Appendix G

Minutes of Meeting
for the Rural Electrification Master Plan Project
in Zambia

G - 1

Minutes of Meeting

of the Fifth Mission

(November, 2007)

MINUTES OF MEETING
FOR
THE RURAL ELECTRIFICATION MASTER PLAN STUDY
IN ZAMBIA

AGREED UPON BETWEEN

DEPARTMENT OF ENERGY
MINISTRY OF ENERGY AND WATER DEVELOPMENT

THE RURAL ELECTRIFICATION AUTHORITY

AND
JICA MASTER PLAN STUDY TEAM

Lusaka, 9 November, 2007

Mr. Patrick Mubanga
Senior Electricity Officer
Department of Energy
Ministry of Energy and Water Development

Mr. Tomoyuki Yamashita
Deputy Team Leader
JICA REMP Study Team
Tokyo Electric Power Co., Inc.

Mr. Wilfred Serenje
Chief Executive
Rural Electrification Authority

The Rural Electrification Master Plan Study Team (Study Team) appointed by the Japan International Cooperation Agency (JICA) carried out the 5th field investigation in Zambia from 4 November to 14 November, 2007. After a series of discussions and activities, the Rural Electrification Authority (REA), Department of Energy (DOE) in the Ministry of Energy and Water Development (MEWD), and the Study Team agreed on the following issues:

1. Agreement on Final Draft Master Plan

REA, DOE, and the Study Team agreed on the contents of the Draft Final Master Plan in the discussion on 6 November 2007. The Study Team shall submit the complete report of Draft Final Master Plan in soft copy by 12 December 2007. REA and DOE agreed to make necessary comments and revisions, and send them back to the Study Team by email by 7 January 2008. The Study Team shall submit twenty (20) copies of the Final Report by the end of January 2008 via international express mail to JICA Zambia Office. After the notification of the date for the handover from JICA Resident Representative to the Permanent Secretary of MEWD, REA and DOE shall receive ten (10) copies each through JICA Zambia Office.

2. Final Workshop

The 4th Stakeholder Workshop (Final Workshop) was held at Cresta Golfview Hotel in Lusaka on 7 November 2007. It was officially opened by Honourable Kenneth Konga, Minister of Energy and Water Development, and His Excellency Mr. Hideto Mitamura, Ambassador of Japan. Approximately 100 participants attended the Workshop, including Ministry of Finance and National Planning, Coordination Committee Members, Provincial Planners, private sector representatives, and cooperating partners. The Workshop was chaired by Mr. Peter Mumba, Permanent Secretary of MEWD.

After active discussions regarding the various issues, such as the possibilities of micro hydro development, all the attendees noted the final electrification priority of Project Packages (including the electrification mode for each of 1,217 RGCs) presented by DOE and REA, and policy recommendations presented by the JICA Study Team. Consequently, the Draft Final Master Plan was warmly received by all participants in the Workshop.

The Workshop was closed by Mr. Shiro Nabeya, Residential Representative of JICA Zambia Office, and Mr. Wilfred Serenje, REA Chief Executive. In his final remarks, Mr. Peter Mumba promised and encouraged all the participants to follow and realize the Master Plan.

3. GIS Training

Following the request from REA and DOE to the Study Team in the 2nd Coordination Committee on 6 November 2006, GIS Training Seminar was held at REA Boardroom on 9 and 12 November 2007, and 11 trainees from DOE, REA and ZESCO took part in the Seminar.

G - 2

Minutes of Meeting

of the Fourth Mission

(August, 2007)

MINUTES OF MEETING
FOR
THE RURAL ELECTRIFICATION MASTER PLAN STUDY
IN ZAMBIA

AGREED UPON AMONG

DEPARTMENT OF ENERGY
MINISTRY OF ENERGY AND WATER DEVELOPMENT

THE RURAL ELECTRIFICATION AUTHORITY

AND
JICA MASTER PLAN STUDY TEAM

Lusaka, 22 August, 2007

Mr. Oscar S Kalumiana
Director
Department of Energy
Ministry of Energy and Water Development

Mr. Tomoyuki Yamashita
Deputy Team Leader
JICA REMP Study Team
Tokyo Electric Power Co., Inc.

Mr. Wilfred Serenje
Chief Executive
Rural Electrification Authority

The Rural Electrification Master Plan Study Team (hereinafter referred to as the "Study Team") nominated by the Japan International Cooperation Agency (hereinafter referred to as "JICA") carried out the first half of the 4th field investigation in Zambia from 30 July to 23 August, 2007. As a result of a series of discussions and activities, Rural Electrification Authority (hereinafter referred to as "REA"), Department of Energy (hereinafter referred to as "DOE") in the Ministry of Energy and Water Development, and the Study Team agreed on the following issues:

1. Agreement on Interim Report

REA, DOE, and the Study Team agreed on the contents of the Interim Report in the discussion on 10 August 2007. The Study Team shall submit twenty (20) copies of the Interim Report by the beginning of September 2007 via international express mail to JICA Zambia Office. After the notification of the date for the handover, REA and DOE shall receive ten (10) copies each through JICA Zambia Office.

2. Renewable Energy Potential Survey and Case Study

From 2 August to 18 August 2007, the Study Team accompanied by DOE, REA and Local Consultant carried out the survey in Northern and Luapula Provinces. The Study Team made a reconnaissance survey on ten (10) potential sites in Northern Province and three (3) sites in Luapula Province.

Among these 13 sites, Chilambwe Falls site in Mporokoso District in Northern Province, which has a potential capacity of approximately 900kW, was selected for a Case Study (pre-feasibility level survey), considering the supply and demand balance and the electrification priority of Kapatu RGCs. The case study at Chilambwe Falls site was carried out from 14 August to 16 August 2007.

3. Distribution Extension Case Study

From 8 August to 15 August 2007, the Study Team accompanied by DOE, REA and Local Consultant carried out the distribution extension case study for three (3) project packages: Kabwe in Central Province, Luangwa in Lusaka Province, and Mazabuka in Southern Province. In the case study, the Study Team investigated locations and sizes of RGCs within each of project packages, optimal route for distribution line extension, among others.

4. Socio-Environmental Survey

From 9 July to 18 July 2007, ZESCO as a local consultant hired by the Study Team for Socio-Environmental Survey, accompanied by DOE and REA, carried out the survey at Mujila Falls No.2 in North-Western Province, which is one of Case Study sites identified during the 3rd field investigation period. The draft report of Project Brief for the site will be submitted to the Study Team by the end of August 2007.

From 14 August to 16 August 2007 (the same period of Renewable Energy Case Study in Northern Province), the Study Team accompanied by DOE, REA and ZESCO carried out socio-environmental survey at Chilambwe Falls site, Kapatu RGC, and possible distribution line route to Kapatu RGC. Draft final reports of Project Brief for Chilambwe Falls and Mujila Falls No.2 are scheduled to submit to the Study Team by 18 September 2007.

5. Discussion on Policy Recommendation

On 21 August 2007, meeting on policy recommendation was held at REA Board Room by inviting representatives from Energy Regulation Board, DOE, REA, ZESCO, and CEC (Copperbelt Energy Corporation). Discussion results in the meeting, such as regarding how to increase the sources for and amount of Rural Electrification Fund, how to increase electricity access rate, and what countermeasure needs to be taken to mitigate financial burden for initial cost of electrification, were summarized by DOE and submitted to the Study Team on 22 August 2007. Opinions obtained in the discussion will be reflected in the policy recommendation section in the Master Plan.

6. Location of RGCs

The 181 RGCs, which did not have GPS readings among the 1,216 un-electrified RGCs in the Master Plan, have been captured by REA and notified to the Study Team.

7. Final Stakeholder Workshop

The 4th Stakeholder Workshop is tentatively scheduled to be held in Lusaka on 31 October 2007. Regarding the cost allocation for the Workshop, the Study Team will meet the cost for the venue (including lunch) for 100 attendees; while DOE and REA will finance the required cost to invite Provincial Planners to the Workshop.

G - 3

Minutes of Meeting

of the Third Mission

(June, 2007)

MINUTES OF THE MEETING
OF
THE RURAL ELECTRIFICATION MASTER PLAN STUDY
IN ZAMBIA

AGREED AMONG

DEPARTMENT OF ENERGY
(MINISTRY OF ENERGY AND WATER DEVELOPMENT)

THE RURAL ELECTRIFICATION AUTHORITY

AND

JICA MASTER PLAN STUDY TEAM

Lusaka, 29 June 2007

Mr. Charles Mulenga
Acting Assistant Director
Department of Energy
Ministry of Energy and Water Development

Mr. Tomoyuki Yamashita
Deputy Team Leader
JICA REMP Study Team
Tokyo Electric Power Co., Inc.

Mr. Wilfred Serenje
Chief Executive
Rural Electrification Authority

The Rural Electrification Master Plan Study Team (hereinafter referred to as the "Study Team") nominated by Japan International Cooperation Agency (hereinafter referred to as "JICA") carried out the second half of the 3rd field investigation in Zambia from 10 May to 29 June 2007. As a result of a series of discussions and activities, Rural Electrification Authority (hereinafter referred to as "REA"), Department of Energy (hereinafter referred to as "DOE") of the Ministry of Energy and Water Development (hereinafter referred to as "MEWD"), and the Study Team agreed on the following issues:

1. Renewable Energy Potential Survey

After the local consultant selection process together with DOE and REA, the Study Team made a contract with Mr. Charles Rea to support the renewable energy potential survey. From 22 May to 7 June 2007, accompanied by DOE, REA and Mr. Charles Rea, the Study Team carried out the survey in North-Western and Western Provinces. The Study Team made a reconnaissance survey on ten (10) potential sites in North-Western Province and six (6) sites in Western Province.

Among these 16 sites, Mujila Falls No.2 site in Mwinilunga District in North-Western Province, which has a potential capacity of approximately 1MW, was selected for a Case Study (pre-feasibility level survey), considering the supply and demand balance and the electrification priority of Kanyama and Kakoma RGCs. The case study at Mujila Falls No.2 site was carried out from 31 May to 2 June 2007.

The potential survey will be continued in Northern and Luapula Provinces in August 2007.

2. Socio-Environmental Survey

On 15 June 2007, the Study Team signed a contract with ZESCO to carry out socio-environmental survey. ZESCO, accompanied by DOE and REA, will carry out a survey at Mujila Falls No.2 site and prepare a Project Brief document in July 2007.

In August 2007, ZESCO will also carry out a survey on another Case Study site to be selected by the Study Team in either Northern or Luapula Provinces.

3. 3rd Stakeholders Workshop

The 3rd Stakeholders Workshop was held at Mulungushi International Conference Center in Lusaka on 27 June 2007. It was officially opened by Honourable Kenneth Konga, Minister of Energy and Water Development, and His Excellency Mr. Masaaki Miyashita, Ambassador of Japan. Approximately 90 participants attended the Workshop, including coordination committee members, provincial planners, and private sector representatives.

By taking into account opinions obtained at the Workshop, DOE, REA and the Study Team agreed that un-electrified District Centres (BOMAs) be given preference over the other RGCs in the Master Plan. Therefore, the current electrification priority ranking based on Demand Criteria will be modified by shifting up all un-electrified BOMAs to the top in the ranking.

4. Interim Report

The Study Team submitted a draft Interim Report on June 25 2007 and had a discussion with REA and DOE on 28 June 2007. REA and DOE requested for more time to read the details of the draft report and asked to postpone its finalization by the Study Team to the 4th field investigation in Zambia starting on 30 July 2007. The Study Team consulted with JICA Headquarters and agreed to postpone the submission deadline of the Interim Report to the end of August 2007.

The DOE and REA also requested to add a new chapter dealing with BOMAs electrified by diesel generators in the Master Plan. The chapter should contain details regarding the names the BOMAs electrified by diesel generators, locations, basic demographic data (population, total and electrified number of households/business entities/public facilities/hammer mills, if available), installation year and specification of the diesel generators, electricity demand (daily, monthly, and annually), income (connection fee, collecting tariff, etc.) and expenditure (operation cost, fuel cost, maintenance cost, etc.). This will be the basic information to consider when reviewing the alternative electrification supply method to these BOMAs. The DOE and REA will prepare the draft of this chapter by the end of August 2007.

5. Location of RGCs

Among the 1,216 un-electrified RGCs in the Master Plan, 181 RGCs are yet to have their GPS locations identified. The DOE and REA promised to obtain and submit these readings to the Study Team by 24 August 2007.

6. Final Stakeholder Workshop

The 4th Stakeholder Workshop is scheduled to be held in Lusaka at the end of October 2007. Due to the limited budget provided by JICA, the Study Team will not be able to finance the participation of Provincial Planners to the Workshop. The DOE and REA will make a financing plan to invite them.

G - 4

Minutes of Meeting

of the Second Mission

(February, 2007)

MINUTES OF THE MEETING
OF
THE RURAL ELECTRIFICATION MASTER PLAN STUDY
IN ZAMBIA

AGREED AMONG

DEPARTMENT OF ENERGY
(MINISTRY OF ENERGY AND WATER DEVELOPMENT)

THE RURAL ELECTRIFICATION AUTHORITY

AND

JICA MASTER PLAN STUDY TEAM

Lusaka, 22 February 2007

Mr. Oscar S Kalumiana
Director
Department of Energy
Ministry of Energy and Water Development

Mr. Tomoyuki Yamashita
Deputy Team Leader
JICA REMP Study Team
Tokyo Electric Power Co., Inc.

Mr. Godwell J. Simbeya
Senior Manager (P & P)
Rural Electrification Authority

The Rural Electrification Master Plan Study Team (hereinafter referred to as the "Study Team") nominated by Japan International Cooperation Agency (hereinafter referred to as "JICA") carried out the second half of the 2nd field investigation in Zambia from 11 February to 23 February 2007, following the discussion on the future financing possibilities of rural electrification projects formulated in the JICA Master Plan with the World Bank (hereinafter referred to as "WB") and the African Development Bank (hereinafter referred to as "AfDB") from 30 January to 10 February 2007. As a result of a series of discussions and activities, Rural Electrification Authority (hereinafter referred to as "REA"), Department of Energy (hereinafter referred to as "DOE") of the Ministry of Energy and Water Development (hereinafter referred to as "MEWD"), and the Study Team agreed on the following issues:

1. Agreement on Progress Report

REA, DOE, and the Study Team agreed on the contents of the Progress Report during the discussions of 12 and 20 February 2007. The Study Team shall submit twenty (20) copies of the Progress Report by the beginning of March 2007 via international express mail to JICA Zambia Office. After the notification of the date for the handover, REA and DOE shall receive ten (10) copies each through JICA Zambia Office.

In the discussions, REA and DOE requested the Study Team to include in the final Master Plan Report the attendant list of the 2nd Workshops held in each of 9 Provincial Centres. This attachment emphasizes that stakeholders, namely a) provincial representative from all the nine (9) provinces and their representatives from all the seventy two (72) Districts of Zambia, b) ZESCO Local Officers, c) Farmers' Cooperatives, NGOs and traditional leaders representatives, participated in selecting and prioritising the Rural Growth Centres (hereinafter referred to as "RGCs") to be electrified, in line with the "Decentralized Planning Process" of the Government of the Republic of Zambia.

2. Additional Unelectrified RGCs to Master Plan

The Study Team pointed out that some of the priority project sites selected for the Increased Access to Electricity Service Project (hereinafter referred to as "IAES") contained in the World Bank (hereinafter referred to as "WB") funded programme were not matching with the long-list of the one thousand one hundred and eighteen (1,118) unelectrified RGCs compiled through the 2nd Workshops. REA and DOE agreed to harmonise the discrepancy between the candidate project sites in IAES and the Study Team's long-list of RGCs.

REA and DOE requested the Study Team to be flexible and include new RGC sites to the long-list, if they established to have been left out from the list. The Study Team agreed to this inclusion, (or addition of unelectrified RGCs in the Master Plan) on condition that all the necessary information of these RGCs, such as the items listed in the Data Collection Sheet used in the 2nd Workshop, topographical location, and the revised priority list for each district, will be provided to the Study Team via REA by the end of March 2007.

3. Coordination with International Donors

The Study Team reported to REA and DOE the summary of the meetings held with WB in Washington DC on 1 and 2 February 2007 and with African Development Bank (hereinafter referred to as "AfDB") in Tunis on 7 and 8 February 2007. REA and DOE were informed that there is a possibility of co-financing between Japan Bank for International Cooperation (hereinafter referred to as "JBIC") and WB for rural electrification projects formulated in the Master Plan. REA and DOE would also contact AfDB to seek financing of rural electrification projects developed in the Master Plan.

REA and DOE appreciated the Study Team's coordination with JBIC, WB and AfDB, and requested its further development. REA and DOE also requested the Study Team to find opportunities of communicating with Development Bank of Southern Africa (hereinafter referred to as "DBSA"), which is one of the major financers of the electricity sector projects in Zambia.

REA and DOE promised to prepare the necessary budget for participating in the coordination meeting with WB, AfDB, and DBSA, together with the Study Team, scheduled for July and November 2007.

4. Completion of Socio-Economic Survey

The contracted local consultant for the socio-economic survey, Independent Management Consulting Services Limited (hereinafter referred to as "IMCS"), finished the field survey on eighty seven (87) RGCs (22 electrified and 65 unelectrified) as scheduled. Due to the inaccessibility during the rainy season, three (3) unelectrified RGCs could not be surveyed. In addition, three (3) RGCs in the survey list originally considered as unelectrified RGCs turned out to be already electrified through the field survey. Despite the changes in the number of total surveyed RGCs and the composition of electrified and unelectrified RGCs from the original plan (90 RGCs consisting of 19 electrified and 71 unelectrified), the survey was on the whole considered to have been successfully completed with satisfactory quality of data collected from one thousand three hundred and twenty seven (1,327) interviewees.

The contract with IMCS came to an end on 22 February 2007, after the submission of all requested materials contained in the Terms of Reference. The Study Team requested IMCS to share information obtained in the survey with REA and DOE. It was agreed that IMCS would be invited to the 3rd Workshop to be held in June 2007, as a stakeholder.

5. Presentation to Minister of Energy and Water Development

On the request from REA and DOE to the Study Team, Mr. Tomoyuki Yamasihta, Deputy Team Leader of the Study Team, and Mr. Yasushi Iida, Socio Economic Expert, had a meeting with the Minister of Energy and Water Development, Hon. Felix Mutati (MP), and presented the status of the Master Plan Study as of 22 February 2007. In the presentation, the outline and progress of the Master Plan Study, as well as the conceivable financing schemes for the implementation of the rural electrification projects formulated in the Master Plan, was highlighted.

REA also requested the Study Team to make a presentation to the Rural Electrification Board of Directors during their next field survey period scheduled in May 2007, and the Study Team accepted the request.

6. Counterpart Training in Japan

Mr. Oscar S. Kalumiana, Director of DOE, and Mr. Wilfred Serenje, Chief Executive of REA, completed all the necessary arrangements with the Government of Zambia to travel for the Counterpart Training in Japan scheduled to take place from 3 March to 28 March 2007. The Study Team has organised a coordination meeting between the Counterparts and JBIC in Tokyo on 8 March 2007.

G - 5

Minutes of Meeting

of the Second Mission

(December, 2006)

MINUTES OF MEETING
FOR
THE RURAL ELECTRIFICATION MASTER PLAN STUDY
IN ZAMBIA

AGREED UPON AMONG

DEPARTMENT OF ENERGY
MINISTRY OF ENERGY AND WATER DEVELOPMENT

THE RURAL ELECTRIFICATION AUTHORITY

AND
JICA MASTER PLAN STUDY TEAM

Lusaka, 20 December, 2006

Mr. Oscar S Kalumiana
Director
Department of Energy
Ministry of Energy and Water Development

Mr. Tomoyuki Yamashita
Deputy Team Leader
JICA REMP Study Team
Tokyo Electric Power Co., Inc.

Mr. Wilfred Serenje
Chief Executive
Rural Electrification Authority

The Rural Electrification Master Plan Study Team (hereinafter referred to as the "Study Team") nominated by the Japan International Cooperation Agency (hereinafter referred to as "JICA") carried out the first half of the 2nd field investigation in Zambia from 30 October to 21 December, 2006. As a result of a series of discussions and activities, Rural Electrification Authority (hereinafter referred to as "REA"), Department of Energy (hereinafter referred to as "DOE") in the Ministry of Energy and Water Development, and the Study Team confirmed and agreed on the following issues:

1. Coordination Committee

The second Coordination Committee meeting was held on 6 November, 2006 in order to build consensus on the rescheduled activities of the Rural Electrification Master Plan Study (hereinafter referred to as the "Master Plan Study") after the traffic accident that took place on 2 August, 2006, by inviting representatives from the Coordination Committee organizations. Twenty (20) participants attended the Coordination Committee and they agreed on the new schedule of the Master Plan Study, which ends in December 2007, i.e. three (3) months behind the original schedule (refer to Appendix-A).

2. 2nd Workshop

The 2nd Workshops were held in nine (9) Provincial Centers: in Kasama (Northern Province) on 1 August, and in the other eight (8) Provincial Centers from 7 November to 24 November, 2006 as shown in Appendix-B. In order to minimize the total duration of the 2nd Workshops, REA, DOE, and the Study Team agreed to carry out the Workshops by two teams in parallel.

The objectives of the 2nd Workshop were to obtain demographic information of un-electrified Rural Growth Centers (hereinafter referred to as "RGCs") based on Data Sheet and Maps that were distributed during the 1st Workshop on 7 June, 2006 for District Planners to fill out. The RGCs are to be given priority in a long-term plan up to 2030, by taking into account opinions from provinces, districts, and local stakeholders, which is in line with the "Decentralized Planning Process" of the Government of the Republic of Zambia.

Two (2) official representatives from each District were officially invited by the JICA Study Team to participate. However, other stakeholders such as ZESCO Local Office, Farmers' Cooperatives and NGOs were also given an opportunity to participate in the 2nd Workshops, on the condition that they make their own arrangements for accommodation, transportation and miscellaneous expenses.

Based on the collected information (Data Sheet & Maps submitted by each District) during the 2nd Workshops, ninety (90) RGCs for the socio-economic survey were selected: 71 un-electrified RGCs: i.e. the first prioritized candidate RGCs for electrification from each of the seventy-two (72) Districts except Lusaka District, plus nineteen (19) electrified RGCs (refer to Appendix-C).

3. Local Consultant Selection for Socio-Economic Survey

Among eleven (11) local consultants requested to submit the Expression of Interest (hereinafter referred to as "EOI") regarding the Socio-Economic Survey, eight (8) of them submitted EOI by 14 July, 2006. Based on the evaluation results of EOI by REA, DOE, and the Study Team, seven (7) of them were short listed as capable local consultants on 24 July, 2006.

The Terms of Reference (hereinafter referred to as "TOR") of the Socio-Economic Survey, excluding the specification of target RGCs, were sent out to the short listed local consultants on 6 November, 2006. The Pre-bid Meeting was held by inviting them individually on 30 November, 2006, to seek clarifications regarding the TOR and provide them the names and locations of the 90 target RGCs selected during the 2nd Workshops.

All the short listed local consultants submitted the bidding documents by 8 December, 2006. The Study Team, together with REA and DOE, evaluated the submitted bidding documents with the following weighting: forty-five percent (45%) on technical aspects, ten percent (10%) on the curricula of vitas for assigned project manager and supervisors, and forty-five percent (45%) on the financial aspects. As a result, Independent Management Consulting Services Limited (hereinafter referred to as "IMCS") was selected as a successful bidder on 12 December, 2006. After the price and contract negotiation, the Study Team and IMCS signed the Contract on 14 December, 2006. The contract period of the Socio-Economic Survey is from 15 December, 2006 to 22 February, 2007. Preparation for questionnaire development, training of enumerators, and pilot survey will take place from 15 December to 28 December, 2006. The field survey on 90 RGCs will be undertaken from 5 January to 4 February, 2007. The data entry by the local consultant and the socio-economic survey will end by 15 February, 2007.

Two members of the Study Team, Mr. Yamashita and Mr. Iida, will return to Lusaka for two weeks, from 11 February to 24 February, 2007, to collect survey results/data and finalize with payments to IMCS.

4. Counterpart Training in Japan

Counterpart Training in Japan related to the rural electrification management, from 3 March to 28 March, 2007, has been requested to Japanese Government. Mr. Oscar S. Kalumiana, Director of DOE, and Mr. Wilfred Serenje, Chief Executive of REA, are nominated for the training in an official letter submitted to JICA Zambia Office on 15 December, 2006.

5. Coordination with International Donors

In order to render the Master Plan effective, coordination with International Donors (such as Japan Bank of International Cooperation [JBIC], African Development Bank [AfDB], and World Bank [WB]) who are likely to assist in financing rural electrification projects identified by the Master Plan needs to be started from an early stage of the Study. REA, DOE, and the Study Team agreed on starting the coordination with International Donors by explaining the execution plan and progress of the Master Plan Study at the respective Headquarters of JBIC (Tokyo, 28 December, 2006), WB (Washington DC, 1 -2 February, 2007), and AfDB (Tunis, 7-8 February, 2007). Together with the Study Team, representatives from REA and DOE will join the coordination meeting with WB and AfDB at their own expense. A coordination meeting with JBIC in Tokyo is also scheduled during the period of Counterpart Training in Japan.

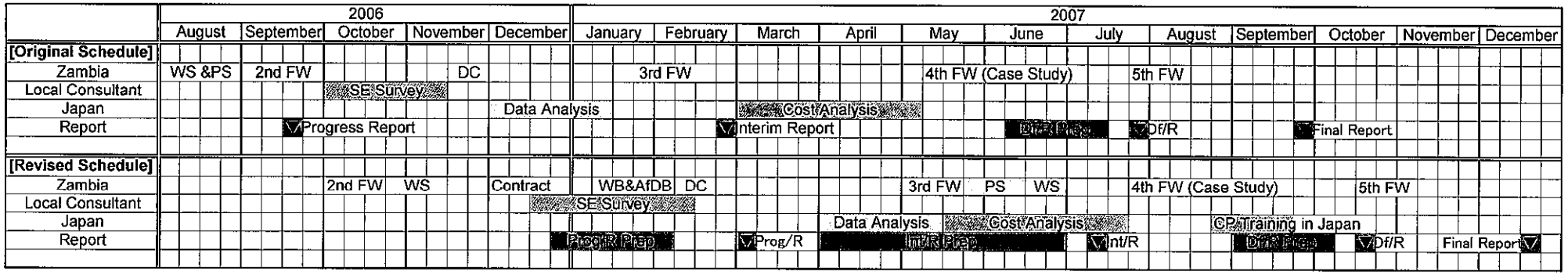
6. Outline of Progress Report

REA, DOE, and the Study Team reached the agreement on the outline (or table of contents) of the Progress Report (refer to Appendix-D). The Study Team will submit the draft Progress Report by 12 February, 2007 and finalize it through the discussion with REA and DOE by February 21, 2007.

7. GIS Training

REA and DOE requested the Study Team to hold GIS Training in Zambia during the 2nd Coordination Committee. After consultations with JICA Zambia Office, the Study Team agreed on holding a one day GIS Training session in October 2007, during the 5th field investigation period.

Revised Study Schedule



Appendix-B

2nd Workshop Schedule

Year 2006		Team A	Team B
11/7	Tue	Move: LUSAKA→MANSA	Move: LUSAKA→MONGU
11/8	Wed	Workshop Preparation	Workshop Preparation
11/9	Thu	**2nd Workshop in MANSA**	**2nd Workshop in MONGU**
11/10	Fri	Visiting ZESCO Office (Data Collection)	Visiting ZESCO Office (Data Collection)
11/11	Sat	Move: MANSA→KITWE	Move: MONGU→LUSAKA
11/12	Sun	Move: KITWE→SOLWEZI Workshop Preparation	Workshop Wrap-up
11/13	Mon	Visiting ZESCO Office (Data Collection)	Move: LUSAKA→KABWE Workshop Preparation
11/14	Tue	**2nd Workshop in SOLWEZI**	**2nd Workshop in KABWE**
11/15	Wed	Move: SOLWEZI→KITWE Workshop Preparation	Visiting ZESCO Office (Data Collection) Move: KABWE→LUSAKA
11/16	Thu	**2nd Workshop in KITWE (NDOLA)**	Workshop Preparation
11/17	Fri	Visiting ZESCO Office (Data Collection)	**2nd Workshop in LUSAKA**
11/18	Sat	Move: KITWE→LUSAKA	Workshop Wrap-up
11/19	Sun	Workshop Wrap-up	Move: LUSAKA→LIVINGSTONE
11/20	Mon	Move: LUSAKA→CHIPATA	Workshop Preparation
11/21	Tue	Workshop Preparation	Visiting ZESCO Office (Data Collection)
11/22	Wed	**2nd Workshop in CHIPATA**	**2nd Workshop in LIVINGSTONE**
11/23	Thu	Visiting ZESCO Office (Data Collection) Move: CHIPATA→LUSAKA	Data Analysis
11/24	Fri		Move: LIVINGSTONE→LUSAKA

Appendix-C

Un-electrified Rural Growth Centers for Socio-Economic Survey

		District	Ward	Rural Growth Center
1. Central Province	1	Chibombo	Kakoma	Shimukuni
	2	Kabwe	Mpima	Mpima
	3	Kapiri Mposhi	Luanchele	Chipepo
	4	Mkushi	Kamimbya	Old Mkushi
	5	Mumbwa	Kalwanyembe	Mumbwa Big Concession
	6	Serenje	Chibale	Chibale
2. Copperbelt Province	7	Chiliabombwe	Anoya Zulu	Mungomba
	8	Chingola	Kapisha	Kamiteta
	9	Kalulushi	Ichimpe	Kameme
	10	Kitwe	Limaposa	Kakolo
	11	Luanshya	Chitwi	Kafubu
	12	Lufwanyama	-	Emarald Mining Area
	13	Masaiti	Mutaba	Mutaba
	14	Mpongwe	Mikata	Mikata
	15	Mufulira	Mutundu	Mutundu North
	16	Ndola	Kavu	Kanglonga
3. Eastern Province	17	Chadiza	Kamini	Mlolo
	18	Chama	Kalinkhu	Kalinkhu
	19	Chipata	-	Chiparamba
	20	Katete	Kapangulula	Kagoro
	21	Lundazi	Chimaliro	Mwase
	22	Mambwe	Mphomwa	Mphomwa Tse-tse
	23	Nyimba	Ngozi	Chipembe
	24	Petauke	Matambazi	Kapungwe
4. Luapula Province	25	Chienge	Lunchinda	Lupiya
	26	Kawambwa	Mulunda	Chama
	27	Mansa	Chibeleka	Kasongwa Sub Boma
	28	Milenge	Mikula	Tayali
	29	Mwense	Mpasa	Katuta
	30	Nchelenge	Chilongo	Chilongo
	31	Samfya	Kapata	Chinsanka
5. Lusaka Province	32	Chongwe	Bunda Bunda	Chinyunyu
	33	Kafue	Malundu	Chipapa
	34	Luangwa	Dzalo	Luangwa Boma
	35	Lusaka	-	-
6. Northern Province	36	Chilubi	Santa Maria	Kambashi
	37	Chinsali	Mukumbi	Shiwangandu
	38	Isoka	Kalansa	Muyombe
	39	Kaputa	-	Nsama Sub Boma
	40	Kasama	Musowa	Kachuma
	41	Luwingu	-	Masonde
	42	Mbala	Lapisha	Chimula
	43	Mpika	Chibwa	Kanchibiya
	44	Mporokoso	Kalungwishi	Mukupakaoma
	45	Mpulungu	Kapembwa	Kasaba Bay
	46	Mungwi	Mpanda	Makasa
	47	Nakonde	Isunda	Wulongo
7. North-Western Province	48	Chavuma	Chivombo	Chivombo
	49	Kabompo	Kashinakazhi	Kashinakazhi
	50	Kasempa	Nselauke	Nselauke
	51	Mufumbwe	Matushi	Matushi
	52	Mwinilunga	Ntambu	Ntambu
	53	Solwezi	Mumena	Mumena
	54	Zambezi	Chitokoloki	Chitokoloki
8. Southern Province	55	Choma	Hamaundu	Kachomba
	56	Gwembe	Chibuwe	Siabwengo
	57	Itezhi-tezhi	Lubanda	Lubanda
	58	Kalomo	Mbwiko	Napatizya
	59	Kazungula	Sekute	Mambova
	60	Livingstone	Kasiya	Kasiya
	61	Mazabuka	Magoye	Ngwezi
	62	Monze	Choongo East	Kamuzya East
	63	Namwala	Bambwe	Bambwe
	64	Siavonga	Nanyanga	Namoomba

Appendix-C

Electrified Rural Growth Centers for Socio-Economic Survey

		District	Ward	Rural Growth Center
1. Central Province	1	Kapiri Mposhi	-	Mpula
	2	Kabwe	Mpunde	Mpunde
2. Copperbelt Province	3	Ndola	Kafulafuta	Mishikishi
	4	Ndola	Kafulafuta	Chiwala
3. Luapula Province	5	Nchelenge	-	Kambwali
	6	Mansa	-	Chembe
	7	Kawambwa	-	Munkanta
	8	Mansa	-	Luamfumu
4. Lusaka Province	9	Chongwe	Nakatindi	Nchute
	10	Kafue	-	Chiawa
5. Northern Province	11	Kasama	-	Nseluka
6. North-Western Province	12	Mwinilunga	-	Kabanda
	13	Solwezi	-	Kapinjimpanga
7. Southern Province	14	Livingstone	-	Mukuni Village
	15	Choma	-	Mochipapa
	16	Livingstone	-	Musokotwane Village
	17	Livingstone	-	Mwandi Village
8. Western Province	18	Sefula	Imatonga	Senanga
	19	Mongu	Sefula	Sfula

Appendix-D

Outline of Progress Report

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Minutes of Meeting

of the First Mission

(June, 2006)

MINUTES OF MEETING
FOR
THE RURAL ELECTRIFICATION MASTER PLAN PROJECT
IN ZAMBIA

AGREED UPON AMONG

DEPARTMENT OF ENERGY
MINISTRY OF ENERGY AND WATER DEVELOPMENT

THE RURAL ELECTRIFICATION AUTHORITY

AND
JICA MASTER PLAN STUDY TEAM

Lusaka, 21 June, 2006

Mr. Charles Mulenga
Acting Director
Department of Energy
Ministry of Energy and Water Development

Mr. Wilfred Serenje
Acting Chief Executive
Rural Electrification Authority

Mr. Tomoyuki Yamashita
Team Sub-Leader
JICA REMP Study Team
Tokyo Electric Power Co., Inc.

The Ministry of Energy and Water Development (hereinafter referred to as "MEWD") through the Ministry of Finance and National Planning (hereinafter referred to as "MFNP") officially requested the Government of Japan to implement the study for Development of the Rural Electrification Master Plan (hereinafter referred to as the "Master Plan"). In response to the request, the Master Plan Study Team nominated by the Japan International Cooperation Agency (hereinafter referred to as "JICA") was dispatched and had a series of discussions with the authorities concerned of the Government of Zambia from 24 May to 23 June, 2006. The purpose and participants of each meeting during the period are summarized in Appendix-A. As a result, REA, DOE, and the JICA Study Team confirmed and agreed to the following issues:

1. Inception Report

The Rural Electrification Authority (hereinafter referred to as "REA"), Department of Energy (hereinafter referred as "DOE") in MEWD, and the JICA Rural Electrification Master Plan Study Team (hereinafter referred to as the "Study Team") reached the agreement on the contents - Basic Concepts, Strategies, Methodologies, and Study Schedule - of the Inception Report (referred to as Appendix-B). REA and DOE received twenty (20) sets of copies of the Inception Report.

2. Counterpart Personnel

The REA and DOE assigned fourteen (14) staff members in total as counterpart personnel to the 10 members in JICA Study Team, as shown in Appendix-C.

3. Undertaking of the Government of Zambia

The JICA Study Team has been provided with two offices at the DOE, including nine (9) sets of desks and chairs, four (4) steel cabinets, a refrigerator, ten (10) sets of cup and glass, and a telephone/Fax machine from the Government of Zambia.

4. Coordination Committee

The REA, DOE, and the Study Team confirmed and agreed that the Coordination Committee will consist of six (6) organizations: the REA, DOE, Department of Planning and Information/MEWD, Energy Regulation Board, ZESCO and Office for Promoting Private Power Investment.

The first Coordination Committee meeting (concurrently with the 1st seminar) was held on 2 June, 2006 in order to build consensus regarding the Inception Report, by inviting representatives from the stakeholders listed in Appendix-D. In addition to the Coordination Committee members, thirty-six (36) other participants attended the 1st Seminar.

Participants to the seminar agreed on the contents of the Inception Report and importance of their cooperation to and participation in the Master Plan Study was highlighted.

5. Workshop

The objectives of the Workshop were to obtain demographic information and make a list of un-electrified village-centers or Rural Growth Centers (RGCs), and prioritize these RGCs as a long-term plan by 2030, by taking Provinces/Districts' opinions into account. The 1st Workshop of 7 June, 2006, was held to share the concepts of the Master Plan with Provincial representatives and request them to cooperate in data collection and prioritization regarding un-electrified RGCs from each District. Three (3) representatives were invited from each Province and fifty-four (54) participants attended the 1st Workshop. The Provincial representatives who participated agreed to cooperate in the Study. They were requested to ensure that the Data Sheet & Map was filled in by 20 July, 2006. The Study Team will collect the Data Sheet & Map in the 2nd Workshops to be held at the nine (9) Provincial Centers.

Due to limited resources and the importance of maintaining consistency, the REA, DOE, and the Study Team agreed to carry out the 2nd Workshops by one team, from 23 July to 27 August, 2006 as shown in Appendix-E. Based on the collected information from each District in the 2nd Workshops, target villages (or Rural Growth Centers) for the socio-economic survey will be selected. Bidding to engage a local consultant for the socio-economic survey is scheduled from 28 August to 8 September, 2006. The socio-economic survey will be carried out nationwide and data will be collected in ninety (90) RGCs: one (1) un-electrified RGC from each of the seventy-two (72) Districts plus eighteen (18) electrified RGCs. A month and two weeks is allocated for this exercise. Preparation of the questionnaire and training of enumerators will take place from 9 September to 23 September, 2006. The field survey will be undertaken from 24 September to 23 October, 2006. The data entry by the local consultant and the socio-economic survey will end on 8 November, 2006 at the earliest.

Two members of the Study Team - Mr. Yamashita and Mr. Iida will travel back to Lusaka for two weeks, from 13 November to 24 November, 2006 in order to collect survey results/data from the local consultant and finalize with payments to the local consultant.

The REA and DOE will carry out all necessary arrangements for the 2nd Workshops in consultation with Provincial Representatives selected in the 1st Workshop. It was agreed between the signatories of these minutes that, only two (2) official representatives from each District will be fully sponsored by the JICA Study Team to participate. However, private sector representatives and NGOs will also be given an opportunity to participate in the 2nd Workshops, but they have to make their own arrangements for accommodation, transportation and miscellaneous expenses.

6. Number of Case Study

In the original study plan, the JICA Study Team proposed one (1) mini-grid potential site and four (4) grid extension sites as case study targets. The REA and DOE, however, requested the Study Team to modify the breakdown of case study targets: it was requested that two (2) mini-grid potential sites and three (3) grid extension sites be considered instead. The REA and DOE indicated that implementation, sustainable operation & maintenance and management of the mini-grid rural electrification system is relatively more difficult than the grid extension system. Therefore, executing a higher number of case studies concerning mini-grid potential sites should be favoured. The Study Team agreed to discuss this issue further with the JICA Tokyo Office, since an increase in the number of case study execution for mini-grid potential sites could cause an extension in the period of fieldwork for the Study Team.

7. Coordination with International Donors

In order to render the Master Plan effective, finance is one of the most critical issues to be considered by the Government of Zambia. Coordination with International Donors (such as Japan Bank of International Cooperation [JBIC], African Development Bank [AfDB], and World Bank [WB]) who can assist in financing rural electrification projects identified by the Master Plan needs to be started from an early stage of the Study. Therefore, the REA and DOE officially requested the Study Team to support the coordination with International Donors by explaining the execution plan, progress, and final results of the Study at the respective Headquarters of JBIC, AfDB, and WB as part of the Master Plan.

8. Local Consultant for Socio-Economic Survey

A local consultant will be hired in August 2006 to execute socio-economic surveys in all the districts of Zambia. At most, six (6) capable local consultants will be considered for carrying out the survey based on their technical, qualitative, and logistical submissions. Based on the evaluation results of their Expression of Interest (EOI) and their technical and financial proposals, only one (1) consultant will be selected among them.

9. Others

The REA, DOE and the Study Team shall consult each other in respect of any other matter that may arise from or in connection with the Study.

Appendix-A

Participants List for Meetings

DATE		May 24	May 24	May 29	May 30	May 30	May 31	June 1	June 6	June 15	June 16
TIME		9:00-11:00	16:00-17:00	16:00-17:00	10:30-11:00	17:00-17:30	9:30-12:00	17:25-18:20	15:20-16:30	16:00-17:30	12:00-13:00
PLACE		DOE	REA	DOE	REA	DOE	DOE	MEWD	DOE	REA	REA
TOPICS		Member Introduction, Inception Report	Member Introduction, Inception Report	SIDA Project	SIDA Project	Inception Report, Counterpart	1st Seminor, Field Survey, Necessary Data/Info	Explanation of Master Plan to Minister	1st WS Presentation, Data Collection Sheet	2nd WS Schedule, Local Subcontract, MOU, Press Release	2nd WS Schedule, Local Subcontract, MOU
MEWD											
Mr.Felix Mutati	Minister of MEWD	○						○			
DOE											
Mr.Oscar KALUMIANA	Director	○									
Mr.Geoffrey MUSONDA	Assistant Director	○		○							
Mr.Charles MULENGA	Acting Principal Energy Officer	○							○		
Mr.Arnold SIMWABA	Senior Electrification Officer	○		○		○	○	○	○		
Mr.Nkusuwila SILOMBA	Electrification Officer			○			○				
Mr.Malama CHILESHE	Energy Officer	○				○					
Mr.Chiwama KASONGO	Computer Programmer										
Miss.Beatrice MUKALA	Energy Information Officer										
Mr.William SINKALA	Electrification Officer									○	
Mr.Patrick MUBANGA	Acting Senior Electricity Officer	○		○				○	○	○	○
REA											
Mr.Wilfred SERENJE	Acting Chief Executive				○				○		
Mr.Mushimbwa FRED	Acting Project Engineer		○		○		○		○	○	○
Mr.Wankunda SIWAKWI	Acting Economic Specialist		○		○		○		○	○	○
Mr.Bruce Chilufya	Acting Assistant Accountant		○							○	
ZESCO											
Mr.Elias Sichande	Senior Electrical Engineer - Generation Projects								○		
JICA TOKYO OFFICE											
Mr. Toshiyuki HAYASHI	Advisor							○	○		
Mr. Masanori AJIMA	Study Supervisor							○			
JICA ZAMBIA OFFICE											
Mr.Eiji INUI	Resident representive							○			
Mr.Tatsuya YANAGI	Project formulation Adviser										
Mr.Patrick CHIBBAMULILO	Officer										
M/P TEAM											
Mr. Hitoshi KOYABU	Team Leader	○	○	○	○	○	○	○	○		
Mr. Tomoyuki YAMASHITA	Sub-Leader/ Electrification Policy & Organization Expert	○	○	○	○	○	○	○	○	○	○
Mr. Kenichi KITAMURA	Transmission& Distribution Planning Expert										
Mr. Takayuki ABE	Hydro Power Planning Expert	○	○	○		○	○			○	
Mr. Genshiro KANO	Renewable-Energy-Based Rural Electrification Planning Expert									○	
Mr. Yasushi IIDA	Socio Economic Expert	○	○	○	○	○	○	○	○	○	○
Mr. Toshiyuki OHASHI	Environmental & Social Impact Analyst	○	○	○	○	○	○				
Mr. Atsushi YUIHARA	GIS Database Specialist	○	○	○		○	○				
Mr. Takashi CHUJO	Power System Analysis	○	○	○		○	○				
Mr. Daisuke MATSUSHITA	Project Coordinator	○	○	○		○	○			○	○

Japan International Cooperation Agency (JICA)
Department of Energy (DOE)
Rural Electrification Authority (REA)

Republic of Zambia

Rural Electrification Master Plan in Zambia

Inception Report

June 23, 2006

TOKYO ELECTRIC POWER CO., LTD

CONTENTS

1. Objectives and Scope of the Study

1.1 Objectives

The objective of the Master Plan Study (hereinafter "the Study") is to formulate the master plan for rural electrification in Zambia up to the year 2030 and to bring about technology transfer to counterparts in order to update and implement the master plan by themselves. The plan will consist of the following contents:

1) Rural electrification plan up to 2030
   a. Development of selection criteria for rural electrification
   b. Selection of candidate site for rural electrification based on socioeconomic and technical aspects
   c. Selection of electrification methods
      - Existing grid extension
      - Mini-grid utilizing renewable energy such as mini- and micro-hydro power generation including a new technology like the hybrid system by micro-hydro, photovoltaic and storage pumps
      - Solar home system (SHS)
      - Mini-grid utilizing Diesel power generation
   d. Case study executions
2) Financial plan for the rural electrification
   a. Study of financing strategy
   b. Cost estimation for implementation of the master plan at each phase
   c. Evaluation of the validity of the rural electrification projects (EIRR / FIRR)
3) Policy recommendations for acceleration and dissemination of rural electrification
   a. Organization structure for promotion of rural electrification
   b. Operational management of rural electrification fund
   c. Framework to promote the participation of private sector (IPP and ESCO)
   d. Affordable initial connection fee and sustainable electricity tariff
   e. Policy to curb the negative impact by electrification to society and environment
4) Development of comprehensive rural electrification program
   a. Implementation procedure of long-term rural electrification plan
   b. Prioritization of execution plans
   c. Consensus-oriented rural electrification plan with donors; ex. Japanese Bank of International Cooperation (JBIC), African Development Bank (AfDB) and World Bank (WB)

1.2 Target Area and Year

The Study will cover unelectrified rural areas in Zambia including electrified areas by the non-grid power supply, and will have 2030 as its target year.

1.3 Counterpart

The Counterpart of the Study is Rural Electrification Authority (REA) and Department of Energy (DOE) in Ministry of Energy and Water Development (MEWD)

2. Basic Concepts

The Study will be executed based on the Scope of Work and the Minutes of Meeting mutually agreed upon between MEWD and Japan International Cooperation Agency (JICA), dated on 2nd March 2006. The basic concepts consist of seven items.

Concept 1 Valid Policy Recommendation

Power and other relevant policies and program implemented by the other agencies will be reviewed in detail. Proposals to be included in the master plan will be made.

Concept 2 Practical GIS Database System Development

GIS system based on the field survey will be established to prioritize and select the site and method for rural electrification.

Concept 3 Electrification Target and Supply Method Selection Criteria Development

Criteria for selecting appropriate rural electrification method and prioritizing rural electrification projects will be developed.

Concept 4 SHS Dissemination Program Planning

The Study will review the current situation of SHS, and consider the suitable approach for expansion of SHS in Zambia.

Concept 5 Logical, Objective, and Comprehensive Master Plan Development

The Master plan for rural electrification will be formulated.

Concept 6 Case Study Execution

The electrification projects that have high priority and viability will be selected as the objects of case studies.

Concept 7 Technology Transfer & Capacity Development

The Study also aims to contribute to establishing a self-sustaining system of rural electrification by the counterparts (DOE/REA) themselves.

Concept 8 Coordination with International Donors

(If requested,) the TEPCO consultant team is ready to assist Zambia Government to coordinate with International Donors such as JBIC, AfDB, and WB, by utilizing its firm connection/communication channel.

3. Basic Strategies at Each Task

The study will be carried out in the following five tasks, from Task 1 to Task 5, and completed by the end of September 2007. The main activities of each task are listed as follows:

Task 1 Valid Policy Recommendation

- Discuss of the framework for enhancing rural electrification by reviewing the existing energy policies and related programs,

Task 2 Practical GIS Database System Development

- Formulation of rural electrification GIS database

Task 3 Electrification Target and Supply Method Selection Criteria Development

- Selection of candidate villages to be electrified through workshops in provinces
- Execution of the socio-economic survey and the field research on renewable energy potential site in selected villages
- Holding workshops to collect information regarding electrified / unelectrified villages in each district / province and select electrified target villages
- Criteria development for selecting electrification method and prioritizing electrification projects

Task 4 Drafting Master Plan with Policy Recommendations

- Development of the draft Master Plan with following contents:
  - (1) Rural electrification program up to 2030
  - (2) Frameworks for rural electrification fund
  - (3) Discuss and propose effective billing management systems

Task 5 Case Study Executions & Master Plan Finalization

- Completion of the Master Plan by utilizing the lessons learned from case study results

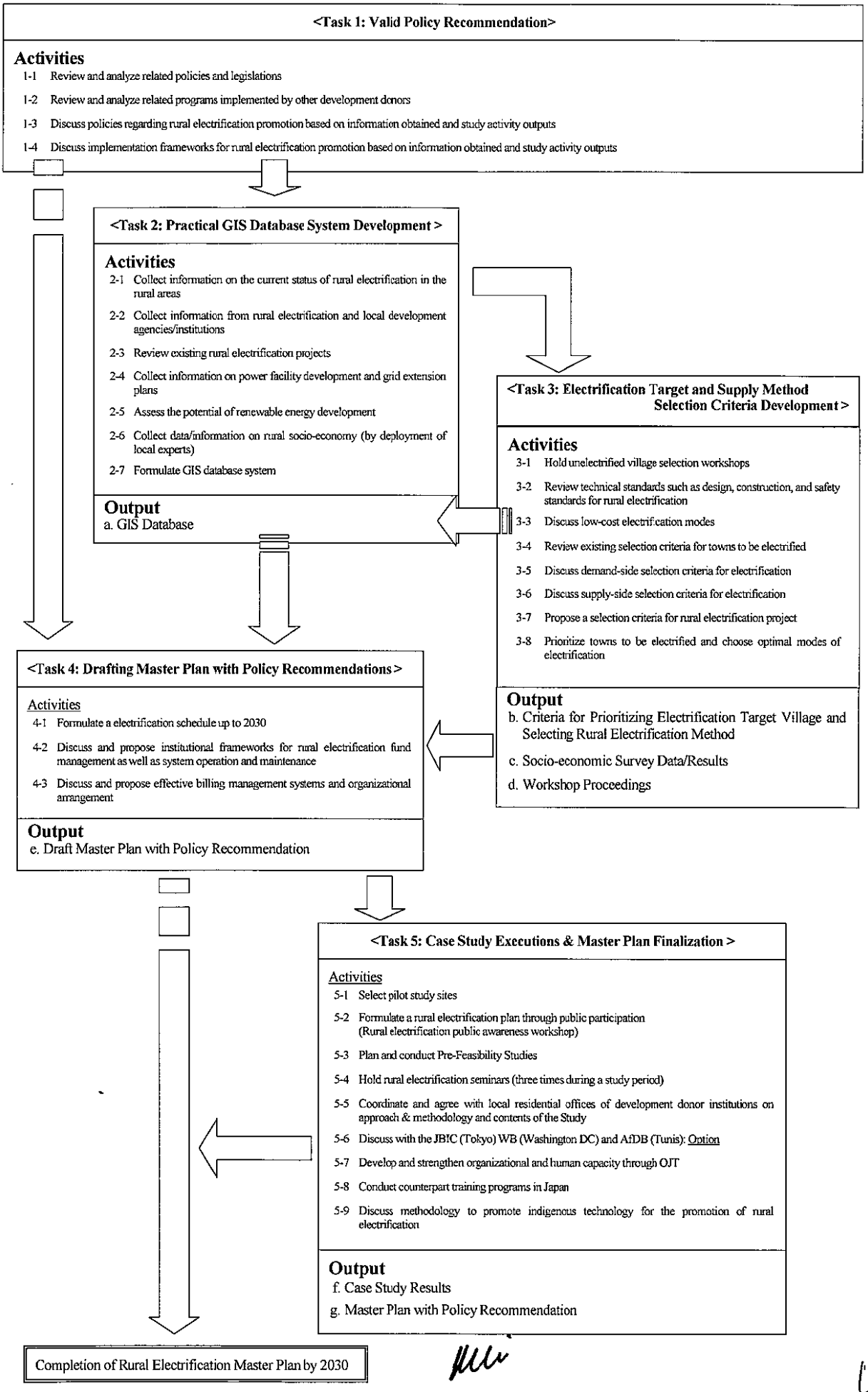


Figure-1 Flow of Each Task

Task 1 Valid Policy Recommendation

3.1.1 Task Outline of the Task

Power and other relevant policies and program implemented by the other agencies will be reviewed in detail. Based on the review, proposals to be included in the master plan will be made.

3.1.2 Basic Concept of the Study

- **Rural Electrification Policies of DOE / REA, ZESCO and ESCO**
  - Segregation of duties by each organization
  - Relationship between comprehensive national development plan and rural electrification plan
  - Electrification-prioritized institution by policies of each organization (school, clinic and local market etc.)
  - Application of renewable energy in terms of mid-to-long-term plan
  - Fostering of self-sustainable organization
- **Proposals for the System Introduction of Rural Electrification**
  - Collection and utilization policies of REF
  - Review and reform of connection fee, electricity tariff and subsidy system considering willingness-to-pay and ability-to-pay
  - Promotion policy of local market by rural electrification

Task 2 Practical GIS Database System Development

3.2.1 Task Outline of the Task

. Based on the available data up to that period, GIS system is developed to prioritize and select the site and method for rural electrification efficiently.

3.2.2 Basic Concept of the Study

- **Contents of Database**

  Figure-2 shows the concept and workflow of the GIS database development for rural electrification. The database shall include (but not necessary limited to) the following data:
  - Socio-economic information including hospital, clinic, school, market, population, household and etc.
  - Existing and planned transmission and distribution system
  - Potentials of renewable energy
- **GIS system**

  GIS system by ArcView includes the above contents and will be build the some criteria for electrification. GIS system will give easy-to-understand visual answer of the priority and method for electrification site.
- **Technology Transfer for Sustainable Database Improvement**

  Counterparts will be enhanced their ability to develop, operate and maintain the GIS system on on-the-job training basis within the study period, to update the system by themselves continuously.

Socio-economic

Information Collection and Analysis

Collection of Existing Information
-Statistical survey (national census, living condition etc.)
-Rural electrification related act

Overview of Rural Area Development
-Segregation of duties by each organization
-Progress of rural area development by each organization

Coordination for Socio-economic survey

Coordination with relevant authorities and other donors for items to be studied

Socio-economic survey

-Subcontracting to local consultant

Selection of surveyed villages
-Selection of 90 villages from promising villages

Items to be surveyed
- Village name, position, area, size, composition
- Public institution
- Economic climate of villages
- Current energy consumption
- Operation maintenance ability of rural community
- Potential of generation

Power Transmission & Distribution System

Information Collection and Analysis

Existing power transmission & distribution system
Power system extension and development plan by ZESCO

- Development of criteria
- Selection of candidate site for electrification

Database preparation
Contents of database
Entry of existing data

Selection of electrification site based on discussion in workshops at each province

Renewable Energy

Information Collection and Analysis

Collection and Analysis of General Data
Climate, Geography, Geological condition, Land use

Environment-related Act
Development regulatory act
Development controlled-area (forest reserve etc.)

Information of Renewable Energy
Meteorologic data (rainfall, river flow, climate, hours of sunlight, wind)
Rural community survey (river condition, river use for agriculture and daily life)

Review of Existing Survey
Renewable energy project

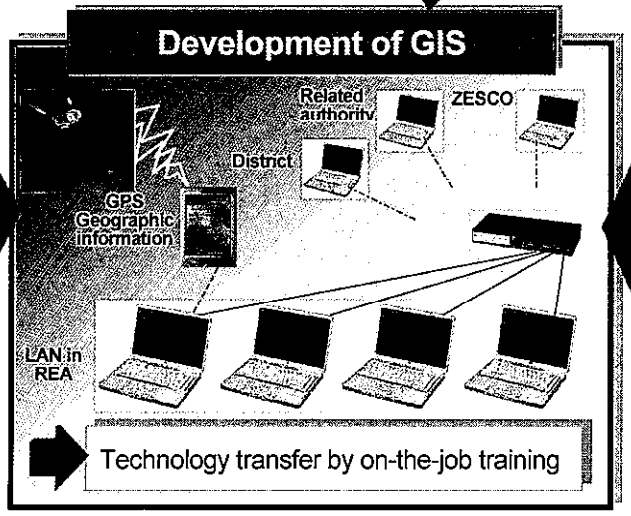
Renewable Energy Potential Survey

Items
-Access conditions (road etc.)
-Natural and Environmental conditions
-Current status of unelectrified villages (population and public institution etc.)

Micro-Hydro Potential site
- River flow in dry season (river flow measurement)
- Existence / nonexistence of water for agriculture
- Simplified measurement of effective head
- Data collection of observing station and confirmation of observing system
- Measurement of water level by temporary gage
- Confirmation of structure position (water intake, detritus tank, channel, head tank, power station etc.)

Solar-Power Potential site
Confirmation of sunlight level at potential site

Development of GIS



Technology transfer by on-the-job training

Figure-2 GIS Database Development

Task 3 Electrification Target and Supply Method Selection Criteria Development

3.3.1 Task Outline of this Task

After the workshops in each province for selecting candidate villages to be electrified, the socio-economic survey in the sample villages, as well as the field research on renewable energy potential site, are conducted. Criteria for selecting appropriate rural electrification method and prioritizing rural electrification projects will be organized.

3.3.2 Basic Concept of the Study

- **Review of existing criteria and method for rural electrification**

  If DOE/REA and ZESCO have already owned own criteria for rural electrification, they will be reviewed and evaluated whether they are applicable as the criteria developed in this task.

- **Dissemination program of SHS**

  SHS is a promising approach for acceleration of rural electrification because of thinly populated characteristic in Zambia, especially in unelectrified area. The Study evaluates and clarifies the current status and problems of SHS, and recommend proper dissemination program of SHS from technical and institutional points of view.

- **Development of the Demand Criteria**

  In order to create reasonable and practical criteria, statistical and logical methods will be applied. First, a model for potential demand estimation will be developed based on the data of electrified villages (about 10 villages) collected in Task 1. Then, potential demand of unelectrified villages will be estimated by adopting the developed model. Possible Demand Criteria are population, number of business equities, public facilities (such as school, medical clinic office, and so on).

- **Development of the Supply Criteria**

  Supply Criteria will be developed based on the results of renewable energy potential (hydro, SHS, wind, and hybrid system) and electricity grid investigations. In the selection task of an appropriate rural electrification method in each unelectrified village, all power resources available in each village will be compared from economical point of view by appropriate. In order to make a comparison of village that has no renewable energy potential, diesel power plant will be an option for an alternative development project.

- **Application for the Criteria**

  As the first step, temporary priority among candidate villages for electrification will be set based on Demand Criteria. Then, as the second step, selection of an appropriate rural electrification method in each candidate village will be carried out based on Supply Criteria. Finally, in consideration of the social and environmental aspects for each village and the consistency with national policy of rural electrification, final priority of rural electrification projects will be determined by reviewing of the temporary priority.

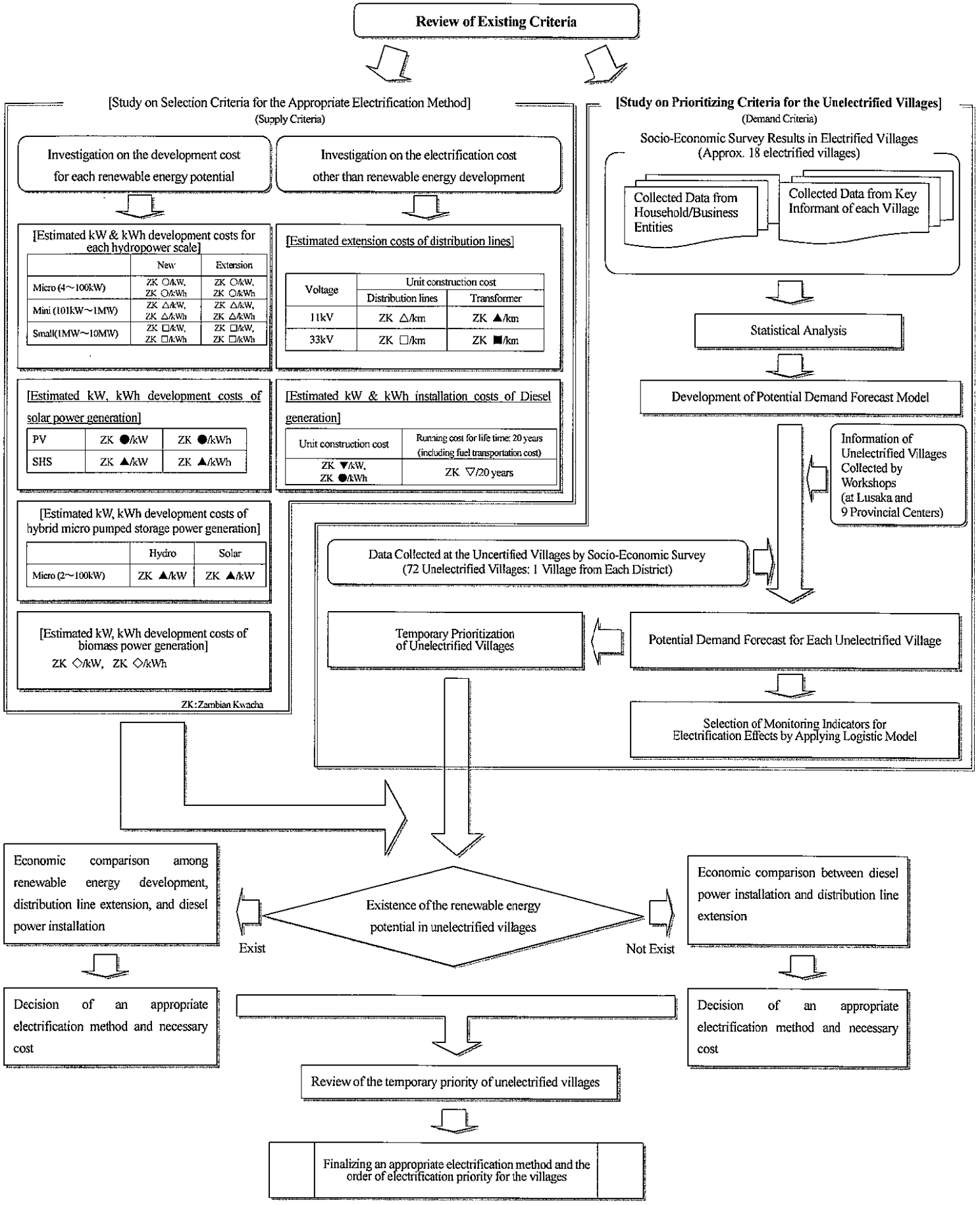


Figure-3 Workflow of Criteria Selection

Task 4 Drafting Master Plan with Policy Recommendations

3.4.1 Task Outline of the Task

The draft Master Plan, which consists of the following contents, will be formulated.

(1) Rural electrification implementation program
(2) Enhancement of institutional framework and human resources
(3) Policy recommendation for rural electrification

3.4.2 Basic Concept of the Study

(1) Formulation of the rural electrification program

- The rural electrification program up to the year 2030 will be formulated using the database and the criteria developed in the tasks 1 and 2.
- Necessary funds for rural electrification must be raised from various sources: the budget of the Zambia government, bi- and multilateral institutions and donors including JBIC, AfDB and so on. This study will analyze and discuss the size and portfolio of the prospective fundraising scheme.
- In this analysis, various aspects must be taken into account, including the government's ability to pay back external loans and financial burden for individual entities implementing rural electrification.
- Power system analysis taking into consideration power generation development will be performed. And if necessary, transmission system development will be proposed to keep the system stable.
- Mini- and micro-hydro, SHS, wind and hybrid system will be the options for the renewable energy generation method.
- Based on the results of rural community and socio-economic survey, the installation requirements of maize mill that is large-scale customer will be modeled.

(2) Enhancement of institutional framework and human resources

The study will analyze social and economic effects of implementation schemes using rural electrification models and recommend a suitable structure for the implementation of rural electrification. In this analysis, the following issues will be discussed:

- Present condition of cross-subsidies and clarification of the responsibilities for each related organization
- Estimation of the availability of private investments under adverse circumstances such as the limited size of power market and insufficient investment environment
- Possibility of market domination caused by insufficient conditioning of laws and regulations securing fair market competition
- Creation of supporting systems for the operations of (ZESCO), NGOs, and NPOs.
- Measures reinforcing DOE/REA operation
- Measures reinforcing the organizational structure of the government for rural electrification
- Facilitation of investments from the private sector

(3) Policy recommendations for rural electrification

This study will recommend necessary measures and policies to facilitate rural electrification effectively. The following issues will be taken into account in the recommendations.

- Relationship between the existing plan for power sector reform and this rural electrification master plan

1. Responsibility of ZESCO and diversified structure for the implementation of rural electrification
2. Introduction of a mini-grid power supply system and dispersing power sources using renewable energy over the medium run
3. Possibility of the creation of community-based business entities such as electric cooperatives
4. Necessity of the promotion of sustainable business entities

- Relationship between other government development programs outside the power sector and this master plan

5. Education programs related to school / hospital / medical facility construction
6. Medical infrastructure development plan
7. Development plan of regional economy and society

The study will also recommend necessary measures for the arrangement of the organizational structure for implementing rural electrification and effective business operation of electricity distribution in rural areas.

- Policies for setting connection fee, monthly tariff and necessary subsidies
- Institutional and technical measures for mitigating consumer cost burden of electrification
- Technical measures for rural electrification
- Plans for the development of local industries related to rural electrification

Task 5 Case Study Executions & Master Plan Finalization

3.5.1 Task Outline of the Task

Figure-4 indicates the workflow for the case studies. The electrification projects that have high priority and viability will be selected as the objects of case studies. Through implementation of the case studies collaborating with the counterpart personnel, how to precisely implement the rural electrification projects will be technically transferred to the counterpart personnel, which will be enhance the sustainability of rural electrification. The draft Master Plan developed in the Task 3 will be reviewed and finalized based on lessons learned from the case studies.

3.5.2 Basic Concept of the Study

- **Selection of the Projects for Case Studies**

  The projects for the case studies will be selected through discussion with the counterpart out of the rural electrification program formulated in the Task 3. The study will select five promising sites for electrification, one off-grid project and four grid extension projects.

- **Implementation of Community Participation Workshop**

  During the case study period for the selected electrification project by micro hydropower, Community participation workshop will be held in order to enlighten electrified project regarding especially for ability-to-pay for electricity tariff and operation & maintenance unit/framework in rural electrification projects.

- **Implementation of Case Studies**

  In the case study, technical and economical feasibility will be considered for each selected electrification project. Especially for the project by micro hydropower, case study for operation & maintenance unit/framework responsible for financial procurement, facility operation/maintenance and collection of electricity tariff will also be implemented. In addition, how to develop the capacity of unit/framework to implement the works mentioned above will be discussed with the counterpart.

  The Master Plan with policy recommendations will be finalized based upon lessons learned from the case studies.

4. Project Management

The Study is managed with Project Design Matrix (PDM) and action plan (refer to Table 1 for the action plan). The project design is reviewed and revised during the study period.

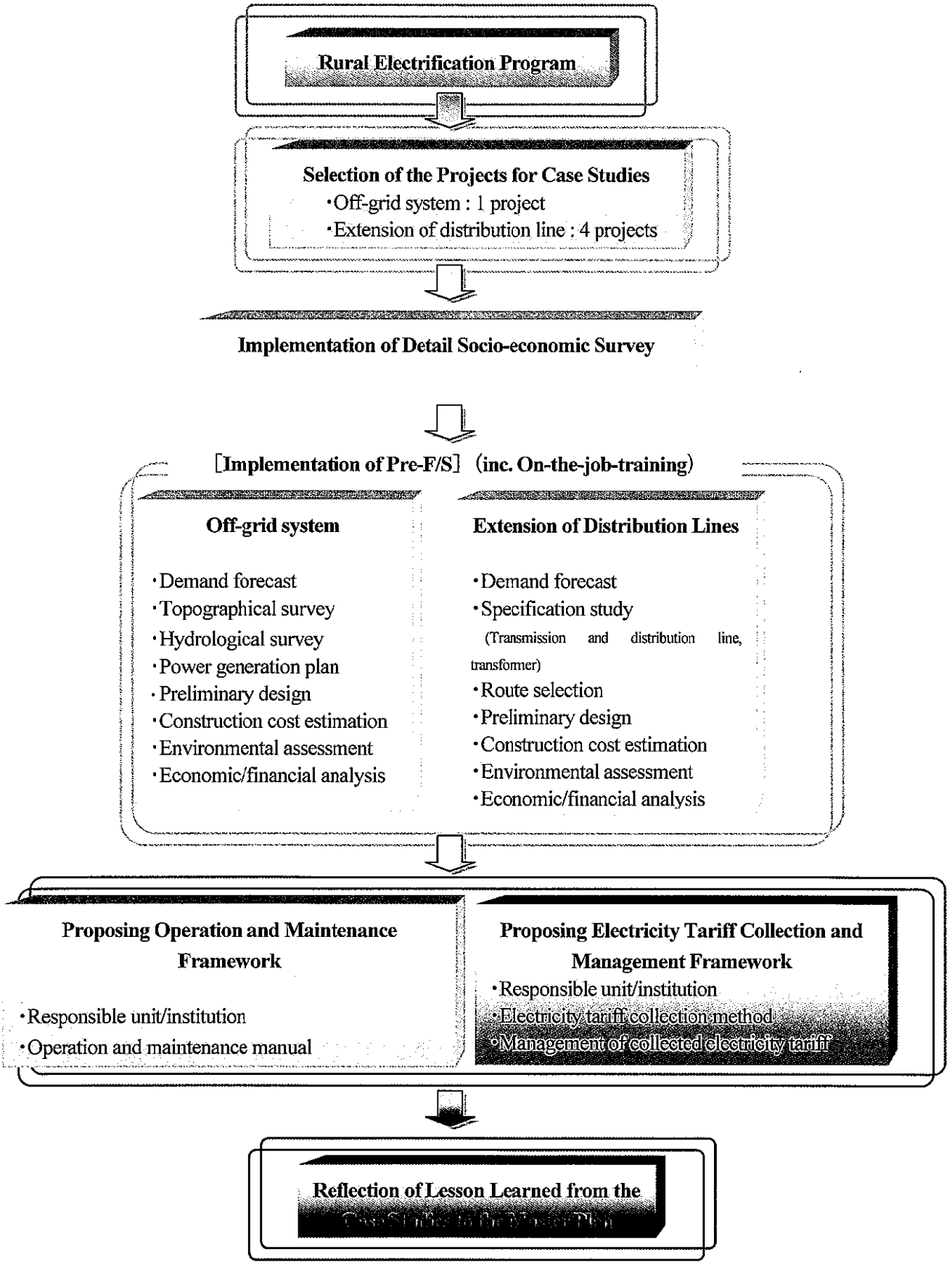
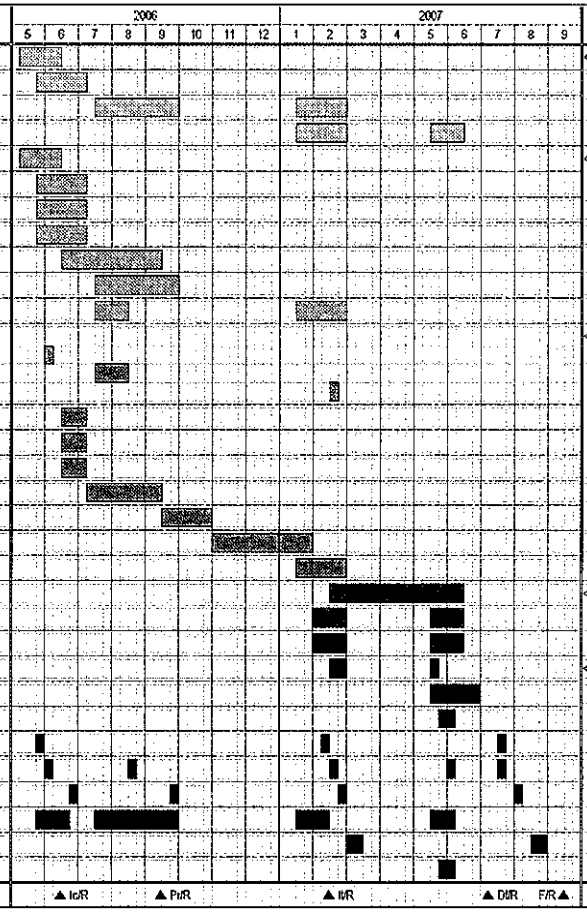


Figure-4 Flow of Case Studies

Table-1 Plan of Operation

Stage	Activity	Output
<Task 1> Valid Policy Recommendation	1-1 Review and analyze related policies and legislations	<Stage 1>
	1-2 Review and analyze related programmes implemented by other development donors	
	1-3 Discuss policies regarding rural electrification promotion based on information obtained and study activity outputs	
	1-4 Discuss implementation frameworks for rural electrification promotion based on information obtained and study activity outputs	
<Task 2> Practical GIS Database System Development	2-1 Collect information on the current status of rural electrification in the rural areas	<Stage 2>
	2-2 Collect information from rural electrification and local development agencies/institutions	a. GIS Database
	2-3 Review existing rural electrification projects	
	2-4 Collect information on power facility development and grid extension plans	
	2-5 Assess the potential of renewable energy development	
	2-6 Collect data/information on rural socio-economy (by deployment of local experts)	
	2-7 Formulate GIS database system	
<Task 3> Electrification Target and Supply Method Selection Criteria Development	3-1 Hold unelectrified village selection workshops - 1st WS: Preliminary workshop in Lusaka - 2nd WS: Province workshops in nine provincial capitals - 3rd WS: Dissemination workshop in Lusaka	<Stage 3> b. Criteria for Prioritizing Electrification Target Village and Selecting Rural Electrification Method c. Socio-economic Survey Data/Results d. Workshop Proceedings
	3-2 Review technical standards such as design, construction, and safety standards for rural electrification	
	3-3 Discuss low-cost electrification modes	
	3-4 Review existing selection criteria for towns to be electrified	
	3-5 Discuss demand-side selection criteria for electrification	
	3-6 Discuss supply-side selection criteria for electrification	
	3-7 Propose a selection criteria for rural electrification project	
	3-8 Prioritize towns to be electrified and choose optimal modes of electrification	
<Task 4> Drafting Master Plan with Policy Recommendations	4-1 Formulate a electrification schedule up to 2030	<Stage 4>
	4-2 Discuss and propose institutional frameworks for rural electrification fund management as well as system operation and maintenance	e. Draft Master Plan with Policy Recommendation
	4-3 Discuss and propose effective billing management systems and organizational arrangement	
<Task 5> Case Study Executions & Final Master Plan Development	5-1 Select pilot study sites	<Stage 5>
	5-2 Formulate a rural electrification plan through public participation (Rural electrification public awareness workshop)	f. Case Study Results
	5-3 Plan and conduct Pre-Feasibility Studies	g. Master Plan with Policy Recommendation
	5-4 Hold rural electrification seminars (three times during a study period)	
	5-5 Coordinate and agree with local residential offices of development donor institutions on approach & methodology and contents of the Study	
	5-6 Discuss with the JBIC (Tokyo) WB (Washington DC) and ADB (Tunis)	
	5-7 Develop and strengthen organizational and human capacity through OJT	
	5-8 Conduct counterpart training programs in Japan	
	5-9 Discuss methodology to promote indigenous technology for the promotion of rural electrification	
Reporting Schedule		



5. Technology Transfer to Counterpart

The Study also aims to contribute to establishment of a self-sustaining system of rural electrification by DOE/REA themselves.

5.1 Contents

The main technologies and skills to be transferred are as follows:

- Researching, planning and preliminary design method of rural electrification project
- Criteria development
- Database development

5.2 Transfer Method

Technical transfer is mainly executed through On the Job Training (OJT) method.

5.3 Other

The execution of counterpart training in Japan will be discussed with JICA Head Office when counterpart requests it to JICA.

6. Flow of Study Work

The flow of study work in Zambia and Japan respectively is shown in Figure-5.

7. Manning Schedule

Manning schedule is shown in Table-2.

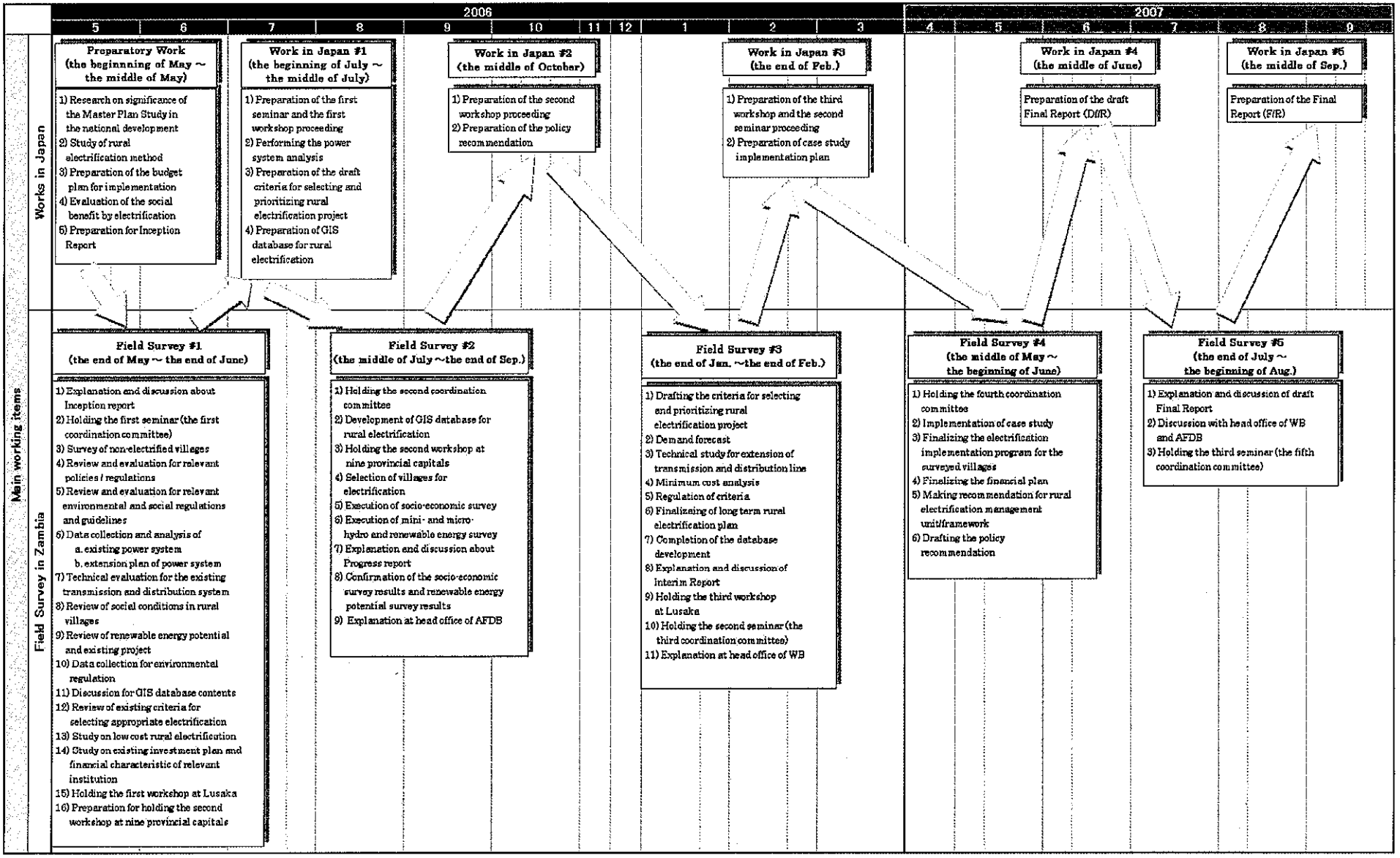


Figure-5 Flow of Study Work

Table-2 Manning Schedule

	Position	Name	2006 5	6	7	8	9	10	11	12	2007 1	2	3	4	5	6	7	8	9
Field Survey in Zambia	Team Leader Rural Electrification Planning Expert	Hiroshi KOYABU	5/22	6/10	7/16	7/29	9/3 9/16				1/20	2/24			5/13	6/9	7/22	7/28	
	Sub-Leader Electrification Policy & Organization Expert	Tomoyuki YAMASHITA	5/22	6/24	7/16		9/30				1/20	2/24			5/13	6/9	7/21	8/4	
	Transmission & Distribution Planning Expert	Kenichi KITAMURA		6/18 6/24	7/16		9/16				1/21	2/24			5/13	6/9	7/22	7/28	
	Hydro Power Planning Expert	Takayuki ABE	5/22	6/24	7/16		9/16				1/21	2/24			5/13	6/9	7/22	7/28	
	Renewable-Energy-Based Rural Electrification Planning Expert	Genshiro KANO		6/1 6/24		8/13	9/16				1/21	2/24					7/22	7/28	
	Socio Economic Expert	Yasushi IIDA	5/22	6/24	7/16	8/19	9/16 9/30					2/13 2/24					7/22	7/28	
	Environmental & Social Impact Analyst	Toshiyuki OHASHI	5/22	6/10			9/10 9/30								5/13	6/9	7/22	7/28	
	GIS Database Specialist	Atsushi YUIHARA	5/22	6/10	7/16	8/12					1/21	2/24					7/22	7/28	
	Power System Analysis	Takashi CHUJO	5/22	6/24															
	Project Coordinator	Daisuke MATSUSHITA	5/22	6/24	7/16		9/16				1/21	2/24			5/13	6/9	7/21	8/4	
Works in Japan	Team Leader Rural Electrification Planning Expert	Hiroshi KOYABU	6		3			6				3				6			
	Sub-Leader Electrification Policy & Organization Expert	Tomoyuki YAMASHITA	6		3			6				3				6			
	Transmission & Distribution Planning Expert	Kenichi KITAMURA	6		3			6				3				6			
	Hydro Power Planning Expert	Takayuki ABE	6		3			6				3				6			
	Renewable-Energy-Based Rural Electrification Planning Expert	Genshiro KANO	3		3			6				3				6			
	Socio Economic Expert	Yasushi IIDA	3		3			6				3				6			
	Environmental & Social Impact Analyst	Toshiyuki OHASHI	3		3			6				3				6			
	GIS Database Specialist	Atsushi YUIHARA	3		3			6				3				6			
	Power System Analysis	Takashi CHUJO	3		3			6				3				6			
	Project Coordinator	Daisuke MATSUSHITA	3		3			6				3				6			
Report			▼ Ic/R				▼ Pr/R					▼ Pr/R					▼ Df/R		▼ F/R
Workshop				▽ 1st		▽ ▽ 2nd						▽ 3rd							
Seminar			□ 1st									□ 2nd					□ 3rd		
Field Survey Period			Field Survey #1		Field Survey #2						Field Survey #3				Field Survey #4		Field Survey #5		
Domestic Work Period					Work in Japan #1			Work in Japan #2				Work in Japan #3				Work in Japan #4			
Coodination with other donors			Preparatory work in Japan				▲ AfDB					▲ WB					▲ WB&AfDB		
			5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9

Ic/R: Inception Report Pr/R: Progress Report It/R: Interim Report Df/R: Draft Final Report Cs/R: Case Study Report F/R: Final Report

: Works in Japan : Field Survey in Zambia

Appendix-C

No.	JAPANESE CONSULTANT	ZAMBIAN COUNTER PART STAFF
1	**HITOSHI KOYABU** *Team Leader* *Rural Electrification Planning Expert*	CHARLES MULENGA (DOE) WILFRED SERENJE (REA)
2	**TOMOYUKI YAMASHITA** *Team Sub –Leader* *Electrification Policy and Organization Expert*	ARNOLD SIMWABA (DOE)
3	**TAKAYUKI *ABE*** *Hydro Power Planning Expert*	NKUSUWILA SILOMBA (DOE)
4	**KENICHI KITAMURA** *Distribution planning Expert*	MUSHIMBWA FRED (REA)
5	**GENSHIRO KANO** *Renewable Energy Based Rural Electrification Planning Expert*	MALAMA CHILESHE (DOE) WANKUNDA SIWAKWI (REA)
6	**YASUSHI IIDA** *Socio Economic Expert*	WANKUNDA SIWAKWI (REA) LANGIWE CHANDI (DOE)
7	**TOSHIYUKI OHASHI** *Environmental and Social Impart Analyst*	MICHAEL MULASIKWANDA (DOE) MUNDU MWILA (DOE)
8	**ATSUSHI YUIHARA** *GIS Database Specialist*	AGGREY SIULUTA (DOE) C.KASONGO (DOE) B.MUKALA (DOE) MUSHIMBWA FRED (REA)
9	**TAKASHI CHUJO** *Power System Analysis*	WILLIAM SINKALA (DOE) MUSHIMBWA FRED (REA)
10	**DAISUKE MATSUSHITA** *Project coordinator*	PATRICK MUBANGA (DOE)

Appendix-D

List of Coordination Committee and Stakeholders

	Coordination Committee	Stakeholders
REA, DOE/MEWD	☐›	☐›
Department of Planning and Information/MEWD	☐›	☐›
Energy Regulation Board	☐›	☐›
ZESCO	☐›	☐›
Office for Promoting Private Power Investment	☐›	☐›
Ministry of Finance and National Planning		☐›
Ministry of Local Government and Housing		☐›
Ministry of Health		☐›
Ministry of Education		☐›
Ministry of Communication and Transport		☐›
Ministry of Agriculture and Corporative		☐›
Ministry of Community Development and Social Services		☐›
Consumer Association of Zambia		☐›
Central Statistics Office		☐›
Zambia National Farmers Union		☐›
Center for Energy, Environment and Engineering		☐›
University of Zambia		☐›
International Donors (JICA, WB, UNDP, SIDA, FINIDA, USAID)		☐›

Appendix-E

2nd Workshop Schedule

Day		Date	Item	Stay
1	2006/7/23	SUN	Move from LUSAKA to KASAMA	KASAMA
2	2006/7/24	MON	Prep	KASAMA
3	2006/7/25	TUE	**Work Shop in KASAMA**	KASAMA
4	2006/7/26	WED	Move from KASAMA to MANSA	MANSA
5	2006/7/27	THU	Prep	MANSA
6	2006/7/28	FRI	**Work Shop in MANSA**	MANSA
7	2006/7/29	SAT	Move from MANSA to LUSAKA	LUSAKA
8	2006/7/30	SUN	Off	LUSAKA
9	2006/7/31	MON	Prep	LUSAKA
10	2006/8/1	TUE	**Work Shop in LUSAKA**	LUSAKA
11	2006/8/2	WED	Move from LUSAKA to SOLWEZI	SOLWEZI
12	2006/8/3	THU	Prep	SOLWEZI
13	2006/8/4	FRI	**Work Shop in SOLWEZI**	SOLWEZI
14	2006/8/5	SAT	Move from SOLWEZI to NDOLA	NDOLA
15	2006/8/6	SUN	Off	NDOLA
16	2006/8/7	MON	Prep	NDOLA
17	2006/8/8	TUE	**Work Shop in NDOLA**	NDOLA
18	2006/8/9	WED	Move from NDOLA to KABWE	KABWE
19	2006/8/10	THU	Prep	KABWE
20	2006/8/11	FRI	**Work Shop in KABWE** Move from KABWE to LUSAKA	LUSAKA
21	2006/8/12	SAT	Off	LUSAKA
22	2006/8/13	SUN	Move from LUSAKA to MONGU	MONGU
23	2006/8/14	MON	Prep	MONGU
24	2006/8/15	TUE	**Work Shop in MONGU**	MONGU
25	2006/8/16	WED	Move from MONGU to LIVINGSTONE	LIVINGSTONE
26	2006/8/17	THU	Prep	LIVINGSTONE
27	2006/8/18	FRI	**Work Shop in LIVINGSTONE**	LIVINGSTONE
28	2006/8/19	SAT	Off	LIVINGSTONE
29	2006/8/20	SUN	Off	LIVINGSTONE
30	2006/8/21	MON	Move from LIVINGSTONE to LUSAKA	LUSAKA
31	2006/8/22	TUE	Wrap-up with REA/DOE	LUSAKA
32	2006/8/23	WED	Move from LUSAKA to CHIPATA	CHIPATA
33	2006/8/24	THU	Prep	CHIPATA
34	2006/8/25	FRI	**Work Shop in CHIPATA**	CHIPATA
35	2006/8/26	SAT	Off	CHIPATA
36	2006/8/27	SUN	Move from CHIPATA to LUSAKA	LUSAKA


JICA