Republic of Zambia

Ministry of Energy and Water Development

Rural Electrification Authority

Project on Capacity Development for Rural Electrification in the Republic of Zambia

Project Completion Report

July 2013

Japan International Cooperation Agency

Chubu Electric Power Co., Inc.

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Abbreviated words

Abbreviation	Formal words
AC	Alternative Current
CEO	Chief Executive Officer
C/P	Counterpart
DC	Direct Current
D/D	Detail Design
DOE	Department of Energy
F/S	Feasibility Study
GIS	Geographical Information System
GPS	Global Positioning System
JCC	Joint Coordinating Committee
JICA	Japan International Cooperation Agency
MEWD	Ministry of Energy and Water Development
M & E	Monitoring and Evaluation
M/M	Minutes of Meeting
OJT	On the Job Training
PDM	Project Design Matrix
PO	Plan of Operation
Pre-F/S	Pre-Feasibility Study
PV	Photovoltaic
R/D	Record of Discussion
REA	Rural Electrification Authority
REF	Rural Electrification Fund
REMP	Rural Electrification Master Plan
RGC	Rural Growth Centre
SHS	Solar Home System
SIDA	Swedish International Development cooperation Agency
T/D	Technical Director
ZESCO	Zambia Electricity Supply Corporation Limited

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Chapter 1. Introduction

1.1 Background

The Republic of Zambia is striving to reinforce the country's power supply as a component of the basic infrastructure, toward its goals of constructing a both stable and balanced economic foundation and mitigating poverty. It has positioned improved access to electrical power as an item of the highest priority. For 2030, it is targeting an increase in the rural electrification (RE) rate from the current 3.1 to 5 percent (%), and in the urban electrification rate from the current 47 to 90 %. With the assistance of the Japanese government, it formulated the RE Master Plan (REMP)completed in January 2008.

Thereafter, the Rural Electrification Authority (REA) instituted upon enactment of the RE Law in 2003 was placed in charge of the planning and execution of RE projects using the RE Fund (REF), under the supervision of the Department of Energy (DOE) attached to the Ministry of Energy and Water Development. At that time, the DOE and REA personnel lack sufficient knowledge and experience on project execution, and had difficulties to implement projects efficiently. It was consequently essential to build the capacity of REA and DOE personnel for implementation of RE projects based on the REMP

Under these circumstances, the Zambian government made a request to the Japanese government for a Technical Cooperation (TC) Project to strengthen the capacity of concerned personnel. As a result of an advance assessment, the Japan International Cooperation Agency (JICA) reached an agreement with the Zambian authorities for execution of the Project on Capacity Development for Rural Electrification (hereinafter referred to as the "Project"). The Project consisted of assistance for the capacity development of the counterparts (C/Ps) through actual execution of RE projects based on extension of distribution lines and stand-alone power systems. The record of discussion (R/D) was signed and exchanged on 18th December 2008 and launched the Project with the period from August 2009 to August 2012 (this was later extended to December 2013).

This is the final report on that portion of the Project work which was consigned to Chubu Electric Power Co., Ltd (CEPCO). It sets forth the activities of the short-term experts, who worked in the following areas: 1) Leader, 2) Deputy Leader/ RE planning, 3) Distribution Planning - 1, 4) Distribution Planning - 2, 5) Mini-Hydropower Development (Civil Engineering), 6) Mini-Hydropower Development (Electrical Engineering), 7) Photovoltaic (PV) Systems, 8) Financial Management and 9) Coordinator/ Assistant of RE planning.

1.2 Project objective

The Project objective was to ascertain and analyze, together with the C/Ps, the problems and current status in the organizational, technical, and other aspects at the REA, and to strengthen the technical capabilities at both for the planning and implementation of proper RE projects based on the REMP (through distribution line extension, mini-hydro and PV systems). The specific means consisted mainly of on-the-job training (OJT), support for the preparation of manuals, and advice needed for the

formulation of annual and individual RE plans at the REA.

The objective also included advice on preparation of documents needed for tenders and execution of the contracting process, and reinforcement of the setup for management of RE projects at the REA.

1.3 Project goal

(1) Overall goal

Accessibility of electricity in rural areas increases.

(2) Project purpose

The capacities of REA for implementing and updating the REMP are strengthened.

1.4 Implementing agency and target groups

REA

1.5 Setup for work performance of the Project

The setup for execution of the Project work is shown in Figure 1.1.

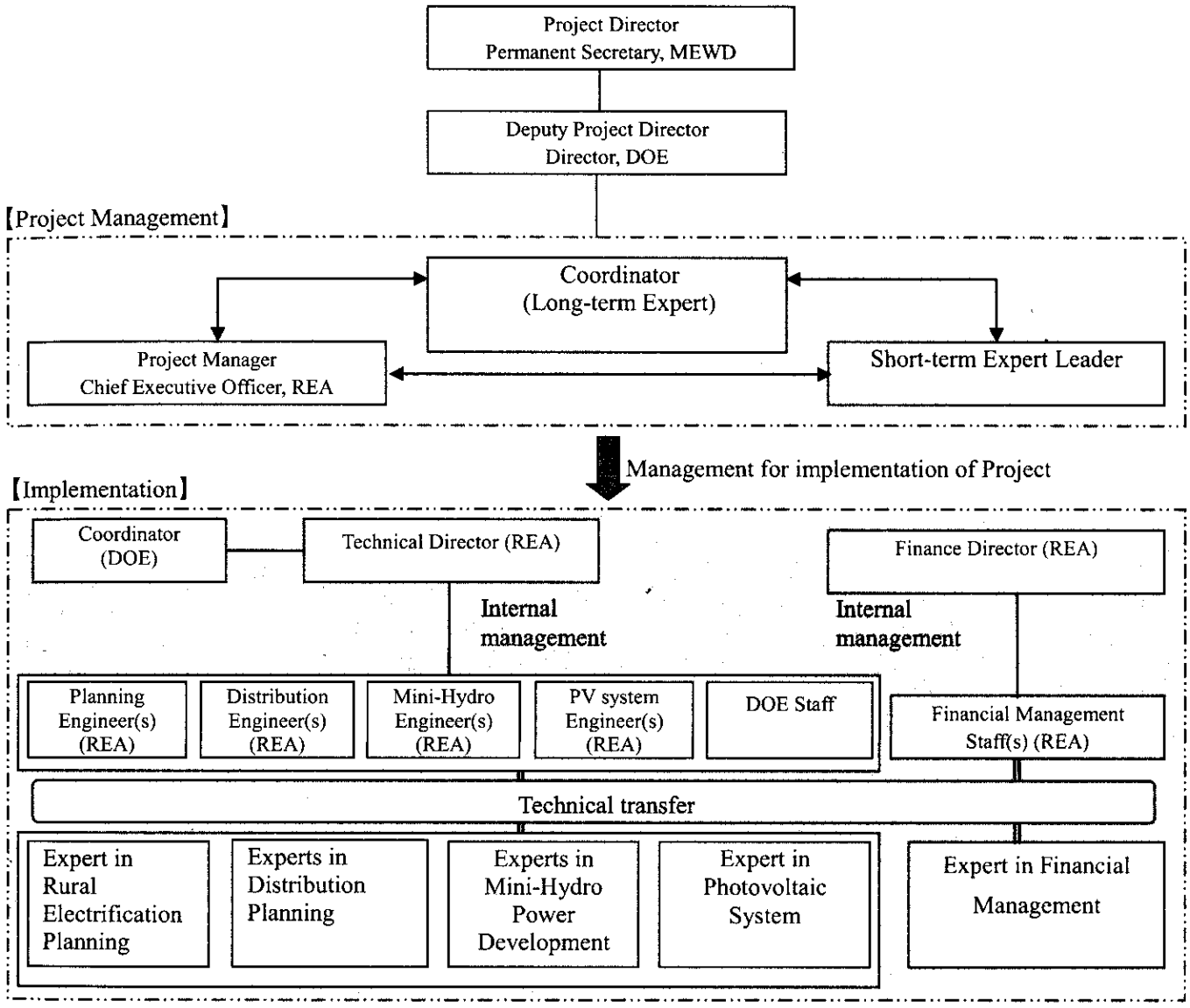

Figure 1.1 Implementation Structure

1.6 Expected Project outputs

The expected Project outputs are shown in Table 1-1.

Table 1-1 Project results (Output)

Output 1	Planning process and planning capacities for rural electrification are enhanced.
Output 2	Technical capacities for rural electrification by distribution line extension are enhanced.
Output 3	Technical capacities for mini-hydro electrification are enhanced.
Output 4	Capacities for project management are improved and strengthened.
Output 5	Technical capacities for photovoltaic (PV) systems are developed and enhanced.
Output 6	Capacities for updating the REMP are developed and enhanced.
Output 7	Capacities for financial management are enhanced.

Chapter 2. Situation at the concerned institutions

The transition of the major C/Ps between early July 2010, when the Project was initiated, and June 2013, when it was completed, is shown in Table 2-1.

Table 2-1 Transition of C/Ps

	As of July,2010	As of June,2013
CEO	Mr. Wilfred Serenje	Mr. Geoffery Musonda
Technical Director	Mr. Francis Mulenga	Mr. Patrick Mubanga (Acting)
Technical Officer	Mr. Patrick Mubanga	Mr. Wazingwa Mugala
	-	Mr. Nason Musonda
	-	Ms. Leah Banda
PV Engineer	Mr. Fred Mushimbwa	Mr. Suzyo Silavwe
Civil Engineer	Mr. Stanlay Lyalabi	Mr. Stanley Lyalabi
	-	Mr. Edmond Mkumba
Surveyor	-	Mr. Penjani Nyimbili
Environment Officer	Mr. Christopher Chisense	Mr. Christopher Chisense
M&E Officer	-	Mrs. Jacqueline H. Musonda
Financial Officer	Mrs. Susan Nalavwe Daka	Mr. Patric Teza Siame
Accountant	Mr. Bruce Chilufya	Mr. Bruce Chilufya

* The underlined C/Ps were attached to the REA from the start of the Project to its end.

** The roles noted above are categorized in terms of major duties. In reality, these personnel also served as technical officers.

The table above does not include interim changes. The major reasons for personnel changes are as follows:

1) Quitting (four technical offers joined/quit during the Project term; including cases of contract non-execution);

2) Transfer or decision not to renew contracts (three personnel among the aforementioned main members); and

3) Death from disease (one).

Among the aforementioned C/Ps, one was away from the REA for more than one year, for the purpose of study in another country.

Chapter 3. State of execution of RE projects

3.1 Outline of RE-related laws and organizational arrangements

In 1994, the Zambian government formulated the National Energy Policy (NEP) for the purpose of improving access to power for the national populace, heightening the efficiency and performance of the power industry, and inducing private-sector investment in development of hydropower sites. The NEP is aimed at promoting access to power through liberalization and re-construction in the power sector and introduction of low-cost technologies and renewable energy. These ends are at the same time key means of RE promotion in Zambia.

The government subsequently prepared the framework of related laws and administrative arrangements for execution of the NEP, and Article 20 of the Rural Electrification Act was passed into law in November 2003. This was followed by institution of the REA in 2004.

3.2 State of RE implementation

From 2009 to the end of 2012, the REA completed the electrification of 70 rural growth centres (RGC; sites to serve as centres for communities to be electrified). A total of 75 RGCs are to be electrified by the end of December 2013. Contracts were concluded for all 10 of the planned projects in fiscal 2011 and for 21 of the 22 planned in fiscal 2012. In some cases, construction works are being carried over to the next year because of delay of the construction works.

In July 2010, when Project consignment to CEPCO began as noted in Chapter 2, the number of engineers was extremely low. Electrical engineers numbered only three even including the head of the Technical Director (T/D), and the C/Ps were extremely busy. To compensate, civil engineers performed the same work as electrical engineers, and operations were technically insufficient. This may be exemplified by tender documents then prepared by the REA. The text contains only an indication of the work. The documents lack detailed designations in the technical aspect (e.g., wetlands and other districts that could present obstacles) and are not accompanied by all requisite design drawings. A particular shortcoming is the attachment of only very rough drawings for designation of distribution line routes. It was impossible to imagine the circumstances on the site from these drawings.

Although there were changes of personnel for various reasons thereafter as well, the REA hired many engineers (for a total of nine, including electrical engineers, as of June 2013), and the short-term experts continued to provide technical instruction to the new recruits as well as the personnel who had been Project members from the start. As a result, the members became able to perform the whole sequence of work from design to tenders, contracting, construction, and inspection. In the planning aspect, the REA intends to continue working with the long-term experts in order to firmly establish the routine of preparing the five-year rolling plan from the REMP and the annual work plan from the five-year rolling plan.

Even at present, however, the REA personnel remain deluged with work, and these points to a need for more engineers and steps for more efficient performance of work. The succeeding chapters set forth the detailed Project results along with adjustments in and lessons from Project operation.

Chapter 4. Project inputs

The input from the Japanese side consisted of the dispatch of experts, provision of equipment and provision of funds needed for renting vehicles and other on-site activities. That from the Zambian side consisted of the provision of offices, desks and chairs for the use of the experts.

4.1 Dispatch of the short-term experts

Table 4-1 shows the experts who engaged in on-site activities and the terms of their dispatch. Their work results are outlined in Chapter 5.

Table 4-1 Record of dispatched Japanese Experts

Name	Assignment	Period
Mr. Keiji SHIRAKI	Short term Expert Leader	27th Jul. – 6th Aug. 2010 (26th Jul. – 8th Aug. 2010)
		21st Nov. – 9th Dec. 2010 (22nd Nov. – 7th Dec. 2010)
		13th Jun. – 24th Jun. 2011 (11th Jun. – 25th Jun. 2011)
		10th Oct. – 21st Oct. 2011 (8th Oct. – 22nd Oct. 2011)
		19th Jan. – 31st Jan. 2012 (18th Jan. – 1st Feb. 2012)
		17th Jun. – 22nd Jun. 2012 (16th Jun. – 23rd Jun. 2012)
		26th Nov. –8th Dec. 2012 (25th Nov. – 9th Dec. 2012)
		24th Feb. – 2nd Mar. 2013 (23rd Feb. – 3rd Mar. 2013)
		21st May – 30th May 2013 (20th May – 31st May 2013)
Mr. Hirokazu NAKANISHI	Deputy Short term Expert Leader/ Rural Electrification Planning	19th Oct. – 29th Oct. 2010 (18th Oct. – 31st Oct. 2010)
		28th Feb – 11th Mar. 2011 (27th Feb – 12th Mar. 2011)
		11th May – 25th May 2011 (10th May – 26th May 2011)
Mr. Yasuhiro KAWAKAMI		29th Jan. – 11th Feb. 2012 (28th Jan. – 12th Feb. 2012)
		4th Jun. – 19th Jun. 2012 (3rd Jun. – 20th Jun. 2012)
		5th Nov. – 20th Nov. 2012 (4th Nov. – 21st Nov. 2012)
		21st May – 5th Jun. 2013 (20th May – 6th Jun. 2013)
Mr. Hideki WADA	Distribution Planning (1)	19th Oct. – 4th Nov. 2010 (18th Oct. – 6th Nov. 2010)
		20th Jun. – 8th Jul. 2011 (19th Jun. – 9th Jul. 2011)
		11th Oct. – 29th Oct. 2011 (10th Oct. – 30th Oct. 2011)
		17th Jan – 4th Feb. 2012 (16th Jan – 5th Feb. 2012)
		11th Jun. – 29th Jun. 2012 (12th Jun. –30th Jun. 2012)
		18th Nov. – 8th Dec. 2012 (17th Nov. – 9th Dec. 2012)
		19th May – 6th Jun. 2013(18th May – 7th Jun. 2013)
Mr. Tatsumi FUKUNAGA	Distribution Planning (2)	27th Jul. – 6th Aug. 2010 (26th Jul. – 8th Aug. 2010)
		19th Oct. – 4th Nov. 2010 (18th Oct. – 6th Nov. 2010)
		17th Jan – 9th Feb. 2011(16th Jan – 10th Feb. 2011)
		8th May – 26th May 2011 (7th May – 27th May 2011)

Dr. Koji SHIKIMACHI	Distribution Planning (2)	17th Oct. – 4th Nov. 2011 (16th Oct. – 5th Nov. 2011)
		26th Jan – 16th Feb. 2012 (25th Jan – 17th Feb. 2012)
		13th May – 31st May 2012 (12th May – 1st Jun. 2012)
		20th Nov. – 5th Dec. 2012 (19th Nov. – 9th Dec. 2012)
		24th Feb. – 15th Mar. 2013 (23rd Feb. – 16th Mar. 2013)
		12th May – 30th May 2013 (11h May – 31st May 2013)
Mr. Toshiaki KIMURA	Mini-hydro Power Development (Civil Engineering)	2nd Aug. – 13th Aug. 2010 (1st Aug. – 15th Aug. 2010)
		21st Nov. – 16th Dec. 2010 (22nd Nov. – 14th Dec. 2010)
		30th May – 24th Jun. 2011 (29th May – 25th Jun. 2011)
		11th Oct. – 26th Oct. 2011 (10th Oct. – 27th Oct. 2011)
Mr. Takashi AOKI		5th Nov. – 23rd Nov. 2012 (4th Nov. – 24th Nov. 2012)
Mr. Ryosuke HATANO	Mini-hydro Power Development (Electrical Engineering)	21st Nov. – 16th Dec. 2010 (22nd Nov. – 14th Dec. 2010)
		30th May – 24th Jun.2011 (29th May – 25th Jun. 2011)
		10th Oct. – 4th Nov. 2011(8th Oct. –5th Nov. 2011)
		24th Jan. – 16th Feb. 2012 (23rd Jan. – 17th Feb. 2012)
		28th May – 15th Jun. 2012 (28th May – 16th Jun. 2012)
		5th Nov. – 24th Nov. 2012 (4th Nov. – 25th Nov. 2012)
		24th Feb. – 14th Mar. 2013 (23rd Feb. – 15th Mar. 2013)
		12th May – 30th May 2013 (11h May – 31st May 2013)
Dr. Akio SHIOTA	Photovoltaic (PV) Systems	7th Oct. – 2nd Dec. 2010 (6th Oct. – 4th Dec.2010)
		12th Jan – 29th Jan. 2011 (11th Jan – 30th Jan. 2011)
		12th May – 29th Jun. 2011 (11th May – 30th Jun.2011)
		29th Aug. – 28th Oct. 2011 (28th Aug. – 29th Oct.2011)
		17th Feb., - 2nd Mar. 2012 (16h Feb. - 3rd Mar. 2012)
		29th May – 27th Jun. 2012 (28th May – 28th Jun.2012)
		12th Sep. – 6th Nov. 2012 (11th Sep. – 7th Nov.2012)
		28th Apr. – 25th May 2013 (27th Apr. – 26th May 2013)
Dr. Takeshi KIKUKAWA	Financial Management	27th Feb. – 10th Mar. 2011 (26th Feb. – 11th Mar. 2011)
		15th May – 4th Jul. 2011 (14th May – 5th Jul.2011)
		20th Jul. – 19th Aug. 2011 (19th Jul. – 20th Aug. 2011)
		30th Oct. – 24th Dec. 2011 (29th Oct. – 25th Dec. 2011) (Except for 6th Nov. – 5th Dec, 2011)
		9th Jan. – 11th Feb. 2012 (8th Jan. – 12th Feb. 2012)
		13th May – 31st May. 2012 (12th May – 1st Jun. 2012)
		14th Sep. – 2nd Oct. 2012 (13th Sep. – 3rd Oct. 2012)
		12th Jan. – 30th Jan. 2013 (11th Jan. – 31st Jan. 2013)
		19th May – 30th May 2013 (18th May – 31st May 2013)
Mr. Ryosuke HATANO	Coordinator / Assistant Rural Electrification Planning	27th Jul. – 6th Aug. 2010 *(26th Jul. – 8th Aug. 2010) Included in the period of activity related to mini hydropower development (electrical facilities)

4.2 Counterpart training in Japan

Counterpart trainings were held in Japan in fiscal year 2011 and 2012. In total five trainees were accepted into the training program. In fiscal 2011, the training was designed for REA executives and centered on procedures for the operation of power projects. In fiscal 2012, it was directed to REA engineers and dealt mainly with the operations of power companies. The programs are outlined in Table 4-2 and Table 4-3.

Table 4-2 C/P training in Japan (2nd Phase, FY2011)

Member	Mr. Wilfred Serenje (Chief Executive Officer) Mr. Francis Mulenga (Director Technical Service)
Duration	12th November, 2011 – 3rd December, 2011(Including trip day)
Place	Chubu Electric Power Company (Nagoya, Iida)
Objective of the training	The training was designed for executives and aimed at deepening understanding of procedures for the operation of power enterprises. The trainees were not only instructed in methodology for electrification plans but also toured the range of facilities to be constructed by the REA (mini-hydropower stations, PV systems, and distribution lines) in order to furnish them with a good understanding of the respective attributes and roles of these facilities.

Table 4-3 C/P training in Japan (3rd Phase, FY2012)

Member	Mr. Justin Mwansa Mr. Nason Musonda Mr. Wazingwa Mugala
Duration	18th August, 2012 – 8th September 2012(Including trip day)
Place	Chubu Electric Power Company (Nagoya)
Objective of the training	The training was aimed at imparting the basic technical knowledge of distribution facilities needed for RE. It furnished the knowledge and experience accumulated by CEPCO through both instruction in classrooms and visits to actual facilities. It was designed to provide REA engineers with the basic knowledge required of them (in areas such as planning work, key points in design, and methodology for overseeing construction).

4.3 Equipment provided

The equipment and materials shown in Table 4-4 were provided directly by the JICA in the Project. They were stored on shelves under lock and key at the REA offices and lent under the supervision of the long-term experts.

Table 4-4 List of equipment

	Item	Specification	Units	FY Provided
1	AC/DC Clamp meter	HIOKI 3287	5	2011
2	Illuminance meter	Yokogawa 51001	1	2011
3	Radiation Thermometer	Custom IR-300	1	2011
4	GPS	Garmin eTrex Legend HCx with MicroSD	1	2011
5	GPS	Garmin eTrex Vista HCx with MicroSD	2	2011
6	Battery charger	Panasonic K-KJQ91M34R	5	2011
7	Voltage Logger	HIOKI 3645-20	1	2011
8	Communication base	HIOKI 3912-20	1	2011
9	Telescopic Ladder	Hasegawa HPS-38BC	1	2012
10	Current Meter	SANEI-SOKURYOUKI Model-I, L-type	1	2012
11	Distance Meter	Nikon 1200S	2	2012
12	Staff	SKT SKT-55D	1	2012
13	Measuring Tape	YAMATO NR100X	5	2012
14	Wader	XL-size (28cm)	5	2012
15	Life Jacket	Ocean C-3/typeA	2	2012
16	Battery	Panasonic K-KJQ08M40V with batteries 4pcs	2	2012
17	Battery	Panasonic HHR-3MVS/2B	2	2012
18	Distance Meter	Nikon 550AS	1	2012
19	Clamp on Power HiTester	HIOKI 3286-20	1	2012
20	Measure Pole	SK SF-12	1	2012
21	Binoculars	Nikon TRAVELITE VI 8X	1	2012
22	Walking Measure	EA720F-12	1	2012
23	Earth Tester	KYORITSU 4105A	1	2012
24	Insulation Tester	KYORITSU 3201	1	2012
25	Phase Detector	HIOKI 3126-01	1	2012
26	Voltage Detector	HASEGAWA HSF-7	1	2012
27	Safety Helmet	TANIZAWA ST#169-FZ	6	2012
28	Safety Shoes	28cm	6	2012
29	Working Glove	NB-U-202 (Insulation Glove)	6	2012
30	Working Glove	Leather, MIDORI-ANZEN No.117	6	2012
31	Insulation Rubber Boot	Size 28cm	6	2012
32	Safety Belt	Titan E-light 16	1	2012

4.4 Expense for local project activities

Table 4-5 shows the expenses of work in Zambia for the Project on Japanese Yen (JPY) basis.

Table 4-5 Expense for local Project activities

Local Expense	2010	2011	2012-2013	Total (JPY)
Interpretation and Translation Cost	0	0	0	0
Repair and Maintenance Cost	0	0	0	0
Material/Equipment Purchase Expenses	1,020	20,950	185,640	207,610
Travel Expenses	0	0	0	0
Communication Expenses	0	0	0	0
Printing and Binding Cost	0	0	0	0
Rental Cost	1,287,854	1,998,635	1,305,076	4,591,565
Training fee	0	137,934	178,200	316,134
Conference Cost	0	0	0	0
Others	0	0	0	0
Total (JPY)	1,288,874	2,157,519	1,668,916	5,115,309

Chapter 5. Results of activities

The number of the C/Ps was limited and, moreover, they had to carry out the wide-ranging duties of routine work. Under these circumstances, the following activities were conducted with the assistance of short-term experts in various fields who cooperated with the long-term expert dispatched separately from them. The numbers in parentheses following the heading titles indicate the items of Project activities in the interim review report (see the attachment II: Work schedule). The main year or years for implementation of each item are also indicated in a second set of parentheses. The photos are attached in the attachment III: Photos of Activities.

5.1 Review of the procedure for RGC packaging and examination of the need for repackaging (1-2, 1-3, 1-4, 2-1) (FY2010 - 2011)

In the REMP, project packages were prepared, each covering two or more RGCs, and an order of priority was established for electrification in the units of packages. A study was made of the propriety of this method of preparing project packages and whether or not there was a need for repackaging.

The packages for the REMP were based mainly on desk studies in the office, and did not fully reflect the circumstances on actual sites. This resulted in various problems. For example, in some cases, the package would turn out to be too large for implementation in a single year. In others, the target facilities for electrification in the package would be unclear, or facilities that ought to be electrified were not included.

There was also a problem in the form of existence of areas without power left out of the REMP list. The REMP had nevertheless been approved by the government, and its revision was difficult by the REA itself. For this reason, on the occasion of preparation of the five-year rolling plan, it was decided to execute a pre-feasibility study (F/S) for project packages in the REMP for the next five years, conduct basic design, and revise the substance (including the electrification subjects; this revision amounted to a segmentation by division of single project packages into smaller ones). The detailed methodology of segmentation was described in the pre-F/S manual.

5.2 Capacity development for REMP updating (6-1) (FY2010 - 2013)

REMP updating requires an understanding of the specific procedure for preparation of the REMP itself. There was a problem in this connection, as the REMP did not contain a both detailed and specific description of the calculation methodology used in its preparation. In response, it was decided not to perform actual updating work because the REMP had been prepared only recently and instead to put together a manual with commentary on the techniques applied in the REMP in order to improve the updating capabilities of the C/P personnel.

In addition, REMP calculations required detailed data, and acquisition of such data was not entirely adequate. Moreover, it was difficult for the assigned personnel at the REA to obtain and examine even

requisite data. It was also found necessary to establish a technique for assessment of requests for electrification from local governments for un-electrified villages not listed in the REMP and points for which the government requested prompt electrification along with the establishment of new districts (collectively termed "outside-REMP projects) on equal footing with the projects listed in the REMP.

In light of this situation, the short-term expert proposed a technique for simplified assessment of methodology (economic merit) for comparison of degrees of project priority in the REMP, based on comparison of the project cost and actual demand.

5.3 Preparation and use of a manual for formulation of RGC electrification plans (1-1) (FY2010 - 2013)

In the first meeting of the joint coordinating committee (JCC), the team of experts first confirmed the need for preparation of five-year rolling plan by the REA. At that time, however, five-year rolling plan was not being prepared, and their purpose was not clear to REA. As a first step, it was consequently decided to confer with the C/P personnel on the purpose.

An identification of REA issues on the occasion of defining objectives revealed the need to order priorities with consideration of both outside-REMP and REMP projects, seeing that it was not permitted to change the REMP list as noted above. The ordering of priority for the outside-REMP villages and REMP villages was particularly problematic. This was because acceptance of the requests from local governments without modification would amount to a lack of fairness as regards the handling of those listed in the REMP. Matters were compounded by the lack of proper management for the state of RE progress.

In consideration of these circumstances, the C/P personnel and short-term experts set the objectives of the five-year rolling plan as follows.

1) Determination of RE implementation plans

2) Determination of budget plans

3) Ordering of the priority of REMP and outside-REMP projects

The short-term experts gave the CEO and T/D an explanation of these objectives. With their consent, a manual was provided with the instruction to enable the REA personnel to prepare the five-year rolling plan themselves by following the manual. It should be noted that "Five-year Rolling Plan Manual" became the replacement of "Manual for Preparation of RGC Electrification Plan" in the title of this section.

5.4 Selection of packages to be covered by the study for RGC electrification planning (1-2, 2-2) (FY2010)

For the packages to be covered by studies in the OJT, a selection was made of locations to which C/P personnel had to go in their other work. The C/P personnel were extremely busy, and this was done so they could receive the training more efficiently. The training sites were also selected with consideration

of the distance from Lusaka and the projects to be implemented by the REA in the near future.

Pre-F/S and F/S are similar in respect of the work performed on site, and the OJT covered both. Actual data for the OJT projects are shown in Table 5-1. These data are only for the locations of the OJT for pre-F/S and F/S; data for OJT for inspections are shown in a different table.

Table 5-1 List of OJT for Pre-F/S, F/S

Site	Period	C/P	Contents
Masuku/ Choma	26 Jan. – 28 Jan.2011	Mr. Christopher Chisense Mr. Patrick Mubanga Mr. Nelson Mbulo	Enhance Preparation knowledge for F/S and method of F/S
Kabompo	5 Jun. – 11 Jun. 2011	Mr. Stanlay Lyalabi Mr. Nelson Mbulo	Enhance F/S skill for Mini-hydro and grid extension(Pre-F/S)
	17 Oct. – 22 Oct. 2011	Mr. Stanlay Lyalabi Mr. Nason Musonda Mr. Edmond Mkumba	
Mukando/ Serenje	25 Oct. – 27 Oct. 2011	Mr. Patrick Mubanga Mr. Nason Musonda Mr. Wazingwa Mugala Ms. Leah Banda Mr. Suzyo Silavwe Mr. Penjani Nyimbili Mr. Besa Chimbaka	Enhance knowledge for F/S and method of F/S
Mazabuka	13 Jun. 2012	Mr. Wazingwa Mugala Mr. Nason Musonda	Enhance knowledge for F/S and method of F/S
	20 Jun. – 22 Jun. 2012		
Chipepo Waya	27 Nov. – 29 Nov. 2012	Ms. Leah Banda Mr. Penjani Nyimbili	Enhance knowledge for F/S and method of F/S

5.5 Implementation of training for RGC electrification planning (1-3, 1-4, 2-2) (FY2010)

At the pre-F/S stage, project packages that were too big had to be divided into mini packages (segments). The short-term experts instructed the C/P personnel in the segmentation procedure. At first, methodologies for desk studies for segmentation were instructed, that is, using manuals and instruction documents. When it was found that desk studies alone did not yield a sufficient understanding, it was decided to switch to a procedure for technology transfer through mainly OJT including actual sites.

The desk training provided instruction in preparatory work needed to ascertain the on-site situation in advance of the actual pre-F/S and F/S. This instruction did not produce a full understanding, partly because the C/P personnel were hard-pressed by their ordinary duties. The short-term experts therefore

took them to the prospective sites to have them experience how inefficient the studies would end up being without sufficient preparation, and to impress the importance of advance study on their minds. This changed the situation for the better. In advance of the on-site study during November 27 - 29, 2012, for example, it was confirmed that the personnel had mastered the know-how by their energetic performance of the preparatory study, even though they were very busy with their ordinary duties.

5.6 Preparation of tender documents for study of RGC electrification planning (4-4) (FY2010 - 2011)

Although there was the option of outsourcing on-site studies, the T/D determined a policy of having the REA performs field survey (which are the same as pre-F/S in content) themselves. In line with this policy, the short-term experts provided OJT for pre-F/S and F/S as noted above, to enable the C/P to handle this work alone. The OJT also deepened their appreciation of the fact that the study results are key points in specification sheets for placement of contracts.

As a result of repeated discussion and on-site OJT, the C/P became capable of executing pre-F/S and F/S by themselves. It is consequently thought that, even if policy at the REA changes and it becomes necessary to outsource pre-F/S, the C/P will be capable of making technical examinations of the items on tender documents (contract specification sheets), as they already have a good knowledge of what these documents should include.

5.7 Collection of data and information required for preparation of RGC electrification plans, and RGC field study (1-3, 1-4, 2-2) (FY2010 - 2011)

As described in Section 5.4, for the sites covered by OJT, basic data and information needed for the demand forecasting and route selection was collected through advance work in Lusaka. Additional basic information was also collected on the site. The on-site study confirmed the following points:

1) There were more target facilities of electrification on the project sites than in the REMP.

2) Information on existing distribution facilities was not being adequately managed by the ZESCO.

3) The items concerned in the preceding two points above could not be ascertained in Lusaka; a full understanding of them could only be acquired by visiting the sites.

4) The RGCs noted in the REMP were not clearly defined in geographical terms.

In particular, although schools were cited as major facilities for electrification, it was found that there were many schools without electricity which were not contained in the REMP. As a result, to further the electrification of major facilities not contained in the REMP, it was decided to have the monitoring and evaluation (M&E) Department of the REA include them in its indicators for monitoring of project progress.

There was also an issue concerning existing electrical facilities. It was learned that the REA personnel had to be accompanied by personnel from the local ZESCO offices when making on-site studies (this is because there were no facility drawings and much depended on the memory of the ZESCO

personnel). These items of information collection and points to be borne in mind in the collection process were included in the pre-F/S manual.

5.8 Preparation and updating of the F/S manual for RGC electrification (2-1) (FY2010 - 2013)

The F/S manual incorporated points requiring points to be considered during collection of information needed for the preparation of tender documents for distribution line extension projects and points of importance for the preparation of basic design drawings. The manual draft was checked against the tender documents already in use and the experts instructed in procedure for revising the documents by inclusion of technical items that had not been in the tender documents. The short-term experts endeavored to make manual more usable through reflection of the instruction results in it. The manual was used in actual OJT (Section 5.9) and improved by the C/P.

5.9 Implementation of F/S for RGC electrification (1-3, 2-2) (FY2010 - 2011)

As noted in Section 5.4, the OJT for F/S or pre-F/S was prepared. Instruction in approaches to solution of newly discovered technical problems were provided. For example, methodologies to improve weaknesses (problem points) in the design of existing on-site facilities were instructed in response to problems such as frequent damage from lightning.

At the same time, the experts repeatedly emphasized the importance of advance desk studies and inquiries to concerned authorities for more efficient performance of on-site studies.

5.10 Preparation of a manual for mini-hydro systems (3-1) (FY2010)

Generally speaking, it is difficult to pass technical skills on unless the work in question continues to exist into the future. Before preparing the manual, the short-term experts checked to see whether or not there were any existing regulations or other items related to hydropower stations. It was pointed out by ZESCO that hydropower stations had not been constructed in recent years and that the technical skills had not been in ZESCO.

In light of this situation and the expectation that the REA will probably not be implementing many mini-hydro projects in the future, it was decided to prepare a manual with general contents on mini-hydro technology, including basic knowledge.

5.11 Preparation of a manual for project management (4-1) (FY2011 - 2013)

As noted in Section 5.3, the flow of work from the five-year rolling plan to the annual work plan was unclear. The experts therefore decided to confirm the flow of work through repeated discussion with the CEO and the T/D, and to identify points to be considered in the process leading up to completion.

Including this flow, the short-term experts drafted the Project Management Manual with a checklist. The manual sets forth how a single RE project should be managed throughout the process from the pre-F/S to completion. Lastly, REA was given instruction in procedure for management of the annual work schedule (Section 5.12).

5.12 Evaluation and review of the existing setup for project management (4-2, 4-3) (FY2011 - 2013)

· Regarding the methodologies for project implementation, it was thought that there was basically no need for suggestions as work in this field was already being led by the T/D at the time. In the aspect of organization management, it appeared that the engineer workload was not sufficiently determined and that work was not being efficiently managed. The experts consequently made repeated suggestions for implementation of the following steps.

1) Determination of the annual workload

2) Preparation of a yearly work schedule

3) Preparation of work schedules for individuals

After the change of CEO and T/D, the new management team at the REA realized that overall project progress was unsatisfactory and understood the need for work schedules.

5.13 Formulation and updating of a manual for supervision of RE construction (4-7) (FY2011 - 2013)

In light of the prevailing state of construction supervision, the short-term experts drafted the Supervision of Construction Works Manual for Power Distribution setting forth process control and the key points of inspection in construction of new distribution line facilities.

The preparation began with the determination of technical standards for indication to contractors by the REA, based on the ZESCO standards. The short-term experts also put together a case book with visual representations of on-site facilities found to have problems in the process of OJT, for use as manual enabling C/P personnel to identify points requiring attention in on-site inspection at a single glance. In these and other ways, they strove to make the manual easy for the C/P personnel to use, and provided suggestions and guidance on its contents.

5.14 Transfer of technology for management of RE construction (4-8) (FY2011)

To instruct personnel in the key points in on-site inspection using actual distribution facilities, technology was transferred through the OJT noted in Section 5.15. In this OJT, the short-term experts explained the key points in advance desk study, and then provided the instruction while confirming the actual on-site facilities. After the on-site study, wrap-up meetings were for mutual confirmation that the C/P personnel had a solid understanding of the know-how.

Upon completion of the OJT, workshops were held not only to secure the understanding of the C/P personnel who participated in the OJT but also to share the technology with C/P personnel who had not. This enabled transfer of the requisite technology to all concerned C/P personnel.

5.15 Implementation of OJT for distribution line extension (2-2, 4-8) (FY2011 - 2013)

The experts provided OJT for management of RE construction at the sites shown in Table 5-2. (The OJT for pre/F/S and F/S work is noted in Section 5.4.) In this OJT, technology was transferred in

accordance with the manual prepared in advance, and made additions to and revisions in the manual, based on information on defective on-site facilities and other knowledge obtained through the OJT.

Table 5-2 List of OJT for inspection

Site	Period	C/P	Contents
Kaparu Mission (north of Lusaka)	29 Oct. 2010	Mr. Francis Mulenga Mr. Christopher Chisense	Enhance Inspection skill and knowledge
Mungle Village/ Chibombo	1 July 2011	Mr. Patrick Mubanga Mr. Nelson Mbulo	Enhance Inspection skill and knowledge
Masuku/ Choma	1 Feb. 2012 – 3 Feb. 2012	Mr. Wazingwa Mugala Mr. Justin Mwansa Mr. Suzyo Silavwe	Enhance Inspection skill and knowledge

5.16 Execution of the contract process and review of contract documents for RGC electrification plans (confirmation of order specification sheets for F/S and D/D related to distribution line extension, and presentation of opinions) (4-4, 4-5) (FY2011 - 2013)

As noted above, the T/D determined policy to have REA performs F/S and D/D themselves. For this reason, the experts confirmed the contents of tender documents actually used in placing contracts for construction and indicated points requiring improvement. The determination of such points was made through the following steps.

1) Confirmation of tender documents

2) Participation in tender presentation meetings (Lusaka)

3) Checking against the tender documents through participation in on-site presentation meetings (project sites)

These steps revealed the following problems.

a) Incomplete technical explanations on tender documents (and particularly the drawings)

b) Necessity of efficient tender explanation meetings

c) Mismatch between the drawings attached to tender documents and the actual on-site conditions

The initial tender documents consisted only of drawings on the level required for on-site explanations (e.g., rough drawings of distribution line routes that did not correctly map the actual site). The experts proposed improvement points and provided instructions in the preparation of accurate drawings.

There were difficulties with some of the improvements proposed by the experts owing to issues in the system of procurement (or business conventions in Zambia). For example, these issues made it impossible to clearly specify items in specification sheets and define penalties for construction delays. Thus far, construction delays have been taken as a matter of course. The situation calls for prompt

improvement, but further studies are required as legal issues are also involved.

5.17 Repackaging of RGCs to be electrified (1-4) (FY2011 - 2013)

As noted in Section 5.1, the repackage of projects was proposed in the pre-F/S including the repackaging procedure in the pre-F/S manual and the related items of technology transfer in the case of Mazabuka, which was also a location of on-site study in the OJT program. In the case of large project packages, it was necessary to install two or more new distribution lines from the existing ones. In this work, efficiency demands a certain degree of map study before making a visit to the site. The importance of this advance study was repeatedly emphasized to the C/P personnel.

5.18 Preparation of tender documents related to D/D, material procurement, and construction for repackaged electrification projects (4-4) (FY2011 - 2013)

This item was included in the implementation of the work outlined in Section 5.16.

5.19 Collection of data and information required for preparation of plans for RGC electrification by mini-hydro systems, and implementation of the related F/S (1-3, 3-2) (FY2011)

Because there were no sites where the REA was scheduled to make studies in the immediate future, the experts conducted an on-site study and provided technical instruction at the Chikata Falls site (Kabompo, North-Western Province), which is a site of mini-hydro development in a World Bank project (actual data are shown in Table 5-3). Two studies were conducted in order to confirm that the know-how had taken root and also to survey the existing distribution lines (first study) and make a field survey of areas without electricity (second study).

Table 5-3 List of OJT for mini-hydro

Site	Period	C/P	Contents
Kabompo	5 June 2011 – 11 June 2011	Mr. Stanlay Lyalabi Mr. Nelson Mbulo	Enhance knowledge and skills of Mini hydro F/S)
	17 Oct. 2011 – 22 Oct. 2011	Mr. Stanlay Lyalabi Mr. Nason Musonda Mr. Edmond Mkumba	

The related OJT included a trip to the actual site to conduct topographical survey and river flow measurement for installation of facilities (small-scale dams). At the same time, a study was made of the situation in areas without electricity supply, such as the distribution of major facilities for distribution line extension and the presence or absence of plans for development at certain points.

Before implementation of on-site OJT, the members made a visit to the ZESCO head office to obtain information on hydropower stations, but were told that the technology had already been lost and did not obtain any useful information. The OJT was implemented with the cooperation of the Department of

Water Affairs, which has information required for hydropower development.

5.20 Instruction for and implementation of studies for the mini-hydro F/S (3-2) (FY2011 - 2012)

In advance of the on-site OJT (Section 5.19), the procedure for desk work of hydropower potential study was provided. Upon completion of the OJT, the results of the measurement of river flow and prepared curves for water level and flow were examined. Hydrological data for the project vicinity was obtained from the Department of Water Affairs and preparations were made for long-term flow data analysis. In addition, cross-section drawings at the dam point based on the results of the on-site survey work were prepared and the size of dam required for the plan was determined.

5.21 Repackaging of RGCs to be electrified by mini-hydro systems (1-4, 3-2) (FY2012)

The short-term experts provided instructions in repackaging (termed "segmentation" in the pre-F/S) on the occasion of distribution line extension, in the case of a mini-hydro OJT site (Section 5.19). A diesel system has already been installed in the vicinity of this site, and there were plans for industrial development. These facilities and plans were therefore taken into account in discussion including approaches to separating electrification by PV systems and that by distribution line extension in projects.

During preparation of the report upon OJT completion, C/P personnel were instructed about the need to note the change in the protection system for simple distribution line extension when there is a change in the distribution of current on the cable. They were also instructed in other items of caution related to actual facilities, such as the single-unit capacity and operating limits of generators and the handling of the diesel generators already installed.

5.22 Revision of the manual for electrification by mini-hydro systems (3-1) (FY2012)

After the OJT, the short-term experts revised the manual for electrification by mini-hydro systems in line with the OJT content. They also made a review of the F/S report on the mini-hydro development at Chanda/Chavuma, in respond to request of the T/D. In addition, they prepared documents and provided instruction on key points and procedure for performance of reviews by C/P themselves.

5.23 Preparation of a framework for improvement of the sustainability of PV systems (preparation of technical specification sheets for PV systems for the REA) (5-2, 5-3, 5-4, 5-8) (FY2010)

The REA was promoting electrification by installation of solar home systems (SHSs) at facilities such as schools and clinics in locations where it would be difficult to extend distribution lines. At the start of the work, there was an urgent need for improvement of the level of technology, partly because of the addition of the sustainable solar market package (SSMP) with assistance from the World Bank, and of the Mpanta mini-grid project for electrification of a village with an intensive PV system with assistance from United Nationals Industrial Development Organization (UNIDO). However, a check of these specification sheets revealed that there were major errors in some of the specifications in each (see Note 1[1]). In spite of this, know-how had not reached a level high enough for noticing and resolving these

[1] Specification sheet defects were anticipated to lead to problems such as a shortage of generation capacity and shortening of

problems. In response, the short-term expert held the basic training and lectures as noted in Section 5.25 in order to raise the level of know-how so that C/P could correct technical specification sheets. This led to completion of the revision of technical specification sheets for the first year.

As this suggests, improvement of the sustainability of PV systems requires the C/P to have the know-how needed to spot and resolve problems themselves. Human resource development must be at the core of the framework for improvement of sustainability to this end. The REA has the role of continuous installation of PV systems in public facilities that would be difficult to electrify by extending distribution lines. The objective was therefore to make arrangements that would produce engineers on the instructor level within the organization.

5.24 Preparation of plans for strategy for diffusion of PV systems and human resource development (-) (FY2010)

In the first year, the expert engaged in discussion on the role of the REA and prepared plans to enable it to discharge the function of putting design and technical specifications for recommended PV systems as the sole institution promoting their diffusion.

As the REA remains the sole institution involved with PV technology, plans for human resource development were prepared aiming at the following as goals to be reached by C/P personnel: 1) acquisition of sophisticated technical know-how as PV specialists and 2) acquisition of the ability to instruct others in the know-how mastered.

5.25 Implementation of basic training in PV systems for public institutions (5-1) (FY2010 and 2012)

In the first year, the short-term expert conducted a five-day program of basic training for three REA personnel and two DOE personnel. The training was of a practical nature and included instruction in the use of a PV system utilized by the REA as a PC back-up system.

Because the basic training alone was insufficient for raising the level of technical know-how high enough, the expert also provided extra instruction to individual REA personnel during their spare time.

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battery service life.

Table 5-4 Basic training of solar power system and supplementary classes (first year)

Purpose	Acquire basic knowledge about solar power generation technology
Duration	Nov.15 ~Nov.19, 2010 (Excluding supplementary classes)
Location	Mika Hotel (Basic training), REA(Supplementary classes)
Trainees	Mr. Fred Mushimbwa (REA, Supplementary classes only) Mr. Nelson Mbulo (REA) Mr. Clement Chiwele (REA) Mr. Wankunda Siwakwi (REA) Mr. Kasongo Chiwama (DOE, Basic training) Mr. Lufunda Muzeya (DOE, Basic training)
Result	It was found that the C/P still needed basic knowledge that the intended results had not been achieved. As such, the expert decided to provide additional instruction aimed at imparting knowledge beginning with the equivalent of fundamental learning (scholastic) ability.

Nevertheless, there was a steep decrease in the number of personnel who had experience with PV systems or graduated from the training, due to factors such as the death of a REA staff whose level of technical know-how had risen, retirement of others, and additional hiring to fill shortages. As a result, the level of technical know-how at the REA almost came back to where it was at the start of the first year. The short-term expert therefore conducted the program of basic training again in the third year and raised the level of know-how as shown in the Table 5-5.

Table 5-5 Basic training of solar power system (3rd year)

Purpose	Acquire basic knowledge about solar power generation technology
Duration	Nov.15 ~Nov.19, 2012
Location	REA
Trainees	Mr. Patrick Mubanga (REA) Mr. Nason Musonda (REA) Mr. Wazingwa Mugala (REA) Mr. Suzyo Silavwe (REA) Mr. Penjani Nyimbili (REA) Mr. Edmond Mkumba (REA) Mr. Justin Mwansa (REA) Ms. Leah Banda (REA)
Result	Half of the personnel who received the training acquired a correct understanding on the basic level, but the other half lacked the fundamental learning ability.

5.26 Revision of manuals and texts related to PV technology (5-5, 5-6) (FY2010 - 2012)

As a result of the basic training, it was decided to make texts on an intermediate technical level. The short-term expert prepared texts covering all necessary know-how and based on the PV conditions in Zambia.

The texts were used in actual training, and areas that were found to be hard to comprehend or liable to cause misunderstanding were revised through a process of repeated improvement to raise the degree of perfection.

The texts consisted of a set of slides used in the training and a manual containing comments for instruction about the slides. It was decided to limit their distribution to the certified instructors because of the risk of misunderstanding if they were read by personnel who lacked a sufficient level of technical know-how.

5.27 Preparation of a manual for inspection and monitoring of PV systems (5-7) (FY2010 - 2012)

In regard to PV systems, the work of the REA is confined to their installation; the REA does not do maintenance. For this reason, the short-term expert raised the question of the framework at the DOE and the REA for maintenance of the large amount of PV systems already installed.

In addition, the existing setup for inspection and monitoring was confined to the external appearance, and a system was judged to be operating normally if it was providing some electricity. PV systems, however, often have defects even if they seem to be working normally and providing power on first inspection. In inspection and monitoring, it is therefore extremely important to take measurements and analyze the measurement data. Because there were essentially no personnel capable of performing measurement-based inspection and monitoring work in Zambia, the expert provided instruction in this area through the training for trainers and OJT. The C/P personnel who acquired the technical know-how realized that the kind of external inspection performed so far was not effective and that the operating status and defects could be determined only by taking measurements and analyzing the measurement data. In parallel, the expert prepared a manual for inspection and monitoring, and distributed it to the certified instructors. The distribution was limited to these certified instructors because of apprehensions that the manual would not be comprehensible to personnel lacking a sufficient level of technical know-how, and may, on the contrary, even invite misunderstanding. For this reason, instruction by a person who had acquired the necessary technical know-how was taken as a prerequisite for performance of inspection and monitoring.

5.28 Implementation of trainers' training for PV technology (5-6) (FY2011 - 2013)

The trainers' training was implemented three times. In the training, a Philippine instructor who had been trained under a previous JICA technical assistance program (see Note2) was invited to serve as a third-country expert as part of the South-South Cooperation activities. The training was grounded in the

[2] A project for RE in the Philippines utilizing renewable energy (2004 - 2009)

Shiota-method, which enables the trainees to acquire knowledge of PV technology and teaching techniques within a comparatively short time by encouraging their understanding and thought (see Note3). The curriculum included some practical know-how thought to be needed in Zambia. Because there are few opportunities for people to receive such practical training, the expert prepared an environment for active learning by participants from countries other than Zambia who were members of another project (see Note4) or wanted to attend at their own expense (see Note5).

For the third trainers' training program, the third-party expert was replaced by an REA staff been certified to serve as a primary-level instructor in the second trainers' training program. There was also training for certification of intermediate-level instructors through improvement of the technical know-how of the primary-level instructors.

Taken together, the three trainers' training programs produced an extended total of seven certified Zambian instructors (five primary-level and two intermediate-level). Because there was essentially no one in Zambia who had correct knowledge of PV technology when the Project began, the trainers' training greatly raised the level of PV technology not only at the REA but also in Zambia as a whole. There are now personnel in Zambia capable of making close examinations of technical specification sheets prepared by Western consultants in future donor projects, pointing out errors in them, and promoting installation of better PV systems as a result. This, in turn, holds prospects for a vital contribution to improvement of PV system sustainability.

It should be added that the level of intermediate-level instructors is sufficient for service as third-country instructors (see Note6). This raises the prospect of promotion of South-South Cooperation activities by appointment of REA personnel to serve as instructors for programs of education about PV technology in neighboring countries. Table 5-6 to Table 5-9 show the summaries of the trainers' trainings.

[3] This method was given highly appreciated in programs in the Philippines, Malawi, Bhutan, and Kenya.
[4] A project for support for reinforcement of high-level technical schools in Tumba, Rwanda (2007 - 2012)
[5] A JICA trainee (training under the B program to support planning for introduction of PV systems in fiscal 2011)
[6] These are classes of certification in Shiota- method training. The primary level indicates a correct understanding of PV systems. In certain developing countries, there are virtually no people who have correct technical know-how even if they have long been working with PV systems, and those with even primary-level certification are become core PV persons in those countries. An intermediate certification qualifies its holder for service as a third-country expert, i.e., one able to provide technical instruction even in other countries.

Table 5-6 Trainer training seminar (Introductory) (2nd year)

Purpose	Train Certified Basic Trainer for Solar PV
Duration	Oct.3 ~Oct.14, 2011
Location	Pumulani Renewable Energy Center (Kafue)
Instructor (Expert from a 3rd country)	Mr. Magdaleno M. Baclay Jr. (Philippine, DOE staff)
Trainees	Mr. Fred Mushimbwa (Passed REA) Mr. Nason Musonda (REA) Ms. Leah Banda (REA) Mr. Mugala Wazingwa (REA) Mr. Michael Champo (District Medical Office) Mr. Iyakaremye Emmanuel (Passed TCT, Rwanda) Ms. Uwabyaye Liliane (TCT, Rwanda) Mr. Nzabonimana Gilbert (TCT, Rwanda)
Result	A total of two personnel (one Zambian from the REA and one Rwandan) passed the certification exam. The training applied a method of repeated instruction encouraging understanding of and thought about the systems as opposed to memorization of knowledge. Trainees who lacked basic learning ability (in areas such as rule-of-three sums and basic knowledge of electricity) and depended on rote memorization failed the exam. The REA personnel who was certified for instruction was provided with OJT in monitoring on the site of actual PV system installation. Because he took measurements of a system that appeared to be operating normally and managed to discover the defect through examination of the measurement data, he was judged to have attained the targeted level of know-how.

Table 5-7 Trainer training seminar (Introductory) (3rd year)

Purpose	Train Certified Basic Trainer for Solar PV
Duration	Oct.8 ~Oct.19, 2012
Location	Pumulani Renewable Energy Center (Kafue)
Instructors (Experts from a 3rd country)	Mr. Camelo B. Cabuga (Philippine, DOE staff) Mr. Peter A. Sablay (Philippine, DOE Staff)
Trainees	Mr. Patrick Mubanga (Passed REA) Mr. Wazingwa Mugala (Passed REA) Mr. Suzyo Silavwe (Passed REA) Mr. William Masocha (DOE) Mr. David Shula Mpundu (Passed ERB) Mr. Sahalu Hassan (Umaru Univ, Nigeria)
Result	A total of four personnel (three from the REA and one from the ERB) passed the certification exam. The exam-passing rate was higher due to the selection of personnel with a sufficient level of basic ability from the basic training and to the high level of enthusiasm for study among the trainees. As a result, the number of Zambians certified as instructors rose to five, and four of them were REA personnel. (However, one of the REA personnel certified in the second year subsequently died of disease, so the number of certified REA personnel was actually three.) As in the previous program, the REA personnel who were certified for instruction were provided with OJT in monitoring on the site of actual PV system installation. They proved that their knowledge had reached a sufficient level by correctly detecting defects through examination of data from measurements they took of a system that appeared to be operating normally.

Table 5-8 Trainer training seminar (Introductory and intermediate) (4th year)

Purpose	Train Certified Basic Trainer for Solar PV Train the trainees to upgrade trainee's qualification from "Certified Basic Trainer for Solar PV" to "Certified Intermediate Trainer for Solar PV"
Duration	May 6 ~May 17, 2013
Location	Pumulani Renewable Center (Kafue)
Trainers	Mr. Wazingwa Mugala (REA, Basic trainer, promoted to Intermediate Trainer) Mr. Suzyo Silavwe (REA, Basic trainer, promoted to Intermediate Trainer)
Trainees	Mr. Nason Musonda (REA) Ms. Ngosa Khondowe (REA Intern) Mr. Newton Ndhlovu (REA Intern) Mr. Danny Kasolo (Mpanta project)
Result	The four trainees all failed the certification exam because of a lack of basic learning ability. Two of the primary-level instructors passed the exam for certification as intermediate-level instructors. The intermediate-level certification is equivalent to mastery of technical know-how required for third-country experts. For this reason, there are hopes for service as technical instructors by REA personnel with this certification, not only in the REA but also in neighboring countries in programs of South-South Cooperation.

Table 5-9 Trainers who passed Certified Trainers after Trainer training seminar

Name	Organization	Certification Number	Qualification
Wazingwa Mugala	REA	ZMPV2013-B01 (ZMPV2012-C01)	Certified Intermediate Trainer for Solar PV (Certified Basic Trainer for Solar PV)
Suzyo Silavwe	REA	ZMPV2013-B02 (ZMPV2012-C03)	Certified Intermediate Trainer for Solar PV (Certified Basic Trainer for Solar PV)
Fred Mushimbwa	REA	ZMPV2011-C01	Certified Basic Trainer for Solar PV
Iyakaremye Emmanuel	Rwanda TCT	ZMPV2011-C02	Certified Basic Trainer for Solar PV
David Shula Mpundu	ERB	ZMPV2012-C02	Certified Basic Trainer for Solar PV
Patrick Mubanga	REA	ZMPV2012-C04	Certified Basic Trainer for Solar PV

5.29 Assessment and improvement of procedure for financial management (REF budget formulation and operation management, and financial management and account supervision related to project implementation) (7-1, 7-2) (FY2010 - 2013)

In advance of this work, the short-term expert ascertained the state of finances. It was found that, up until 2009, there was an outstanding accumulated balance of funds because the initially targeted average amount of investment (about USD50 million) in projects had not been implemented. This is presumably due to the methodology (state) of project implementation (see Section 5.12). It is assumed that, from now on, projects will be implemented in accordance with the initial budget and plans, and that financial execution will likewise be improved.

Regarding the financial statement for 2010, the C/P completed the draft within one month, and the documents for board meetings within three months, after the end of the fiscal year. There were no particular problems with the contents. It was consequently thought that the financial units had considerable capability, and that issues lay more with the method of project implementation than with financial operations, as noted above. (Financial operations for fiscal 2011 were disrupted by the change of administration.)

In the interest of higher efficiency, it is considered important for the Financial Department to make a review of the process of work with other divisions (support of project payment work and the work of procurement and contract placement). In connection with management of project finances, the Study Team held separate meetings for consultation and technical discussions in order to enhance the knowledge of C/P personnel. The results of these meetings are expected to provide the basis for studies at the REA on revision of work processes and management methods.

At present, personnel hand each other paper documents or Excel data. For improvement, the expert

proposed the use of software for accounting and financial management sold in the market. A seminar was held on this software, but budgetary constraints prevented its adoption. The Project includes the preparation of a report for improvement of work, and studies on the next step are anticipated to be made by the REA in the future.

5.30 Partnership with other donors (-) (FY2010 - 2013)

When the short-term experts attempted to make contact with the Swedish International Development Cooperation Agency (SIDA) and World Bank in the interest of coordination, the CEO noticed and strongly requested that they refrain from conferring with other donors. At the same time, the short-term experts were not permitted to be present at discussions between the World Bank and the REA. They therefore did not confer with other donors. In contrast, coordination and information-sharing with other donors were conducted through JICA Zambian Office, and encountered no particular obstacles.

5.31 Preparation of a manual for accounting and financial management (7-3) (FY2011 - 2012)

The current REA's Operation Manual was prepared in 2009, and did not match the realities of the operations in certain respects. Upon consultation with the C/P personnel, it was decided they would prepare a revised version and address the related issues. The revision concerned the role of personnel assigned to finances and the process of formulation of the annual budget plans. It also took account of conformance with the accounting system at the ZESCO. The revised version heightened the degree of completeness as a manual for actual use in operations.

The manual is currently being finalized at a board meeting. Upon approval, it will be printed in book form and distributed to concerned personnel, like the other manuals.

5.32 Formulation of five-year rolling plan (1-5, 1-6) (FY2011 - 2012)

REA personnel were provided with instruction enabling them to prepare the five-year rolling plan themselves, in accordance with the manual prepared as described in Section 5.3. As a result, they eventually formulated the next five-year rolling plan with the support of the long-term expert.

5.33 Formulation of annual work plan (-) (FY2011 - 2012)

The experts decided to basically stipulate, within the project management manual, application of those parts of the five-year rolling plan equivalent to the plan for a given year as is, unless the F/S ascertained changes in the situation from the time of the pre-F/S. This was done to have all survey work required for the tender documents to be performed in the pre-F/S, in the interest of simplifying operations.

5.34 Support for construction of a system for RE-related M&E (4-6) (FY2011-2013)

The REA has instituted a setup for checking of the influence of electrification by the Monitoring and Evaluation (M&E) Department. To this end, the M&E Department is preparing a monitoring and evaluation manual. The Study Team commented on the final draft of this manual. (This final draft has not yet been approved at a board meeting.)

In the process of work implementation, the M&E Department is going to hold community meetings for explanation in advance of project initiation. The short-term expert consequently proposed execution of a baseline study at this time to make the work more efficient. Because of the large number of projects to be implemented by the technical division during the year, the expert also provided instruction on the process of on-site survey and plans for personnel posting.

As in the case of project implementation by the Technical Department, the experts proposed the outsourcing of this survey due to the human resource issues at the REA. A certain degree of results is being achieved as a result; the REA is outsourcing some monitoring and analysis work, and resolving some of the work backlog. The experts also made suggestions for improvement of the existing work at the REA in monitoring and evaluation, and these are thought to be endowing work within the REA organization with added value.

5.35 Implementation of training in Japan for C/P personnel

As noted in Section 4.2 (Counterpart training in Japan), trainings were provided in Japan one time each in the second and third years. This training was adapted to the needs of the trainees.

Chapter 6. Measures and lessons in the aspect of Project operation

6.1 Measures in the aspect of Project operation

6.1.1 Flexible adaptation to the situation at the C/Ps

As noted in Chapter 2, during the term of the Project, there were many changes among the C/P personnel due to quitting and other factors, and this led to big disparities in respect of technical capacity. The instruction therefore had to be deftly adapted to the circumstances on the Zambian side. More specifically, changes had to be made in the items of technical study to be carried out in F/S and other operations, without changing the objectives of REA work.

Furthermore, because C/P personnel were extremely busy with the ordinary work, it was difficult to furnish many of them with OJT at the same time in the course of on-site activities. As far as possible, the experts held workshops after the on-site OJT and had the C/P personnel who had received the OJT act as the instructors. This service as instructors helped to deepen the understanding of the personnel who had gone to the project site, and effected a sharing of knowledge with the C/P personnel who had not been able to receive instruction directly from the Study Team members.

6.1.2 Close coordination with the long-term expert (RE advisor)

C/P personnel were hard-pressed by their routine work. In some cases, schedules had to be changed at short notice owing to sudden inconvenience for the C/P personnel even after adjustments had been made in advance for on-site surveys etc. The short-term experts alone were not able to efficiently make scheduling and work arrangements for on-site activities. In response, it was decided to have the long-term expert make arrangements for the dispatch of short-term experts simultaneously with their performance of activities with C/P personnel on a routine basis. This enabled smooth promotion of the work.

6.2 Lessons

6.2.1 Number of C/P personnel

The C/P personnel had to receive the OJT in this Project in addition to performing their ordinary duties. Besides the JICA, various other donors were accepting trainees and dispatching experts. Some C/P personnel were absent for long periods due to the requirements of these other programs.

As such, the C/P personnel have all they can do to perform their routine duties and receive training under these programs; they have almost no margin for instatement of new methods and improvement on their own problems. In light of these circumstances, it was thought that priority should be placed on improvement of the organization and work management by, for example, revising plans for routine work. As will be related below, however, these tasks could not be implemented smoothly, and work execution and adjustment required the assistance of the long-term expert.

6.2.2 Developments at the C/P

As noted above, there was a change (turnover) of almost all C/P personnel over the three-year Project term owing to quittance and other factors. Only three of these personnel were with the C/P Technical Department throughout the Project term (and one of them was absent for a long period because of study in another country). This made systematic technology transfer extremely difficult.

The experts held discussions on this point with the CEO at the time on several occasions. They were told that nothing could be done about the situation at the present stage on the issues. Some sort of measure for improvement is presumably required in the aspect of organizational management.

6.2.3 Information provided by the C/P

Initially, the expert team was told that the REA already had a five-year rolling plan. For a long time, however, the REA side did not provide the experts with any such plan, and eventually it was learned that, although the plan was mentioned in the Operational Manual, it did not in fact exist. This delayed the start of concrete work, i.e., preparation of a five-year rolling plan and annual work plan based on it, by nearly one year. Issues were also encountered in regard to the project list (specific work related to project management) and scheduling for routine work at the REA (organizational management). The T/D at the time did not ask the experts to get involved with these items, on the grounds that they were outside the scope of their duties. As a result, it was impossible to make improvements in these respects. Based on this situation, it was considered necessary to conclude an M/M in advance to permit discussion also on management issues in aspects such as organization and promotion of work.

6.2.4 Response to contract issues

In the Project, certain points required legal interpretation regarding construction contracts. This matter was bound up with improvement of specification sheets. In particular, there was thought to be a need for inclusion of penalty clauses for construction delays, which were frequently occurring, and for changes in specifications to suit the convenience of the contractors. However, it was said that such legal penalties could not be instated in Zambia (this opinion could also be interpreted to mean that related requirements could not be imposed because of business conventions in Zambia). The involvement of the short-term experts with such important issues was held to the level of having the C/P personnel recognize the realities, partly because contracts themselves were outside the jurisdiction of the REA. It should be necessary to make arrangements for provision of advice on such contracting issues with the C/P, which has just begun to promote RE projects on the organizational level.

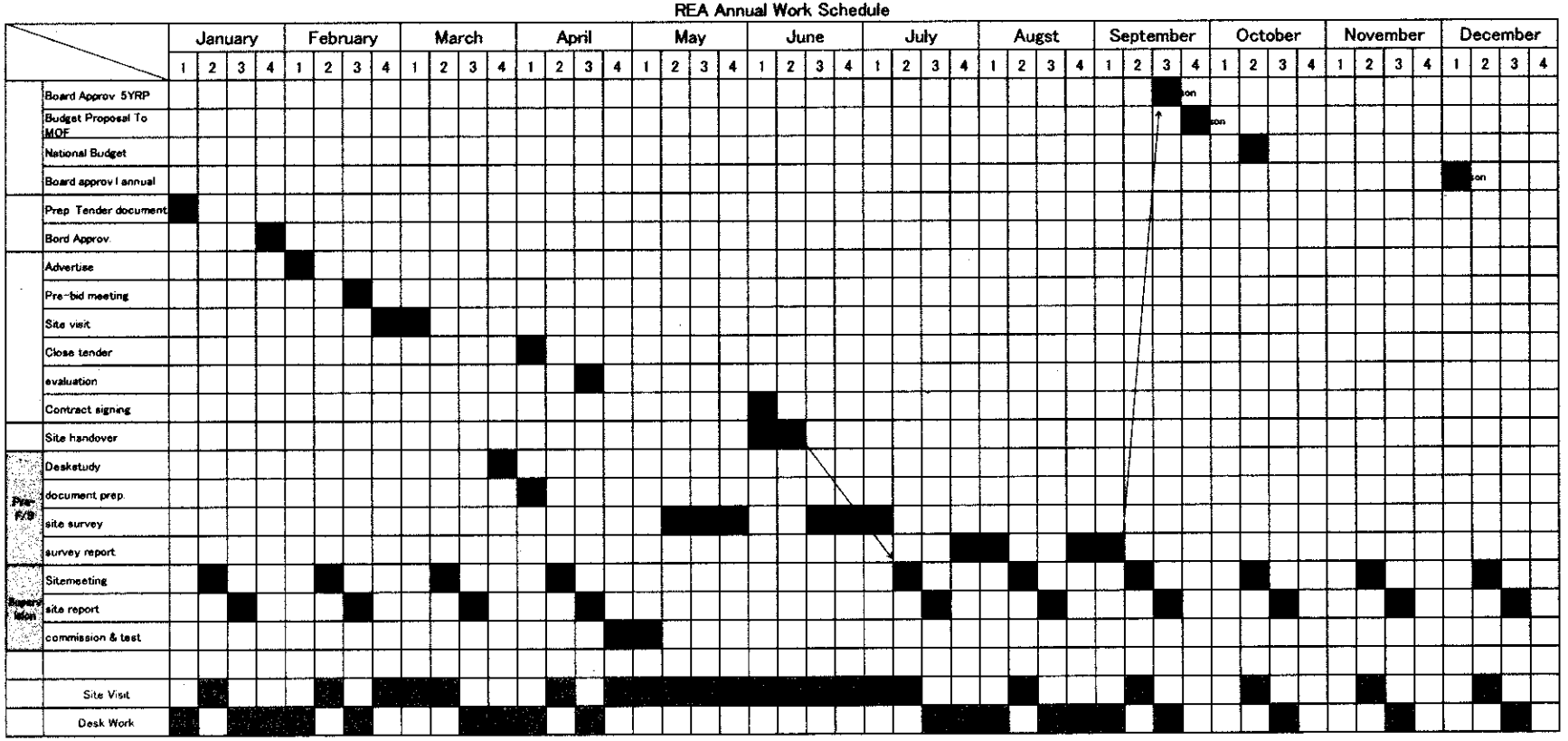
6.3 Expectations of (recommendations for) the C/P for future activities

6.3.1 Increase in the number of technical officers

The preparation of the five-year rolling plan gave the experts a grasp of the amount of work which the REA must execute. Personnel must be posted in numbers commensurate with the amount of projects to be implemented. The standard numbers of work days was ascertained through consultation with the C/P (in February 2013) (see Table 6-1)。

Table 6-1 General work schedule per technical officer

REA Annual Work Schedule



*: The figures for numbers of work days were provided by the C/P personnel at a workshop held in February 2013. Although some may be of the opinion that the figures are excessive in some cases, it was decided to use them as is. Besides the load of work to be performed by a single technical officer, the table also affords a grasp of the times for making trips to local areas and for taking yearly leave. It should be noted that the figures do not include the time spent doing miscellaneous work in offices, and are therefore thought to be higher in reality. It may also be seen that there are periods when the work physically cannot be performed by individuals (from the second half of April to the first half of July, officers are in the provinces and could not return to Lusaka).

As a result, the work that could be performed by a single officer was put at the implementation of one project and the F/S for one other project. A need to implement 10 projects plus ten F/S would consequently require a staff of ten technical officers.

As this suggests, the preparation of an annual work schedule for REA personnel (not for the projects) based on the five-year rolling plan and use of the same not only for the project process but also for formation of the organization are presumably important for implementation of work without unreasonable loads.

It might be added that technical officers are naturally expected to exercise technical capabilities. As such, it is strongly recommended that the addition of selection of capabilities based on exams to check whether or not hiring candidates have in fact acquired the basic technical know-how needed for the work. At present, the selection is based on resumes and interviews only. This setup cannot measure technical capabilities, and can result in the hiring of some personnel who lack the requisite know-how as technical officers. This presented obstacles to technical instruction in the Project.

6.3.2 Active leadership of the organization by the CEO (review of the division of duties between office personnel and technical officers

Project-related work is currently performed almost entirely by technical officers. In addition to construction and other technical work directly involved with project management, they also perform work related to accounting and materials. This makes it impossible to allocate resources effectively to project implementation.

For this reason, it is considered important to construct a setup to have office personnel assist work implemented in the office and to have projects implemented by organizations instead of individuals. There is a need for prompt discussion on this topic because of the existence of work similar to that in the M&E division. In addition, to have the work performed more smoothly, it is necessary to make technical specification sheets and construction-related documents more clear than at present.

It was also observed that a tendency for the activities of the organizational units to be confined to their respective work allocations. There is thought to be a need for the CEO to actively exercise more leadership than has been done so far for a review of the allocation of work among organizational units.

Chapter 7. PDM developments

As shown in Table 7-1, the project design matrix (PDM) was modified twice during the Project term (for details, see Attachment 1).

Table 7-1 Transition of PDM

Date modified	Reasons for the modification
August 5, 2010	Adjustment of the PDM and items of implementation in advance of project implementation
October 13, 2011	Work to bring the PDM in agreement with the realities based on the results of the interim evaluation, and clear specification of indicators

Chapter 8. Record of JCC meetings

As shown in Table 8-1, the JCC was held four times, including the interim and final evaluations (for details, see Attachment 1).

Table 8-1 Record of JCC organized

Date	Main points of argument
August 5, 2010	Confirmation of the work items along with the dispatch of short-term experts ・ Revision of the PDM ・ Confirmation of Project objectives ・ Confirmation of the C/P role in preparation of the manual (confirmation that the manual would not be prepared entirely by the experts)
June 23, 2011	Confirmation of policy for revision of the PDM to reflect the results of the interim evaluation ・ Confirmation of updating of the PDM ・ Specification of the evaluation indicators
October 13, 2011	Approval of changes in the PDM (based on the agreement of the JCC on June 23, 2011)
May 29, 2013	Final evaluation

Chapter 9. List of outputs of Project

9.1 Reports

As shown in Table 9-1, reports were submitted during the project period.

Table 9-1 Reports

FY	Title	Time of submission
2010	Activity Plan (1st year)	August 2010
	Progress report (No.1)	November 2010
	Progress report (No.2)	January 2011
	Intermediate report (1st year)	March 2011
2011	Activity Plan (2nd year)	May 2011
	Progress report (No.3)	December 2011
	Intermediate report (2nd year)	March 2012
2012 2013	Activity Plan (3rd year)	May 2012
	Progress report (No.4)	October 2012
	Progress report (No.5)	March 2013
	Project completion report	July 2013

9.2 Manuals

Manuals (Draft) were submitted to C/P as shown below.

1) Five-year Rolling Plan Formulation Manual
2) Pre- Feasibility Study Manual For Rural Electrification
3) The Feasibility Study and Detailed Design Manual for Power Distribution
4) The Supervision of Construction Works Manual for Power Distribution
5) The Rural Electrification Implementation Manual for Mini-Hydro
6) The Practical Manual for Solar PV Training (text book)
7) The Practical Manual for Inspection and Monitoring of Solar PV systems
8) The Manual for the Project Management on the Rural Electrification
9) The REA Operational Manual; Finance and Accounting
10) The Procedure Manual for Revising the Rural Electrification Master Plan(Explanation)

Chapter 10.Attachment

Attachment I	R/D and M/M (including revision of PDM)
Attachment II	Work Schedule
Attachment III	Photo of Activities

Attachment I

R/D and M/M (including revision of PDM)

Annex I

RECORD OF DISCUSSIONS
BETWEEN
JAPAN INTERNATIONAL COOPERATION AGENCY
AND
CONCERNED AUTHORITIES OF THE GOVERNMENT OF
THE REPUBLIC OF ZAMBIA
ON JAPANESE TECHNICAL COOPERATION
FOR
THE CAPACITY DEVELOPMENT FOR RURAL ELECTIRIFICATION

Japan International Cooperation Agency (hereinafter referred to as "JICA") had a series of discussions with the concerned Zambian authorities with respect to desirable measures to be taken by JICA and the Government of the Republic of Zambia for the successful implementation of the Project on "Capacity Development For Rural Electrification" in the Republic of Zambia.

As a result of the discussions, and in accordance with the provisions of the Agreement on Technical Cooperation between the Government of Japan and the Government of the Republic of Zambia, signed in Lusaka on June 27, 2006 (hereinafter referred to as "the Agreement"), JICA and the Zambian authorities concerned agreed on the matters referred to in the document attached hereto.

Lusaka, December 18, 2008

鍋屋史朗	
Mr. Shiro Nabeya	Mr. Peter Mumba
Resident Representative	Permanent Secretary
Japan International Cooperation Agency	Ministry of Energy and Water Development
Zambia Office	Republic of Zambia
Japan	

THE ATTACHED DOCUMENT

I. COOPERATION BETWEEN JICA AND THE GOVERNMENT OF THE REPUBLIC OF ZAMBIA

1. The Government of the Republic of Zambia will implement the Capacity Development for Rural Electrification (hereinafter referred to as "the Project") in cooperation with JICA.

2. The Project will be implemented in accordance with the Outline of the Project that is given in Appendix I.

II. MEASURES TO BE TAKEN BY JICA

In accordance with the laws and regulations in force in Japan, and the provisions of Article III of Agreement, JICA, as the executing agency for technical cooperation by the Government of JAPAN, will take, at its own expense, the following measures according to the normal procedures of its technical cooperation scheme.

1. DISPATCH OF JAPANESE EXPERTS

JICA will provide the services of the Japanese experts as listed in Appendix II.

The provision of Article III of the Agreement will be applied to the above-mentioned experts.

2. PROVISION OF MACHINERY AND EQUIPMENT

JICA will provide such machinery, equipment and other materials (hereinafter referred to as "the Equipment") necessary for the implementation of the Project as listed in Appendix III.

The provision of Article III of the Agreement will be applied to the Equipment.

III. MEASURES TO BE TAKEN BY THE GOVERNMENT OF THE REPUBLIC OF ZAMBIA

1. The Government of the Republic of Zambia will take necessary measures to ensure that the

self-reliant operation of the Project will be sustained during and after the period of Japanese technical cooperation, through full and active involvement in the Project by all related authorities, beneficiary groups and institutions.

2. The Government of the Republic of Zambia will ensure that the technologies and knowledge acquired by the Zambian nationals as a result of Japanese technical cooperation will contribute to the economic and social development of the Republic of Zambia.

3. In accordance with the provisions of Article V of the Agreement, the Government of the Republic of Zambia will grant in the Republic of Zambia privileges, exemptions and benefits to the Japanese experts referred to in II-1 above and their families.

4. In accordance with the provisions of Article V of the Agreement, the Government of the Republic of Zambia will take the necessary measures to receive and use the Equipment provided by JICA under II-2 above and equipment, machinery and materials carried in by the Japanese experts referred to in II-1 above.

5. The Government of the Republic of Zambia will take necessary measures to ensure that the knowledge and experience acquired by the Zambian personnel from technical training in Japan will be utilized effectively in the implementation of the Project.

6. In accordance with the provision of Article V of the Agreement, the Government of The Republic of Zambia will provide the services of Zambian counterpart personnel and administrative personnel as listed in Appendix IV.

7. In accordance with the provision of Article V of the Agreement, the Government of The Republic of Zambia will provide the buildings and facilities as listed in Appendix V.

8. In accordance with the laws and regulations in force in the Republic of Zambia, the Government of the Republic of Zambia will take necessary measures to supply or replace at its own expense machinery, equipment, instruments, vehicles, tools, spare parts and any other materials necessary for the implementation of the Project other than the Equipment

provided by JICA under II-2 above.

9. In accordance with the laws and regulations in force in the Republic of Zambia, the Government of the Republic of Zambia will take necessary measures to meet the running expenses necessary for the implementation of the Project.

IV. ADMINISTRATION OF THE PROJECT

1. Permanent Secretary in the Ministry of Energy and Water Development, as the Project Director, will bear overall responsibility for the administration and implementation of the Project.

2. Chief Executive Officer of Rural Electrification Authority (REA), as the Project Manager, will bear the direct responsibility of managing and implementing the Project.

3. The Japanese Experts will provide necessary recommendations and advice to the Project Director and the Project Manager on any matters pertaining to the implementation of the Project.

4. Japanese Experts will give necessary technical guidance and advice to the Department of Energy (DOE) and the Rural Electrification Authority (REA).

5. For effective and successful implementation of the Project, the Joint Coordinating Committee (JCC) will be established. The functions and members of the JCC are stipulated in Appendix VI.

V. JOINT EVALUATION

Evaluation of the Project will be conducted jointly by JICA, DOE and REA, during the last six months of the cooperation term in order to examine the level of achievement.

VI. CLAIMS AGAINST JAPANESE EXPERTS

In accordance with the provision of Article VI of the Agreement, the Government of the Republic of Zambia undertakes to bear claims, if any arises, against the Japanese experts engaged in technical cooperation for the Project resulting from, occurring in the course of, or otherwise connected with the discharge of their official functions in the Republic of Zambia except for those arising from the willful misconduct or gross negligence of the Japanese experts.

VII. MUTUAL CONSULTATION

There will be mutual consultation between JICA and the Government of the Republic of Zambia on any major issues arising from, or in connection with this Attached Document.

VIII. MEASURES TO PROMOTE UNDERSTANDING OF AND SUPPORT FOR THE PROJECT

For the purpose of promoting support for the Project among the people of the Republic of Zambia, the Government of the Republic of Zambia will take appropriate measures to make the Project widely known to the people of the Republic of Zambia.

IX. TERM OF COOPERATION

The duration of the Project under this Attached Document will be three [3] years from the date of the first Japanese expert's arrival in the Republic of Zambia.

APPENDIX I OUTLINE OF THE PROJECT

1. Title of the Project

The Capacity Development for Rural Electrification

2. Overall Goal

Access to electricity in rural areas increases in accordance with the Rural Electrification Master Plan (REMP).

3. Project Purpose

The capacities of DOE and REA for implementing and updating the Rural Electrification Master Plan (REMP) are strengthened.

4. Outputs of the Project

1. Technical capacities of DOE and REA for planning annual work plan for rural electrification projects are developed and enhanced.
2. Technical capacities of REA for implementing rural electrification projects are enhanced.
3. Project management system of REA is improved and strengthened.
4. Facilitating capacities of DOE and REA and technical capacities of public entities and private companies for photovoltaic (PV) systems are developed and enhanced.
5. Capacities for updating the REMP are developed and enhanced.
6. REA's capacities for financial management of Rural Electrification Fund is developed and enhanced.

5. Activities of the Project

1-1. Review the method of packaging RGCs in the REMP.

1-2. Identify the packages in the REMP to conduct study on RGC Electrification Plan.

1-3. Carry out Training on the method of RGC Electrification Plan including Technical, Economic, Financial, Environmental and Social analyses.

1-4. Investigate the RGCs to collect necessary data and information for preparing RGC Electrification Plan through grid extension, micro-hydro and PV system.

1-5. Prepare the manuals for RGC Electrification Plan.

1-6. Carry out feasibility studies (F/S) for electrifying RGCs by grid extension and micro-hydro.

1-7. Prepare the F/S manuals for grid extension electrification and micro hydro electrification.

1-8. Utilize these manuals for planning activities, and review and revise the manuals if necessary.

2-1. Carry out detailed design (D/D) for grid extension and micro-hydro electrification.

2-2. Prepare the D/D manuals for grid extension and micro-hydro electrification.

2-3. Utilize these manuals.

2-4. Supervise the construction works.

2-5. Prepare the supervision manuals.

2-6. Utilize the manuals for supervision activities, and review and revise the manuals if necessary.

3-1. Prepare the tender documents for consultants to conduct study on RGC Electrification Plan.

3-2. Carry out contractual process for RGC Electrification Plan and revise the contract agreements if necessary.

3-3. Prepare the tender documents for F/S of grid extension and micro-hydro electrification.

3-4. Carry out contractual process for F/S of grid extension and micro-hydro electrification and revise the contract agreements if necessary.

3-5. Prepare manuals for project management of planning work.

3-6. Repackage the RGCs to be electrified by grid extension.

3-7. Repackage the RGCs to be electrified by micro-hydro.

3-8. Prepare the tender documents for the repackages of grid extension electrification and micro-hydro electrification respectively for D/D, material procurement, and construction works.

3-9. Carry out contractual process for D/D and revise the contract agreements if necessary.

3-10. Carry out contractual process for material procurement and revise the tender documents if necessary.

3-11. Carry out contractual process for construction works and revise the contract agreements if necessary.

3-12. Review and assess the present project management system.

3-13. Introduce the improved project management system including decentralized mechanism for project management.

4-1. Carry out basic training on PV systems for DOE and REA.

4-2. Develop the technical standard of PV systems.

4-3. Prepare strategic plan for disseminating PV systems for rural electrification.

4-4. Prepare human resource development plan in accordance with the strategic plan.

4-5. Prepare trainer's training text books and manuals.

4-6. Carry out trainer's training in accordance with the human resource development plan, and revise the text books and manuals if necessary.

4-7. Prepare text books and manuals for training the inspectors and engineers.

4-8. Carry out training for inspectors and engineers of private companies in accordance with the human resource development plan, and revise the text books and manuals if necessary.

4-9. Prepare text books and manuals for training the technicians.

4-10. Carry out training for technicians of public entities and private companies, and revise the text books and manuals if necessary.

4-11. Introduce regulation framework for improving the quality of PV systems installed by private companies.

5-1. Understand thoroughly the contents and method of the REMP including the database.

5-2. Prepare the updating procedure of the REMP.

5-3. Revise the REMP in accordance with the updating procedure.

5-4. Prepare guidelines for updating the REMP and revise the guidelines if necessary.

6-1. Prepare an annual Work Plan and budget of REA activities in accordance with the REMP.

6-2. Assess the present procedure of accounting, and budget and asset management.

6-3. Identify the needs for capacity development for the improved procedure of accounting, and budget and asset management.

6-4. Prepare guidelines and manuals for the improved procedure.

6-5. Carry out accounting, and budget and asset management using the guidelines and manuals, and revise the guidelines and manuals if necessary.

APPENDIX II LIST OF JAPANESE EXPERTS

1. Long-term Experts

   (i) Rural Electrification Advisor

2. Short-term Experts

   (i) Expert in Rural Electrification Planning

   (ii) Expert in Distribution Line Planning

   (iii) Expert in Micro Hydro Power Development

   (iv) Expert in Photovoltaic (PV) Systems and Training

   (v) Expert in Financial Management

Other short-term experts will be dispatched as necessary.

Note:

Assignment schedule of experts depends on the progress of the Project and availability of the suitable experts. It will be decided through mutual consultations for each Japanese fiscal year.

APPENDIX III LIST OF MACHINARY AND EQUIPMENT

Equipment will be given as necessary for the effective implementation of the Project. Details shall be discussed during the Project.

The expected machinery and equipment are as follows:

a) Necessary survey equipment for distribution lines and micro-hydro electrification,

b) One (1) 4WD Vehicle,

c) Two (2) sets of laptop computers,

d) Two (2) sets of printers,

e) One (1) set of engineering drawing software (Visual),

f) One (1) set of software for power flow simulation,

g) One (1) set of equipment and tools for PV system training and inspection, and

h) One (1) set of equipment for distribution line inspection.

APPENDIX IV LIST OF THE REPUBLIC OF ZAMBIA COUNTERPART PERSONNEL AND SUPPORTING STAFF

1. Counterpart personnel

(1) Project Director: Permanent Secretary, Ministry of Energy and Water Development

(2) Deputy Project Director: Director, Department of Energy, MEWD

(3) Project Manager: Chief Executive Officer, REA

(4) Senior Manager, Planning and Projects, REA

(5) Manager, Finance and Administration, REA

(6) Other Energy officers of DOE, and Project Engineers and other Specialists of REA

2. Supporting staff

(1) Drivers

(2) Other personnel

APPENDIX V LIST OF LAND, BUILDINGS AND FACILITIES

1. Office space and necessary facilities for Japanese experts and Zambian counterparts
2. Other facilities mutually agreed upon as necessary for the implementation of the Project

MINUTES OF MEETING

BETWEEN

JAPAN INTERNATIONAL COOPERATION AGENCY

AND

AUTHORITIES CONCERNED OF THE GOVERNMENT OF

THE REPUBLIC OF ZAMBIA

ON

JAPANESE TECHNICAL COOPERATION

FOR

THE CAPACITY DEVELOPMENT FOR RURAL ELECTRIFICATION

Japan International Cooperation Agency (hereinafter referred to as "JICA") had a series of discussions on the Project for Capacity Development for Rural Electrification (hereinafter referred to as "the Project") with the authorities concerned of the Government of the Republic of Zambia (hereinafter referred to as "the Zambian side").

As a result of discussion, JICA and the Zambian side agreed on the matters referred to the document attached hereto.

Lusaka, 5th August 2010

Mr. Shiro NABEYA
Resident Representative
Japan International Cooperation Agency
Zambia Office

Mr. Teddy J. Kasonso
Permanent Secretary
Ministry of Energy and Water Development
Republic of Zambia

THE ATTACHED DOCUMENTS

1. Project Design Matrix (PDM) and Plan of Operation (PO)

Because it has been almost 3 years since PDM and PO were signed, JICA and the Zambian side agreed to modify PDM and PO in line with current situation as shown in Annex I and Annex II.

2. Project Period

JICA and the Zambian side agreed that the extension of project period should be considered during the mid-term review which will be carried out in 2011.

3. Project Implementation Structure

JICA and the Zambian side agreed that the Project should be implemented in collaboration with the various parties concerned on the basis of the structure as shown in Annex III.

Annex I	PROJECT DESIGN MATRIX Version.1
Annex II	PLAN OF OPERATION Version.1
Annex III	PROJECT IMPLEMENTATION STRUCTURE

ANNEX I

Project Design Matrix

Project Title: Capacity Development for Rural Electrification — **Version 1**

Implementing Agency: Rural Electrification Authority (REA) — **Target Group: Primary; DOE and REA, Secondary; ZESCO**

Project Site: Zambia — **Project Period: Aug.2009– Aug.2012 (3 years)**

NARRATIVE SUMMARY	OBJECTIVELY VERIFIABLE INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
Overall Goal: Access to electricity in rural areas increases in accordance with the Rural Electrification Master Plan (REMP).	Household electrification rate in rural area is improved to 27.8% by year 2015.	Statistical report by DOE/REA	
Project Purpose: The capacities of DOE and REA for planning and implementing the Rural Electrification Master Plan (REMP) are strengthened.	Annual Work Plan by REA is properly implemented, and target electrification rate is achieved.	Annual Work Plan	There is no drastic change in Fifth National Development Plan. Barriers of in-house wiring and connection fees are reduced to affordable level. Enough financial resources for rural electrification are secured.
Outputs: 1. Technical capacities for planning rural electrification projects are developed and enhanced	1.1 Necessary manuals are prepared. 1.2 DOE/REA is able to prepare appropriate Annual Work Plan. 1.3 RGC Electrification Plan is prepared. 1.4 F/S reports are appropriately prepared.	1.1 Manuals 1.2 Annual Work Plan 1.3 RGC Electrification Plan 1.4 F/S reports	There is no drastic change in Fifth National Development Plan. Counterparts who participate in the training and activities will not change during the project period. Rural Electrification Fund is properly allocated in accordance with the law.
2. Technical capacities for implementing rural electrification projects are enhanced	2.1 Necessary manuals are prepared. 2.2 D/D reports are appropriately prepared. 2.3 Construction works are appropriately completed.	2.1 Manuals 2.2 D/D reports 2.3 Completion reports	
3. Project management system is improved and strengthened.	3.1 Appropriate Tender Documents are prepared. 3.2 Necessary manuals are prepared. 3.3 F/S reports are appropriately prepared. 3.4 D/D reports are appropriately prepared. 3.5 Construction works are appropriately completed.	3.1 Tender Documents 3.2 Manuals 3.3 F/S reports 3.4 D/D reports 3.5 Completion certificate	
4. Technical capacities for photovoltaic (PV) systems are developed and enhanced.	4.1 The technical specification of PV systems is prepared. 4.2 Strategic plan is prepared. 4.3 Human resource development plan is prepared. 4.4 Qualified trainers are trained. 4.5 Qualified inspectors and engineers are trained. 4.6 Qualified technicians are trained. 4.7 Necessary text books and manuals are prepared.	4.1 The technical specification of PV systems 4.2 Strategic plan 4.3 Human resource development plan 4.4 Training reports 4.5 Text books and manuals	
5. Capacities for updating the REMP are developed and enhanced.	5.1 REMP is properly updated. 5.2 Guidelines are prepared	5.1 Updated REMP 5.2 Guidelines	
6. REA's capacities for financial management of Rural Electrification Fund are developed and enhanced.	6.1 Necessary guidelines and manuals are prepared. 6.2 Financial Report is properly prepared.	6.1 Guidelines and manuals 6.2 Financial Report	
Activities: 1-1. Review the method of packaging RGCs in the REMP. 1-2. Identify the packages in the REMP to conduct study on RGC Electrification Plan. 1-3. Carry out training on the method of RGC Electrification Plan including Technical, Economic and Financial, Environmental and Social analyses. 1-4. Investigate the RGCs to collect necessary data and information for preparing RGC Electrification Plan through grid extension, mini-hydro and PV system. 1-5. Prepare the manuals for RGC Electrification Plan. 1-6. Carry out feasibility studies (F/S) for electrifying RGCs by grid extension and mini-hydro. 1-7. Prepare the F/S manuals for grid extension electrification and mini-hydro electrification. 1-8. Utilize these manuals for planning activities, and review and revise the manuals if necessary. 2-1. Carry out detailed design (D/D) for grid extension electrification. 2-2. Prepare the D/D manuals for grid extension and mini-hydro electrification. 2-3. Utilize these manuals for D/D activities, and review and revise the manuals if necessary.	**Inputs (Means and Cost)** **Japanese Side** A. Dispatch of Japanese Experts (1) Long-term Expert (2) Short-term Expert B. C/P Training in Japan C. Procurement of equipment D. Necessary expense to implement the Project **Zambia Side:** A. Allocation of full-time C/Ps		Counterparts who participate in the training and activities will not change during the project period. Rural Electrification Fund is properly allocated in accordance with the law.

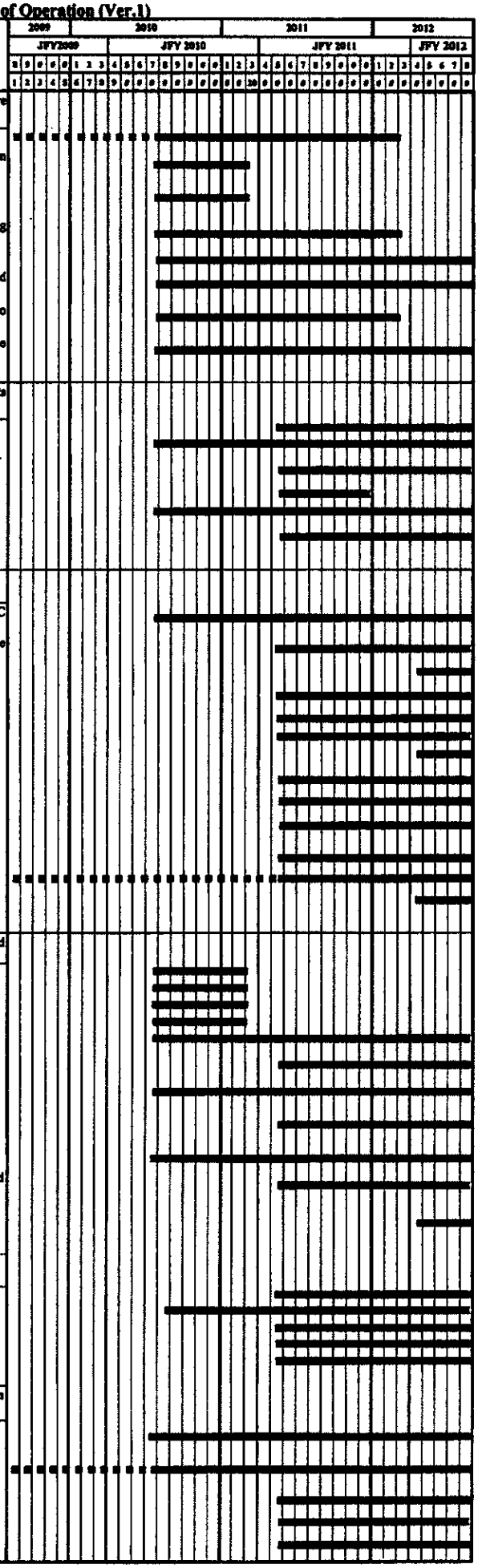
ANNEX I

2-4.	Supervise the construction works.	B. Allocation of supporting staff and drivers C. Provision of office space and facilities for the Project D. Local Cost Appropriation of necessary budget to support the local cost of the project, such as provision of workshop, domestic and foreign travel allowances, etc.	
2-5.	Prepare the supervision manuals.		
2-6.	Utilize the manuals for supervision activities, and review and revise the manuals if necessary.		
3-1.	Prepare the tender documents for consultants to conduct study on RGC Electrification Plan.		
3-2.	Carry out contractual process for RGC Electrification Plan and revise the contract agreements if necessary.		
3-3.	Prepare the tender documents for F/S of grid extension and mini-hydro electrification.		
3-4.	Carry out contractual process for F/S of grid extension and mini-hydro electrification and revise the contract agreements if necessary.		
3-5.	Prepare manuals for project management of planning work.		
3-6.	Repackage the RGCs to be electrified by grid extension.		
3-7.	Repackage the RGCs to be electrified by mini-hydro.		
3-8.	Prepare the tender documents for the repackages of grid extension electrification and mini-hydro electrification respectively for D/D, material procurement, and construction works.		
3-9.	Carry out contractual process for D/D and revise the contract agreements if necessary.		
3-10.	Carry out contractual process for material procurement and revise the tender documents if necessary.		
3-11.	Carry out contractual process for construction works and revise the contract agreements if necessary.		
3-12.	Review and assess the present project management system.		
3-13.	Introduce the improved project management system including decentralized mechanism for project management.		
4-1.	Carry out basic training on PV systems for DOE and REA.		
4-2.	Develop the technical specification of PV systems for REA.		
4-3.	Prepare strategic plan for disseminating PV systems for rural electrification.		
4-4.	Prepare human resource development plan in accordance with the strategic plan.		
4-5.	Prepare trainer's training text books and manuals.		
4-6.	Carry out trainer's training in accordance with the human resource development plan, and revise the text books and manuals if necessary.		
4-7.	Prepare text books and manuals for training the inspectors and engineers.		
4-8.	Carry out training for inspectors and engineers of private companies in accordance with the human resource development plan, and revise the text books and manuals if necessary.		
4-9.	Prepare text books and manuals for training the technicians.		
4-10.	Carry out training for technicians of public entities and private companies, and revise the text books and manuals if necessary.		
4-11.	Prepare framework for improving the quality of PV systems installed.		Pre-condition: Necessary C/Ps are allocated. Necessary budget, office space and facilities for the Project are prepared. ZESCO's contribution is assured.
5-1.	Understand thoroughly the contents and method of the REMP including the database.		
5-2.	Prepare the updating procedure of the REMP.		
5-3.	Revise the REMP in accordance with the updating procedure.		
5-4.	Prepare guidelines for updating the REMP and revise the guidelines if necessary.		
5-5.	Prepare the monitoring and evaluation system for the RE projects.		
6-1.	Prepare Annual Work Plan and budget of REA activities in accordance with the REMP.		
6-2.	Assess the present procedure of accounting, and budget and asset management.		
6-3.	Identify the needs for capacity development for the improved procedure of accounting, and budget and asset management.		
6-4.	Prepare guidelines and manuals for the improved procedure.		
6-5.	Carry out accounting, budget and asset management using the guidelines and manuals, and revise the guidelines and manuals if necessary.		

ANNEX II

Capacity Development for Rural Electrification
Tentative Plan of Operation (Ver.1)

	Activities
Output 1: Technical capacities for planning rural electrification projects are developed and enhanced.	
1-1.	Review the method of packaging RGCs in the REMP.
1-2.	Identify the packages in the REMP to conduct study on RGC Electrification Plan.
1-3.	Carry out training on the method of RGC Electrification Plan including Technical, Economic and Financial, Environmental and Social analyses.
1-4.	Investigate the RGCs to collect necessary data and information for preparing RGC Electrification Plan through grid extension, mini-hydro and PV system.
1-5.	Prepare the manuals for RGC Electrification Plan.
1-6.	Carry out feasibility studies (F/S) for electrifying RGCs by grid extension and mini-hydro.
1-7.	Prepare the F/S manuals for grid extension electrification and mini-hydro electrification.
1-8.	Utilize these manuals for planning activities, and review and revise the manuals if necessary.
Output 2:Technical capacities for implementing rural electrification projects are enhanced.	
2-1.	Carry out detailed design (D/D) for grid extension electrification.
2-2.	Prepare the D/D manuals for grid extension and mini-hydro electrification.
2-3.	Utilize these manuals for D/D activities, and review and revise the manuals if necessary.
2-4.	Supervise the construction works.
2-5.	Prepare the supervision manuals.
2-6.	Utilize the manuals for supervision activities, and review and revise the manuals if necessary.
Output 3: Project management system is improved and strengthened.	
3-1.	Prepare the tender documents for consultants to conduct study on on RGC Electrification Plan.
3-2.	Carry out contractual process for RGC Electrification Plan and revise the contract agreements if necessary.
3-3.	Prepare the tender documents for F/S of grid extension and mini-hydro
3-4.	Carry out contractual process for F/S of grid extension and mini-hydro electrification and revise the contract agreements if necessary.
3-5.	Prepare manuals for project management of planning work.
3-6.	Repackage the RGCs to be electrified by grid extension.
3-7.	Repackage the RGCs to be electrified by mini-hydro.
3-8.	Prepare the tender documents for the repackages of grid extension electrification and mini-hydro electrification respectively for D/D, material
3-9.	Carry out contractual process for D/D and revise the contract agreements if
3-10.	Carry out contractual process for material procurement and revise the tender documents if necessary.
3-11.	Carry out contractual process for construction works and revise the contract agreements if necessary.
3-12.	Review and assess the present project management system.
3-13.	Introduce the improved project management system including decentralized mechanism for project management.
Output 4: Technical capacities for photovoltaic (PV) systems are developed and enhanced.	
4-1.	Carry out basic training on PV systems for DOE and REA.
4-2.	Develop the technical specification of PV systems for REA.
4-3.	Prepare strategic plan for disseminating PV systems for rural electrification.
4-4.	Prepare human resource development plan in accordance with the strategic
4-5.	Prepare trainer's training text books and manuals.
4-6.	Carry out trainer's training in accordance with the human resource development plan, and revise the text books and manuals if necessary.
4-7.	Prepare text books and manuals for training the inspectors and engineers.
4-8.	Carry out training for inspectors and engineers of private companies in accordance with the human resource development plan, and revise the text books and manuals if necessary.
4-9.	Prepare text books and manuals for training the technicians.
4-10.	Carry out training for technicians of public entities and private companies, and revise the text books and manuals if necessary.
4-11.	Recommend framework for improving the quality of PV systems installed by private companies.
Output 5: Capacities for updating the REMP are developed and enhanced.	
5-1.	Understand thoroughly the contents and method of the REMP including the
5-2.	Prepare the updating procedure of the REMP.
5-3.	Revise the REMP in accordance with the updating procedure.
5-4.	Prepare guidelines for updating the REMP and revise the guidelines if
5-5.	Prepare the monitoring and evaluation system for the RE projects.
Output 6: REA's capacities for financial management of Rural Electrification Fund are developed and enhanced.	
6-1.	Prepare an Annual Work Plan and budget of REA activities in accordance with the REMP.
6-2.	Assess the present procedure of accounting, and budget and asset management.
6-3.	Identify the needs for capacity development for the improved procedure of accounting, and budget and asset management.
6-4.	Prepare guidelines and manuals for the improved procedure.
6-5.	Carry out accounting, and budget and asset management using the guidelines and manuals, and revise the guidelines and manuals if necessary.



ANNEX III

Project Implementations Structure

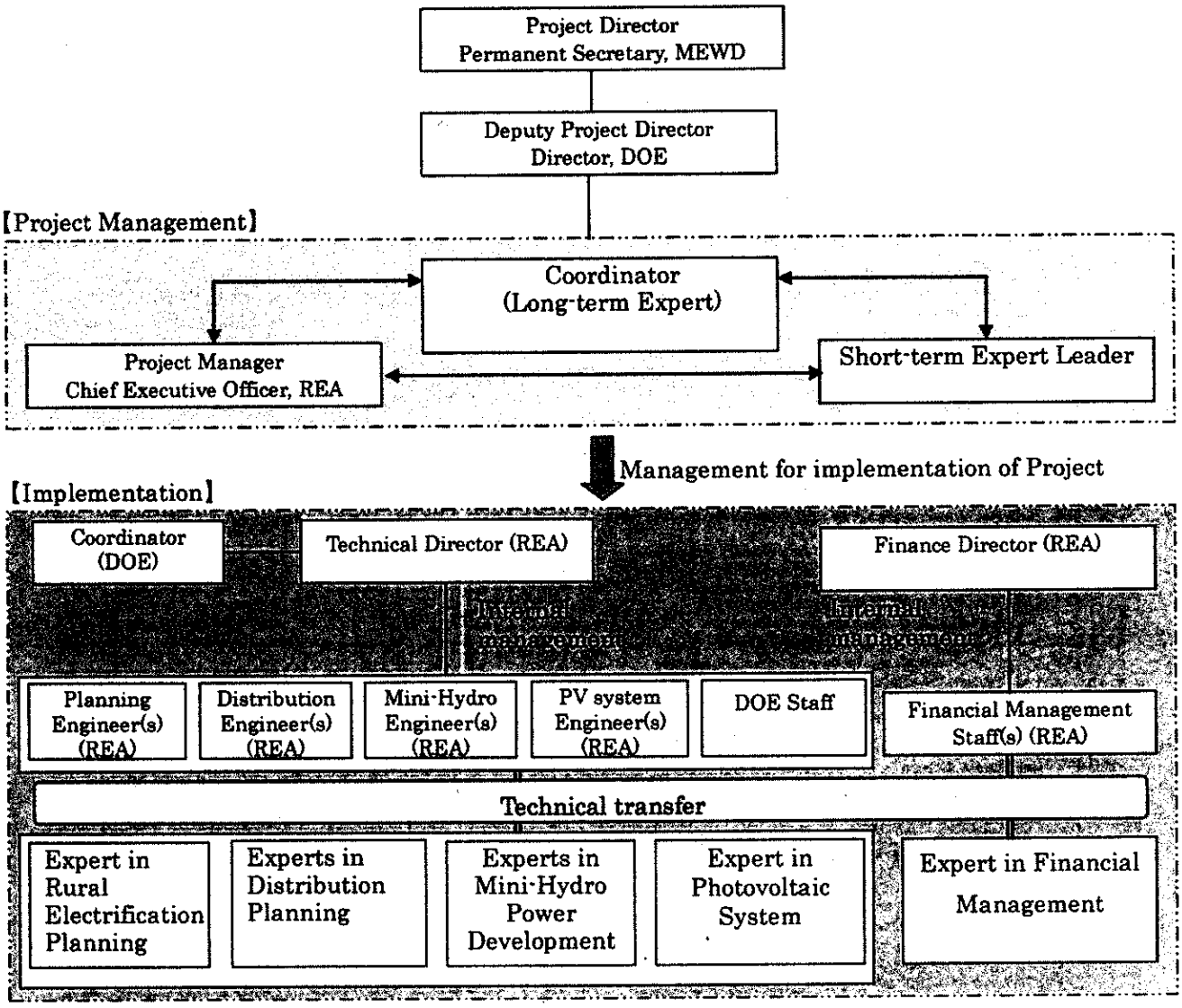


Figure Project Implementations Structure

- Secondary target group

Role of ZESCO:

Considering that the power facilities after construction by REA are transferred to ZESCO, participation by ZESCO while performing the technology transfer would be encouraged.

MINUTES OF MEETING
BETWEEN JICA MID-TERM REVIEW TEAM
AND
THE AUTHORITIES CONCERNED OF THE GOVERNMENT OF
THE REPUBLIC OF ZAMBIA
ON
JAPANESE TECHNICAL COOPERATION PROJECT
FOR
THE CAPACITY DEVELOPMENT FOR RURAL ELECTRIFICATION

The JICA Mid-Term Review Team (hereinafter referred to as "the Team") organized by the Japan International Cooperation Agency (hereinafter referred to as "JICA") and headed by Mr. Toshiyuki HAYASHI, JICA Senior Advisor, visited the Republic of Zambia from June 13 to 24, 2011 for the purpose of conducting a mid-term review study on the Project for the Capacity Development for Rural Electrification (hereinafter referred to as "the Project").

During its stay in the Republic of Zambia, the Team had a series of discussions, exchanged views, and compiled a mid-term review report with the authorities concerned of the Government of Republic of Zambia over the matters for the successful implementation of the Project.

As a result of the discussions, both sides agreed upon the matters referred to in the document attached hereto.

Lusaka, June 24, 2011

Mr. Toshiyuki HAYASHI
Leader, Mid-Term Review Team,
Senior Advisor,
Japan International Cooperation Agency

Mr. Teddy J. Kasonso
Permanent Secretary
Ministry of Energy and Water Development
Republic of Zambia

ATTACHMENT

1. Recognition of the mid-term review report

Both sides recognized that the mid-term review report was proper, and accepted the recommendations mentioned in the report.

2. Project period

Based on the recommendation in the mid-term review report, both sides agreed to extend the project period by one to two years, and to revise the Record of Discussions signed by both sides on 18th Dec. 2008, subject to approval by JICA Head Office.

Japanese side recognized that Zambian side strongly requested to extend the project period by two years.

3. Revision of Project Design Matrix (PDM) and Plan of Operation (PO)

Based on the recommendation in the mid-term review report, both sides agreed to revise the PDM and PO, and to approve them as the second version of the PDM and PO by the end of October 2011.

Appendix : Mid-term Review Report

Joint Mid-term Review Report

On

Capacity Development for Rural Electrification Project

Lusaka, June 23, 2011

Table of Contents

List of acronyms and abbreviations

APO	Annual Plan of Operation
D/D	detailed design
DOE	Department of Energy
F/S	feasibility study
JCC	Joint Coordinating Committee
JFY	Japanese Fiscal Year
JICA	Japan International Cooperation Agency
K	Zambian Kwacha
MEWD	Ministry of Energy and Water Development
PDM	Project Design Matrix
PO	Plan of Operation
PV	photovoltaic
R/D	Records of Discussions
REA	Rural Electrification Authority
REF	Rural Electrification Fund
REMP	Rural Electrification Master Plan
ZESCO	ZESCO Limited

1. Introduction

1.1 Objectives of the review

The joint mid-term review was conducted with the following objectives:
(1) To verify the accomplishments of the project;
(2) To examine the process of project implementation;
(3) To identify obstacles and/or enabling factors that are affecting the implementation process;
(4) To provide recommendations on the project regarding the measures to be undertaken for the remaining period; and
(5) For the Zambian and Japanese sides to jointly prepare and agree on the Mid-term Review Report.

1.2 Methodology

(1) Joint Evaluation

The project was jointly evaluated by the review team composed of Zambian and Japanese using the project design matrix (PDM) and plan of operation (PO) as key references. The evaluation activities included report analysis, interviews with project members, and observation of project activities. The evaluation follows the JICA Guideline for Project Evaluation and is basically based on the five evaluation criteria: relevance, effectiveness, efficiency, impact and sustainability.

(2) The Five Evaluation Criteria

1) Relevance
Relevance refers to the integrity and necessity; whether the project purpose meets the needs of the intended beneficiaries; whether it is consistent with the host country's policies and Japan's aid policies; and whether the approach of the project is appropriate.

2) Effectiveness
Effectiveness refers to the extent to which the project purpose has been achieved to benefit the beneficiaries and target societies.

3) Efficiency
Efficiency refers mainly to the relationship between the costs and outputs; whether input resources have been utilized effectively or not.

4) Impact
Impact refers to the long-term effects and ripple effects brought by the implementation of a project; including the achievement level of the overall goal and unintended positive and negative effects.

5) Sustainability
Sustainability refers to the extent to which the achievements of the project would be further continued or expanded after the completion of cooperation.

1.3 Members of the joint review team

(1) Japanese team

Role in the team	Name	Position/ Organization
Team Leader	Mr. Toshiyuki Hayashi	Senior Advisor, Economist: Power Development Planning / Rural Electrification, JICA
Project Management	Mr. Masanobu Mayusumi	Associate Expert, Electric Power Division, Natural Resources and Energy Group, Industrial Development Department, JICA
Evaluation and Analysis	Mr. Hirofumi Ishizaka	Consultant, IC Net Limited

(2) Zambian team

Role in the team	Name	Position/ Organization
Team Leader	Mr. Maxwell Phiri Zeffinati	Director, Human Resources and Administration, REA

1.4 Schedule of the review

The review was conducted from 14 to 23 June 2011. The detailed schedule can be found in Annex 1

2. Outline of the project

2.1 Background of the project

Zambia is aiming to improve the rural electrification rate from the current 3% to 50% by 2030. Japan has been aiding Zambia by assisting the development of the Rural Electrification Master Plan (REMP). However, the Rural Electrification Authority (REA) which is tasked to promote rural electrification did not have sufficient capacity to implement the REMP. Against this background, the current project which aims to enhance the capacity of the Department of Energy (DOE) and REA to implement the REMP commenced in August 2009 and is planned to close in August 2012.

2.2 Project overview

2.2.1 Overall Goal

The Overall Goal of the project is:
Access to electricity in rural areas increases in accordance with the REMP.

2.2.2 Project Purpose

The Project Purpose is:
The capacities of DOE and REA for planning and implementing the REMP are strengthened.

2.2.3 Outputs

There are six outputs. These are:

1. Technical capacities for planning rural electrification projects are developed and enhanced
2. Technical capacities for implementing rural electrification projects are enhanced
3. Project management system is improved and strengthened.
4. Technical capacities for photovoltaic (PV) systems are developed and enhanced.
5. Capacities for updating the REMP are developed and enhanced.
6. REA's capacities for financial management of Rural Electrification Fund is developed and enhanced.

2.2.4 Implementing agency

REA

2.2.5 Target group

Primary: DOE and REA
Secondary: ZESCO Ltd. (ZESCO)

3. Inputs provided to the project

3.1 Japanese side

A list of Japanese experts provided to the project is given in Table 1. As of 1 June 2011, a total of approximately 46 person-months of experts have been provided to the project. This translates into an average input of 25 person-months per year.

Table 1 List of Japanese experts provided

As of 1 June 2011

	Name	Technical Field	Total person-months	
			Zambia	Japan
1	Mr. Kazuhiko Miyamori	Rural Electrification Advisor	10.00	0.40
2	Mr. Tsutomu Takahashi	Coordinator	8.47	0.37
3	Mr. Keiji Shiraki	Short-term Expert Leader	1.60	1.10
4	Mr. Hirokazu Nakanishi	Deputy Short-term Expert Leader/Rural Electrification Planning	1.53	0.40
5	Mr. Hideki Wada	Distribution Planning 1	1.37	1.40
6	Mr. Tatsumi Fukunaga	Distribution Planning 2	2.73	1.20
7	Mr. Toshiaki Kimura	Mini-Hydro Power Development (Civil Engineering)	2.30	1.00
8	Mr. Ryosuke Hatano	Mini-Hydro Power Development (Electrical Engineering)	1.17	0.90
9	Dr. Akio Shiota	Photovoltaic (PV) Systems	4.40	1.70
10	Dr. Takeshi Kikukawa	Financial Management	1.27	0.47
11	Mr. Ryosuke Hatano	Coordinator / Assistant Rural Electrification Planning	1.10	1.17
Total person-months			35.94	10.11

The equipment provided by the Japanese side is listed in Table 2. Equipment worth USD 50,721 in total including a 4WD vehicle has been provided as of 1 June 2011.

Table 2 List of equipment provided by Japanese side

As of 1 June 2011

	Item	Specification	Units	Cost (USD)
1	Vehicle	Nissan Patrol (4WD)	1	45,350
2	Projector	Epson S79 LCD	1	1,071
3	AC/DC clamp meter	Hioki 3287	5	1,337
4	Illuminance meter	Yokogawa 51001	1	513
5	GPS receiver	Garmin eTrex Legend HCx	1	336
6	Voltage logger	Hioki 3645-20	5	1,337
7	Communication base	Hioki 3912-20	1	280
8	Telescopic Ladder	Hasegawa HPS-38BC	1	380
9	Radiation thermometer	Custom IR-300	1	38
10	Battery charger	Panasonic K-KJQ91M34R	2	79
Sub-total				50,721
				Cost (K)
11	GPS		1	2,890,000
12	Printer		1	524,000
13	Digital Camera		1	1,550,000
Sub-total				4,964,000

The local cost borne by the Japanese side is indicated in Table 3. A total budget of K (Zambian Kwacha) 29,059,150 and K 35,889,000 has been spent in Japanese fiscal years (JFYs) 2009 and 2010 respectively. For JFY 2011, K 78,700,000 has been budgeted. These figures do not include all the costs of equipment provided by the Japanese side listed in Table 3 but items 2, 11, 12, and 13, cost of dispatching Japanese experts and training of counterparts in Japan.

Table 3 Local cost borne by Japanese side

Unit: Zambian Kwacha

Item	Japanese Fiscal Year[1]			Total
	2009	2010	2011[2]	
Total	29,059,150	35,889,000	78,700,000	143,648,150

Note 1: Japanese fiscal year starts in April and concludes in March
Note 2: Planned budget

A list of overseas training conducted under the Japanese budget is given in Table 4. One training opportunity has been provided so far.

Table 4 List of overseas training conducted under Japanese budget

As of 1 June 2011

Course Title	Duration	Participant's Name	Position/Organization
Sustainable Rural Electrification Promotion Utilizing Renewable Energies	03/Nov/2010 - 04/Dec/2010	Fred Mushimbwa	Snr. Renewable Energy Officer / REA

3.2 Zambian side

A list of Zambian counterparts and personnel involved in the project is provided in Table 5. A total of 12 people have a role in the project.

Table 5 List of Zambian counterparts

Role in Project	Name	Position	Organization
Project Director	Mr. Teddy Kasonso	Permanent Secretary	MEWD[2]
Deputy Project Director	Mr. O. Kalumiana	Director	DOE
Project Manager	Mr. Wilfred Serenje	Chief Executive Officer	REA
Counterpart	Mr. Morgan Mutale Chiselebwe	Director-Finance	REA
Counterpart	Mr. Francis Mulenga	Director-Technical	REA
Counterpart	Mr. Fred Mushimbwa	Snr. Renewable Energy Officer	REA
Counterpart	Mr. Stanley Lyalabi	Snr. Mini Hydropower Dev. Officer	REA
Counterpart	Mrs. Susan Nalavwe Daka	Senior Accountant	REA
Counterpart	Mr. Clement Chiwele[1]	Prov. Rural Electrification Officer	REA
Counterpart	Mr. Siwakwi Wankunda	HR & Administration Officer	REA
Counterpart	Mr. Patrick Mubanga	Power Distribution DEV. Officer	REA
Counterpart	Mr. Nelson Mbulo	Power Distribution DEV. Officer	REA

Note 1: Currently not counterpart due to resignation from REA
Note 2: Ministry of Energy and Water Development

The financial contribution made by the Zambian side to the project is indicated in Table 6. In-kind contributions by the Zambian side include the provision of office for the Rural Electrification Advisor, Coordinator, and Short-term Experts.

Table 6 Financial contribution by Zambian side

Unit: Zambian Kwacha

Item	Zambian Fiscal Year			Total
	2009	2010	2011*	
Total	1,000,000	100,000,000	350,000,000	451,000,000

* Planned budget

4. Achievements and implementation process of the project

4.1 Outputs

4.1.1 Output 1

The main achievements of Output 1 are summarized in Table 7. Initial discussions on the planning process for rural electrification have been made. Manuals for feasibility study (F/S) for both grid extension and mini-hydro have been drafted. REA has prepared the Annual Work Plan and Budget for 2011. Data gathering exercises for preparing RGC electrification plans have been conducted. However, it is difficult to judge to what extent the technical capacities for planning rural electrification projects have been enhanced because it is not clear what Output 1 is exactly aiming to achieve.

The narrative summary for Output 1 which reads 'technical capacities for planning rural electrification projects are developed and enhanced' is rather broad. The Records of Discussions (R/D) version of Output 1 which reads 'technical capacities for planning annual work plan for rural electrification projects...' do not match with the PDM. Some of the objectively verifiable indicators for Output 1 are inappropriate. For example, the Annual Work Plans are already prepared by REA and not DOE. It is not clear which RGC Electrification Plan or F/S reports the indicators stated in the PDM is referring to. Moreover, the PDM does not define appropriate means of verification. The PDM does not indicate how to judge whether the Annual Work Plan or F/S reports prepared are appropriate. The PDM must be corrected so that the narrative summary for Output1 and its objectively verifiable indicators reflect what the project is exactly aiming to achieve.

The current or the intended planning process for rural electrification projects has not become fully clear, at least to the Japanese experts. Despite the importance of streamlining the process starting from the REMP down to the completion of construction work so that rural electrification progresses quickly, there have been limited discussions on this issue. It has not become clear how the REMP is translated into the Annual Work Plans through the five-year rolling plan or when, how, and if pre-F/S, F/S, and detailed design (D/D) are conducted or supposed to be conducted. More discussions are necessary to come up with the optimal planning process and to effectively implement the corresponding technical transfer in the project.

Table 7: Achievements of Output 1

Objectively Verifiable Indicators	Achievements to date
1.1 Necessary manuals are prepared. 1.2 DOE/REA is able to prepare appropriate Annual Work Plan. 1.3 RGC Electrification Plan is prepared. 1.4 F/S reports are appropriately prepared.	• Manuals for F/S for both grid extension and mini-hydro have been drafted. • REA has prepared the Annual Work Plan and Budget for 2011. • Data gathering exercises for preparing RGC electrification plans have been conducted.

4.1.2 Output 2

The main achievements of Output 2 are summarized in Table 8. Manuals for D/D for both grid extension and mini-hydro have been drafted. Manuals for construction work management for both grid extension and mini-hydro have been drafted. Technical standards for grid extension have been drafted.

The project has been strengthening the technical capacities for rural electrification by grid extension and mini-hydro. Of the various skills required to promote rural electrification, the Short-term Expert Team has focussed on enhancing the capacity required to manage rural electrification projects from the client's perspective. The definition of F/S and D/D, and how REA should engage in such activities are being discussed with the counterparts in the course of technical transfer.

However, it is difficult to judge to what extent the technical capacities for implementing rural

electrification projects have been enhanced because the objectively verifiable indicators for Output 2 are not well defined. The current indicators are insufficient for measuring the level of capacities developed. Moreover, it is not clear which or how many D/D reports or construction works the indicators are pointing to and whether production of such reports or completion of such works can be regarded as a sign of appropriate capacities being enhanced.

Table 8: Achievements of Output 2

Objectively Verifiable Indicators	Achievements to date
2.1 Necessary manuals are prepared. 2.2 D/D reports are appropriately prepared. 2.3 Construction works are appropriately completed.	• Manuals for D/D for both grid extension and mini-hydro have been drafted. • Manuals for construction work management for both grid extension and mini-hydro have been drafted. • Technical standards for grid extension have been drafted.

4.1.3 Output 3

The main achievements of Output 3 are summarized in Table 9. Project activities on contractual processes and contract management have been limited to date. However, it is difficult to judge to what extent the project management system has been enhanced because the objectively verifiable indicators for Output 3 are not well defined. The current indicators are insufficient for measuring the level of improvement. Moreover, it is not clear which or how many tender documents, F/S reports, D/D reports or construction works the indicators are pointing to and whether production of such documents or completion of such works can be regarded as a sign of improvement.

Table 9: Achievements of Output 3

Objectively Verifiable Indicators	Achievements to date
3.1 Appropriate Tender Documents are prepared. 3.2 Necessary manuals are prepared. 3.3 F/S reports are appropriately prepared. 3.4 D/D reports are appropriately prepared. 3.5 Construction works are appropriately completed.	• No major progress to date.

4.1.4 Output 4

The main achievements of Output 4 are summarized in Table 10. The technical capacities of REA for PV systems are being developed and enhanced by the project. Three officers are currently being trained in this subject. One officer has sufficiently understood the Basic Level PV Training Course. All of them are acquiring knowledge and skills necessary to design and inspect PV systems. Through on-site inspections, they have realized the proper way to inspect PV systems. The standard technical specification of PV systems, PV dissemination plan, PV human resource development plan, and materials for PV system training courses have been prepared. The project is on track to develop PV specialists who will be able to train others.

Through project implementation, it has become apparent that it is premature to develop a strategic plan for PV at this stage. Instead, the PV dissemination plan has been proposed by the Japanese expert. It has also become apparent that the ultimate aim of Output 4 should be the development of trainers on PV systems within REA, i.e., basically the development of experts who would be able to continue capacity development of REA in that field. Hence the objectively verifiable indicators for Output 4 require revision.

One of the major constraints for capacity development is that there is only one technical officer in charge of PV systems. Both the Japanese and Zambian sides are making efforts to overcome this situation by involving other officers in the technical transfer. The successful capacity development of REA for PV

systems depends very much on REA being able to retain and increase the number of officers.

Table 10: Achievements of Output 4

Objectively Verifiable Indicators	Achievements to date
4.1 The technical specification of PV systems is prepared. 4.2 Strategic plan is prepared. 4.3 Human resource development plan is prepared. 4.4 Qualified trainers are trained. 4.5 Qualified inspectors and engineers are trained. 4.6 Qualified technicians are trained.. 4.7 Necessary text books and manuals are prepared.	• One officer has sufficiently understood the Basic Level PV Training Course. • The standard technical specification of PV systems, PV dissemination plan, PV human resource development plan, and materials for PV system training courses have been prepared.

4.1.5 Output 5

The main achievements of Output 5 are summarized in Table 11. A thorough consideration on how the REMP should be updated has been conducted. Guidelines for REMP revision have been drafted. However, the actual revision or updating activities have not taken place. Given the fact that the REMP is a long-term plan and that it was only officially launched in 2010, it does not make sense to update the plan in a short cycle or to actually update it within the current project lifespan. Hence the objectively verifiable indicators for Output 5 require revision.

Table 11: Achievements of Output 5

Objectively Verifiable Indicators	Achievements to date
5.1 REMP is properly updated. 5.2 Guidelines are prepared.	• Guidelines for REMP revision have been drafted.

4.1.6 Output 6

The main achievements of Output 6 are summarized in Table 12. The financial management capacities of REA have been developed substantially between the time the project was formulated in 2008 and started to fully operate in 2010. Most of the activities planned for Output 6 have already been or are being implemented by REA. The two objectively verifiable indicators for Output 6 have already been achieved without the project. In fact the Japanese expert and counterparts involved in the finance component have identified that the development of an integrated reporting system was the next step to enhance the capacity of REA in financial management. The objective and activities of Output 6 need to be re-articulated and the objectively verifiable indicators need to be revised.

Table 12: Achievements of Output 6

Objectively Verifiable Indicators	Achievements to date
6.1 Necessary guidelines and manuals are prepared. 6.2 Financial Report is properly prepared.	• The course of action to enhance REA's financial management capacity has been identified.

4.2 Project Purpose

The achievements of the project in reference to the Project Purpose are shown in Table 13. REA officers who are counterparts of the Japanese experts are gaining useful knowledge and experience. Manuals to establish the standard procedures for REA's work are gradually being developed. However, it is not clear from the PDM to what extent the project is aiming to enhance the capacities of REA. Therefore, it is impossible to judge whether the project purpose is likely to be achieved within the current project period.

The stated Project Purpose is problematic in two aspects. Firstly, it is not clear what is meant by

'planning REMP.' The 'planning' is replaced by 'updating' in the R/D which makes things even more complicated. Secondly, it is REA who is tasked to implement the REMP and most probably not DOE. It is also not clear what role the two organizations are meant to play in updating the REMP.

The objectively verifiable indicators stated in the PDM are no better. It is not possible to judge whether the stated objectively verifiable indicator for the Project Purpose can be attained. The vagueness of the statement prevents judgement on whether it is likely that REA will become capable of 'properly' implementing the Annual Work Plan and that the target electrification rate is achieved accordingly. REA has been preparing the Annual Work Plan and Budget, and also the Annual Report but it is not clear what constitutes a 'proper' implementation. There is no 'target electrification rate' as such stated in the Annual Work Plan. Clearly, the current stated objectively verifiable indicator for the Project Purpose is problematic.

In sum, the technical capacities of REA will most likely be strengthened through this project. But whether that translates into the Project Purpose being achieved is unclear because its objectively verifiable indicator is inappropriately defined.

Table 13: Achievements of Project Purpose

Objectively Verifiable Indicators	Achievements to date
Annual Work Plan by REA is properly implemented, and target electrification rate is achieved.	• REA officers are gaining useful knowledge and experience. • Manuals to establish the standard procedures for REA's work are gradually being developed. • Annual Work Plans are prepared but without the help of the project.

4.3 Crosscutting implementation process

(1) Planning and monitoring

There is room for improvement in the overall administration of the project. In particular, monitoring and reporting of project progress requires attention.

The PDM and PO are not effectively functioning as project management tools. They have not been frequently referred to by the project members. Project progress and achievements are not been recorded against the outputs stated in the PDM. The PDM and PO have not been sufficiently updated. Some project members have suggested that the PDM and PO should be revised for clarity but there has been no consensus.

The project commenced in August 2009 with the dispatch of the Rural Electrification Advisor. The Advisor drafted and shared the work schedule of the project with REA. However, the Joint Coordinating Committee (JCC), which is supposed to approve the annual work plan of the project, was not held until August 2010. The PDM and PO were only approved by the project stakeholders one year after project commencement. There is no sign of the PDM or the PO being effectively used as project management tools during the first year of the project.

Prior to the first JCC, in July 2010, the Short-term Expert Team was engaged. The Team, in conjunction with the counterparts, prepared a detailed plan of project activities in the form of Activity Plan, first produced in August 2010 and then revised in May 2011, in place of Annual Plan of Operation (APO). However, the way the activities are structured in the Activity Plans differs from that of the PDM and PO. As a consequence, the results of the project activities reported in the Progress Reports cannot be easily compared with the outputs and targets stipulated in the PDM and PO. The project activities seem to be properly planned and implemented according to the Activity Plans, but monitoring is problematic because progress and achievements are not recorded against the PDM and PO.

The Short-term Expert Team has expressed that it had difficulties in digesting some parts of the PDM. Hence the Activity Plans were based on the best interpretation of the PDM, and the Team's technical

expertise and experiences.

(2) Communication, decision-making, and implementation structure

Communication among project members has room for improvement. The communication within the Japanese side consisting of the Coordinator and Short-term Expert Team has not always been smooth. The parties seem to have been hesitant to actively communicate with one another, to say the least. The fact that each party has a separate contract with JICA and that the expectations regarding their relationship have not been defined in detail may have contributed to the problem. Moreover, the roles and decision making rules among the parties do not seem to have been properly established.

The communication between the Japanese experts and REA at the administrative level has been rather limited. The Japanese experts have not been able to fully understand the challenges and intentions of REA or to fully obtain the information necessarily to effectively perform the technical transfer. The fact that the Short-term Experts stay in Zambia only for a very short time and, that REA is understaffed and its officers are overstretched has been a contributing factor.

Tools to enhance communication are insufficient. Apart from the JCC, there is no regular meeting on the project. There is no common format to regularly share the progress, problems, and plans of the project. This is limiting the information flow among project members. It is also restricting the chances of improving project implementation.

The Joint Working Group, which was to be composed of REA, DOE, ZESCO, and other stakeholders, has not been formed. DOE and ZESCO have had very limited engagement with the project. Moreover, given the objective and limited resources of the project, and the mandate of those organizations, there seems to be little scope for DOE and ZESCO to seriously participate in the project. However, the lack of the Joint Working Group has not affected the project.

DOE believes that the project would benefit the DOE in the areas of planning rural electrification, monitoring and evaluation, and updating of the REMP. Although DOE recognizes that it may not be possible to fully participate in all the capacity building programmes of the project, it has expressed that to allow for DOE to prepare better in terms of gauging whether or not to participate in some of the programmes, there is need for the project to send detailed schedules which show the dates and time of courses at least two weeks before commencement.

(3) Technical transfer

The counterparts are appreciative of the technical transfer provided by the project. The Japanese experts have been praised for generally having a high level of technical expertise, openness to suggestions, and receptiveness to local realities. The existing capacities of the counterparts were assessed either explicitly or inexplicitly before any training was conducted. Training and advice have been given according to progress thereafter. The PV system component has taken a more structured approach than others. First, a baseline assessment was conducted. Then, a structured training course was conducted. The understanding of the participants was assessed and feedback was given utilizing a radar chart that highlighted the strengths and weaknesses of each participants. In sum, it can be concluded that the technical transfer is implemented taking into account the capacity and constraints of the counterparts and counterpart organisations.

However, the Japanese experts and counterparts have found it challenging to secure sufficient common time. Moreover, the counterparts face difficulties in concentrating on the technical transfer because they are frequently distracted by the need to attend to their regular duties. The counterparts have expressed preference for on-site training and structured training in an isolated environment so that they can concentrate and get more out of the technical transfer. They also feel that they should be able to spend more time on the manuals being developed. One of the counterparts suggested that it would be better if they can draft the manual and the Japanese experts provide a critical review.

The counterparts also suggested that a resident expert who they could consult whenever they face technical problems would be of great help. Even if such expert is not a specialist in all the technical fields covered under the project, if he/she can provide general directions or get in touch with the relevant short-term expert and convey the advice obtained to the counterparts, it would help accelerate their capacity development. Similar suggestions were made by Japanese experts as well.

5. Evaluation results

5.1 Relevance

The relevance of the project is very high, although some of the assumptions made during the ex-ante evaluation have proved to be inaccurate. The necessity of the project is high and the project is addressing issues of high priority as expected during the ex-ante evaluation. With regards to the approach of the project, it seems that the expected roles of the target group have not been accurately defined.

The project content matches with the rural electrification needs of Zambia. It is in line with the needs of REA. The situation has not changed since the ex-ante evaluation.

In principle, the Project Purpose and Overall Goal are consistent with the rural electrification policies and development policies of Zambia. Its Sixth National Development Plan (2011-2015) states that the government will aim to increase the rural access to electricity from the current 3.5 percent to at least 15 percent. The strategy identified to achieve this goal is the implementation of the REMP. However, the Overall Goal requires refinement because it is unrealistic.

The Project Purpose and Overall Goal are consistent with the aid policies of Japan. Its Official Development Assistance Rolling Plan for Zambia explicitly states that Japan will provide assistance to strengthen the capacity of REA. The policy has not changed since the ex-ante evaluation.

JICA has a clear advantage in providing the current assistance. The REMP was developed under Japanese assistance. The project has clearly been able to capitalize on Japanese technical expertise and experiences. Especially regarding the PV system component, experiences in JICA assisted projects in many countries including Malawi has been utilized. Development of training materials has benefited a great deal from past experiences.

The project is complimenting assistance provided by other donors and generating synergy. On one hand there is no duplication of assistance among donors. The project is building on the existing capacity including manuals and practices to enhance the capacity of REA. On the other hand, the capacity strengthened by the project will contribute to the effective implementation of rural electrification projects funded by the Zambian Government and donors. The project has already contributed towards the successful implementation of the solar component of a World Bank assisted project. The current project helped correction of the specifications for PV systems.

Given that the main objective of the project is capacity development for implementation of the REMP, the target group of the project should be REA. Still, ZESCO is required to be involved as a collaborating organization which provides information necessary for REA to implement the REMP. DOE needs to monitor the project as a policy and oversight organization but DOE need not necessarily be the target of the project because the content of the capacity building provided through the project is not policy related.

Given the objective of the project and the need for intense capacity development of REA's officers, it seems that it was overambitious and perhaps inappropriate for the project to directly target those in charge of PV systems at public facilities, schools, and local governments, and private PV system vendors for the technical training on PV systems. It makes more sense to concentrate on developing manuals and training materials on PV systems for REA officers and to train them in such field so that they will become able to teach other parties. The final two points mentioned here are different from the ex-ante evaluation.

5.2 Effectiveness

The project is effective in the sense that it is strengthening the capacities of REA officers to implement rural electrification projects. However, it is not possible to provide a rating on the effectiveness at this stage. As stated earlier, it is not possible to assess to what extent the Project Purpose is being achieved partly because its objectively verifiable indicator is inappropriately defined and also because the achievements have not been monitored and recorded sufficiently.

The outputs stated in the PDM seem to be sufficient for attaining the Project Purpose at first glance. A close examination raises some concerns. As mentioned earlier, the way the activities are structured in the Activity Plans differs from that of the PDM. In total, the activities planned in the PDM are covered in the Activity Plans but differences, such as the activities under Outputs 1, 2, 3 and 5 of the PDM being regrouped under three new headings, are apparent. The fact that the Activity Plans have been agreed by all the stakeholders of the project and that project activities have progressed without major problems according to these plans suggests that the PDM and PO need restructuring.

The important assumptions which need to be fulfilled to attain the Project Purpose need some revision. The Sixth National Development Plan has come into effect replacing the fifth. The important assumption is probably not the Rural Electrification Fund (REF) being properly allocated in accordance with the law per se but may simply be sufficient budget made available for REA to implement rural electrification projects. REA would also need to retain its qualified staff and maintain its current legal status.

5.3 Efficiency

The efficiency of the project is moderate.

As stated earlier, it is difficult to assess whether the achievement levels of the outputs are adequate partly because the objectively verifiable indicators are insufficiently defined and also because the achievements have not been monitored and recorded sufficiently.

As explained below, the project has suffered from the late engagement of the Short-term Expert Team in terms of efficiency because very little was achieved during the first year. Also as explained below, the way in which JICA assigned and managed the Japanese experts turned out not be economically optimal.

Since the engagement of the Short-term Expert Team, the extent and volume of activities seem sufficient although if the Japanese experts and counterparts can spend more time together, for example, to work on the manuals, the capacity development being undertaken will be more productive. There are basically no unnecessary activities conducted. Because the ownership of REA over the outputs produced by various activities including those under other projects is high, whatever existing useful outputs are utilized properly in the current project. For the on-the-job training including the on-site training, the project has made arrangements with other projects so that the current project can utilize the sites under other projects.

As stated earlier, however, the project activities have not been implemented according to the PDM and PO. Some of the activities stated in the PDM require clarification. Terms such as RGC Electrification Plan, F/S, and D/D appear in many activities but it is not clear which plan or project they are referring to. The precise definitions of these terms are also not clear. The PDM and PO require restructuring for efficient and effective project implementation.

Regarding the inputs by the Japanese side, the dispatch timing of the Short-term Expert Team was delayed by approximately six months. According to the initial plan, the Short-term Expert Team was expected to work together with the Rural Electrification Advisor. The team would dispatch specialists in the required technical field for a short duration at planed intervals while the Advisor facilitates communication between the Japanese experts and counterparts, and follow up on issues that arise when the specialists are absent. In reality, only the Advisor was dispatched in the first year. As a result, very little progress was made during the first year. Consequently the PO was revised.

From the second year, the Coordinator was engaged in place of the Rural Electrification Advisor. The Short-term Expert Team has benefited from his logistical support, summarizing of REA's key documents, and follow-up on information requests made to REA while the Team was away. Generally, however, the Coordinator has been underutilized. The lack of enthusiastic communication between the Coordinator and Short-term Expert Team, and the fact that the Team had its own coordinator are some of the likely reasons. Although the Coordinator was tasked by JICA to relay messages between the Short-term Expert Team and counterparts, this role was not sufficiently recognized by project members. In addition, because the Coordinator was not expected to provide technical advice, the interaction with the counterparts was rather limited. Otherwise, the number, technical field, and dispatch timing and duration of Japanese experts have been reasonable.

Generally, the Japanese side has provided the necessary equipment in a timely manner. However, the vehicle procured by the project could have been utilized more frequently, particularly by the Short-term Expert Team. The possibility of introducing software to enhance the rural electrification planning and establish an integrated reporting system is being considered. The budget of the Japanese side has so far been sufficient for project implementation.

On the Zambian side, given REA's current staffing and workload, the number, technical field, position, and assignment period of counterparts have been appropriate. REA has basically assigned all relevant officers as counterparts to the project. However, it would definitely be more beneficial for REA if it can secure more staff and assign them as counterparts. The capacity of the Japanese experts allows such room. Moreover, the project will be more cost effective as it will be training more people under the same budget.

REA has provided sufficient budget and logistics to the project. There has been no major problem regarding the expenses to be provided by the Zambian side. There was an instance when the cost sharing agreement with the Japanese side was not clear and REA's budget for that particular occasion turned out to be insufficient but this kind of trouble can be easily averted by communicating to each other beforehand.

5.4 Impact

It is too early to predict the impact of the project at this stage. However, it is highly unlikely that the stated Overall Goal will be attained. Access to electricity in rural area is not likely to increase in accordance with the REMP. The targeted rural household electrification rate is much higher than that of the Sixth National Development Plan. The Sixth National Development Plan targets an increase from the current 3.5 percent to at least 15 percent by year 2015. The current Overall Goal is overambitious. There are no negative effects observed to date.

5.5 Sustainability

Analysis of the current policy, institutional, organizational, and financial environment surrounding rural electrification and the outcome of the technical transfer to date suggests that the sustainability of the project would be high.

Policies and institutions on rural electrification are likely to be maintained if not strengthened. Since the ex-ante evaluation, the REMP has been officially launched. The Sixth National Development Plan starting from 2011 continues to recognize the importance of rural electrification.

The organizational capacity of REA has been steadily strengthened since the ex-ante evaluation. The number of staff was 24 when the project started in 2009. This has risen to 29 over approximately one year. REA is currently trying to add 11 more. The positions include six engineers, a surveyor, an economist, and an accountant. REA has also developed its second Strategic Plan covering the period from 2009 to 2013. Although REA still requires substantial capacity building including the recruitment of staff, it is likely that it will continue to be strengthened into the future.

There is already a reasonable amount of budget being secured to implement rural electrification projects although it is not at par with the requirements set in the REMP. The annual amount made available to the REF was approximately K 22 billion in 2008. This has risen to K 69 billion in 2009 and to K 121 billion in 2010. Similarly, the recurrent budget for REA has been increased from K 1 billion in 2008 to K 10 billion in 2009 and K 12 billion in 2010.

The techniques and methods introduced by the project so far are generally well-received by the counterparts. REA's ownership over the manuals being produced is high. There are no technical barriers that impede the sustainability of the project achievements at this stage. Currently, factors that may jeopardize the sustainability of the project cannot be found.

6. Factors enabling the realization of positive effects

Both the Zambian and Japanese sides have been very considerate towards the constraints and limitations of each other. Both sides are appreciative of each other and this has contributed to the smooth technical transfer.

The REMP has been instrumental in drawing attention to and mobilizing finance for rural electrification. As a result, there have been substantial increases in REA's budget, confirming the importance of REA properly performing its duty. This in turn is raising the relevance of the technical transfer provided by the current project.

7. Factors obstructing the realization of positive effects

There is basically no significant external factor that impedes the progress of the project. However, the limited number of REA staff against the large volume of regular work to be done poses a challenge for project activities. The frequency and intensity of interaction between the Japanese experts and REA administration have been rather limited. This has caused some anxiety among the Japanese experts. Both sides, particularly at the top level, need to discuss more frequently and frankly so that the project will become more productive.

8. Conclusions

The relevance of the project is very high. Efficiency has been moderate. The project is effective but a rating cannot be given at this stage. Similarly, it is too early to predict its impact. However, it is expected that the sustainability of the project outcomes would be high.

Evaluation of the project was not easy because the project activities have not been implemented according to the PDM and PO, and project achievements have not been recorded against the same. The precise target of the project not being totally clear also made evaluation difficult. There is room for improvement in the planning and monitoring of the project.

The project has suffered from the late engagement of the Short-term Expert Team. Communication has not been at its best at certain levels and circles. These factors have compromised efficiency of the project.

However, during the discussions held in the course of the current mid-term review, all the stakeholders seemed to have recognized the problems and the measures for improvement. It is hoped that the stakeholders will follow the recommendation below and that the project will steadily progress towards its goal.

9. Recommendations

9.1 Recommendation to the Project

1) Revise the PDM and PO taking into account the discussions held in the course of the mid-term review and its report: The Overall Goal and its objectively verifiable indicators require revision. The Project Purpose should be amended so that the statement is the same as the R/D, and its indicators should also be revised for clarity. The Outputs and Activities need to be restructured so that they better reflect the exact aims of the project and its actual implementation method. The project stakeholders including REA, Japanese experts, and JICA have agreed to complete the revision of the PDM and PO based on the discussions held during the meeting on 20 June 2011.

2) Properly monitor and record the achievements of the project: It is important to be able to verify the effectiveness of the activities undertaken by the project. Make sure that the indicators in the PDM are monitored and recorded.

3) Organize regular project meeting: Project members should meet regularly, at least every quarter, to confirm the achievements to date and activity plans, and the challenges the project members are facing. The meeting should become an opportunity to share the experiences of the project, discuss technical issues to be improved by the project and communicate the intentions of project members. Such project meetings can be held as a part of REA's regular meeting. In case the Short-term Experts are not in Zambia at the time of the meeting, the Rural Electrification Advisor mentioned below can still attend.

4) Intensify discussions on the rural electrification planning process: REA's budget has been on the rise on one hand and there is a backlog of rural electrification projects to implement on the other. During the course of the mid-term review, both REA and the Japanese experts have confirmed that streamlining of the rural electrification planning process starting from the REMP down to the preparation of the Annual Work Plan and individual project plans was crucially important for accelerating rural electrification. The project should place more emphasis on activities to establish a streamlined planning process for rural electrification to accelerate project implementation. The decision makers of REA should sit together with the Japanese experts to thoroughly discuss this issue.

5) Sequence dispatch of Japanese experts so that there is no clash in schedule of counterparts: In order for REA to be able to take full advantage of the technical transfer to be provided, overlapping of the dispatch period of Japanese experts in the various technical fields needs to be avoided. Because REA intends to expose all of its technical officers to the range of rural electrification techniques and know-how, it is important to ensure that all of its engineers have sufficient opportunities to interact with the Japanese experts in the respective technical field.

9.2 Recommendations to REA

1) Integrate the project activities into the regular work of REA: While REA management and staff members have regular duties to execute such as the implementation of electrification projects, at the same time they are also required to work for developing their own capacity. Under such circumstance, it is important to integrate the current project into the regular work cycle of REA. It is recommended that the counterparts, as well as REA as an organization, include the project activities in their work plan.

2) Accelerate the recruitment of staff: In order for REA to take full advantage of the project for its capacity enhancement, it is strongly recommended that REA quickly hire more staff and fill in the establishment.

9.3 Recommendations to JICA

1) Consider extending the project period: Although the current project commenced in August 2009 when the Rural Electrification Advisor was dispatched to Zambia, significant technical transfer only started in August 2010 after the engagement of the Short-term Expert Team. During the first year of the

project period, very little was achieved.

In the course of the current mid-term review, it has become apparent that for the counterparts to fully acquire the knowledge and experience necessary to properly carry out mini-hydro electrification projects, the current duration of the project, which is three years, was too short. Owing to the scale of construction work and the associated surveys required, it is practically not possible to cover the process from planning to supervision of the construction works under the current project period.

Similarly, if the project was to implement on-the-job training from the planning stage starting from the examination of the REMP to implementation of electrification projects and monitoring of their outcomes, three years is not sufficient.

It has also turned out that the number of counterparts were smaller than what the Japanese side had anticipated. REA had only four engineers when the project commenced. The number of engineers has increased to six by the time the Short-term Experts were engaged. REA is currently in the process of adding six more. As REA continuously increases its technical staff, additional training for new members will be necessary. Therefore, the extension of the project period by one or two years is recommended to enable REA to sufficiently develop and enhance its capacity.

2) Assign the Rural Electrification Advisor on a long-term basis: According to the R/D, a rural electrification advisor was to be assigned as a long-term expert. However, this was discontinued in 2010. It has become apparent that this was crucial for efficient and effective implementation of the project. The advisor should have a technical back ground on rural electrification and work with REA management and staff members for their regular work, and provide advice. At the same time, the advisor should observe REA work and identify places where improvement is required so that the Short-term Experts of respective technical field can carry out their technical transfer efficiently and effectively. The advisor should also coordinate the timing and contents of technical transfer in Zambia.

10. Lessons learned

1) Good communication
Discussions during the mid-term review opened up dialogue between REA's decision makers regarding the rural electrification planning process, which has always been deemed important by the Japanese project stakeholders. This has enabled the Japanese side to understand the intentions and challenges of REA on this issue and further productive discussions can now be anticipated. This has shown that efforts to convey one's intentions enthusiastically and frankly exchange views, in particular at the administrative level, are important ingredients for efficient project implementation.

2) Proper project monitoring
The mid-term review discovered some differences in the project plan between what is planned in the R/D and PDM. It also became apparent that the actual implementation method of the project stated in the Activity Plans was not structured in the same way as in the PDM. JICA, as the overall administrator of the project, needs to ensure that there is no major divergence between the project plan in the R/D and how the project is actually being implemented. JICA needs to consciously compare the PDM, and the activity plans and completion reports produced by the experts. If there is major divergence, there is need to guide the revision of the PDM and/or the project implementation method. This is an essential element of proper project monitoring.

3) Clearly defining the roles and responsibilities of Japanese experts
The way that the Japanese experts were engaged by JICA in the current project was different from the great majority of other technical cooperation projects and this has considerably compromised project efficiency. The Rural Electrification Advisor and Coordinator were engaged under separate individual contracts with JICA. The Short-term Experts were engaged as a group under a single contract with JICA. There was, however, no overarching contract which covered all the parties. In such a case, clearly defined roles and responsibilities for each party is essential for efficient project implementation. The terms of references for each party should stipulate its roles and responsibilities vis-à-vis the other parties.

Although this manner of expert engagement may not be a common case in JICA's technical cooperation projects, JICA needs to take note of this lesson if it were to retain such option for expert engagement.

Annex 1: Schedule of Mid-term Review

Date	Activities
6/13 (Mon)	Arrival of Ishizaka Meeting with JICA Office and Japanese Experts
6/14 (Tue)	Meeting with JICA Office and Japanese Experts Courtesy call to DOE Interview with DOE Courtesy call to REA Interview with Japanese Experts
6/15 (Wed)	Interview with REA Interview with Japanese Experts
6/16 (Thu)	Interview with REA Interview with Japanese Experts
6/17 (Fri)	Meeting with Japanese Experts Report preparation
6/18 (Sat)	Report preparation Arrival of Hayashi and Mayusumi
6/19 (Sun)	Meeting with JICA Office Report preparation
6/20 (Mon)	Meeting with JICA Office Courtesy Call to DOE Discussions with REA, DOE, ZESCO, and Japanese experts Report preparation
6/21 (Tue)	Discussions with REA and Japanese experts Meeting with JICA Office and Japanese experts Report preparation
6/22 (Wed)	Discussions with REA and Japanese experts Report preparation
6/23 (Thu)	Joint Coordinating Committee and signing of minutes

MINUTES OF MEETING

BETWEEN

JAPAN INTERNATIONAL COOPERATION AGENCY

AND

AUTHORITIES CONCERNED OF THE GOVERNMENT OF

THE REPUBLIC OF ZAMBIA

ON

JAPANESE TECHNICAL COOPERATION

FOR

THE CAPACITY DEVELOPMENT FOR RURAL ELECTRIFICATION

Japan International Cooperation Agency (hereinafter referred to as "JICA") had a series of discussions on the Project for Capacity Development for Rural Electrification (hereinafter referred to as "the Project") with the authorities concerned of the Government of the Republic of Zambia (hereinafter referred to as "the Zambian side").

As a result of discussion, JICA and the Zambian side agreed on the matters referred to the document attached hereto.

Lusaka, 13th October 2011

Mr. Shiro NABEYA
Resident Representative
Japan International Cooperation Agency
Zambia Office

Mr. Teddy J. Kasonso
Permanent Secretary
Ministry of Lands, Energy and Water Development
Republic of Zambia

THE ATTACHED DOCUMENTS

1. Terms of Cooperation

JICA and the Zambian side agreed that Terms of Cooperation mentioned in Record of Discussions signed by both sides on 18th December 2008 should be revised to as the following.

IX. Terms of Cooperation

The Duration of the Project under this attached document will be 4 years and 4 months from August 2009 to December 2013.

2. Outline of the Project

JICA and the Zambian side agreed that Outline of the Project attached as APPENDIX I in Record of Discussions signed by both sides on 18th December 2008 should be revised to as shown in Annex II.

3. Project Design Matrix (PDM) and Plan of Operation (PO)

Considering the above revisions of the Project, JICA and the Zambian side agreed that PDM and PO should be revised in line with current situation to as shown in Annex III and Annex IV.

Annex I	RECORD OF DISCISSIONS OF 18th DECEMBER 2008
Annex II	OUTLINE OF THE PROJECT
Annex III	PROJECT DESIGN MATRIX Version.2
Annex IV	PLAN OF OPERATION Version.2

Annex I

RECORD OF DISCUSSIONS
BETWEEN
JAPAN INTERNATIONAL COOPERATION AGENCY
AND
CONCERNED AUTHORITIES OF THE GOVERNMENT OF
THE REPUBLIC OF ZAMBIA
ON JAPANESE TECHNICAL COOPERATION
FOR
THE CAPACITY DEVELOPMENT FOR RURAL ELECTIRIFICATION

Japan International Cooperation Agency (hereinafter referred to as "JICA") had a series of discussions with the concerned Zambian authorities with respect to desirable measures to be taken by JICA and the Government of the Republic of Zambia for the successful implementation of the Project on "Capacity Development For Rural Electrification" in the Republic of Zambia.

As a result of the discussions, and in accordance with the provisions of the Agreement on Technical Cooperation between the Government of Japan and the Government of the Republic of Zambia, signed in Lusaka on June 27, 2006 (hereinafter referred to as "the Agreement"), JICA and the Zambian authorities concerned agreed on the matters referred to in the document attached hereto.

Lusaka, December 18, 2008

鍋屋史朗

Mr. Shiro Nabeya
Resident Representative
Japan International Cooperation Agency
Zambia Office
Japan

Mr. Peter Mumba
Permanent Secretary
Ministry of Energy and Water Development
Republic of Zambia

THE ATTACHED DOCUMENT

I. COOPERATION BETWEEN JICA AND THE GOVERNMENT OF THE REPUBLIC OF ZAMBIA

1. The Government of the Republic of Zambia will implement the Capacity Development for Rural Electrification (hereinafter referred to as "the Project") in cooperation with JICA.

2. The Project will be implemented in accordance with the Outline of the Project that is given in Appendix I.

II. MEASURES TO BE TAKEN BY JICA

In accordance with the laws and regulations in force in Japan, and the provisions of Article III of Agreement, JICA, as the executing agency for technical cooperation by the Government of JAPAN, will take, at its own expense, the following measures according to the normal procedures of its technical cooperation scheme.

1. DISPATCH OF JAPANESE EXPERTS

JICA will provide the services of the Japanese experts as listed in Appendix II.

The provision of Article III of the Agreement will be applied to the above-mentioned experts.

2. PROVISION OF MACHINERY AND EQUIPMENT

JICA will provide such machinery, equipment and other materials (hereinafter referred to as "the Equipment") necessary for the implementation of the Project as listed in Appendix III.

The provision of Article III of the Agreement will be applied to the Equipment.

III. MEASURES TO BE TAKEN BY THE GOVERNMENT OF THE REPUBLIC OF ZAMBIA

1. The Government of the Republic of Zambia will take necessary measures to ensure that the

self-reliant operation of the Project will be sustained during and after the period of Japanese technical cooperation, through full and active involvement in the Project by all related authorities, beneficiary groups and institutions.

2. The Government of the Republic of Zambia will ensure that the technologies and knowledge acquired by the Zambian nationals as a result of Japanese technical cooperation will contribute to the economic and social development of the Republic of Zambia.

3. In accordance with the provisions of Article V of the Agreement, the Government of the Republic of Zambia will grant in the Republic of Zambia privileges, exemptions and benefits to the Japanese experts referred to in II-1 above and their families.

4. In accordance with the provisions of Article V of the Agreement, the Government of the Republic of Zambia will take the necessary measures to receive and use the Equipment provided by JICA under II-2 above and equipment, machinery and materials carried in by the Japanese experts referred to in II-1 above.

5. The Government of the Republic of Zambia will take necessary measures to ensure that the knowledge and experience acquired by the Zambian personnel from technical training in Japan will be utilized effectively in the implementation of the Project.

6. In accordance with the provision of Article V of the Agreement, the Government of The Republic of Zambia will provide the services of Zambian counterpart personnel and administrative personnel as listed in Appendix IV.

7. In accordance with the provision of Article V of the Agreement, the Government of The Republic of Zambia will provide the buildings and facilities as listed in Appendix V.

8. In accordance with the laws and regulations in force in the Republic of Zambia, the Government of the Republic of Zambia will take necessary measures to supply or replace at its own expense machinery, equipment, instruments, vehicles, tools, spare parts and any other materials necessary for the implementation of the Project other than the Equipment

provided by JICA under II-2 above.

9. In accordance with the laws and regulations in force in the Republic of Zambia, the Government of the Republic of Zambia will take necessary measures to meet the running expenses necessary for the implementation of the Project..

IV. ADMINISTRATION OF THE PROJECT

1. Permanent Secretary in the Ministry of Energy and Water Development, as the Project Director, will bear overall responsibility for the administration and implementation of the Project.

2. Chief Executive Officer of Rural Electrification Authority (REA), as the Project Manager, will bear the direct responsibility of managing and implementing the Project.

3. The Japanese Experts will provide necessary recommendations and advice to the Project Director and the Project Manager on any matters pertaining to the implementation of the Project.

4. Japanese Experts will give necessary technical guidance and advice to the Department of Energy (DOE) and the Rural Electrification Authority (REA).

5. For effective and successful implementation of the Project, the Joint Coordinating Committee (JCC) will be established. The functions and members of the JCC are stipulated in Appendix VI.

V. JOINT EVALUATION

Evaluation of the Project will be conducted jointly by JICA, DOE and REA, during the last six months of the cooperation term in order to examine the level of achievement.

VI. CLAIMS AGAINST JAPANESE EXPERTS

In accordance with the provision of Article VI of the Agreement, the Government of the Republic of Zambia undertakes to bear claims, if any arises, against the Japanese experts engaged in technical cooperation for the Project resulting from, occurring in the course of, or otherwise connected with the discharge of their official functions in the Republic of Zambia except for those arising from the willful misconduct or gross negligence of the Japanese experts.

VII. MUTUAL CONSULTATION

There will be mutual consultation between JICA and the Government of the Republic of Zambia on any major issues arising from, or in connection with this Attached Document.

VIII. MEASURES TO PROMOTE UNDERSTANDING OF AND SUPPORT FOR THE PROJECT

For the purpose of promoting support for the Project among the people of the Republic of Zambia, the Government of the Republic of Zambia will take appropriate measures to make the Project widely known to the people of the Republic of Zambia.

IX. TERM OF COOPERATION

The duration of the Project under this Attached Document will be three [3] years from the date of the first Japanese expert's arrival in the Republic of Zambia.

APPENDIX I OUTLINE OF THE PROJECT

1. Title of the Project

The Capacity Development for Rural Electrification

2. Overall Goal

Access to electricity in rural areas increases in accordance with the Rural Electrification Master Plan (REMP).

3. Project Purpose

The capacities of DOE and REA for implementing and updating the Rural Electrification Master Plan (REMP) are strengthened.

4. Outputs of the Project

1. Technical capacities of DOE and REA for planning annual work plan for rural electrification projects are developed and enhanced.
2. Technical capacities of REA for implementing rural electrification projects are enhanced.
3. Project management system of REA is improved and strengthened.
4. Facilitating capacities of DOE and REA and technical capacities of public entities and private companies for photovoltaic (PV) systems are developed and enhanced.
5. Capacities for updating the REMP are developed and enhanced.
6. REA's capacities for financial management of Rural Electrification Fund is developed and enhanced.

5. Activities of the Project

1-1. Review the method of packaging RGCs in the REMP.

1-2. Identify the packages in the REMP to conduct study on RGC Electrification Plan.

1-3. Carry out Training on the method of RGC Electrification Plan including Technical, Economic, Financial, Environmental and Social analyses.

1-4. Investigate the RGCs to collect necessary data and information for preparing RGC Electrification Plan through grid extension, micro-hydro and PV system.

1-5. Prepare the manuals for RGC Electrification Plan.

1-6. Carry out feasibility studies (F/S) for electrifying RGCs by grid extension and micro-hydro.

1-7. Prepare the F/S manuals for grid extension electrification and micro hydro electrification.

1-8. Utilize these manuals for planning activities, and review and revise the manuals if necessary.

2-1. Carry out detailed design (D/D) for grid extension and micro-hydro electrification.

2-2. Prepare the D/D manuals for grid extension and micro-hydro electrification.

2-3. Utilize these manuals.

2-4. Supervise the construction works.

2-5. Prepare the supervision manuals.

2-6. Utilize the manuals for supervision activities, and review and revise the manuals if necessary.

3-1. Prepare the tender documents for consultants to conduct study on RGC Electrification Plan.

3-2. Carry out contractual process for RGC Electrification Plan and revise the contract agreements if necessary.

3-3. Prepare the tender documents for F/S of grid extension and micro-hydro electrification.

3-4. Carry out contractual process for F/S of grid extension and micro-hydro electrification and revise the contract agreements if necessary.

3-5. Prepare manuals for project management of planning work.

3-6. Repackage the RGCs to be electrified by grid extension.

3-7. Repackage the RGCs to be electrified by micro-hydro.

3-8. Prepare the tender documents for the repackages of grid extension electrification and micro-hydro electrification respectively for D/D, material procurement, and construction works.

3-9. Carry out contractual process for D/D and revise the contract agreements if necessary.

3-10. Carry out contractual process for material procurement and revise the tender documents if necessary.

3-11. Carry out contractual process for construction works and revise the contract agreements if necessary.

3-12. Review and assess the present project management system.

3-13. Introduce the improved project management system including decentralized mechanism for project management.

4-1. Carry out basic training on PV systems for DOE and REA.

4-2. Develop the technical standard of PV systems.

4-3. Prepare strategic plan for disseminating PV systems for rural electrification.

4-4. Prepare human resource development plan in accordance with the strategic plan.

4-5. Prepare trainer's training text books and manuals.

4-6. Carry out trainer's training in accordance with the human resource development plan, and revise the text books and manuals if necessary.

4-7. Prepare text books and manuals for training the inspectors and engineers.

4-8. Carry out training for inspectors and engineers of private companies in accordance with the human resource development plan, and revise the text books and manuals if necessary.

4-9. Prepare text books and manuals for training the technicians.

4-10. Carry out training for technicians of public entities and private companies, and revise the text books and manuals if necessary.

4-11. Introduce regulation framework for improving the quality of PV systems installed by private companies.

5-1. Understand thoroughly the contents and method of the REMP including the database.

5-2. Prepare the updating procedure of the REMP.

5-3. Revise the REMP in accordance with the updating procedure.

5-4. Prepare guidelines for updating the REMP and revise the guidelines if necessary.

6-1. Prepare an annual Work Plan and budget of REA activities in accordance with the REMP.

6-2. Assess the present procedure of accounting, and budget and asset management.

6-3. Identify the needs for capacity development for the improved procedure of accounting, and budget and asset management.

6-4. Prepare guidelines and manuals for the improved procedure.

6-5. Carry out accounting, and budget and asset management using the guidelines and manuals, and revise the guidelines and manuals if necessary.

APPENDIX II LIST OF JAPANESE EXPERTS

1. Long-term Experts

(i) Rural Electrification Advisor

2. Short-term Experts

(i) Expert in Rural Electrification Planning

(ii) Expert in Distribution Line Planning

(iii) Expert in Micro Hydro Power Development

(iv) Expert in Photovoltaic (PV) Systems and Training

(v) Expert in Financial Management

Other short-term experts will be dispatched as necessary.

Note:

Assignment schedule of experts depends on the progress of the Project and availability of the suitable experts. It will be decided through mutual consultations for each Japanese fiscal year.

APPENDIX III LIST OF MACHINARY AND EQUIPMENT

Equipment will be given as necessary for the effective implementation of the Project. Details shall be discussed during the Project.

The expected machinery and equipment are as follows:

a) Necessary survey equipment for distribution lines and micro-hydro electrification,

b) One (1) 4WD Vehicle,

c) Two (2) sets of laptop computers,

d) Two (2) sets of printers,

e) One (1) set of engineering drawing software (Visual),

f) One (1) set of software for power flow simulation,

g) One (1) set of equipment and tools for PV system training and inspection, and

h) One (1) set of equipment for distribution line inspection.

APPENDIX IV LIST OF THE REPUBLIC OF ZAMBIA COUNTERPART PERSONNEL AND SUPPORTING STAFF

1. Counterpart personnel

(1) Project Director: Permanent Secretary, Ministry of Energy and Water Development
(2) Deputy Project Director: Director, Department of Energy, MEWD
(3) Project Manager: Chief Executive Officer, REA
(4) Senior Manager, Planning and Projects, REA
(5) Manager, Finance and Administration, REA
(6) Other Energy officers of DOE, and Project Engineers and other Specialists of REA

2. Supporting staff

(1) Drivers
(2) Other personnel

APPENDIX V LIST OF LAND, BUILDINGS AND FACILITIES

1. Office space and necessary facilities for Japanese experts and Zambian counterparts
2. Other facilities mutually agreed upon as necessary for the implementation of the Project

Annex II

OUTLINE OF THE PROJECT

1. Title of the Project

The Capacity Development for Rural Electrification

2. Overall Goal:

Access to electricity in rural areas increases

3. Project Purpose:

The capacities of REA for implementing and updating the Rural Electrification Master Plan (REMP) are strengthened.

4. Outputs of the Project:

1. Planning process and planning capacities for rural electrification are enhanced.
2. Technical capacities for rural electrification by distribution line extension are enhanced.
3. Technical capacities for mini-hydro electrification are enhanced.
4. Capacities for project management are improved and strengthened.
5. Technical capacities for photovoltaic (PV) systems are developed and enhanced.
6. Capacities for updating the REMP are developed and enhanced.
7. Capacities for financial management are enhanced.

5. Activities of the Project:

1-1 Prepare a manual for the formulation of five year rolling Plan
1-2 Select some projects for pre-F/S from the projects mentioned in REMP & other important projects outside REMP
1-3 Collect the data and information of selected projects by conducting RGC field survey
1-4 Repackage RGCs based on the data and information collected
1-5 Prepare five year rolling Plan considering the result of repackaging.
1-6 Prepare Annual Work Plan by using five year rolling Plan

2-1 Prepare a F/S & D/D manual for grid extension electrification
2-2 Carry out F/S & D/D for grid extension electrification in accordance with the manual

3-1 Prepare a F/S manual for mini-hydro electrification
3-2 Carry out F/S for mini-hydro electrification in accordance with the manual

4-1 Prepare a manual for project management
4-2 Assess and revise the existing project management system
4-3 Introduce the improved project management system
4-4 Prepare tender documents related to F/S & D/D, material procurement, and construction
4-5 Cary out the contracting process for F/S & D/D, material procurement, and construction, and review of contract documents

4-6 Support preparation of monitoring and evaluation system for the rural electrification promotion

4-7 Prepare a manual for supervision of grid extension electrification

4-8 Supervise construction work for grid extension electrification in accordance with the manual

5-1 Carry out basic training on PV systems for DOE and REA

5-2 Develop the technical specifications of PV systems for REA

5-3 Prepare the plan for disseminating PV systems for rural electrification

5-4 Prepare human resource development plan in accordance with the plan for disseminating PV systems

5-5 Prepare trainer's training text books and manuals

5-6 Carry out trainer's training in accordance with the human resource development plan, and revise the text books and manuals if necessary

5-7 Prepare the manual for inspection and monitoring of PV systems.

5-8 Prepare framework for improving the sustainability of PV systems

6-1 Understand thoroughly the contents and method of the REMP for updating

7-1 Effectively make transactions for financial management and prepare the proper reports satisfactory to the stakeholders.

7-2 Study the possibilities to improve the procedures for financial management for project implementation

7-3 Improve the guidelines and manuals for accounting and financial management..

Project Design Matrix

Project Title: Capacity Development for Rural Electrification
Implementing Agency: Rural Electrification Authority (REA)
Project Site: Zambia

Version 2 (13/Oct/2011)
Target Group: Primary; REA
Project Period: Aug.2009– Dec.2013

NARRATIVE SUMMARY	OBJECTIVELY VERIFIABLE INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
Overall Goal: Access to electricity in rural areas increases.	At least 80% of five year rolling plan implemented by 2018.	Annual Report and five year rolling plan	
Project Purpose: The capacities of REA for implementing and updating the Rural Electrification Master Plan (REMP) are strengthened.	1. At least 54 RGCs mentioned are electrified by Dec. 2013.	Annual Report	- Rural electrification policies do not deteriorate significantly. - Barriers of in-house wiring and connection fees are reduced to affordable level. - Sufficient financial resource for rural electrification is secured.
	2. At least 18 project packages mentioned in REMP are listed in Annual Work Plans by Dec. 2013.	Annual Work Plan	
	3. At least 70 % of the newly-posted projects in the annual budget (except carry-over projects) are contracted within each fiscal year.	Financial Report	
Outputs: 1. Planning process and planning capacities for rural electrification are enhanced.	1.1 Systematic planning process is established.	Planning Flow Chart	- Sufficient financial and material resources for rural electrification is secured. - Sufficient human resource for rural electrification is secured.
	1.2 At least 5 officers are able to prepare five year rolling plan from REMP.	Assessment by expert and REA senior staff	
	1.3 At least 5 officers are able to prepare annual plan from five year rolling plan.	Assessment by expert and REA senior staff	
2. Technical capacities for rural electrification by distribution line extension are enhanced.	2.1 At least 9 feasibility studies are conducted in proper manner along planning process.	Assessment by expert and REA senior staff	
	2.2 At least 9 detailed designs are conducted in proper manner along planning process.	Assessment by expert and REA senior staff	
3. Technical capacities for mini-hydro electrification are enhanced.	3.1 At least 2 officers are able to determine hydropower potential through map study and simple measurement of flow rate and head.	Assessment by expert and REA senior staff	
	3.2 At least 2 officers are able to conduct feasibility studies including simple surveying with survey instruments, measurement of flow rate with current meters, preparation of mini-hydro layouts, cost estimation, Construction Method, O&M Plan, and financial analysis	Assessment by expert and REA senior staff	
4. Capacities for project management are improved and strengthened.	4.1 All projects are managed in proper manner from the standpoint of budget management	Assessment by expert and REA senior staff	
	4.2 9 tender documents for F/S projects are prepared with sufficient quality.	Tender documents	
	4.3 9 tender documents for D/D projects are prepared with sufficient quality.\	Tender documents	
	4.4 At least 4 officers are able to prepare tender documents with sufficient quality.	Assessment by expert and REA senior staff	
	4.5 At least 4 officers are able to carry out supervision of grid extension electrification with sufficient quality.	Assessment by expert and REA senior staff	
5. Technical capacities for photovoltaic (PV) systems are developed and enhanced.	5.1 At least 2 REA officers are able to carry out load assessment, design, prepare cost estimation for solar PV systems.	Assessment by expert and REA senior staff	
	5.2 At least 2 REA officers are able to inspect and monitor solar PV systems properly by measuring system parameters.	Assessment by expert and REA senior staff	
	5.3 At least 2 officers are qualified as certified solar PV trainer.	Number of certified solar PV trainers.	
6. Capacities for updating the REMP are developed and enhanced.	6.1 At least 5 officers are able to review the method of packaging RGCs in the REMP	Assessment by expert and REA senior staff	

7. Capacities for financial management are enhanced.	7.1 Processing time for accounting and financial management is improved.	Quarterly management report	
	7.2 The information system for integrated management is designed and planned.	Assessment by expert and REA senior staff	

Activities:

1-1 Prepare a manual for the formulation of five year rolling Plan
1-2 Select some projects for pre-F/S from the projects mentioned in REMP & other important projects outside REMP
1-3 Collect the data and information of selected projects by conducting RGC field survey
1-4 Repackage RGCs based on the data and information collected
1-5 Prepare five year rolling Plan considering the result of repackaging.
1-6 Prepare Annual Work Plan by using five year rolling Plan

2-1 Prepare a F/S & D/D manual for grid extension electrification
2-2 Carry out F/S & D/D for grid extension electrification in accordance with the manual

3-1 Prepare a F/S manual for mini-hydro electrification
3-2 Carry out F/S for mini-hydro electrification in accordance with the manual

4-1 Prepare a manual for project management
4-2 Assess and revise the existing project management system
4-3 Introduce the improved project management system
4-4 Prepare tender documents related to F/S & D/D, material procurement, and construction
4-5 Cary out the contracting process for F/S & D/D, material procurement, and construction, and review of contract documents
4-6 Support preparation of monitoring and evaluation system for the rural electrification promotion
4-7 Prepare a manual for supervision of grid extension electrification
4-8 Supervise construction work for grid extension electrification in accordance with the manual

5-1 Carry out basic training on PV systems for DOE and REA
5-2 Develop the technical specifications of PV systems for REA
5-3 Prepare the plan for disseminating PV systems for rural electrification
5-4 Prepare human resource development plan in accordance with the plan for disseminating PV systems
5-5 Prepare trainer's training text books and manuals
5-6 Carry out trainer's training in accordance with the human resource development plan, and revise the text books and manuals if necessary
5-7 Prepare the manual for inspection and monitoring of PV systems.
5-8 Prepare framework for improving the sustainability of PV systems

6-1 Understand thoroughly the contents and method of the REMP for updating

7-1 Effectively make transactions for financial management and prepare the proper reports satisfactory to the stakeholders.
7-2 Study the possibilities to improve the procedures for financial management for project implementation

7-3 Improve the guidelines and manuals for accounting and financial management.

Inputs (Means and Cost)

Japanese Side

A. Dispatch of Japanese Experts
(1) Long-term Expert
(2) Short-term Expert

B. C/P Training in Japan

C. Procurement of equipment

D. Necessary expense to implement the Project

Zambia Side:

A. Allocation of full-time C/Ps

B. Allocation of supporting staff and drivers

C. Provision of office space and facilities for the Project

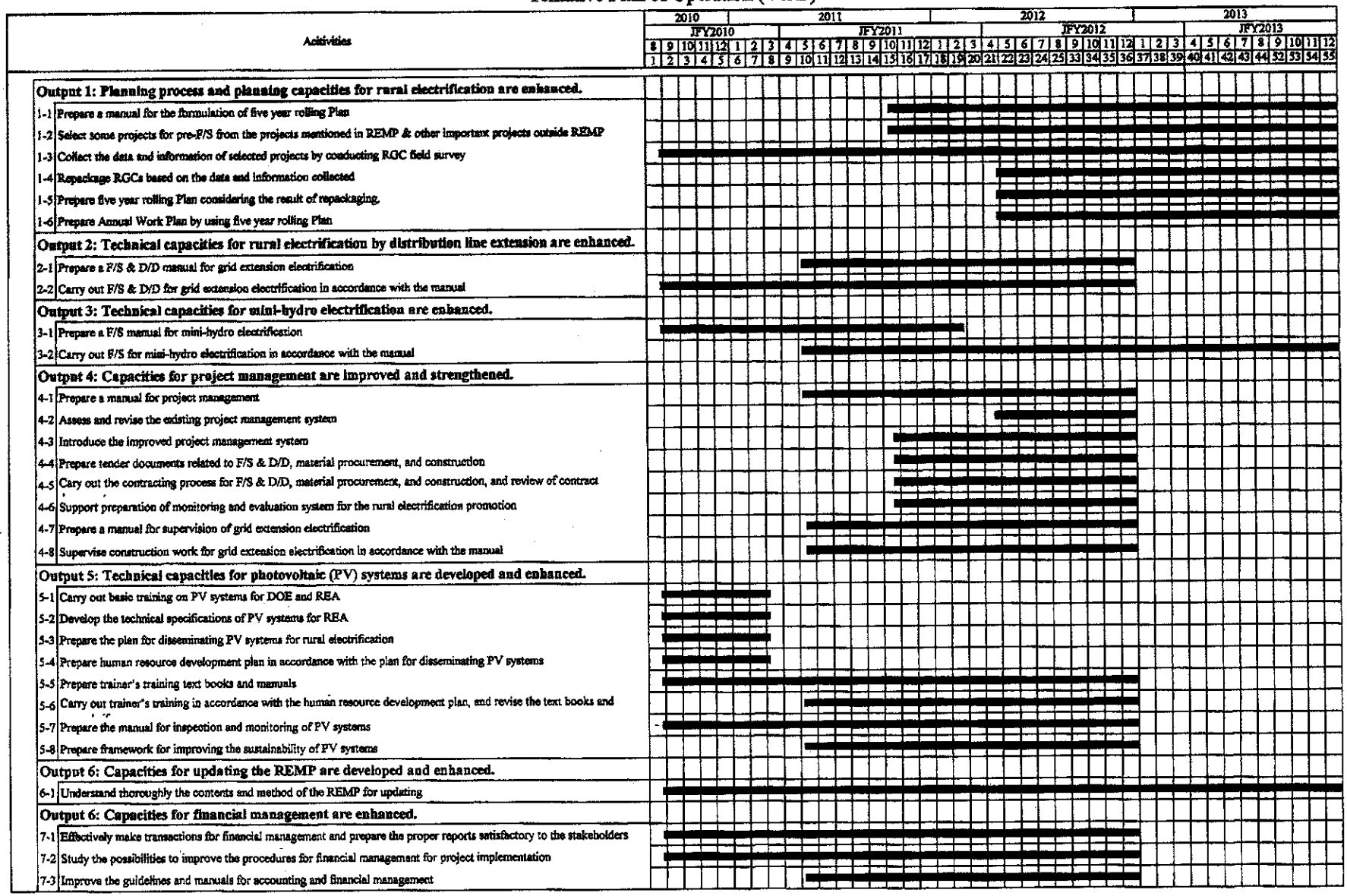
D. Local Cost
Appropriation of necessary budget to support the local cost of the project, such as provision of workshop, domestic and foreign travel allowances, etc.

- REA is able to retain majority of its officers.
- REA is allocated sufficient budget for its operation.

Preconditions

- ZESCO's contribution is assured

Capacity Development for Rural Electrification
Tentative Plan of Operation (Ver.2)



MINUTES OF MEETING
BETWEEN
THE RURAL ELECTRIFICATION AUTHORITY OF
THE REPUBLIC OF ZAMBIA
AND
THE SHORT-TERM EXPERT TEAM FROM
CHUBU ELECTRIC POWER COMPANY INC.
ON
JAPANESE TECHNICAL COOPERATION PROJECT
FOR
THE CAPACITY DEVELOPMENT FOR RURAL ELECTRIFICATION

As a result of the discussions and activities of the Capacity Development for Rural Electrification (hereinafter referred to as "the Project"), carried out from May to July, 2012, the Rural Electrification Authority of the Republic of Zambia (hereinafter referred to as "REA"), and the Short-Term Expert Team from Chubu Electric Power Company Inc. (hereinafter referred to as "CEPCO"), hired by the Japan International Cooperation Agency (hereinafter referred to as "JICA"), agreed upon the matters referred to in the documents attached hereto:-

Lusaka, 28th June 2012

Mr. Wilfred SERENJE
Chief Executive
Rural Electrification Authority
Republic of Zambia

For
和田 英樹
Mr. Keiji SHIRAKI
Leader, Short Term Expert Team
Chubu Electric Power Company Inc.

ATTACHMENT

REA and CEPCO, in the presence of the Rural Electrification Advisor had a series of discussions. CEPCO and REA agreed that rural electrification (RE) planning is one of the most critical issues to be dealt with during the period from May to July 2012. Relevant activities are as follows:

- Discussion on the formulation of the Five-Year Rolling Plan (FYRP) on 7th and 14th June 2012
- Map study training for the pre-Feasibility Study (Pre-FS);
- Field training for the Pre-FS in Mazabuka from 20th to 22nd June 2012

REA and CEPCO agreed that REA will start the process of preparing the FYRP from end June 2012 in line with the schedule and concept as Attached in the ANNEX I and II. CEPCO will come back to Zambia by the end of September 2012 and continue the technical assistance activities to REA.

9th June 2012

Proposed REA's Schedule on the Formulation of the 5-Year Rolling Plan including the Pre-FS for Year 2013 and 2014

As agreed by REA and the Experts on 8th June 2012, REA would like to start the formulation of the 5-Year-Rolling Plan including the Pre-FS from end June 2012. The steps to formulate the 5-year rolling plan with necessary activities and human resources required were prepared by the Experts as follows:

1. Selection of the target sites from REMP (up to early July)

Twenty (20) packages (2 from each Province) shall be selected from the REMP and the engineers in charge of the projects would be appointed by 1st week of July 2012.

More project names would be prepared from the REMP list as back-up in case the target sites are already electrified.

Activity	Remarks	Period
Preparation of preliminary 20-package list from REMP	More names should be prepared as back-up	- 6th July
Engineers in charge should be appointed.		- 6th July

2. Screening and confirmation of the project sites (up to end July)

The engineers in charge ask ZESCO and Provincial Office relevant information such as location, electrification status, accessibility with location of relevant facilities thorough interview (telephone) and questionnaire and confirm the target sites to be surveyed by end of 3rd week of July (assume 20th July).

The engineers in charge should prepare the location map of Google earth and hand over the data to the surveyor by end July (31st July).

Activity	Remarks	Period
Screening and confirmation of the project sites	Relevant information should be acquired in this stage.	- 20th July
Preparation of Google location map and handing over to surveyor		- 31st July

3. Mapping, Desk Study and Preparation of the Field Survey (up to end August)

The Surveyor with the Engineers in charge should prepare the maps with relevant public/ private facility information of each project site by 3rd week of August (assume 20th August) 2012.

The engineers in charge, in parallel, should conduct Desk Study with tentative HV/MV routes and the survey preparation by end August (31st August).

Activity	Remarks	Period
Preparation of maps with relevant facilities	The surveyor should lead the work.	- 20th August
Carrying out desk study for each project site	The work should be in parallel with the mapping works by the engineer	- 31st August
Preparation of the field survey	Appointment with the Provincials office, ZESCO	- 31st August

4. Field survey and Reporting (up to end November)

The engineers in charge will conduct the field survey from the 1st week of September 2012. It is assumed that one site will be studied in 2 weeks per site including field survey and reporting. If 4 engineers can be assigned, 8 sites could be studied in a month. It is concluded that all 20 sites could be studied until end November (for 3 months) in earliest.

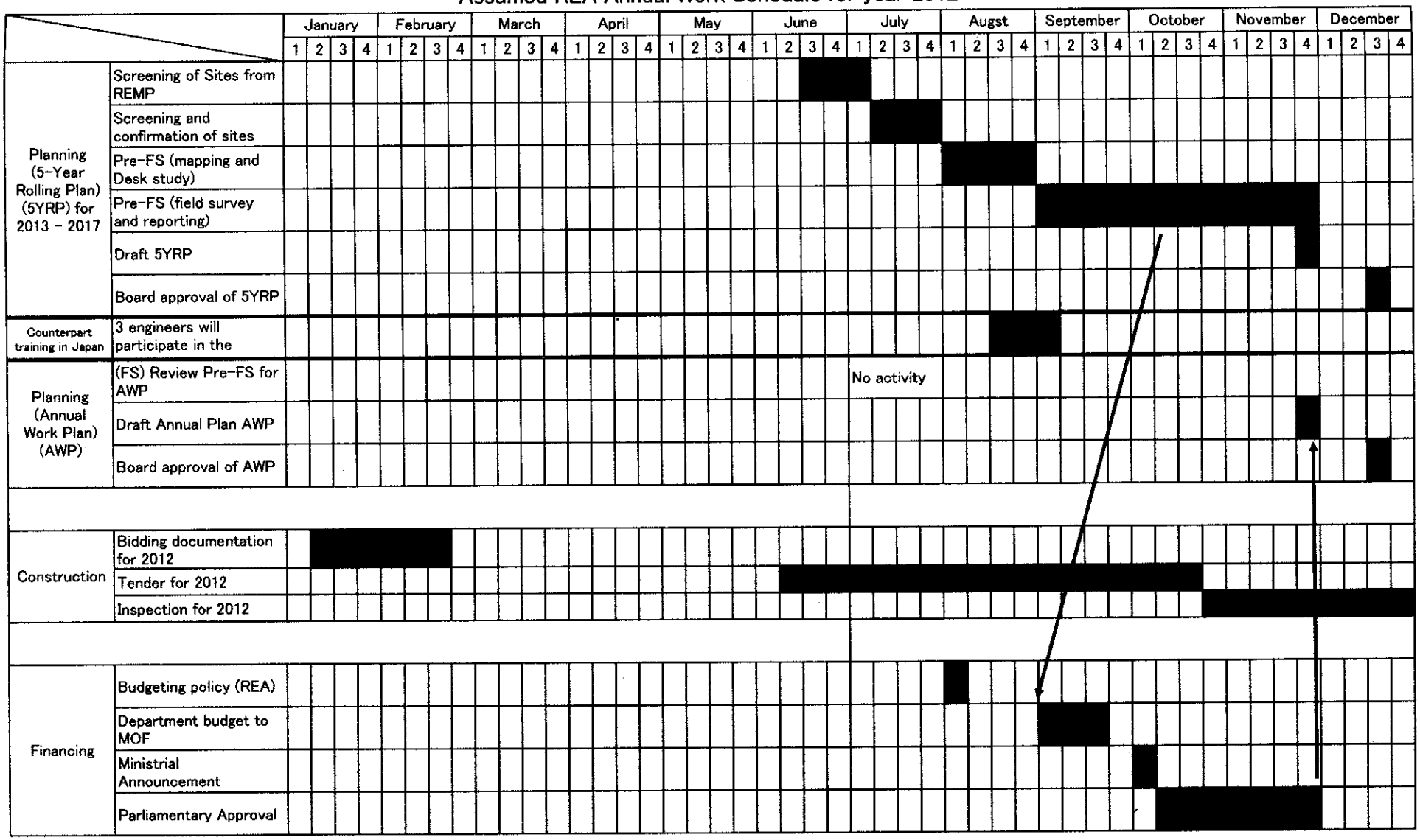
Sites for 2013 can be studied/surveyed before those for 2014 until middle October.

Activity	Remarks	Period
Conducting field survey with reporting	- 1 site for 2 weeks - 8 sites by 4 engineers - 3month for 20 sites (1.5months for 10 sites)	- End November - (Middle October)

5. Preparation of the 5-Year Rolling Plan in 2012 (for 2013 - 2017)

At the end of the Pre-FS, the 5-Year Rolling Plan in 2012 for 2013 – 2017 will be prepared by end of November 2012 considering the project segment as necessary.

Assumed REA Annual Work Schedule for year 2012



MINUTES OF MEETING
BETWEEN
THE RURAL ELECTRIFICATION AUTHORITY OF
THE REPUBLIC OF ZAMBIA
AND
THE SHORT-TERM EXPERT TEAM FROM
CHUBU ELECTRIC POWER COMPANY INC.
ON
JAPANESE TECHNICAL COOPERATION PROJECT
FOR
THE CAPACITY DEVELOPMENT FOR RURAL ELECTRIFICATION

The Rural Electrification Authority of the Republic of Zambia (hereinafter referred to as "REA") and the Short-Term Expert Team from Chubu Electric Power Company Inc. (hereinafter referred to as "CEPCO"), hired by the Japan International Cooperation Agency (hereinafter referred to as "JICA"), held the workshop for the Capacity Development for Rural Electrification from 28th February to 1st March, 2013. As a result of the workshop, REA and CEPCO, in the presence of the Rural Electrification Advisor, agreed to complete the final draft manuals according to the attachment III and to prepare a Five-year Rolling Plan by 11th May 2013.

ATTACHMENT I : The agenda of the workshop
ATTACHMENT II : The attendance list of the workshop
ATTACHMENT III : The future schedule on the manuals

Lusaka, 14th March 2013

Mr. Patrick Mubanga
Acting Technical Director
Rural Electrification Authority
Republic of Zambia

for
Mr. Keiji SHIRAKI
Leader, Short Term Expert Team
Chubu Electric Power Company Inc.

ATTACHMENT I

RURAL ELECTRIFICATION AUTHORITY

WORKSHOP FOR JICA TECHNICAL COOPERATION PROJECT/ CAPACITY DEVELOPMENT FOR RURAL ELECTRIFICATION TO BE HELD FROM 28TH FEBRUARY TO 1ST MARCH AT CROSSROAD LODGE

PROGRAM

Date	Program		Remarks
28th ,Thu	8:30-9:00	Opening Remarks/ Introduction	
	9:00-9:15	Status of JICA Technical Cooperation Project	Mr. Shiraki
	9:15-9:30	Status of Preparation of Five Year Rolling Plan	Mr. Mubanga
	9:30-17:00	Comment of the Draft Manuals and Discussion 1. Manual for the Formulation of Five-year Rolling Plan 2. Pre-F/S Manual 3. Feasibility Study and Detailed Design Manual for Power Distribution 4. Supervision of Construction Works Manual for Power Distribution 5. Mini-Hydro Manual 6. REA Operational Manual: Finance and Accounting 7. Procedure Manual for revising the Rural Electrification Master Plan	
1st ,Fri	8:30-15:00	Discussion of the Project Management 1. Challenges REA facing of project management 2. Confirmation of Annual REA's schedule 3. Project Manger's responsibility stipulated in the Contract 4. Confirmation of generalized project schedule 5. Discussion of the Manual Preparation	 Mr. Mubanga Mr. Hatano Mr. Mayusumi Mr. Hatano
	15:00-17:00	Discussion of the capacity building necessary for further improvement	

ATTACHMENT II

Attendance List of the Workshop for JICA Technical Cooperation Project/ the Capacity Development for Rural Electrification

on 28 February, 2013

No.	Name	Organization	Signature
1			
2			
3			
4			
5	Christopher Chisenga	REA	
6	Kelvin Hamyanda	JICA	
7		JICA	
8		REA	
9	Edmond Mkumba	REA	
10		REA	
11	Keiji SHIRAKI	Chubu (JICA)	
12	Patrick	REA	
13			

Attendance List of the Workshop for JICA Technical Cooperation Project/ the Capacity Development for Rural Electrification

on 1 March, 2013

No.	Name	Organization	Signature
1	Masanobu MATSUMI	JICA / [illegible]	
2	[illegible]	REA	
3	Keiji SHIRAKI	JICA (CEPCO)	
4	Takeshi Kikukawa	JICA CEPCO [illegible]	
5	[illegible]	JICA / CEPCO	
6	Ryosuke Hotate		
7	Jean Nimenya	REA – Engineer	
8	Fabrice Kabanga	REA – Director Technical	
9	Nadine Tembo	REA - INTERN	
10	Edmond Mbumba	REA	
11	Christopher Chirwa	REA	
12	Collins Phiri	REA - [illegible]	
13			

ATTACHMENT III

The future schedule on the manuals

Manual	Assignment	Person in charge
The Manual for the formation of Five-year Rolling Plan	The contents were agreed. Wording should be revised.	Mr. Christopher Chisense
The Pre-F/S Manual	The contents were agreed. Wording should be revised.	Mr. Suzyo Silabvwe
The Feasibility Study and Detailed Design Manual for Power Distribution	The contents were agreed. Wording should be revised.	Mr. Wazingwa Mugala
The Supervision of Construction Works Manual for Power Distribution	The contents were agreed. Wording should be revised.	Mr. Nason Musonda
The Mini-Hydro Manual	To be completed by a presentation by the expert next time	Mr. Edmond Mkumba
The PV Manual (Text)	Completed	-
The Manual for the Project Management on the Rural Electrification	The contents were agreed. Checklist should be prepared separately.	Mr. Patrick Mubanga
The REA Operational Manual: Finance and Accounting	Completed	-
The Procedure Manual for Revising the Rural Electrification Master Plan	The contents were agreed. Wording should be revised.	Mr. Patrick Mubanga Mr. Christopher Chisense

MINUTES OF THE JOINT COORDINATING COMMITTEE FOR JICA TECHNICAL COOPERATION PROJECT/ CAPACITY DEVELOPMENT FOR RURAL ELECTRIFICATION HELD ON 29TH MAY, 2013 AT 14:40 HOURS IN THE REA BOARDROOM

PRESENT:

1.	Mr. Geoffrey Musonda	Chief Executive Officer, REA - **Chairperson**
2.	Mr. Patrick Mubanga	Acting Director Technical Services, REA
3.	Mr. Morgan Chiselebwe	Director Finance, REA
4.	Mr. Maxwell Z. Phiri	Director Human Resource & Administration, REA
5.	Mr. Justin Mukosa	Manager – Corporate Affairs Unit, REA
6.	Mr. Penjani H. Nyimbili	Surveyor, REA – **Secretary**
7.	Mr. Nkusuwila Silomba	Senior Electrification Officer, Department of Energy
8.	Mr. Mwape Chipala	Energy Planner, DPI
9.	Mr. Takashi Kikukawa	JICA short term expert
10.	Mr. Koji Shikimachi	JICA short term expert
11.	Mr. Hideki Wada	JICA short term expert
12.	Mr. Keiji Shiraki	JICA short term expert, team leader
13.	Mr. Yasuhiro Kawakami	JICA short term expert
14.	Mr. Masanobu Mayusumi	JICA Rural Electrification Advisor
15.	Mr. Yoshihide Teranishi	JICA Resident Representative, JICA Zambia office
16.	Mr. Junichi Kawase	JICA Project Formulation Advisor, JICA Zambia office
17.	Mr. Tadayuki Ogawa	JICA Senior Advisor, JICA HQ
18.	Ms. Chiyoko Miyata	Program officer, JICA HQ
19.	Ms. Ayako Nakagawa	Evaluator, Ingerosec corporation

AGENDA:

1. Welcoming remarks
2. Presentation of the activities conducted by JICA experts
3. Presentation of the improved way of works in REA
4. Presentation of the Terminal Evaluation Report
5. Discussion of the report
6. Any other business
7. Closing remarks

1. Welcoming Remarks

The welcoming remarks were made by both the Chairperson and JICA Resident Representative, after which the meeting was officially declared open at 14:40 hours.

2. Presentation of the activities conducted by JICA experts

The Presentation was made by JICA short term expert leader as ANNEX I.

3. Presentation of the improved way of works in REA

The Presentation was made by Acting Director Technical Services, REA as ANNEX II.

4. Presentation of the Terminal Evaluation Report

The Presentation was made by evaluator as ANNEX III.

5. Discussion of the report

The Acting Director Technical Services requested additional support to JICA on mini hydro development, revision of manuals and capacity building in PV system. The JICA Senior Advisor responded that he expected REA to continue utilizing the manuals and revise them as required in the remaining period of 6 months and train more engineers by using certified trainers.

The Manager Corporate Affairs raised the issue of the Five Year Rolling Plan which REA had developed 6 month ago and needed support in terms of implementation. In response, the Acting Director Technical Services responded that the activities requiring further support would be finalized before the end of the year and would be communicated to JICA accordingly. The JICA Senior Advisor agreed to the proposal.

The Department of Energy, Senior Electrification Officer asked REA what the next step would be in terms of managing feasibility studies in terms of mini hydro development. The Acting Director Technical Services responded that REA had built enough capacity to conduct pre feasibility studies on mini hydro sites. In addition REA was going to develop one of the mini hydro sites.

JICA Project Formulation Advisor asked REA if the manuals prepared through the project would be authorized officially and whether the REMP would be revised in the near future. The Chief Executive Officer responded that REA had accepted the manuals as part of REA documents and would present them to the board for approval.

6. Any Other Business

There was no any other business.

7. Closing Remarks

The short term expert leader and Chief Executive Officer gave closing remarks and meeting ended at 16:40 hours.

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Chairman	Secretary
24/06/13	20/06/13
Date	Date

Attachment II

Work Schedule

Annex-2 Plan of Operation for the Project on Capacity Development for Rural Electrificationof Zambia Plan of Operation

Duration of work	JFY2010									JFY2011										JFY2012										JFY2013		
	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6
Overall work plan		Activities in Zambia for the first year									Activities in Zambia for the second year												Activities in Zambia for the third year											
	Activities in Japan for the first year									Activities in Japan for the second year												Activities in Japan for the third year											
Activities	▼JCC										▼JCC					▼JCC															▼JCC		
1)Review of the procedure for RGC packaging and exmaination of the need for repackagingidentify the needs for repackaging																																			
2)Capacity develoment for REMP updating																																			
3)Preparation and use of a manual for formation of RGC electrification plans																																			
4)Selection of packages to be covered by the study for RGC electrification planning																																			
5)Implementation of training for RGC electrification planning																																			
6)Preparation of tender documents for study of RGC electrification planning																																			
7)Collection of data and information required for preparation of RGC electrification plans, and RGC field study																																			
8)Preparation and updating of the F/S manual for RGC electrification																																			
9)Implementation of F/S for RGC electrification																																			
10)Preparation of a manual for mini-hydro systems																																			
11)Preparation of a manual for project management																																			
12)Evaluation and review of the existing setup for project management																																			
13)Formulation and updating of a manual for supervision of RE construction																																			
14)Transfer of technology for management of RE construction																																			
15)Implementation of OJT for distribution line extension																																			
16)confirmation of order specification sheets for F/S and D/D related to distribution line extension, and presentation of opinions																																			
17)Repackaging of RGCs to be electrified																																			
18)Preparation of tender documents related to D/D, material procurement, and construction for repackaged electrification projects																																			
19)Collection of data and information required for preparation of plans for RGC electrification by mini-hydro systems, and implementation of the related F/S																																			
20)Instruction for and implementation of studies for the mini-hydro F/S																																			
21)Repackaging of RGCs to be electrified by mini-hydro systems																																			
22)Revision of the manual for electrification by mini-hydro systems																																			
23)Preparation of a framework for improvement of the sustainability of PV systems																																			
24)Implementation of basic training in PV systems for public institutions																																			
25)Revision of manuals and texts related to PV technology																																			
26)Preparation of a manual for inspection and monitoring of PV systems																																			
27)Implementation of trainers' training for PV technology																																			
28)Assessment and improvement of procedure for financial management																																			
29)Partnership with other donors																																			
30)Preparation of a manual for accounting and financial management																																			
31)Formulation of five-year rolling plans																																			
32)Formulation of annual work plans																																			
33)Support for construction of a system for RE-related M&E																																			
(Submit Project Completion Report)																																			★

Attachment III

Photo of Activities

Photo of Activities

Field Training for DL design (pre-F/S, F/S and D/D)

Visit substation (Serenje Dist.)

Lecture and group discussion (Serenje Dist.)

Interview for demand forecast of RGC (Serenje Dist.)

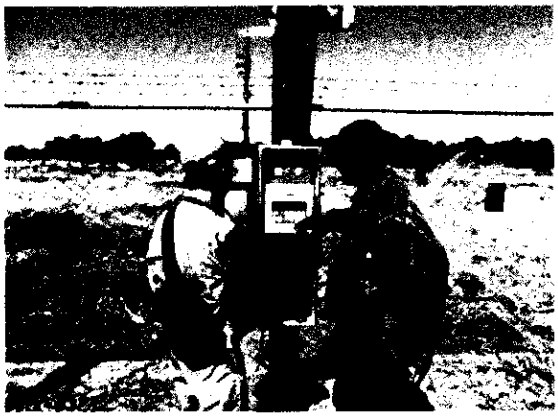
Lecture of DL system (Serenje Dist.)

Training for measurement tool (Serenje Dist.)

Wrap-up meeting (Serenje Dist.)

Field Training for DL design (pre-F/S, F/S and D/D)

Confirmation of location of RGCs
(Mazabuka Dist.)



Confirmation of current demand (Mazabuka Dist.)

Interview with teacher of RGC
(Kapiri Mposhi Dist.)

DL root planning (Mazabuka Dist.)

Interview with teacher of RGC
(Kapiri Mposhi Dist.)

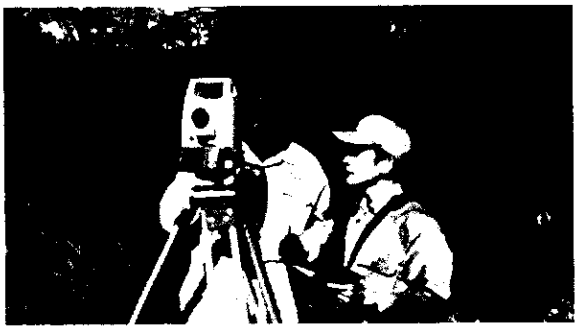
DL root planning (Kapiri Mposhi Dist.)

Field Training for DL Supervision	
	
Interview with contractor (Choma Dist.)	Training for measurement tool (Choma Dist.)
	
Interview with contractor (Choma Dist.)	Training for inspection of DL facility (Choma Dist.)
	
Training for inspection of DL facility (Choma Dist.)	Wrap-up meeting (Choma Dist.)

Field Training (F/S for mini-hydro)

Site Visit (Kabompo Dist.)

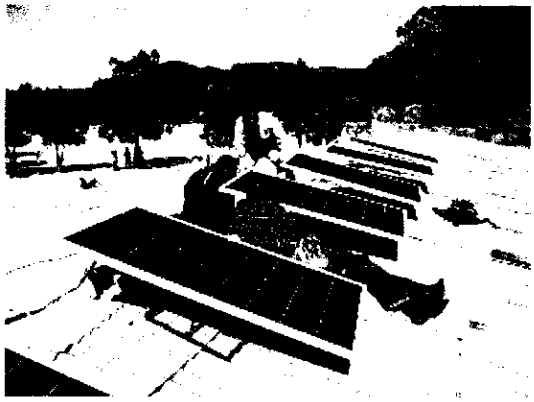
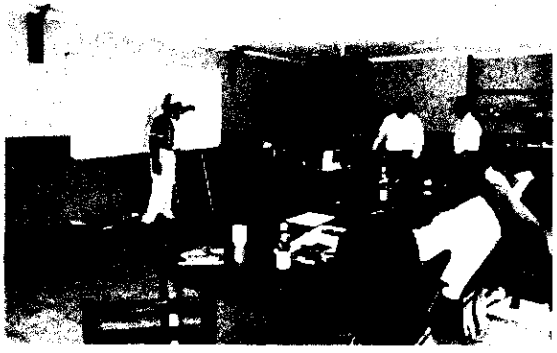
Bush clearing for the site survey



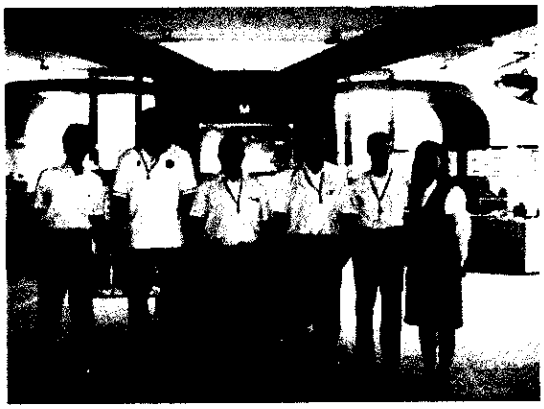
Training for measurement tool (Kabompo Dist.)

Training for measurement tool (Kabompo Dist.)

Checking the grid connecting point
(Kabompo Dist.)

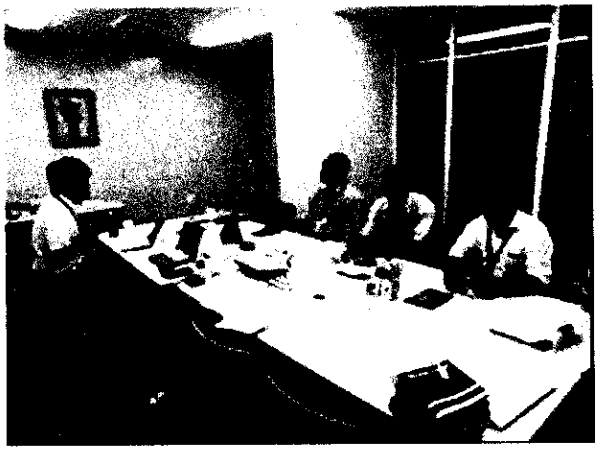
PV Training	
	
Field Training	Lecture and exercise
	
Lecture and exercise	Field Training
	
Group Discussion	Repairing of defects

C/P training in Japan



Visit of transformer manufacturing company

Visit of pole manufacturing company



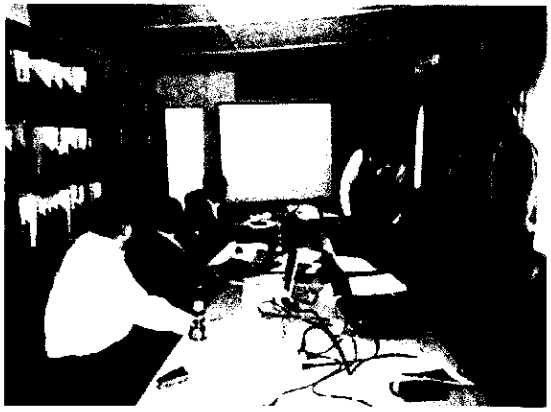
Lecture

Visit of a cable tunnel

Visit of a customer service center

Visit of a construction site

Meeting and workshop with the C/Ps



Technical Workshop

Discussion at a workshop

JCC for the kick off the project

Presentation about activities

Closing remarks of JCC

Group Photo of the project members