secondary School	1	1,250	2,551	0	0,000	0	1	1,250	2,551	1	1,250	2,551	1	1,250	2,551	1	1,250	2,551	1	1,250	2,551
b) Primary School	1	1,410	2,592	1	1,410	2,592	1	1,410	2,592	1	1,410	2,592	1	1,410	2,592	1	1,410	2,592	1	1,410	2,592
c) Teacher's Development Center	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0
d) Staff House	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0
e) Hospital	0	0,000	0	0	0,000	0	0	0,000	0	1	2,450	11,517	0	0,000	0	0	0,000	0	0	0,000	0
f) Health Center	1	0,790	5,584	0	0,000	0	1	0,790	5,584	0	0,000	0	0	0,000	0	0	0,790	5,584	1	0,790	5,584
g) Clinic	1	0,430	3,050	0	0,000	0	2	0,860	6,101	2	0,860	6,101	0	0,000	0	0	0,430	3,050	2	0,860	6,101
h) Post Office	0	0,000	0	0	0,000	0	0	0,000	0	1	0,130	671	0	0,000	0	0	0,000	0	0	0,000	0
i) Police Station	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0
j) Police Post	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0
k) Police Unit	0	0,000	0	0	0,000	0	0	0,000	0	1	0,110	870	0	0,000	0	0	0,000	0	1	0,110	870
l) Admarc	0	0,000	0	0	0,000	0	0	0,000	0	1	0,100	585	0	0,000	0	0	0,000	0	1	0,100	585
m) Government Office	3	0,420	2,067	0	0,000	0	0	0,000	0	4	0,560	2,756	0	0,420	2,067	0	0,000	0	6	0,840	4,134
n) Church	5	0,700	2,584	6	0,840	3,101	5	0,700	2,584	6	0,840	3,101	3	0,140	517	3	0,420	1,551	3	0,420	1,551
o) Mosque	1	0,140	443	1	0,140	443	1	0,140	443	1	0,140	443	1	0,000	0	1	0,140	443	1	0,140	443
p) Court	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0	1	0,530	1,277
q) Other Public Facility	1	0,100	598	0	0,000	0	0	0,000	0	3	0,300	1,794	0	0,000	0	0	0,000	0	1	0,100	598
Total	14	5,240	19,469	8	2,390	6,137	11	5,150	19,855	22	8,150	32,980	6	3,220	7,727	6	4,440	15,771	19	6,550	26,284
7. Targeted Business Entities in 2020																					
r) Maize Mills	5	100,250	287,937	2	40,100	115,175	4	80,200	230,350	4	80,200	230,350	1	20,050	57,587	0	0,000	0	3	60,150	172,762
s) Business Entity	23	12,880	85,813	6	3,360	22,386	18	10,080	67,158	15	8,400	55,965	7	3,920	26,117	6	3,360	22,386	17	9,520	63,427
Total	28	113,130	373,750	8	43,460	137,561	22	90,280	297,508	19	88,600	286,315	8	23,970	83,704	6	3,360	22,386	20	69,670	236,189
8. Targeted Household in 2020																					
t) Ordinary Household	76	48,640	269,724	14	8,960	49,686	76	48,640	269,724	76	48,640	269,724	38	24,320	134,862	19	12,160	67,431	76	48,640	269,724
u) Rich Household	4	8,080	23,019	1	2,020	5,755	4	8,080	23,019	4	8,080	23,019	2	4,040	11,510	1	2,020	5,755	4	8,080	23,019
Total	80	56,720	292,743	15	10,980	55,441	80	56,720	292,743	80	56,720	292,743	40	28,360	146,372	20	14,180	73,186	80	56,720	292,743
Grand Total		175	685,963		57	199,138		152	610,106		153	612,038		56	237,803		22	111,342		133	555,217

	MP	Follow-up	MP	Follow-up	MP	Follow-up	MP	Follow-up	MP	Follow-up	MP	Follow-up	MP	Follow-up	MP	Follow-up
kW	244	175	67	57	224	152	224	153	113	56	38	22	190,000	111,342	1,021,000	555,217
kWh	1,221,000	685,963	336,000	199,138	1,121,000	610,106	1,121,000	612,038	567,000	237,803	190,000	111,342	1,021,000	555,217		

Ranking

Amount of Demand	1	10	3	2	8	11	5
Distance from Tapping Point	1	10	1	12	7	10	1
Public Electricity Demand Ratio	11	10	8	3	9	2	5

Points

Amount of Demand	120	30	100	110	50	20	80
Distance from Tapping Point	24	6	24	2	12	6	24
Public Electricity Demand Ratio	2	3	5	10	4	11	8
Total	146	39	129	122	66	37	112
Priority	1	10	2	3	8	11	5

Table of App.3- 18 Result of Prioritization of Zomba District(2/2)

NAME OF DISTRICT: ZOMBA

TC Number	186			187			188			189			190		
	Sakata			Makina			Ngweleri			Chisunzi			Ngondole		
1. Name of Trading Center	Number	kW at 2020	kWh at 2020	Number	kW at 2020	kWh at 2020	Number	kW at 2020	kWh at 2020	Number	kW at 2020	kWh at 2020	Number	kW at 2020	kWh at 2020
2. Traditional Authority	Kuntumaje			Chikowi			Chikowi			Chikowi			Kuntumaje		
3. Distance from the Existing Distribution Line (km)	5			4			3			3			5		
4. Market Fee							350			350			350		
a) Monthly Market Fee per Person (MK/month)															
b) Total Collected Annual Market Fee in TC (MK/year)	57,600			48,000			44,800			38,000			24,000		
5. a) Population in TC															
b) Population in CA [inc. the TC]	76														
6. Number of Existing Public Facilities															
a) Secondary School	1	1,250	2,551	0	0.000	0	1	1,250	2,551	0	0.000	0	1	1,250	2,551
b) Primary School	1	1,410	2,592	1	1,410	2,592	2	2,820	5,184	1	1,410	2,592	1	1,410	2,592
c) Teacher's Development Center	0	0.000	0	0	0.000	0	0	0.000	0	0	0.000	0	0	0.000	0
d) Staff House	0	0.000	0	0	0.000	0	0	0.000	0	0	0.000	0	0	0.000	0
e) Hospital	0	0.000	0	0	0.000	0	0	0.000	0	0	0.000	0	0	0.000	0
f) Health Center	0	0.000	0	0	0.000	0	1	0.790	5,584	0	0.000	0	1	0.790	5,584
g) Clinic	0	0.000	0	0	0.000	0	2	0.860	6,101	1	0.430	3,050	2	0.860	6,101
h) Post Office	1	0.130	671	0	0.000	0	0	0.000	0	1	0.130	671	0	0.000	0
i) Police Station	0	0.000	0	0	0.000	0	0	0.000	0	0	0.000	0	0	0.000	0
j) Police Post	0	0.000	0	0	0.000	0	0	0.000	0	0	0.000	0	0	0.000	0
k) Police Unit	1	0.110	870	0	0.000	0	0	0.000	0	0	0.000	0	0	0.000	0
l) Admarc	0	0.000	0	0	0.000	0	1	0.100	585	0	0.000	0	1	0.100	585
m) Government Office	3	0.420	2,067	0	0.700	3,445	3	0.420	2,067	1	0.140	689	5	0.700	3,445
n) Church	2	0.280	1,034	5	0.140	517	6	0.840	3,101	6	0.840	3,101	4	0.560	2,068
o) Mosque	3	0.420	1,329	1	0.000	0	1	0.140	443	1	0.140	443	5	0.700	2,215
p) Court	0	0.000	0	0	0.000	0	0	0.000	0	0	0.000	0	1	0.530	1,277
q) Other Public Facility	0	0.000	0	0	0.000	0	1	0.100	598	0	0.000	0	1	0.100	598
Total	12	4,020	11,113	7	2,250	6,554	18	7,320	26,214	11	3,090	10,547	22	7,000	27,015
7. Targeted Business Entities in 2020															
r) Maize Mills	0	0.000	0	3	60.150	172,762	4	80.200	230,350	1	20.050	57,587	3	60.150	172,762
s) Business Entity	8	4.480	29,848	10	5.600	37,310	14	7.840	52,234	6	3.360	22,386	6	3.360	22,386
Total	8	4.480	29,848	13	65.750	210,072	18	88.040	282,584	7	23.410	79,973	9	63.510	195,148
8. Targeted Household in 2020				156											
t) Ordinary Household	2	1.280	7,098	76	48.640	269,724	76	48.640	269,724	38	24.320	134,862	76	48.640	269,724
u) Rich Household	1	2.020	5,755	4	8.080	23,019	4	8.080	23,019	2	4.040	11,510	4	8.080	23,019
Total	3	3.300	12,853	80	57	292,743	80	57	292,743	40	28	146,372	80	57	292,743
Grand Total	12	53,814		125	509,370		152	601,541		55	236,892		127	514,906	

	MP	Follow-up	MP	Follow-up	MP	Follow-up	MP	Follow-up	MP	Follow-up	MP	Follow-up
kW	6	12	204	125	224	152	113	55	204	127		
kWh	30,000	53,814	1,021,000	509,370	1,121,000	601,541	567,000	236,892	1,021,000	514,906		

Ranking

Amount of Demand	12	7	4	9	6
Distance from Tapping Point	7	6	4	4	7
Public Electricity Demand Ratio	1	12	7	6	4

Points

Amount of Demand	10	60	90	40	70
Distance from Tapping Point	12	14	18	18	12
Public Electricity Demand Ratio	12	1	6	7	9
Total	34	75	114	65	91
Priority	12	7	4	9	6

Table of App.3- 19 Result of Prioritization of Chiradzulu District

DISTRICTS TC DATA COLLECTION

NAME OF DISTRICT: CHIRADZULU

TC Number			
194			
Ndunde			
1. Name of Trading Center	Number	kW at 2020	kWh at 2020
2. Traditional Authority			
Kadewere			
3. Distance from the Existing Distribution Line (km)			
2			
4. Market Fee			
a) Monthly Market Fee per Person (MK/month)			
b) Total Collected Annual Market Fee in TC (MK/year)			
107,151			
5. a) Population in TC			
b) Population in CA (inc. the TC)			
6. Number of Existing Public Facilities			
a) Secondary School	0	0.000	0
b) Primary School	1	1,410	2,592
c) Teacher's Development Center	0	0.000	0
d) Staff House	0	0.000	0
e) Hospital	0	0.000	0
f) Health Center	1	0.790	5,584
g) Clinic	2	0.860	6,101
h) Post Office	0	0.000	0
i) Police Station	0	0.000	0
j) Police Post	0	0.000	0
k) Police Unit	0	0.000	0
l) Admarc	1	0.100	585
m) Government Office	1	0.140	689
n) Church	3	0.420	1,551
o) Mosque	1	0.140	443
p) Court	1	0.530	1,277
q) Other Public Facility	0	0.000	0
Total	11	4,390	18,821
7. Targeted Business Entities in 2020			
r) Maize Mills	3	60,150	172,762
s) Business Entity	8	4,480	29,848
Total	11	64,630	202,610
8. Targeted Household in 2020			
t) Ordinary Household	95	60,800	337,155
u) Rich Household	5	10,100	28,774
Total	100	71	365,929
Grand Total		140	587,360

	MP	Follow-up
kW	51	140
kWh	254,000	587,360

Ranking

Amount of Demand	1
Distance from Tapping Point	1
Public Electricity Demand Ratio	1

Points

Amount of Demand	10
Distance from Tapping Point	2
Public Electricity Demand Ratio	1
Total	13
Priority	1

Table of App.3- 20 Result of Prioritization of Blantyre District

DISTRICTS TC DATA COLLECTION

NAME OF DISTRICT: BLANTYRE

TC Number	197			198			199			200			201		
	Dziwe			Mudi			Mlenje			Domwe			Chigwaja		
1. Name of Trading Center	Number	kW at 2020	kWh at 2020	Number	kW at 2020	kWh at 2020	Number	kW at 2020	kWh at 2020	Number	kW at 2020	kWh at 2020	Number	kW at 2020	kWh at 2020
2. Traditional Authority	Kuntaja			Makata			Machinjiri			Makata			Kuntaja		
3. Distance from the Existing Distribution Line (km)	3			6			3			3			3		
4. Market Fee															
a) Monthly Market Fee per Person (MK/month)															
b) Total Collected Annual Market Fee in TC (MK/year)	80,000			58,842			48,000			350,000			-		
5. a) Population in TC				896			271								
b) Population in CA [inc. the TC]															
6. Number of Existing Public Facilities															
a) Secondary School	1	1,250	2,551	1	1,250	2,551	0	0,000	0	0	0,000	0	0	0,000	0
b) Primary School	2	2,820	5,184	1	1,410	2,592	1	1,410	2,592	0	0,000	0	1	1,410	2,592
c) Teacher's Development Center	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0
d) Staff House	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0
e) Hospital	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0
f) Health Center	0	0,000	0	1	0,790	5,584	1	0,790	5,584	0	0,000	0	0	0,000	0
g) Clinic	1	0,430	3,050	0	0,000	0	1	0,430	3,050	1	0,430	3,050	1	0,430	3,050
h) Post Office	1	0,130	671	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0
i) Police Station	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0
j) Police Post	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0
k) Police Unit	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0
l) Admarc	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0
m) Government Office	1	0,140	689	1	0,140	689	0	0,000	0	0	0,000	0	0	0,140	689
n) Church	1	0,140	517	1	0,140	517	1	0,140	517	0	0,000	0	1	0,140	517
o) Mosque	1	0,140	443	1	0,140	443	1	0,140	443	1	0,140	443	1	0,140	443
p) Court	0	0,000	0	1	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0
q) Other Public Facility	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0
Total	8	5,050	13,105	7	3,870	12,375	5	2,910	12,186	2	0,570	3,493	4	2,120	6,848
7. Targeted Business Entities in 2020															
r) Maize Mills	0	0,000	0	1	20,050	57,587	1	20,050	57,587	1	20,050	57,587	1	20,050	57,587
s) Business Entity	4	2,240	14,924	2	1,120	7,462	3	1,680	11,193	4	2,240	14,924	5	2,800	18,655
Total	4	2,240	14,924	3	21,170	65,049	4	21,730	68,780	5	22,290	72,511	6	22,850	76,242
8. Targeted Household in 2020							18			78					
r) Ordinary Household	19	12,160	67,431	31	19,840	110,019	9	5,760	31,941	38	24,320	134,862	38	24,320	134,862
u) Rich Household	1	2,020	5,755	2	4,040	11,510	1	2,020	5,755	2	4,040	11,510	2	4,040	11,510
Total	20	14	73,186	33	24	121,529	10	8	37,696	40	28	146,372	40	28	146,372
Grand Total	21	101,215		49	198,954		32	118,662		51	222,376		53	229,462	

	MP	Follow-up	MP	Follow-up	MP	Follow-up	MP	Follow-up	MP	Follow-up	MP	Follow-up
kW	38	21	101	49	38	32	113	51	567,000	222,376	567,000	229,462
kWh	190,000	101,215	504,000	198,954	193,000	118,662	567,000	222,376	567,000	229,462	567,000	229,462

Ranking

Amount of Demand	6	4	5	3	2
Distance from Tapping Point	1	4	1	1	1
Public Electricity Demand Ratio	1	3	2	6	5

Points

Amount of Demand	10	30	20	40	50
Distance from Tapping Point	12	6	12	12	12
Public Electricity Demand Ratio	6	4	5	1	2
Total	28	40	37	53	64
Priority	6	4	5	3	2

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Table of App.3- 21 Result of Prioritization of Mwanza District

DISTRICTS TC DATA COLLECTION

NAME OF DISTRICT: MWANZA			
TC Number	212		
1. Name of Trading Center	Kasuzi		
	Number	kW at 2020	kWh at 2020
2. Traditional Authority	Nkhache		
3. Distance from the Existing Distribution Line (km)	2		
4. Market Fee			
a) Monthly Market Fee per Person (MK/month)			
b) Total Collected Annual Market Fee in TC (MK/year)	n/a		
5. a) Population in TC			
b) Population in CA [inc. the TC]			
6. Number of Existing Public Facilities			
a) Secondary School	2	2,500	5,101
b) Primary School	1	1,410	2,592
c) Teacher's Development Center	0	0,000	0
d) Staff House	0	0,000	0
e) Hospital	0	0,000	0
f) Health Center	1	0,790	5,584
g) Clinic	1	0,430	3,050
h) Post Office	0	0,000	0
i) Police Station	0	0,000	0
j) Police Post	0	0,000	0
k) Police Unit	0	0,000	0
l) Admarc	0	0,000	0
m) Government Office	3	0,420	2,067
n) Church	6	0,840	3,101
o) Mosque	0	0,000	0
p) Court	0	0,000	0
q) Other Public Facility	0	0,000	0
Total	14	6,390	21,496
7. Targeted Business Entities in 2020			
r) Maize Mills	3	60,150	172,762
s) Business Entity	9	5,040	33,579
Total	12	65,190	206,341
8. Targeted Household in 2020			
t) Ordinary Household	4	2,560	14,196
u) Rich Household	1	2,020	5,755
Total	5	5	19,951
Grand Total	76	345,000	247,788

	MP	Follow-up
kW	69	76
kWh	345,000	247,788

Ranking

Amount of Demand	1
Distance from Tapping Point	1
Public Electricity Demand Ratio	1

Points

Amount of Demand	10
Distance from Tapping Point	2
Public Electricity Demand Ratio	1
Total	13
Priority	1

Table of App.3- 22 Result of Prioritization of Thyolo District

DISTRICTS TC DATA COLLECTION

NAME OF DISTRICT: THYOLO

TC Number	216			217			218			219		
	Thomasi			Makapwa			Sandama			Chipho		
1. Name of Trading Center	Number	kW at 2020	kWh at 2020	Number	kW at 2020	kWh at 2020	Number	kW at 2020	kWh at 2020	Number	kW at 2020	kWh at 2020
2. Traditional Authority	Thomasi			Kapichi			Nsiabwe			Nsiabwe		
3. Distance from the Existing Distribution Line (km)	14			5			3			6		
4. Market Fee												
a) Monthly Market Fee per Person (MK/month)												
b) Total Collected Annual Market Fee in TC (MK/year)	12,000			12,000			12,000			9,000		
5. a) Population in TC										403		
b) Population in CA (inc. the TC)										777		
6. Number of Existing Public Facilities												
a) Secondary School	1	1,250	2,551	1	1,250	2,551	0	0,000	0	1	1,250	2,551
b) Primary School	1	1,410	2,592	1	1,410	2,592	1	1,410	2,592	1	1,410	2,592
c) Teacher's Development Center	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0
d) Staff House	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0
e) Hospital	1	2,450	11,517	1	2,450	11,517	0	2,450	11,517	0	2,450	11,517
f) Health Center	0	0,000	0	0	0,000	0	0	0,000	0	1	0,790	5,584
g) Clinic	1	0,430	3,050	2	0,860	6,101	0	0,000	0	1	0,000	0
h) Post Office	0	0,000	0	0	0,000	0	1	0,130	671	0	0,000	0
i) Police Station	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0
j) Police Post	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0
k) Police Unit	1	0,110	870	0	0,000	0	0	0,000	0	0	0,000	0
l) Admarc	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0
m) Government Office	3	0,420	2,067	1	0,140	689	4	0,560	2,756	2	0,280	1,378
n) Church	3	0,420	1,551	1	0,140	517	3	0,420	1,551	2	0,280	1,034
o) Mosque	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0
p) Court	1	0,530	1,277	0	0,000	0	0	0,000	0	0	0,000	0
q) Other Public Facility	0	0,000	0	0	0,000	0	1	0,100	598	0	0,000	0
Total	12	7,020	25,474	7	6,250	23,966	10	5,070	19,685	8	6,460	24,655
7. Targeted Business Entities in 2020												
r) Maize Mills	3	60,150	172,762	0	0,000	0	1	20,050	57,587	2	40,100	115,175
s) Business Entity	6	3,360	22,386	4	2,240	14,924	4	2,240	14,924	4	2,240	14,924
Total	9	63,510	195,148	4	2,240	14,924	5	22,290	72,511	6	42,340	130,099
8. Targeted Household in 2020				39								
r) Ordinary Household	76.0	48,640	269,724	19	12,160	67,431	38	24,320	134,862	59.0	37,760	209,391
u) Rich Household	4.0	8,080	23,019	1	2,020	5,755	2	4,040	11,510	4.0	8,080	23,019
Total	80	57	292,743	20	14	73,186	40	28	146,372	63	46	232,410
Grand Total		127	513,366		23	112,076		56	238,568		95	387,164

	MP	Follow-up	MP	Follow-up	MP	Follow-up	MP	Follow-up
kW	204	127	38	23	341	56	152	95
kWh	1,021,000	513,366	190,000	112,076	1,708,000	238,568	761,000	387,164

Ranking

Amount of Demand	1	4	3	2
Distance from Tapping Point	4	2	1	3
Public Electricity Demand Ratio	4	1	2	3

Points

Amount of Demand	40	10	20	30
Distance from Tapping Point	2	6	8	4
Public Electricity Demand Ratio	1	4	3	2
Total	43	20	31	36
Priority	1	4	3	2

Table of App.3- 23 Result of Prioritization of Mulanje District¹¹⁾

DISTRICTS TC DATA COLLECTION

NAME OF DISTRICT: MULANJE

TC Number	223			224			225			226			227			229		
	Chambe			Mathambi			Chinakanaka			Msikawanjala			Namphungo			Kamwendo		
1. Name of Trading Center	Number	kW at 2020	kWh at 2020	Number	kW at 2020	kWh at 2020	Number	kW at 2020	kWh at 2020	Number	kW at 2020	kWh at 2020	Number	kW at 2020	kWh at 2020	Number	kW at 2020	kWh at 2020
2. Traditional Authority	Mkanda			Mabuka			Chikumru			Mabuka			Juma			Juma		
3. Distance from the Existing Distribution Line (km)	3			6			3			3			3			2		
4. Market Fee																		
a) Monthly Market Fee per Person (MK/month)																		
b) Total Collected Annual Market Fee in TC (MK/year)	114,578			92,108			136,297			142,938			249,455			9,319		
5. a) Population in TC																		
b) Population in CA (inc. the TC)	848			257			466			212			813					
6. Number of Existing Public Facilities																		
a) Secondary School																		
b) Primary School																		
c) Teacher's Development Center																		
d) Staff House																		
e) Hospital																		
f) Health Center																		
g) Clinic																		
h) Post Office																		
i) Police Station																		
j) Police Post																		
k) Police Unit																		
l) Admarc																		
m) Government Office																		
n) Church																		
o) Mosque																		
p) Court																		
q) Other Public Facility																		
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7. Targeted Business Entities in 2020																		
r) Maize Mills																		
s) Business Entity																		
Total	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8. Targeted Household in 2020																		
t) Ordinary Household																		
u) Rich Household																		
Total	0	0	0	125	0	0	115	0	0	0	0	0	40	0	0	114	0	0
Grand Total	0			0			0			0			0			0		

	MP	Follow-up	MP	Follow-up	MP	Follow-up	MP	Follow-up	MP	Follow-up	MP	Follow-up	MP	Follow-up
kW	263		155		146		48		59		146			
kWh	1,315,000	805,840	777,000	476,150	732,000	448,574	239,000	146,461	294,000	180,165	729,000	446,736		

Ranking

Amount of Demand	1	2	3	6	5	4
Distance from Tapping Point	2	7	2	2	2	1
Public Electricity Demand Ratio	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!

Points

Amount of Demand	70	60	50	20	30	40
Distance from Tapping Point	12	2	12	12	12	14
Public Electricity Demand Ratio	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
Total	82	62	62	32	42	54
Priority	1	2	2	6	5	4

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11) The Public Electricity Demand Ratio cannot be calculated since whole data of the number of facilities in Mulanje District were not collected.

Table of App.3- 24 Result of Prioritization of Phalombe District

DISTRICTS TC DATA COLLECTION

NAME OF DISTRICT: PHALOMBE

TC Number	233			234			235		
	Chitekesa			Mpassa			Nambazo		
1. Name of Trading Center	Number	kW at 2020	kWh at 2020	Number	kW at 2020	kWh at 2020	Number	kW at 2020	kWh at 2020
2. Traditional Authority	STA Jenjala			Mkhumba			STA Whiwalo		
3. Distance from the Existing Distribution Line (km)	4			8			11		
4. Market Fee									
a) Monthly Market Fee per Person (MK/month)									
b) Total Collected Annual Market Fee in TC (MK/year)	156,000			41,600			10,400		
5. a) Population in TC							25		
b) Population in CA [inc. the TC]									
6. Number of Existing Public Facilities									
a) Secondary School	0	0.000	0	1	1,250	2,551	0	0.000	0
b) Primary School	2	2,820	5,184	3	4,230	7,777	2	2,820	5,184
c) Teacher's Development Center	0	0.000	0	0	0.000	0	0	0.000	0
d) Staff House	0	0.000	0	0	0.000	0	0	0.000	0
e) Hospital	0	0.000	0	0	0.000	0	0	0.000	0
f) Health Center	1	0.790	5,584	1	0.790	5,584	1	0.790	5,584
g) Clinic	2	0.860	6,101	2	0.860	6,101	0	0.000	0
h) Post Office	1	0.130	671	0	0.000	0	1	0.130	671
i) Police Station	0	0.000	0	1	0.760	4,834	0	0.000	0
j) Police Post	0	0.000	0	0	0.000	0	0	0.000	0
k) Police Unit	1	0.110	870	0	0.000	0	1	0.110	870
l) Admarc	0	0.000	0	0	0.000	0	0	0.000	0
m) Government Office	1	0.140	689	0	0.000	0	1	0.140	689
n) Church	4	0.560	2,068	5	0.700	2,584	4	0.560	2,068
o) Mosque	1	0.140	443	1	0.140	443	1	0.140	443
p) Court	1	0.530	1,277	1	0.530	1,277	1	0.530	1,277
q) Other Public Facility	0	0.000	0	1	0.100	598	1	0.100	598
Total	14	6.080	22,886	16	9.360	31,748	13	5.320	17,383
7. Targeted Business Entities in 2020									
r) Maize Mills	1	20,050	57,587	0	0.000	0	1	20,050	57,587
s) Business Entity	9	5,040	33,579	5	2,800	18,655	3	1,680	11,193
Total	10	25,090	91,166	5	2,800	18,655	4	21,730	68,780
8. Targeted Household in 2020									
t) Ordinary Household	38	24,320	134,862	19	12,160	67,431	38	24,320	134,862
u) Rich Household	2	4,040	11,510	1	2,020	5,755	2	4,040	11,510
Total	40	28	146,372	20	14	73,186	40	28	146,372
Grand Total	60	260,424	1,000,000	26	123,588	400,000	55	232,535	800,000

	MP	Follow-up	MP	Follow-up	MP	Follow-up
kW	113	60	38	26	113	55
kWh	567,000	260,424	190,000	123,588	567,000	232,535

Ranking

Amount of Demand	1	3	2
Distance from Tapping Point	1	2	3
Public Electricity Demand Ratio	2	1	3

Points

Amount of Demand	30	10	20
Distance from Tapping Point	6	4	2
Public Electricity Demand Ratio	2	3	1
Total	38	17	23
Priority	1	3	2

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Table of App.3- 25 Result of Prioritization of Chikwawa District

DISTRICTS TC DATA COLLECTION

NAME OF DISTRICT: CHIKWAWA

TC Number	239			240			241			242		
	Kakoma			Tomali			Ndakwera			Kanyinda		
1. Name of Trading Center	Number	kW at 2020	kWh at 2020	Number	kW at 2020	kWh at 2020	Number	kW at 2020	kWh at 2020	Number	kW at 2020	kWh at 2020
2. Traditional Authority	Chapananga			Lundu			Chapananga			Ngabu		
3. Distance from the Existing Distribution Line (km)	15			2			6			3		
4. Market Fee												
a) Monthly Market Fee per Person (MK/month)												
b) Total Collected Annual Market Fee in TC (MK/year)	41,000			28,458			28,000			15,000		
5. a) Population in TC				212			257			944		
b) Population in CA [inc. the TC]												
6. Number of Existing Public Facilities												
a) Secondary School	1	1,250	2,551	1	1,250	2,551	0	0.000	0	1	1,250	2,551
b) Primary School	2	2,820	5,184	3	4,230	7,777	2	2,820	5,184	1	1,410	2,592
c) Teacher's Development Center	0	0.000	0	0	0.000	0	0	0.000	0	0	0.000	0
d) Staff House	0	0.000	0	0	0.000	0	0	0.000	0	0	0.000	0
e) Hospital	0	0.000	0	0	0.000	0	0	0.000	0	0	0.000	0
f) Health Center	1	0.790	5,584	0	0.000	0	1	0.790	5,584	1	0.790	5,584
g) Clinic	0	0.000	0	0	0.000	0	0	0.000	0	0	0.000	0
h) Post Office	0	0.000	0	0	0.000	0	0	0.000	0	0	0.000	0
i) Police Station	0	0.000	0	0	0.000	0	0	0.000	0	0	0.000	0
j) Police Post	0	0.000	0	0	0.000	0	0	0.000	0	0	0.000	0
k) Police Unit	0	0.000	0	0	0.000	0	0	0.000	0	1	0.110	870
l) Admarc	0	0.000	0	0	0.000	0	0	0.000	0	0	0.000	0
m) Government Office	0	0.000	0	3	0.420	2,067	0	0.000	0	1	0.140	689
n) Church	4	0.560	2,068	3	0.420	1,551	2	0.280	1,034	3	0.420	1,551
o) Mosque	0	0.000	0	1	0.140	443	0	0.000	0	0	0.000	0
p) Court	0	0.000	0	1	0.530	1,277	0	0.000	0	0	0.000	0
q) Other Public Facility	1	0.100	598	1	0.100	598	0	0.000	0	3	0.300	1,794
Total	9	5.520	15,984	13	7.090	16,262	5	3.890	11,802	11	4.420	15,630
7. Targeted Business Entities in 2020												
r) Maize Mills	3	60.150	172,762	1	20.050	57,587	4	80.200	230,350	5	100.250	287,937
s) Business Entity	6	3.360	22,386	3	1.680	11,193	6	3.360	22,386	13	7.280	48,503
Total	9	63.510	195,148	4	21.730	68,780	10	83.560	252,736	18	107.530	336,440
8. Targeted Household in 2020												
t) Ordinary Household	76	48.640	269,724	6	3.840	21,294	10	6.400	35,490	28	17.920	99,372
u) Rich Household	4	8.080	23,019	1	2.020	5,755	1	2.020	5,755	2	4.040	11,510
Total	80	57	292,743	7	6	27,049	11	8	41,245	30	22	110,882
Grand Total		126	503,876		35	112,092		96	305,782		134	462,952

	MP	Follow-up	MP	Follow-up	MP	Follow-up	MP	Follow-up
kW	204	126	32	35	100	96	174	134
kWh	1,021,000	503,876	162,000	112,092	499,000	305,782	873,000	462,952

Ranking

Amount of Demand	1	4	3	2
Distance from Tapping Point	4	1	3	2
Public Electricity Demand Ratio	2	3	1	3

Points

Amount of Demand	40	10	20	30
Distance from Tapping Point	2	8	4	6
Public Electricity Demand Ratio	3	2	4	2
Total	45	20	28	38
Priority	1	4	3	2

Table of App.3- 26 Result of Prioritization of Nsanje District

DISTRICTS TC DATA COLLECTION

NAME OF DISTRICT: NSANJE

TC Number	247			248			249			250			251		
	Masenjere			Kampata			Lulwe			Chididi			Sankhulani		
1. Name of Trading Center	Number	kW at 2020	kWh at 2020	Number	kW at 2020	kWh at 2020	Number	kW at 2020	kWh at 2020	Number	kW at 2020	kWh at 2020	Number	kW at 2020	kWh at 2020
2. Traditional Authority	Mlolo			Chimombo			Ndamera			Malema			Mlolo		
3. Distance from the Existing Distribution Line (km)	13			18			40			24			18		
4. Market Fee				1,152											
a) Monthly Market Fee per Person (MK/month)				1,152											
b) Total Collected Annual Market Fee in TC (MK/year)	15,120			13,824			-			-			350,000		
5. a) Population in TC	8,389			3,610			87			7,890			3,963		
b) Population in CA [inc. the TC]	18,360			665						14,375			6,340		
6. Number of Existing Public Facilities															
a) Secondary School	1	1,250	2,551	0	0,000	0	0	0,000	0	1	1,250	2,551	0	0,000	0
b) Primary School	3	4,230	7,777	2	2,820	5,184	2	2,820	5,184	1	1,410	2,592	1	1,410	2,592
c) Teacher's Development Center	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0
d) Staff House	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0
e) Hospital	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0	1	2,450	11,517
f) Health Center	1	0,790	5,584	0	0,000	0	1	0,790	5,584	1	0,790	5,584	0	0,000	0
g) Clinic	0	0,000	0	1	0,430	3,050	0	0,000	0	0	0,000	0	0	0,000	0
h) Post Office	1	0,130	671	0	0,000	0	1	0,130	671	1	0,130	671	0	0,000	0
i) Police Station	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0
j) Police Post	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0
k) Police Unit	0	0,000	0	0	0,000	0	0	0,000	0	1	0,110	870	0	0,000	0
l) Admarc	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0
m) Government Office	2	0,280	1,378	0	0,000	0	1	0,140	689	0	0,000	0	0	0,000	0
n) Church	4	0,560	2,068	0	0,000	0	1	0,140	517	2	0,140	517	0	0,000	0
o) Mosque	1	0,140	443	0	0,000	0	0	0,000	0	0	0,000	0	0	0,000	0
p) Court	0	0,000	0	1	0,530	1,277	0	0,000	0	0	0,000	0	0	0,000	0
q) Other Public Facility	0	0,000	0	1	0,100	598	0	0,000	0	1	0,100	598	1	0,100	598
Total	13	7,380	20,470	5	3,880	10,109	6	4,020	12,645	8	3,930	13,382	3	3,960	14,707
7. Targeted Business Entities in 2020															
r) Maize Mills	3	60,150	172,762	0	0,000	0	2	40,100	115,175	4	80,200	230,350	3	60,150	172,762
s) Business Entity	18	10,080	67,158	4	2,240	14,924	6	3,360	22,386	6	3,360	22,386	16	8,960	59,696
Total	21	70,230	239,920	4	2,240	14,924	8	43,460	137,561	10	83,560	252,736	19	69,110	232,458
8. Targeted Household in 2020															
t) Ordinary Household	76	48,640	269,724	19	12,160	67,431	9	5,760	31,941	76	48,640	269,724	76	48,640	269,724
u) Rich Household	4	8,080	23,019	1	2,020	5,755	1	2,020	5,755	4	8,080	23,019	4	8,080	23,019
Total	80	56,720	292,743	20	14,180	73,186	10	8	37,696	80	57	292,743	80	57	292,743
Grand Total		134	553,134		20	98,219		55	187,901		144	558,861		130	539,909

	MP	Follow-up	MP	Follow-up	MP	Follow-up	MP	Follow-up	MP	Follow-up	MP	Follow-up
kW	204	134	37	20	59	55	224	144	204	130		
kWh	1,021,000	553,134	185,000	98,219	295,000	187,901	1,121,000	558,861	1,021,000	539,909		

Ranking

Amount of Demand	2	5	4	1	3
Distance from Tapping Point	1	2	5	4	2
Public Electricity Demand Ratio	3	1	2	5	4

Points

Amount of Demand	40	10	20	50	30
Distance from Tapping Point	10	8	2	4	8
Public Electricity Demand Ratio	3	5	4	1	2
Total	53	23	26	55	40
Priority	2	5	4	1	3

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