

ANNEX-2

MINUTES OF MEETING

***AGREED UPON BETWEEN
JAPAN INTERNATIONAL COOPERATION AGENCY
AND
MINISTRY OF TRADE AND INDUSTRY***

JUNE 27, 2003

MINUTES OF MEETING
FOR
THE PRELIMINARY STUDY
FOR
THE INTEGRATED MASTER PLAN STUDY
FOR DZONGKHAG-WISE ELECTRIFICATION
IN
THE KINGDOM OF BHUTAN

BETWEEN
JAPAN INTERNATIONAL COOPERATION AGENCY
AND
DEPARTMENT OF ENERGY
MINISTRY OF TRADE AND INDUSTRY

Thimphu, June 27, 2003



Dr. Akira Niwa
Leader, The Preliminary study team
Japan International Cooperation Agency (JICA)



Mr. Sonam Tshering
Director, Department of Energy
Ministry of Trade and Industry

The preliminary study team (hereinafter referred to as "the Team") sent by the Japan International Cooperation Agency (hereinafter referred to as "JICA"), headed by Mr. Akira Niwa, the Leader of the Team, visited the Kingdom of Bhutan from June 16 to June 27, 2003 for the purpose of discussing the Scope of Work regarding the Study on Integrated Master Plan for Dzongkhag-wise Electrification in the Kingdom of Bhutan (hereinafter referred to as "the Study"). JICA and the Department of Energy, Ministry of Trade and Industry (hereinafter referred to as "DOE"), discussed the following issues and finalized the Scope of Work. This minutes of meeting is prepared to record the issues that complement the Scope of Work.

The list of participants is attached as Annexure A.

1. Concept of RE Master Plan

The Team and DOE jointly developed the Study concept and workflow of RE Master Plan as shown in Appendix 1. Dzongkhag-wise Rural Electrification Master Plan and Recommendations for National Action Plan (policy and regulations, financial strategy, planning and implementation capacity, and technology in household energy) are expected to be the output of the Study.

2. Counterpart personnel

To ensure technology transfer, which is one of the important objectives of the Study, the DOE and the Bhutan Power Corporation (hereinafter referred to as "BPC") shall assign appropriate counterpart personnel with relevant technical background, experience and skills who will directly carry out the study work jointly with the Study team. Counterpart personnel from other related governmental agencies and organizations shall also be provided as and when required. The Study team will provide the DOE with a tentative plan of counterpart assignment, based on which the DOE will intimate the list of names of counterpart personnel.

3. Coordinating Committee

In order to facilitate the smooth implementation of the Study, a Coordinating Committee shall be established. The Coordinating Committee is responsible for the smooth implementation of the Study and also monitoring the progress of the Study. The Coordinating Committee meeting shall be held at least once in every quarter. The DOE shall coordinate the meetings. A tentative list of Coordinating Committee members shall comprise the DOE, BPC, Ministry of Finance, JICA/JOCV Bhutan office, and the Study team. Participation of other government agencies shall be coordinated by DOE in the event of need.

4. Workshop

The Team and DOE agreed to hold workshops in order to enunciate the draft Dzongkhag-wise RE Master Plan and to take into account opinions of stakeholders, including representatives of twenty (20) Dzongkhags (Districts). Necessary arrangements for the workshops, including sending invitation to stakeholder, scheduling, arrangements for the venue, etc. shall be conducted by DOE. The DOE requested including the expenses for the workshops

within the overall project scope. The Team understood the necessity of these expenses and will convey the request to JICA Headquarters.

5.Provision of digital maps made by the Survey of Bhutan

The DOE agreed to provide the Study team with digital maps made by the Survey of Bhutan as DOE input.

6.Provision of census data

The DOE agreed to pursue with the Department of Registration, Ministry of Home Affairs, for census data required for the purposes of the Study.

7. List of unelectrified villages

The DOE will make all efforts to provide the list of unelectrified villages after RE-3 before the commencement of the Study.

8.Office space and equipment

The Team requested that the DOE provide adequate office space to the Study team with enough furnishing, a telephone line, and necessary office equipment (e.g., desks, chairs, personal computer, multimedia projector, and printer) that are needed to carry out the Study. The Study team is expected to consist of around ten professionals. The DOE replied that adequately furnished office accommodation shall be provided including access to telecommunication connections. However, the DOE requested that office equipment such as desktop computers, copiers, fax machines etc. and running expenses of telecommunication system be included within the project cost.

9.Counterpart training

The DOE requested that JICA provide opportunities of counterpart training in Japan for DOE staff. The Team replied that it would be possible to arrange the training for, at least, one person per year.

10.Software and equipment to be used in the Study

The DOE requested, in the event software is required, to consider the use of MIPOWER software for power system analysis of the Study as they already have personnel trained in the use of this software. Further, the DOE mentioned the need for having several units of GPS equipment and GIS software. The Team will convey the request to JICA Headquarters.

11.Timing of Study Commencement

The DOE requested the Team that JICA take necessary measures to commence the Study as soon as possible, preferably in November 2003.

Annexure A

List of the MembersJICA Preliminary Study Team

Dr. NIWA Akira
Team Leader, Senior Advisor for Power Development, JICA

Mr. TATEMATSU Shingo
Study Planning, Program Officer, Energy and Mining Development Study Division,
Mining and Industrial Development Study Department, JICA

Mr. OTAKI Kazuhiko
Planning for Rural Electrification, Consultant, Proact International Co., Ltd.

Mr. OKAWARA Kunio
Planning for Transmission and Distribution System, Consultant, A&S Engineering Co.,
Ltd.

MR. IKE Tomohiko
Environmental Issues, Consultant, E & E Solutions Inc.

Mr. YONEDA Gen
Development Fund Planning, Deputy Director, Division 3, Development Assistance
Department III, Japan Bank for International Cooperation (JBIC)

Department of Energy

Mr. Sonam Tshering
Director, Department of Energy

Mr. Bharat Tamang
Chief Engineer, Planning & Coordination Division, Department of Energy.

Mr. Karma P Dorji
National Project Manager, Planning & Coordination Division, Department of Energy

Mr. Karma Tshewang
Assistant Engineer, Planning & Coordination Division, Department of Energy

Bhutan Power Corporation

Mr. Tenzin Yonten
General Manager, Customer Service Department, Bhutan Power Corporation

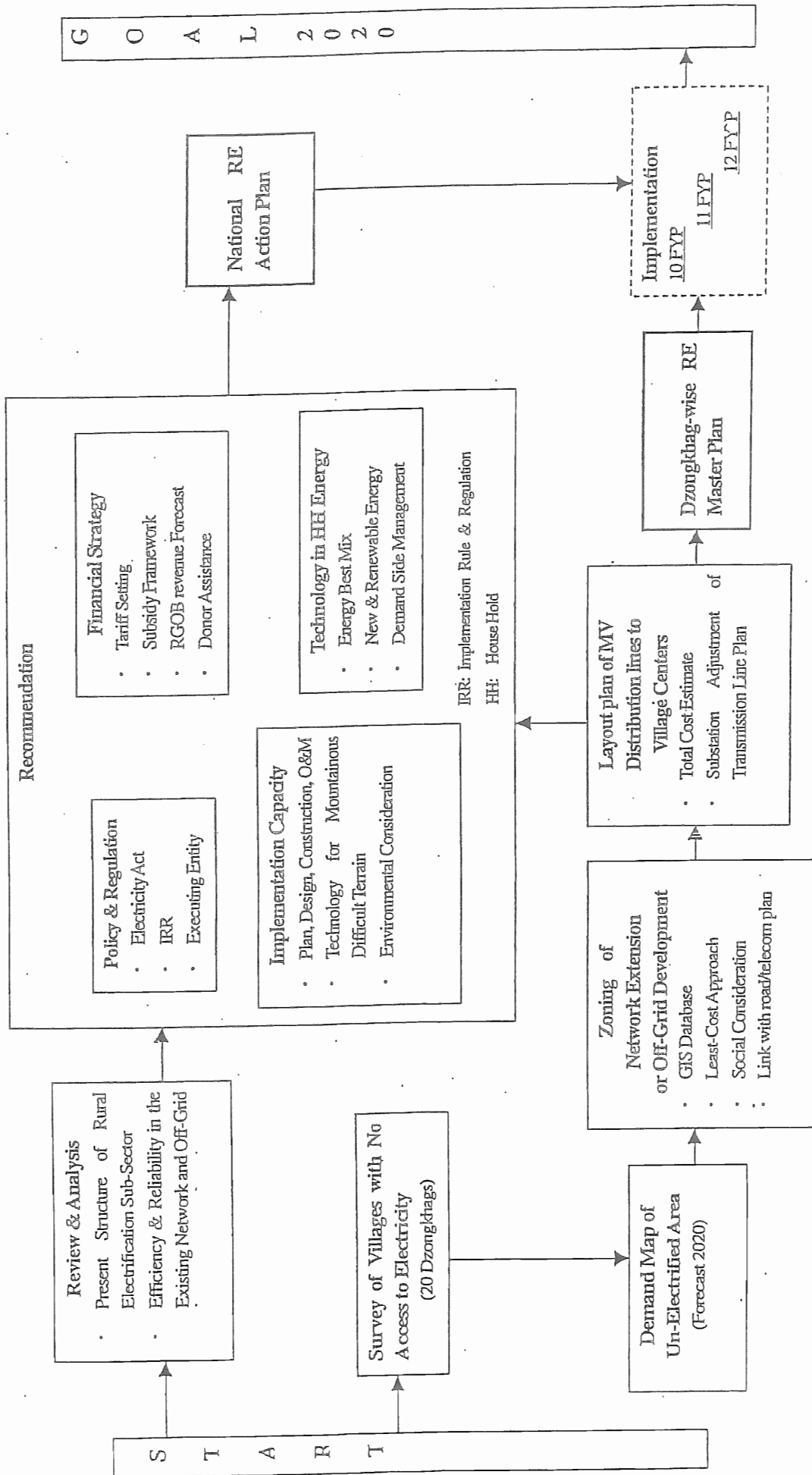
Mr. K. B. Wakhley
General Manager, Development & Construction Department, Bhutan Power Corporation

Mr. Jigme Tobgyel
Manager, Planning Division, Bhutan Power Corporation

Mr. Tenpa Gurme
Sr. Manager, R & UED, Development & Construction Department, Bhutan Power Corporation

Mr. Sunil Rasaily
Engineer, Customer Service Department, Bhutan Power Corporation





Work Scope of JICA Rural Electrification (RE) Master Plan

ANNEX-3

***MINUTES OF MEETING
(FIRST SITE WORK: NO.1)
BETWEEN***

THE MASTER PLAN STUDY TEAM

AND

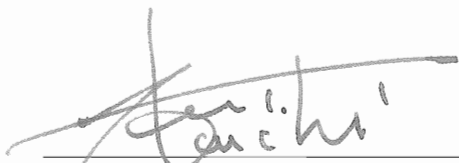
***DEPARTMENT OF ENERGY
MINISTRY OF INDUSTRY***

DECEMBER 24, 2003

MINUTES OF MEETING
FOR
THE INTEGRATED MASTER PLAN STUDY
FOR DZONGKHAG-WISE ELECTRIFICATION
IN
THE KINGDOM OF BHUTAN
(FIRST SITE WORK: NO.1)

BETWEEN
THE MASTER PLAN STUDY TEAM
AND
DEPARTMENT OF ENERGY
MINISTRY OF TRADE AND INDUSTRY

THIMPHU
DECEMBER 24, 2003



Mr. Tomoyasu Fukuchi
Team Leader, JICA Study Team
Nippon Koei Co., Ltd.



Mr. Sonam Tshering
Director/Managing Director
Depart. of Energy/Bhutan Power Corporation
Ministry of Trade and Industry

The Master Plan Study Team (the Team) of the Japan International Cooperation Agency (JICA), which is headed by Mr. Tomoyasu FUKUCHI, arrived in Bhutan on December 2, 2003, and will leave on December 25, 2003. During their stay in Bhutan, the Team submitted the inception report, explained it to Bhutan side and had discussions with the officials concerned in Bhutan.

On December 23, 2003, the Team had a wrap-up meeting with Department of Energy (DOE), Ministry of Trade and Industry, Bhutan Power Corporation (BPC) and the parties confirmed the followings.

1. **Inception Report** : The Team submitted twenty copies of Inception Report to DOE on December 3, 2003 and discussed the contents with DOE and Bhutan Power Corporation (BPC). The Team received the official comments from DOE via their letter DOE/PCD/RE-MP/2003-04/354 dated December 19, 2003 (Attachement-1). The Team will revise the inception report according to the specific comments attached to the above letter and the letter itself will be a part of the inception report as attachment. The Team will resubmit twenty sets of revised inception report as final version.
The Team well understands the general comments of the letter and those comments will be reflected in the master plan study. However, it is quite difficult to forecast the electricity demand up to 2035 or 2040 precisely; it's far future. Thus, the demand after 2020 may be simply forecasted with the appropriately estimated increase ratios.
2. **Counterpart Personnel**: DOE submitted the list of counterpart personnel by DOE/PCD/RE-MP/2003-2004/334 dated December 10, 2003 (Attachement-2). Project Manager from DOE and Focal Person from BPC will arrange and/or coordinate counterpart personnel as required by the Team. Besides, counterpart personnel for the financial and economic analysis will be coordinated with Ministry of Finance through DOE.
3. **Coordinating Committee** : The first coordinating committee will be held on January 15, 2004 at 10:00 a.m. at DOE's conference hall as informed by DOE's letter (Attachment-3).
4. **Workshop** : The first workshop will take place at RICB/BCCI Conference Hall, on January 30, 2004 from 10:00 a.m. according to the program shown in the Attachment-4. DOE will send the invitation to the members of coordinating committee, the official concerned, the representative of each Dzongkhag and the related donors and NGO/NPO by December 30, 2003.
The Team has provision to provide budgetary support for the workshop such as conference hall charges and other associated logistic cost.

5. **GIS Map** : The Team received the digital file of GIS map prepared by BPC. Department of Survey and Land Records (DoSLR) confirmed that they are still in process of digitizing the maps and will not be in position to provide the information as requested by Department of Energy (Attachment-5). However, DOE procured topo sheets from DoSLR for the Team. The Team offers to share the GIS data from the study with DoSLR through DoE if required.
6. **Census Data** : According to the Ministry of Home Affairs, they are in the process of cross checking and updating the census data and scheduled to be completed by early next year. The Team will be able to receive the preliminary census data as confirmed by Deputy Secretary, Administration and Finance Division, Ministry of Home Affairs on request through DoE.
7. **List of Non-Electrified Villages** : The Team received the data of non-electrified villages in the form of list. The status of received data is shown in the Attachment-6. DOE will provide the remaining data in the middle of January 2004.
8. **Office Equipment**: DOE will provide the following office equipment by January 10, 2004.

a) Working desk:	5 sets
b) Small table:	2 sets
9. **Power System Data** : As base line data, the Team needs all the existing power system data. However, at present, the existing transmission and distribution line infrastructure are not recorded completely and accurately on the map/GIS. The Team received the GPS coordinates of the existing distribution transformers installed as of year 2000 in the form of Excel file.

In connection with the above, DOE/BPC will provide the following data by the end of January, 2004.

- a) Single line diagram of the existing transmission lines
- b) GPS coordinates of the existing substations
- c) Location data as coordinates and capacity of the distribution transformers installed from 2001 to the present¹
- d) GIS data of RE3 network which is to be completed by the end of 2007

¹ The Time frame does not seem realistic as the process involves identifying adequate and relevant personnel from 19 Electricity Service Divisions, conducting GPS training and data collection.

- e) Route length and conductor size of all the distribution lines

The existing distribution line routes will be mapped on GIS map based on the above available data.

10. **Lending GPS** : The Team lends 10 sets of GPS to DOE from December 24, 2003 to January 23, 2004 only for the purpose to locate the existing distribution transformers and the other power facilities.
11. **Next Site Work** : The Team explained the next site work Schedule (January to February 2004) as shown in the Attachment-7 and was accepted by DOE.
12. **Participants to Site Survey** : DOE will select the personnel to take part in the site survey mentioned in the schedule of January and February 2004.
13. **GIS Training** : GIS training will be held on January 19/Mon through 21/Wed and 23/Fri, 2004 (4 days) at DOE/BPC office to the counterpart personnel. The Team will prepare ArcGIS trial version and will also arrange two proper licenses for the training.
14. **Installation and Training of Power System Program** : Mipower will be installed and initial training will be held at DOE office by the program supplier on January 26/Mon through 28/Wed, 2004 (3 days). Complying with the conditions of contract between the Team and the supplier, number of participant to the training is limited to two. Mr. Oohara from the Team and one personnel from BPC/DOE will take part in the training.

End

Attachment

1. DOE's letter: DOE/PCD/RE-MP/2003-04/354 dated December 19, 2003
2. DOE's letter: DOE/PCD/RE-MP/2003-2004/334 dated December 10, 2003
3. DOE's letter: DOE/PCD/RE-MP/2003-2004/348 dated December 16, 2003
4. Program of First Workshop
5. DoSLR's letter PA-ADM(21)/900 dated December 15, 2003
6. Status of Received Data of Non-Electrified Villages
7. Site Work Schedule in January and February 2004



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DEPARTMENT OF ENERGY
MINISTRY OF TRADE & INDUSTRY
THIMPHU : BHUTAN

DOE/PCD/RE-MP/2003-04/ 354

19 December, 2003

✓ Mr. Fukuchi Tomoyasu
Team Leader
Nippon Koei Co. Ltd.
Thimphu

Subject: *Integrated Master Plan Study for Dzongkhag-wise Electrification in Bhutan.*

Sir,

Thanks for giving us the inception report. While it has been very well prepared, we would like you to take into account certain views from our side so that the document is in line with our expectation.

The following points are to be noted and regarded with priority for inclusion with clarity in the study although most of these have been touched upon in various parts of the inception report. This is being stressed in order to achieve realistic and practical program document for rural electrification in future.

1. The study should conduct a Dzongkhag wise electricity demand forecasting upto 2035 or 2040 (as deemed foreseeable).
2. The study must identify and provision for electrifying the entire country by 2020 as envisioned by the RGOB (with adequate provisions for increase in the number of houses).
3. The study must analyze and identify the optimum infrastructure capacities so that unnecessary investments in large extra capacities are minimized.
4. The field surveys need to incorporate some technical survey data besides socio-economic data collections for e.g. the provision of route lines and source or tapping position of proposed lines.
5. The study should review the existing system design, standards and equipment with the objectives of deducing the least cost system options in Bhutan's context. Especially, thorough and convincing cost benefit analysis/least cost benefit analysis must be done on the following:
 - a) the most cost effective steel poles w.r.t. optimizing the pole strength, height and weight vis-à-vis the conductors used, span length etc.,
 - b) the most cost effective conductors used for over head lines from available conductors such as ASCR, AAC, AAAC and insulated ABC,
 - c) the most cost effective insulators from those such as porcelain insulators, silicone rubber insulators, etc.,
 - d) the most cost effective grounding equipments such as spike earthing, chemical rod earthing, pipe earthing, plate earthing, etc.,
 - e) isolators such as auto reclosers, load break switches and Gang operated switches,

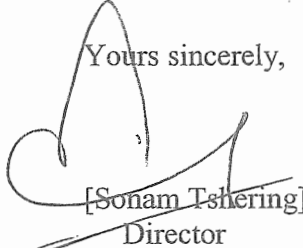
- f) SWER vis-à-vis cost reduction in RE,
- g) Small (1kVA to 30 kVA) single phase transformers versus three phase transformers. This also requires to address the reduction of weight, suitability/easiness for construction and maintenance given the terrain and remoteness of villages in Bhutan's context,
- h) Oil filled transformers versus dry type transformers in terms of cost, weight and adoptability in Bhutan,
- i) digital versus analog energy meters. Also some consideration on current limiting devices/prepaid cards especially from perspectives of cost of billing and collection at village level not viable venture,
- j) since the RE is commercially not viable, there is need to look into RESCO concepts (Rural Energy Service Cooperatives) where the energy service is operated and maintained by community based management. Hence the issue of sustainability also needs to be addressed in detail.
- k) Technological developments should also be catered for in order to come out with the most suitable and cost effective solutions.

We are also attaching the specific comments herewith. I hope you will find the comments in order and look forward to your incorporating them in the report.

Words/sentences to be deleted/edited are shown in italics and underlined. Additions are shown in bold letters.

Thanking you,

Yours sincerely,



[Sonam Tshering]
Director

CHAPTER 1 INTRODUCTION

1.1 Background

- Page 1-1, Para 1, first line: Replace 30% with 40%
- Page 1-1, Para 2, 4th line: Delete "with some points of view of correction of differentials between Urban and Rural"

CHAPTER 2 BASIC APPROACH OF THE STUDY

2.1 Basic Understanding to the study

- Page 2-1, Para 3, 3rd line: Delete "a" in "at around 100 W per household"
- Page 2-1, Para 3, 4th line: Replace "Renewable energies including micro hydros are regarded as supplemental electrification schemes where the extension of distribution lines are difficult" with "Renewable energies including micro hydros were an interim measure pending availability of grid supply"
- Page 2-1, Para 3, 2nd last sentence: Replace "The clear goal to achieve "100%" electrification level by 2020" is not a mere slogan but has a meaning of an order from the king that must be achieved" with "The clear goal to achieve "100%" electrification level by 2020" is not a mere slogan but a goal whereby all citizens have access to the natural resource of Bhutan which is hydro used for generating power"
- Page 2-1, Para 4, Line 1&2: Replace "demand, 400 MW, 100 MW" with "capacity, 428 MW, 128MW"
- Page 2-1, Para 5, 2nd sentence: Replace "30%" with "40 %"
- Page 2-2, In the summary with bullets: Add "**The Master Plan study will fulfill the role a program document of RE**" as first bullet point.

- Page 2-4, (3) Preparation of the plans with the view of the implementation: Comment on 3rd sentence "The finance plan is basically from the village's own money" - *As RE is not commercially viable, subsidy aspects will need to be addressed.*
Also add to the next Para towards the end with "**and also look at overcoming transport bottlenecks**".

Page 3-2, 3.2 First Site Work

- (1) Explanation of and Discussion on Inception Report,
Para 2, Line 1: Insert "to" to read the sentence as " In the meeting, the Team will confirm to the DOE....."
- (2) Collection and Analysis of Baseline Data

- a) Reports and contract documents for the rural electrification having been executed and planned by the ADB, “Replace NORAD with Sustainable Development Secretariat (SDS)” and other International supporting groups.

Page 3-5, 2) Study on methodology and software for the planning, Para 2, 3rd line: Replace word “village” with “voltage”.

Page 3-13, 2) Power Demand Forecast, 2nd Sentence replace word “Particularity” with “Peculiarity”



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DEPARTMENT OF ENERGY
MINISTRY OF TRADE & INDUSTRY
THIMPHU : BHUTAN

DOE/PCD/RE MP/2003-2004/ 334

December 10, 2003

Ms. Kondo Michiko
JICA Representative
Camp: Thimphu

Subject: Forwarding of list of counterpart personnel and the coordination committee.

Madam,

Please find enclosed herewith note No. DOE/PCD/RE-MP/332 dated 10th December 2003 containing the list of counterpart personnel and the coordination committee.

This is in accordance with the "Minutes of Meeting" for project " The Preliminary Study for the integrated master plan study for Dzongkhag-wise Electrification in the kingdom of Bhutan" between Japan International Cooperation Agency and Department of Energy, Ministry of Trade and Industry held on 27th June 2003, wherein the Executing Agency "Department of Energy" have agreed to provide list of Coordination Committee and Counterpart Personnel for the study before the commencement of the project.

Thanking you,

Yours sincerely,


[Karma P Dorji]
Project Manager

Cc: ✓ The JICA study Team Leader, Nippon Koei Co. Ltd. for kind information and perusal please.

DOE/PCD/RE-MP/ 332

December 10, 2003

NOTE

In accordance with the "Minutes of Meeting" for project "The Preliminary Study for the integrated master plan study for Dzongkhag-wise Electrification in the kingdom of Bhutan" between Japan International Cooperation Agency and Department of Energy, Ministry of Trade and Industry held on 27th June 2003, the Executing Agency "Department of Energy" have agreed to provide list of Coordination Committee and Counterpart Personnel for the study before the commencement of the project.

Upon request by the JICA study team, an internal coordination meeting was held between Department of Energy, Bhutan Power Corporation and the JICA study team on 9th December 2003 at BPC conference hall. The meeting discussed mainly on following key areas:

1. Inception report submitted by the study team on 3rd December 2003
2. Counterpart Personnel
3. Formation of coordination committee

The comments on the inception report by BPC and DOE were discussed with the study team and will be giving in writing to the study team soon. On the counterpart personnel, the following list of counterparts for the study team from DOE and BPC is proposed. The list of counterparts from BPC was discussed and agreed upon by General Manager, CSD, Manager, Planning Division and Sr. Manager, DCD subject to approval by the Managing Director, BPC.

Department of Energy:

Name	Position	Organization
Karma P Dorji	Project Manager	PCD, DOE
Karma Tshewang	Off-grid Development (Hydro)	PCD, DOE
Mewang Gyeltshen	Off-grid Development (Solar)	RED, DOE
Dechen Wangmo	GIS study	PCD, DOE

Bhutan Power Corporation:

Name	Position	Organization
Jigme Tobgyel	Focal Person from BPC	Planning Div, BPC
Pushpa Lal	Power Distribution Design	CSD, BPC
Sonam Tobgay	Financial study	Finance Dept., BPC
Sonam Palden	Environment Impact Evaluation	DCD, BPC
Sunil Kr. Rasailly	GIS study	CSD, BPC
Ujjwal D Dahal	GIS study	Planning Div., BPC
Dechen Dema	Load flow Analysis	CSD, BPC
Suresh Nepal	Design Engineer	DC, BPC

The counterpart personnel are being felt important to ensure technology transfer, which is one of the main objectives of the study. The counterparts will directly carry out the study jointly with the study team and the study team will provide the DOE with a tentative plan

of counterpart assignment, based on which the DOE will intimate the counterpart personnel.

In order to facilitate the smooth implementation of the study, we also require forming a Coordination Committee consisting of members from DOE, BPC, JICA/JOCV (Thimphu), MOF (DADM) and Study Team. The following members are proposed for the coordination committee.

Designation	Organization	Position
Director	Department of Energy	Chairman
Head	Planning & Coordination Division, Dept. of Energy	Member
Resident Representative	JICA/JOCV, Thimphu	Member
General Manager	Customer Service Department, Bhutan Power Corporation	Member
Representative	DADM, MOF	Member
Team Leader	Nippon Koei Co. Ltd. JICA Study Team	Member
Project Manager	PCD, DoE	Member Secretary

The coordination committee is responsible for smooth implementation of the study and also monitoring the progress of the study. The committee meeting shall be held at least once in every quarter and DoE shall coordinate the meeting. DoE will also coordinate participation of other Government agencies in the event of need.

Therefore, it is submitted to Directorate for according approval, as we require submitting the list of coordination committee and counterpart personnel to JICA office in Japan as a part of our commitment for the study at the earliest.

Submitted for approval please.

Recommended for kind approval

[Signature]
 Head, Planning and Coordination Division, DoE

[Signature]
 (Karma P Dorji)
 Project Manager

[Signature]
 DIRECTOR, DEPARTMENT OF ENERGY

Approved

[Signature]
 9/12



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DEPARTMENT OF ENERGY
MINISTRY OF TRADE & INDUSTRY
THIMPHU : BHUTAN

DOE/PCD/RE-MP/2003-04/ 348

16 December, 2003

Subject: Project “Rural Electrification Master Plan Study” Coordination Committee Meeting.

Sir,

Department of Energy has received technical assistance from Japan International Cooperation Agency, Japan for the project “ The Preliminary Study for the integrated master plan study for Dzongkhag-wise Electrification in the kingdom of Bhutan”. In accordance with the “Minutes of Meeting” between Japan International Cooperation Agency and Department of Energy, Ministry of Trade and Industry held on 27th June 2003, the Executing Agency “Department of Energy” have agreed to provide list of Coordination Committee for the study before the commencement of the project.

In this context, Department of Energy hereby proposes to convene the first meeting of coordination committee on *15th January 2004 at 10.00am at DOE Conference Hall* to confirm the nomination as well as discuss and review the project inception.

The following members are proposed for the coordination committee.

Designation	Organization	Position
Director	Department of Energy	Chairman
Head	Planning & Coordination Division, Dept. of Energy	Member
Resident Representative	JICA/JOCV Bhutan	Member
General Manager	Customer Service Department, Bhutan Power Corporation	Member
Representative	DADM, MOF	Member
Team Leader	Nippon Koei Co. Ltd. JICA Study Team	Member
Project Manager	PCD, DoE	Member Secretary

The Coordination Committee is required in order to facilitate the smooth implementation and also monitoring the progress of the study. The committee meeting shall be held atleast once in every quarter and DoE shall coordinate the meeting. DoE will also coordinate participation of other Government agencies in the event of need.

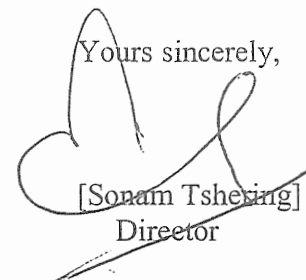
We would be grateful if a representative could be present for the meeting.

Phone # 328279 Fax # 328278

Your cooperation in this regard will be appreciated.

Thanking you,

Yours sincerely,



[Sonam Tshering]
Director

Cc: The Managing Director, Bhutan Power Corporation with a request to depute GM, CSD, BPC for the meeting.

To

1. The Director
Department of Aid and Debt Management
Ministry of Finance
Thimphu.

2. Mr. Yasuyuki Mori
The Resident Representative
JICA Bhutan Office
Thimphu.

3. Mr. Fukuchi Tomoyasu
Team Leader
Nippon Koei Co. Ltd.
Thimphu.

4. The General Manager
Customer Service Department
Bhutan Power Corporation
Thimphu.

5. The Chief Engineer/Head
Planning and Coordination Division
Department of Energy
Thimphu.

DRAFT

Attachment-4

Japan International Cooperation Agency (JICA)
Department of Energy (DOE), Ministry of Trade and Industry

**The Integrated Master Plan Study for
Dzongkhag-wise Electrification in the Kingdom of Bhutan**

**First Workshop
30 January 2003, in Thimpu**

Agenda

9:30 - 9:40	Welcome and Introduction	Director DoE
9:40 - 9:45	Greetings by JICA Bhutan Office	Representative of JICA Bhutan Office
9:45 - 10:00	Introduction of Study Team Members and Explanation of General Flow of the Study	Team Leader, JICA Study Team
10:00 - 10:30	Explanation of Current Status and Problem of Rural Electrification	DoE
10:30 - 10:50	Coffee Break	
10:50 - 12:30	Presentation of Methodology of Master Plan Study	Study Team Members
12:30 - 13:00	Questions and Answers	
13:00 - 14:00	Lunch	
14:00 - 15:00	Presentation of Actual Status of Rural Area and Request to Master Plan Study	Dzongkhag representatives
15:00 - 15:30	Discussions	
15:30 - 15:45	Coffee Break	
15:45 - 16:00	Presentation of New Technology	Study Team Members
16:00	Closing Remarks	Director DoE

8018
18/12/03

Post Box No. 142

ROYAL GOVERNMENT OF BHUTAN
DEPARTMENT OF SURVEY & LAND RECORDS
MINISTRY OF HOME AFFAIRS
THIMPHU

Attachment - 5

Tel: 321743
321745
Fax: 321746
EPABX
324741/321217/
324259/322798

PA-ADM(21)/900

Date: 15th December 2003

✓ To,
The Director
Planning & Coordination Division
Department of Energy
Thimphu.

Sir,

I am directed to convey that, with regard to your letter No.DOE/PCD/RE/2003-04/304 dated 21-11-2003, we regret our inability to provide the required data as we are still in the process of digitizing the maps.

The inconvenience caused is highly regretted please.

Yours faithfully,

(Shankar Sharma)
Dy.S.Engineer
Map production Division

(JICA) Team leader
For your information pls.

28/12/03

18/12

Land Registration
323024
322965
325274
325607 Fax

Cadastral Info
325219
322939
323565 Fax

Map Production
325145
321171 Fax

Topographical Survey
322588
324654 Fax

Attachment - 6

Status of Preparation of Listing Non-Electrified Villages after RE-III by DOE

- as of December 24, 2003 -

Dzongkhag	Status		Number		Remarks
	Received	Not Received	Non-Electrified Villages	Non-Electrified Households	
Bumthang	✓		36	491	
Chhukha	✓		122	2,603	
Dagana	✓		-	2,168	Only total number of non-electrified households by Gewog is listed, but there is no breakdown of non-electrified households by village.
Gasa		✓	-	-	
Haa	✓		10	212	
Lhuntse		✓	-	-	
Mongar		✓	-	-	
Paro	✓		34	430	
Pemagatshel		✓	-	-	
Punakha	✓		73	357	
Samtse		✓	-	-	
Sarpang	✓		99	2,104	
Samdrup Jongkhar	✓		138	3,449	
Thimphu	✓		40	243	
Trashigang	✓		91	1,745	
Trashiyangtse		✓	-	-	
Trongsa	✓		39	1,029	
Tsirang	✓		-	2,504	Only total number of non-electrified households by Gewog is listed, but there is no breakdown of non-electrified households by village.
Wangdue Phodrang	✓		188	1,531	
Zhemgang	✓		53	1,639	
Total			923	20,505	

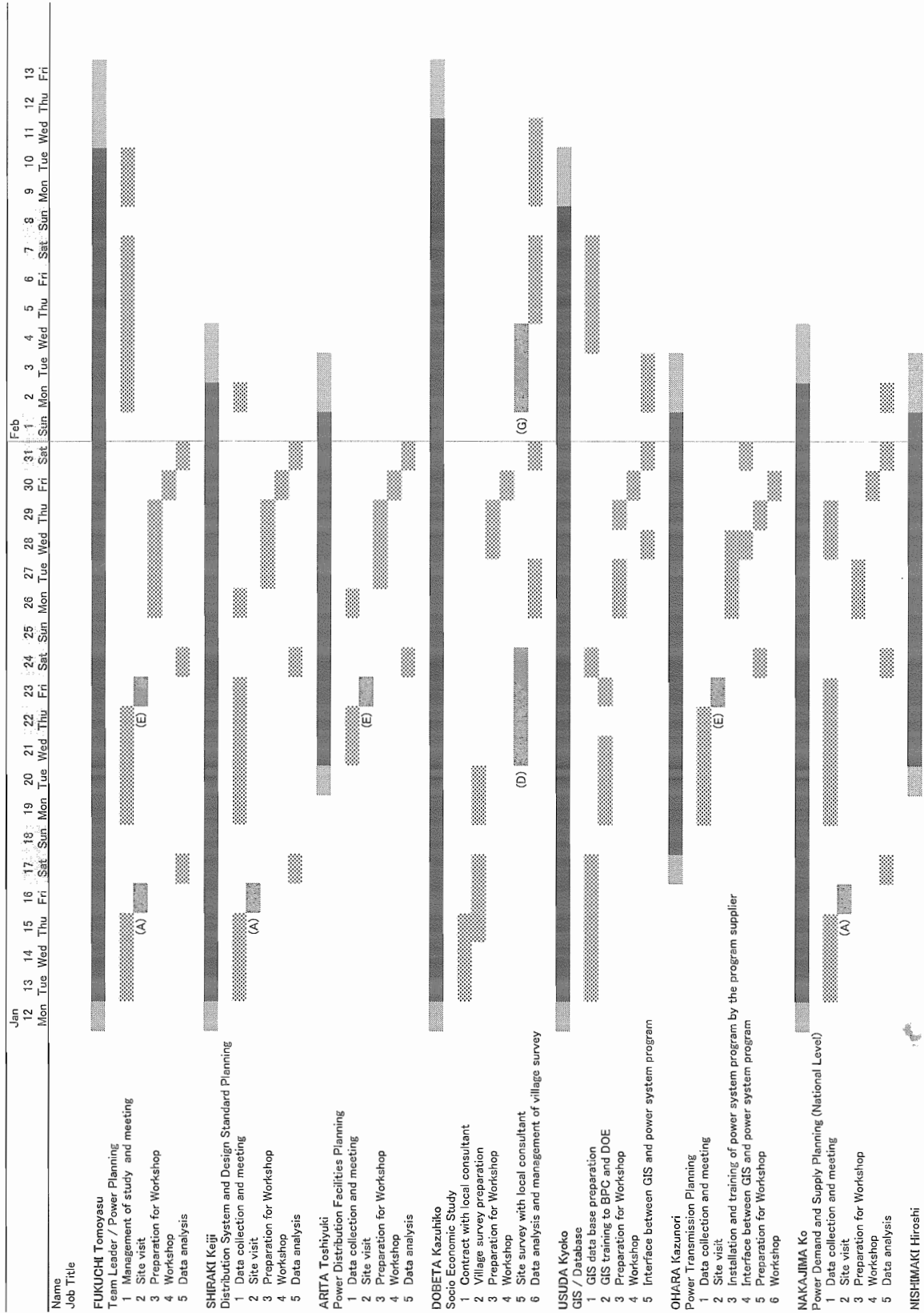
Prepared by JICA Study Team (December 24, 2003)

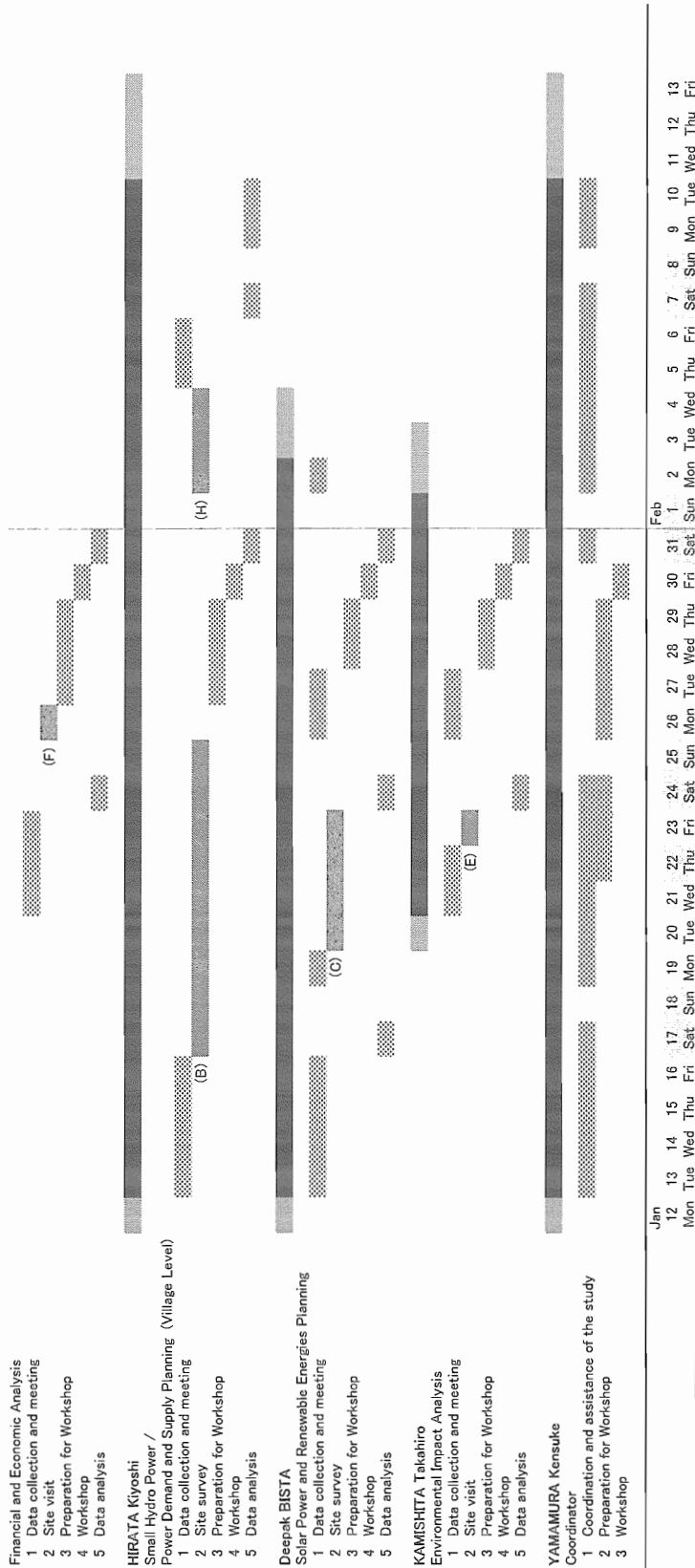
Schedule of the 1st Site Work; 12 Jan to 13 Feb 2004

Date	Day	Activities	Accommodation	Remarks
1/12	Mon	(A) Narita/1045->Bangkok/1545 by TG641 (B) Nagoya/1030->Bangkok/1515 by TG645	Bangkok	(A) Fukuchi, Hirata, Dobeta, Usuda, Nakajima, Bista, Yamamura (B) Shiraki
1/13	Tue	(A) Bangkok/0650->Kolkata->Paro/1010 by KB125 (1) Meeting with JICA/Bhutan (1600)	Thimpu	(A) Fukuchi, Hirata, Dobeta, Usuda, Nakajima, Bista, Yamamura, Shiraki
1/14	Wed	(1) Meeting with DOE (1000) (2) Study in Thimpu	Thimpu	
1/15	Thu	(1) Coordinating Committee Meeting (1000) (2) Study in Thimpu	Thimpu	
1/16	Fri	(1) Study in Thimpu (2) Site visit	Thimpu	
1/17	Sat	(A) Nagoya/1520->Bangkok/1935 by JL737 (1) Site survey (2) Study in Thimpu	Thimpu, Bangkok, Other	(A) Ohara
1/18	Sun	(A) Bangkok/0650->Kolkata->Paro/1010 by KB125 (2) Site survey	Thimpu, Other	(A) Ohara
1/19	Mon	(1) GIS training to BPC and DOE (2) Site survey (3) Study in Thimpu	Thimpu, Other	
1/20	Tue	(A) Narita/1045->Bangkok/1545 by TG647 (2) GIS training to BPC and DOE (3) Site survey (4) Study in Thimpu	Thimpu, Bangkok, Other	(A) Nishimaki, Arita, Kamishita
1/21	Wed	(A) Bangkok/0650->Yangon->Dhaka->Paro/1110 by KB127 (1) GIS training to BPC and DOE (2) Site survey (3) Study in Thimpu	Thimpu, Other	(A) Nishimaki, Arita, Kamishita
1/22	Thu	Site survey	Thimpu, Other	National holiday
1/23	Fri	(1) GIS training to BPC and DOE (2) Site survey (3) Study in Thimpu	Thimpu, Other	
1/24	Sat	(1) Site survey (2) Study in Thimpu	Thimpu, Other	
1/25	Sun	Site survey	Thimpu	
1/26	Mon	(1) Installation and training of power system program (2) Study in Thimpu	Thimpu	
1/27	Tue	(1) Installation and training of power system program (2) Study in Thimpu	Thimpu	
1/28	Wed	(1) Installation and training of power system program (2) Study in Thimpu	Thimpu	
1/29	Thu	Study in Thimpu	Thimpu	
1/30	Fri	Workshop-1	Thimpu	
1/31	Sat	Study in Thimpu	Thimpu	
2/1	Sun	Leaving Thimpu to Paro	Thimpu, Paro	Nishimaki, Arita, Ohara, Kamishita

2/2	Mon	(A) Leaving Thimpu to Paro (B) Paro/930->Bangkok/1530 by KB126 (1) Site survey (2) Study in Thimpu	Thimpu, Paro, Bangkok, Other	(A) Shiraki, Nakajima, Bista (B) Nishimaki, Arita, Ohara, Kamishita
2/3	Tue	(A) Paro/0930->Bangkok/1450 by KB124 (B) Bangkok/1120->Narita/1900 by TG640 (C) Bangkok/08:30->Narita/16:10 by JL708, Narita/18:15->Nagoya/19:30, by JL053 (1) Site survey (2) Study in Thimpu	Thimpu, Bangkok, Other	(A) Shiraki, Nakajima, Bista (B) Nishimaki, Arita, Kamishita (C) Ohara
2/4	Wed	(A) Bangkok/1120->Narita/1900 by TG640 (B) Bangkok/0830->Narita/1610 by JL708, Narita/18:15->Nagoya/19:30 by JL053 (1) Site survey (2) Study in Thimpu	Thimpu	(A) Nakajima, Bista (B) Shiraki
2/5	Thu		Thimpu	
2/6	Fri	Wrap-up meeting (1000)	Thimpu	
2/7	Sat	Study in Thimpu	Thimpu	
2/8	Sun	Leaving Thimpu to Paro	Thimpu, Paro	Usuda
2/9	Mon	(A) Paro/930->Bangkok/1530 by KB126 (1) Signing of Minutes of Meeting (1000) (2) Study in Thimpu	Thimpu, Bangkok	(A) Usuda
2/10	Tue	(A) JICA/Bhutan (1000) and Leaving Thimpu to Paro (B) Bangkok/1120->Narita/1900 by TG640 (1) Study in Thimpu	Thimpu, Paro	(A) Fukuchi, Hirata, Yamamura (B) Usuda
2/11	Wed	(A) Leaving Thimpu to Paro (B) Paro/0930->Delhi/1230 by KB204, JICA/India (1600)	Paro, Delhi	(A) Dobeta (B) Fukuchi, Hirata, Yamamura
2/12	Thu	(A) Paro/0930->BKK/1450 by KB124 (B) Embassy of Japan (0900), JBIC/India (1100)	Bangkok, in Air	(A) Dobeta (B) Fukuchi, Hirata, Yamamura
2/13	Fri	(A) Bangkok/1120->Narita/1900 by TG640 (B) Deli/0:05->BKK/05:35, BKK/08:20->Narita/16:00, by TG772		(A) Dobeta (B) Fukuchi, Hirata, Yamamura

Schedule of the 1st Site Work (Detail); 12 Jan to 13 Feb 2004





Site Visit and Site Survey

Team	Date/Day	Study Members	Sites	Objectives
(A)	Jan16/Fri	FUKUCHI, SHIRAKI, NAKAJIMA	Chhukha	Transmission and distribution lines
(B)	Jan17/Sat to Jan25/Sun	HIRATA	Tashigang, Mongar, Yangtse Lhuntsahi (via Wangdi Phodrang, Tongsa and Bumthang)	Small hydropower power and demand forecast
(C)	Jan20/Tue to Jan23/Fri	BISTA	Paro	Solar and renewable energies
(D)	Jan21/Wed to Jan24/Sat	DOBETA	Chhukha, Ha (via Paro)	Village survey with local consultant
(E)	Jan23/Thu	FUKUCHI, ARITA, OOHARA, KAMISHITA	Wangdi Phodrang	Distribution lines and environmental impact assessment
(F)	Jan25/Mon	NISHIMAKI	Chhukha	Electrified village survey
(G)	Feb02/Mon to Feb04/Wed	DOBETA	Punakha	Village survey with local consultant
(H)	Feb02/Mon to Feb04/Wed	HIRATA	Ha (via Paro)	Small hydropower power and demand forecast

ANNEX-4

***MINUTES OF MEETING
(FIRST SITE WORK: NO.2)
BETWEEN***

THE MASTER PLAN STUDY TEAM

AND

***DEPARTMENT OF ENERGY
MINISTRY OF INDUSTRY***

FEBRUARY 9, 2004

**MINUTES OF MEETING
FOR
THE INTEGRATED MASTER PLAN STUDY
FOR DZONGKHAG-WISE ELECTRIFICATION
IN
THE KINGDOM OF BHUTAN
(FIRST SITE WORK: NO.2)**

**BETWEEN
THE MASTER PLAN STUDY TEAM
AND
DEPARTMENT OF ENERGY
MINISTRY OF TRADE AND INDUSTRY**

**THIMPHU
FEBRUARY 9, 2004**



Mr. Tomoyasu Fukuchi
Team Leader, JICA Study Team
Nippon Koei Co., Ltd.



Mr. Sonam Tshering
Director
Department of Energy
Ministry of Trade and Industry

The Master Plan Study Team (the Team) of the Japan International Cooperation Agency (JICA), which is headed by Mr. Tomoyasu FUKUCHI, stayed in Bhutan from January 13, 2004 through February 11, 2004 as a last half of the first site work. On February 6, 2004, the Team had a wrap-up meeting with Department of Energy (DOE), Ministry of Trade and Industry and Bhutan Power Corporation (BPC), and the parties confirmed the followings.

1. **Inception Report** : The Team submitted twenty copies of the final version of Inception Report to DOE on January 13, 2004 according to the clause 1 of the minutes of meeting for the first site work No.1.
2. **Coordinating Committee Meeting** : The coordinating committee was held on January 23, 2004 and discussion was made as shown in its minutes of meeting (Attachment-1).
3. **Workshop** : The first workshop took place at the conference hall of RICB on January 30, 2004 according to the agenda shown in the Attachment –2 along with list of participants. Record of discussions on 1st National Workshop is attached herewith (Attachment-3).
4. **List of Non-Electrified Villages** : The Team received the remaining list of non-electrified villages. The status of received data is shown in the Attachment-4.
5. **Collection of Distribution Line Data** : DOE/BPC will collect and check the data of all the existing distribution lines by the end of May, 2004; see the Attachment-5 for reference, and submit the same to the Team at the beginning of 2nd site work which is scheduled to commence in June 2004.

The required data to submit is shown below.

- a) Location data (GPS) of distribution transformers with their capacities and routes and conductor size of distribution lines
 - b) Location data (GPS) of substations and their transformers' capacities
6. **GIS Training** : GIS training was imparted by the Team from January 19/Mon through 21/Wed and 23/Fri, 2004 (4 days) at BPC office to 9 personnel listed in the Attachment-6.
 7. **GPS Training** : According to the request of DOE/BPC to collect the location data of the existing distribution lines, GPS training was executed by the Team on January 26/Mon and 28/wed, 2004 (2 days) to 12 personnel listed in the Attachment-7.
 8. **Mipower Training** : One license of power system analysis program - Mipower – was installed and the training for the same was executed from January 26 through 28 (3 days) to Ms. Dechen Dema of BPC and Mr. K. Ohara of the Team by the package supplier: Technology & Business Power Research & Development Consultant Private Limited (PRDC).
The Mipower hardware key is kept by the Team.

9. **Standard Spelling of Dzongkhag and Gewog** : Standard spellings to be used in this study of all the Dzongkhags and Gewogs were decided as shown in the Attachment-8. The boundaries of the Dzongkhags and Gewogs were also finalized as shown in the same Attachment.
10. **Lending GPS and Software & Hardware Key of GIS** : The Team lends DOE 14 sets of GPS (Garmin eTrex, "Yellow Color") and two sets of software & hardware key of Arc-GIS (Ver.8.3) from January 10, 2004 to the commencement of the 2nd site work only for the purpose to locate the existing distribution transformers and the other power facilities.
11. **Village Survey by Local Consultant** : DOE will monitor and check the progress of the village survey conducted by local consultant: NORLHA ASSOCIATES, and inform the progress once in every month to the Team.
12. **Base Line Data of the Study** : The baseline data of the existing power facilities for this study will be finalized with available data by end of May 2004.
13. **The Original Data of Living Standard Survey 2003** : The Team requested for the original data of the living standard survey 2003 being compiled by National Statistical Bureau vide letter No. LBRE-03-003. DoE will obtain the data before the commencement of 2nd site work.
14. **Water Discharge Data** : DOE will submit the water discharge data of the following rivers in dry season to the Team at the beginning of 2nd site work.

No.	Name of River	Dzongkhag	Gewog
1	Jabkang Broksar-chu	Trashigang	Sakten
2	Sam-chu	Samtse	Dorokha

15. **Collaborative Project Planning with DIT and BBS** : The Team and DOE agreed in principle to collaborate project planning and promotion for Rural ICT Services with Department of Information Technology, Ministry of Information and Communication, expansion of TV Broadcasting with Bhutan Broadcasting Service (BBS). This main objective of such collaboration is more from perspective of cost sharing and value addition to Rural Electrification.
16. **Policy of Technology Transfer to Counterparts** : For the effective transfer of the technology to DOE/BPC, the Team and DOE/BPC agreed to the following:
- to set the final target;
 - to decide the key subjects of technology transfer to achieve the final target;
 - to set the target of each subjects;
 - to decide the persons who receive the technology transfer by each subject;
 - to set the benchmarks to evaluate the achievement of the technology transfer; and
 - to evaluate the achievement of the persons using the benchmarks

g) Draft "Design of technology transfer" attached as Attachment -9

17. **Census Data** : The Team is expecting to receive the census data requested by their letter LKLBHE-03-048 dated February 6, 2004 by the commencement of 2nd site work.

18. **Next Site Work** : The 2nd site work is scheduled to be conducted in June to July, 2004.

End

Attachment

1. Minutes of the 1st Project Coordination Committee Meeting
2. Agenda and List of Participants for 1st Workshop
3. DOE's letter: DOE/PCD/RE-MP/03-04/562 dated 9th February 2004
4. Status of Received Data of Non-Electrified Villages
5. BPC's Inter Office Memo: BPC/PLANNING/F-2(A)/020 dated January 29/30,2004
6. Participants list of GIS Training
7. Participants list of GPS Training
8. Definition of Names and Boundaries of Dzongkhags and Gewogs
9. Draft Design of Technology Transfer



Minutes of the 1st Project Coordination Committee Meeting on the Integrated Master Plan Study for Dzongkhag-wise Electrification

Venue: Department of Energy Conference Hall, Thimphu

Date: 23rd January 2004.

Time: 10.00 am

Following members were for the meeting:

1. *Mr. Sonam Tshering, Director, Department of Energy- Chairman.*
2. *Mr. Fukuchi Tomoyasu, Team Leader, JICA Study Team-Member.*
3. *Mr. Bharat Tamang, Head, Planning & Coordination Division, Department of Energy-Member*
4. *Mr. Jigme Tobgyel, Sr. Manager, Planning Division, Bhutan Power Corporation-Member*
5. *Mr. Kinley Dorji, JICA Bhutan Office, Thimphu (Representative on behalf of RR, JICA Bhutan Office)-Member.*
6. *Mr. Phuntsho Wangyel, Program Officer, Department of Aid and Debt Management-Member.*
7. *Mr. Karma P Dorji, Project Manager, Planning and Coordination Division, Department of Energy-Member Secretary.*

Background

In response to the request of the RGoB, the Government of Japan kindly agreed to conduct the Integrated Master Plan study for Dzongkhag-wise Electrification in Bhutan in accordance with the relevant laws and regulations in force in Japan.

The objective of the study is to formulate comprehensive rural electrification plan to achieve RGoB's vision of "Electricity for All" by 2020. Thus the study is expected to produce a sustainable tech-economic rural electrification plan envisaging environment, technical, socio-economic and financial parameters.

In pursuance to the minutes of meeting for the project " the Preliminary Study for the integrated master plan study for Dzongkhag-wise Electrification in the kingdom of Bhutan" between Japan International Cooperation Agency and Department of Energy, Ministry of Trade and Industry held on 27th June 2003, the Executing Agency "Department of Energy" has committed to establish a Project Coordination Committee (PCC) consisting of members from DOE, BPC, JICA/JOCV (Thimphu), MOF (DADM) and Study Team.

On 23rd January 2004, 1st Project Coordination Committee Meeting was convened in order to confirm the members, discuss the draft TOR and presentation of progress of the project.

Discussion

The Chairman welcomed the members for the 1st Project Coordination committee meeting. The Chairman informed the members that the Department felt the need of Rural

Electrification Master Plan during 8th Five Year Plan and later it was submitted to Japanese Government requesting for funding the project. In response, Government of Japan kindly agreed to conduct the study. In October 2002, Department received JICA mission to assess and evaluate the request. As far as Royal Government is concerned, rural electrification is given highest priority in order to fulfill the objective of providing electricity for all by 2020. In June 2003, appraisal mission from JICA visited Bhutan to determine the "Scope of work". A country agreement was signed between JICA and Ministry of Trade and Industry spelling out the scope of work and separate minutes of meeting between Department of Energy and JICA to implement the scope of work. In the minutes of meeting, it was identified to establish a coordination committee in order to facilitate the smooth implementation of the study. The committee is responsible for monitoring the progress of the study.

The Chairman also pointed out that although he has been referred to as Chairman of the committee but that does not mean the decisions made during meeting will be based on his position, rather should be based on collective decision by the committee. The role and support of the committee is very crucial and important in terms of leading and providing direction of the project. The committee should be in a position to take responsibility and ownership of final outcome (Report) of the project.

On the composition of the committee members, Chairman pointed out the need for including Sr. Manager, Planning Division, Bhutan Power Corporation in addition to General Manager, Customer Service Department, Bhutan Power Corporation. Further, a representative from Ministry of Trade and Industry's Planning and Policy Department to be included as committee member. The meeting finalized the PCC members as follows:

Designation	Organization	Position
Director	Department of Energy	Chairman
Head	Planning & Coordination Division, Dept. of Energy	Member
Resident Representative	JICA/JOCV, Thimphu	Member
General Manager	Customer Service Department, Bhutan Power Corporation	Member
Representative	DADM, MOF	Member
Team Leader	Nippon Koei Co. Ltd. JICA Study Team	Member
Sr. Manager	Planning and IT Division, BPC	Member
Representative	Planning and Policy Division, MTI	Member
Project Manager	PCD, DoE	Member Secretary

The Project Manager presented the project background, key areas of study, schedules and progress of the project (attached appendix 1) along with submission of two issues to the committee on scheduled 1st National Workshop.

1. Few Dzongkhag deputing Chairman of the DYT for the workshop and felt a need for English-Dzongkhag interpreter for interpreting the discussion during the workshop.
2. Most of Dzongkhag and the BPC's District Manager requesting to cover the travel and DSA from the project. Whereas, the earmarked budget of US\$ 4000 by the JICA for the workshop is inadequate to meet the request.

The meeting discussed two issues presented by project manager and agreed that Mr. Gem Tshering, General Manager, Transmission Department, Bhutan Power corporation may be requested for his assistance if an interpreter is required. Besides, the Planning Officers from the Dzongkhags should be responsible for disseminating the information to DYT members. The Chairman also pointed out that limitation of representatives should not be constrained by budget limitation. The importance of the 1st National Workshop scheduled on 30th January 2004 particularly in terms of number of Dzongkhag representations and dissemination of objectives/purpose of the study to the representatives was felt very pertinent and vital. The Team Leader of Nippon Koei Co. and Project Manager was asked to work on cost estimate for covering DSA and transportation for the participants and request JICA for additional financing. Under extreme conditions Project Manager should explore counterpart funding if budget is available. Further, the Head, Planning and Coordination Division to present the paper on policy, current status and constraints being faced in carrying out RE in the workshop.

The representative from DADM also pointed out that they would not be in any position to arrange any additional funds from RGoB for the project, as it was not committed specifically in the agreed minutes. However, if Project has earmarked counterpart funding in the current fiscal year, it was suggested that the additional funds required be met from the fund if possible.

The Team Leader presented issues/problems being faced by study team mainly on baseline data, counterpart personnel and technology transfer. He highlighted the need for correct baseline data such as GPS positions of existing power facilities and commitment of counterpart personnel on priority basis to work in close association with experts, so as to achieve technology transfer and thereby resulting into fruitful master plan study.

Comments on submission by the Team Leader:

Counterpart personnel: The Chairman highlighted the importance of counterpart personnel to take advantage of availability of experts and working with more purpose rather than just fulfilling counterpart assignments. He also pointed out that as far as commitment of fulltime jobs with counterparts is concerned, it would be realistic to provide the detail schedule dates of consultants in field to Bhutanese counterparts. The Team Leader and Project Manager is expected to provide the detail list of roles of all counterparts and inform the counterparts accordingly emphasizing the importance of their participation. Chairman has asked Project manager to call on all counterpart personnel from DoE to meet him in a separate meeting.

The Sr. Manager, BPC, submitted that although the BPC counterpart personnel had been identified, there has been some confusion due to the various counterparts reporting to

different departments of BPC. He informed that, as assured in the earlier meeting held between the Study Team, DoE and BPC, the matter was immediately taken up with the Managing Director of BPC, who has accordingly issued an order to all counterpart personnel from BPC instructing them to be available for the study team during the entire duration of their stay in Bhutan. He also submitted that a BPC counterpart personnel for the Transmission expert had not been identified earlier and that during the meeting referred above, the General Manager, Transmission Department, BPC, was also out of station. However, the Sr. Manager submitted that a BPC counterpart for transmission services could be made available and that he would request the General Manager, Transmission Department, for the same. He also submitted that it would be very helpful if the study team could prepare a more detailed schedule so that the various counterpart parts from BPC know exactly when their respective counterparts in the study team would require interactions and discussions.

Baseline data: Chairman informed the members that BPC has earmarked a goal in corporate strategy to collect and compile baseline data of the entire existing infrastructure by end of December 2003 and should follow up with BPC on the status of the work.

The Head, PCD also highlighted the requirement of correct baseline information and that it is also obligatory for the BPC/DOE to provide them in accordance with the agreed scope of work with JICA.

Regarding the availability of the GPS data up to year 2000, the Sr. Manager, BPC, submitted that the GM, CSD, had informed during the meeting with the consultants (at the BPC conference hall) that the GPS data available had been collected for asset valuation purposes and that it would not be adequately accurate for the master plan studies. He also submitted that the GM, CSD, during the same meeting with the consultants, had requested for help from the consultants on the GPS and GIS system establishment since GIS system is new to the BPC. Somehow these requests were not included in the consultants TOR. He stated that immediate collection of GPS data without a planned GIS system would most probably require the BPC to redo the GPS data collection later and such requirement would be wasteful of resources for the BPC. He also informed that even if the available GPS data up to 2000 were to be used, it would be difficult to clearly differentiate the infrastructure existing before year 2000 from that added later. The Sr. Manager also submitted that the GPS data collection can commence immediately after the ongoing GIS training and formulation of the desired GIS system where the consultant's assistance would be very beneficial.

Team Leader apprised the members that although not envisaged in their TOR for provision of additional GPS equipment, based upon request by the Project Manager and with further consultation with JICA, they have procured 14 more GPS equipment feeling the importance of correct baseline information for the study.

Discussion on draft TOR

Chairman pointed out the main purpose of the coordination committee is to monitor the progress of the project. In performing this functions, if there were any provisions or clear

indication by JICA to disclose the budgetary allocations for the project would actually assist the committee in carrying out its roles.

However, the Technical Officer, JICA Bhutan Office pointed out that since the implementation contract is signed between JICA and Nippon Koei, it will not be possible to point out the budgetary allocations. He advised that DOE should be guided by the scope of work signed between DoE and JICA. Any change in implementation of project can be worked out in the committee and put up to JICA headquarter for consideration.

Based on above deliberations, the meeting decided to finalize the functions of the coordination committee as follows:

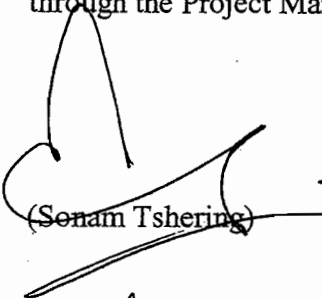
1. To review and monitor progress of the project and provide recommendation as and when deemed necessary.
2. To advice on policy matters and environment and socio-economic planning issues of the project.
3. Provide guidance and direction for smooth implementation of the project.
4. The coordination committee meeting shall be held at least once in every quarter.
5. DoE shall coordinate the meeting and also coordinate participation of other Government agencies in the event of need.

Next Action Plan

It was that the Project Manager with consultation with Team Leader will inform the committee members for next meeting.

Conclusion

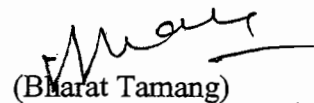
Chairman concluded the meeting by thanking all the members and pointed out once again the important role of committee members in ensuring the completion of project successfully. He also informed the Team Leader if there is any need for him to consult him or Head-PCD, he should feel free to contact them anytime instead of routing through the Project Manager.



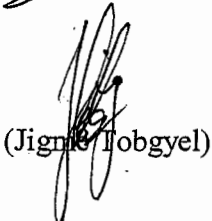
(Sonam Tshering)



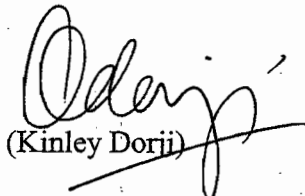
(Fukuchi Tomayasu)



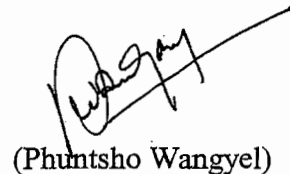
(Bharat Tamang)



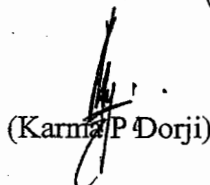
(Jigme Tobgyel)



(Kinley Dorji)



(Phuntsho Wangyel)



(Karma P Dorji)

Japan International Cooperation Agency (JICA)
Department of Energy (DOE), Ministry of Trade and Industry

**The Integrated Master Plan Study for
Dzongkhag-wise Electrification in the Kingdom of Bhutan**

**First Workshop
30 January 2003, in Thimphu
Venue: RICB Conference Hall (3rd Floor of BPC Main Office Building)**

Agenda

9:00 - 9:30	Arrival of Delegates	
9:30 - 9:40	Welcome and Introduction	Director, Department of Energy
9:40 - 9:45	Greetings by JICA Bhutan Office	Representative of JICA Bhutan Office
9:45 - 10:00	Explanation of General Flow of the Study Introduction of Study Team Members and	Team Leader, JICA Study Team
10:00 - 10:30	Presentation on Rural Electrification Program Overview	The Head, Planning & Coordination Division, Department of Energy
10:30 - 10:50	Coffee Break	
10:50 - 12:30	Presentation of Methodology of Master Plan Study (see attached Detailed Program)	Study Team Members
12:30 - 13:00	Questions and Answers	
13:00 - 14:00	Lunch	
14:00 - 15:00	Presentation on "A perspective of electrification in your Dzongkhag - an articulation of rural folks that need to be focused in the Study"	Dzongkhag Representatives
15:00 - 15:30	Discussions	
15:30 - 15:45	Coffee Break	
15:45 - 16:00	Presentation of New Technology	Study Team Members
16:00	Closing Remarks	Director, Department of Energy

Detailed Program by the Study Team

10:50 - 12:30	Presentation of Methodology of Master Plan Study by Study Team Members	
10:50 - 10:55	Overview of Study Methodology	Fukuchi
10:55 - 11:10	Present Situation of GIS in Bhutan and How to Apply GIS to Study	Usuda
11:10 - 11:20	Purpose and Methodology of Village Survey	Dobeta
11:20 - 11:35	Available Data of Existing Facilities and Study Methodology on Distribution Line Extension Planning	Shiraki (supported by Oohara and Arita)
11:35 - 11:40	Short Break	
11:40 - 11:50	Review and Comments on Power System and Coordination with Rural Electrification	Nakajima
11:50 - 11:55	Methodology of Demand Forecast	Hirata
11:55 - 12:05	Study Methodology for Off-grid Power Supply	Bista and Hirata
12:05 - 12:15	Financial and Economic Approach and On/Off-Grid Cutoff Point Methodology	Nishimaki
12:15 - 12:25	Methodology of Environmental Impact Analysis	Kamishita
12:25 - 12:30	Policy of Technology Transfer	Fukuchi
15:45 - 16:00	Presentation of New Technology	Bista and Hirata

**List of Participants for 1st Workshop
on Integrated Master Plan Study for Dzongkhag-wise Electrification in Bhutan**

No	NAMES	TITLE	ORGANIZATION
DZONGKHAGS			
1	BP Rai	Sr. Planning Officer	Paro Dzongkhag
2	Sonam Tshering	DYT Chairman	Paro Dzongkhag
3	Nado	Dzongrab	Sarpang Dzongkhag
4	Jambay	DYT Chairman	Bumthang Dzongkhag
5	Kunzang N Tshering	Dzongda	Bumthang Dzongkhag
6	Lobzang Dorji	Planning Officer	Bumthang Dzongkhag
7	K.B. Rai	Planning Officer	Trongsa Dzongkhag
8	Kunzang L Sangay	Planning Officer	Thimphu Dzongkhag
9	Lhawang Dorji	DYT Chairman	Dagana Dzongkhag
10	Sangay Penjore	Planning Officer	Dagana Dzongkhag
11	Namgyal Phuntsho	DYT Chairman	Punakha Dzongkhag
12	Namgyal Wangchuk	Planning Officer	Samdrupjonghar
13	NB Tamang	Planning Officer	Gasa Dzongkhag
14	Sabadev Maps	Planning Officer	Yangtse Dzongkhag
15	Singye Dorji	DYT Chairman	Chukha Dozngkhag
16	Tshering Dorji	Planning Officer	Chukha Dozngkhag
17	Tshewang Dorji	DYT Chairman	Haa Dzongkhag
18	Ugyen Dema	JE, Dagana Dzongkhag	Dagana Dzongkhag
OTHER ORGANIZATIONS			
19	Jigme Tobgyal	Programme Assistant	UNDP
20	Deki Choden	Reporter	Bhutan Broadcasting Service
21	Samten Wangchuk	Reporter	Kuensel Corporation
22	Monira Tsewang	Deputy Director, Department of Planning	Ministry of Finance
DEPARTMENT OF ENERGY			
23	Sonam Tshering	Director	DOE
24	Bharat Tamang	Chief Engineer, PCD	DOE
25	Karma P Dorji	National Project Manager	DOE
26	Karma Tshering	Executive Engineer, PCD	DOE
27	Karma Yonten	Head, BAE	DOE
28	Mewang Gyeltsen	RED	DOE
29	Ngwang Choeda	Assistant Engineer, PCD	DOE
30	Satchi	Assistant Engineer, RED	DOE
31	Tashi Dorji	Hydropower Development Engineer, PCD	DOE
32	Thukten Wangmo	Assistant Engineer, BAE	DOE
33	Karma Tsewang	Assistant Engineer, PCD	DOE
34	Dechen Wangmo	JE, PCD	DOE
35	Wangmo	JE, PCD	DOE
BHUTAN POWER CORPORATION			
36	Jigme Tobgyal	Sr. Manager, Planning & IT Division	BPC
37	CM Rai, Manager*	ESD, Yangtse Dzongkhag	BPC
38	Dechen Dema	Engineer, CSD	BPC
39	Gem Tshering	GM, Transmission Department	BPC
40	K.B. Wakhlay	GM, D&CD	BPC
41	K.B. Gurung*	Sr. Supervisor, ESD, Zhemgang Dzongkhag	BPC
42	Sam Tshewang*	Assistant Manager, Sr. Supervisor, Wangdi Dzongkhag	BPC
43	Norbu Tshering*	JE, Lhunsi Dzongkhag	BPC
44	Sonam Palden	Deputy Manager	BPC
45	Sonam Tobgay	Sr. Manager Finance	BPC
46	Sunil Rasaily	Engineer, CSD	BPC
47	Suresh Nepal	Manager, D&CD	BPC
48	Tashi Dorji	Hydropower Development Engineer, PCD	BPC
49	Tashi Tobgay *	JE, CSD, Punakha Dzongkhag	BPC
50	Ugyen Dorji	CSD	BPC
51	Ujjwal Dahal	Deputy Manager	BPC
52	Chencho Tshering Namgyal	Dy. Manager, DCD	BPC

No	NAMES	TITLE	ORGANIZATION
JICA			
53	Sugimoto Mitsukuni	Resident Representative	JICA
JICA STUDY TEAM			
54	Tomoyasu Fukuchi	Team Leader	Nippon Koei Co., Ltd.
55	Keiji Shiraki	Distribution System and Designstandard planning	Nippon Koei Co., Ltd.
56	Kazunori Ohara	Power Transmission Planning	Nippon Koei Co., Ltd.
57	Ko Nakajima	Power Supply and Demand Planning	Nippon Koei Co., Ltd.
58	Toshiyuki Arita	Power Distribution Facility Planning	Nippon Koei Co., Ltd.
59	Kyoko Usuda	GIS/Database	Nippon Koei Co., Ltd.
60	Kiyoshi Hirata	Small Hydro Power / Power Demand and Supply Panning (village level)	Nippon Koei Co., Ltd.
61	Hiroshi Nishimaki	Financial and Economic Analysis	Nippon Koei Co., Ltd.
62	Kazuhiko Dobeta	Socio Economic Study	Nippon Koei Co., Ltd.
63	Deepak Bista	Solar Power and Renewable Energies Planning	Nippon Koei Co., Ltd.
64	Takahiro Kamishita	Environment Impact Analysis	Nippon Koei Co., Ltd.
65	Kensuke Yamamura	Coordinator	Nippon Koei Co., Ltd.
66	Kesang Anayat	Secretary	Nippon Koei Co., Ltd.

* Note: These persons were representing Dzongkhags

BPC : Bhutan Power Corporation
 ESD : Electricity Service Division
 CSD : Customer Services Department
 DYT : Dzongkhag Yargay Tshogdue
 D&CD : Development and Construction Depart
 BEA : Bhutan Electricity Authority
 PCD : Planning and Coordination Division
 RED : Renewable Energy Division
 JICA : Japan International Cooperation Agency
 JE : Junior Engineer
 UNDP : United Nations Development Programe

from 13 Dzongkhags : 18 persons
 from 5 Dzongkhags of BPC : 5 persons



འབྲུག་རྒྱལ་ཁབ་ལྷན་ཁྲིམས་ལྷན་ཁུངས་།
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DEPARTMENT OF ENERGY
MINISTRY OF TRADE & INDUSTRY
THIMPHU : BHUTAN

DOE/PCD/RE-MP/2003-04/ 562

9 February, 2004

Mr. Fukuchi Tomoyasu
Team Leader
Nippon Koei Co. Ltd.
JICA Study Team

Subject: *Forwarding of record of discussions on 1st National Workshop on "Integrated Master Plan Study for Dzongkhag-wise Electrification in Bhutan".*

Sir,

Please find enclosed herewith record of discussions on 1st National Workshop on "Integrated Master plan Study for Dzongkhag-wise Electrification in country".


Congratulations for success of the first workshop. It has been very informative and the team has shown utter professionalism.

You may also note that later sections of the comments made by the participants from DoE for your kind information and perusal.

Your assistance has always been appreciated.

Thanking you,

Sincerely yours


(Karma P Dorji)
Project Manager

**RECORD OF DISCUSSIONS ON 1ST NATIONAL WORKSHOP ON THE
INTEGRATED MASTER PLAN STUDY FOR DZONGKHAG-WISE
ELECTRIFICATION IN BHUTAN**

The Department of Energy in association with Japan International Cooperation Agency Study Team Nippon Koei Co. Ltd conducted the **1st National Workshop on the Integrated Master Plan Study for Dzongkhag-wise Electrification in Bhutan** on **30th January 2003**, at the RICB conference hall, Thimphu from 10:00 Hours to 16:00 Hours.

The main objective of the workshop was to disseminate Rural Electrification Master Plan study activities including study methodologies being carried out by the JICA Study Team to all the stakeholders especially targeted to all the Dzongkhags for their information.

About 65 participants from various government and non government agencies including Dasho Dzongdag, Bumthang Dzongkhag, 7 DYT Chairman and Planning Officers from 14 Dzongkhags participated in the workshop. The agenda for the workshop is attached as Annex I and list of participants as Annex II.

In the opening remarks, Director, Department of Energy, Ministry of Trade and Industry welcomed all the participants and informed the gathering about the background of the workshop. He also emphasized the importance of the study and pointed out roles to be played by all the stakeholders especially seeking cooperation and inputs during the visits of JICA Study team to various Dzongkhags.

The Resident Representative, JICA Bhutan Office pointed out the importance of the study and highlighted the contributions made by JICA for socio-economic development of Bhutan as of date.

The Team Leader, JICA Study Team briefly explained the general flow of study followed by the introduction of study team members.

Mr. Bharat Tamang, Head Planning and Coordination Division, Department of Energy presented the Rural Electrification Program overview. This was followed by presentations of JICA Study Team. The copies of the presentations were distributed to all the participants.

After the presentations by Dagana and Samdrupjongkhar Planning Officers, open discussions were held. The following is the summary of discussions/comments/views expressed by Dzongkhag representatives during the workshop.

1. The Chairman of DYT, Haa Dzongkhag.

He expressed appreciations for availing the opportunity to participate in national workshop. He presented Dzongkhag's electrification statistical information. Out of total

1274 HH, 967 Gungs have been electrified. That makes almost 76% electrification in the Dzongkhag. The aspire further assistance and supports from Department of Energy and other Donor agencies like JICA to provide electricity for the remaining unelectrified households and gungs.

2. Mr. Jambay, Bumthang DYT Chairman.

He pointed out that in RGOB's effort to electrify all the gungs and Dzongkhags, Bumthang and Trongsa have been deprived from lack of adequate supply of power. Out of 1400 gungs in 4 gewogs in the Dzongkhag, 600HH still have not been electrified. Further, villages like Ura and Tamshing have been electrified with Micro Hydrel with assistance from JICA. Their sincere request to the Study Team to look into consideration of upgrading those existing hydels.

It has also been observed that Tang and Choekhar Toe villages will not be feasible at any cost with grid extensions from Chamkhar. Therefore, JICA is requested to assist for providing electricity by Micro or Solar PV power.

Director, DoE commented that the Department is fully aware of acute shortage of power in Bumthang and Trongsa. Recently, in the plan talks with India, GOI have committed funds for Trongsa-Tingtibi and Bumthang grid lines. Now we are working on tender documents and implementation will commence within this fiscal year. Further, JICA Team will incorporate in their study and recommend the feasibility of either Grid or Off Grid options for electrification in Tang, ChoekharToe villages. But they are not responsible for implementation.

3. Mr. Lhawang Dorji, Dagana DYT Chairman.

He pointed out in the 11 gewogs of Dzongkhag, 443 HH is getting electricity from Micro Hydrel and still have 732 HH unelectrified. He also questioned about the funding aspects of planned works after completion of study by JICA Team. He highlighted that because of lack of social infrastructures, the Dzongkhag has no socio-economic development as Road and Electricity is necessary prerequisite for fueling any development.

JICA study Team Leader responded that JICA Study Team is only responsible for carrying out study component and cannot commit the implementation of the plan. However, JBIC has indicated interest in funding the implementation.

Director, DoE added that as per 9th Five Year Plan, grid supply will be provided to Dagana and Tsirang. However, due to lack of donor financing, the work is yet to start. He expressed his optimism that the work would be carried out within the plan possibly through soft financing.

4. Mr. Kuenzang N Tshering, Bumthang Dzongdag.

He pointed out the importance of supply of electricity for people and honored the Rural Electrification Master Plan as important steps to achieve universal electricity for Bhutanese.

He then expressed the availability of our natural resources "White Gold" to fulfill the expectations of our people. Expectation of people getting electricity thereby moving out of darkness, generating income through local/rural initiatives with availability of electricity.

He also pointed out that there is a need for Department of Energy and JICA Study to think seriously on options of renewable energies such as Solar, Biomass and Pico/Micro hydels to provide alternative source of electricity. 2020 is too long to wait given the geographical situation of the country, where grid extension might not be the viable solution.

Further, he pointed out that one of the main objectives of the RE Master Plan is being viewed as technology transfer. If this objective could be shared and implemented beyond Thimphu/DoE/BPC to Dzongkhag people.

Director, DoE commented that technology transfer by JICA to DOE/BPC was basically to upgrade capacity within the two organizations for upgrading the master plan in future. Since this is the function of the central Government, technology transfer to there Dzongkhag would not be necessary. However, within the project responsibility of management of off grid hydros by Dzongkhag could be studied.

5. Mr. Singye Dorji, Chukha DYT Chairman.

He raised four questions.

1. Under 9FYP, 15,000HH is targeted to provide electricity. Will the new additional households get electricity although not incorporated in plan?
2. What is a main objective of DYT Chairman requiring attending the workshop?
3. How will the Master Plan be implemented in future as the plan is being made in 2004-05?
4. List of JICA's major assistance to Bhutan.

Director, DoE responded to question as follows.

1. Yes, there will not be any disparity over getting electricity whether it is new or old households. All the households are entitled to get the access to electricity. The identification of 15,000 HH is as per discussions with the various Dzongkhags and the list provided by them.
2. The workshop is being organized with an objective to disseminate our plan and process of carrying out study to achieve electricity for all by 2020 to all the

stakeholders, mainly targeted to all the Dzongkhags as they have major roles to play and therefore it's a process of consultation with Dzongkhags.

3. JICA assisted projects to power sector are
 1. 13 Micro Hydels all over the country,
 2. Punatshangchu Pre-feasibility study and
 3. RE Master Plan Study

Some technical comments on the various presentations made by the JICA Study Team on 30 January 2004 expressed by participants from DoE:

1. We know that about 26% of our land is under protected area, which means that the provision of electricity for those citizens residing within the protected area will be very difficult if not impossible. The study team may need to work out clear methodologies and strategies to electrify the residents within the protected area without much difficulty if we have to achieve 100% electrification by 2020.
2. With regard to the household survey, it was mentioned that 2 households per village will be selected. Will this method provide realistic and sufficient information for the village? Is this sample selection based on some international norms?
3. Regarding the collection of available data for existing facilities, it was mentioned that the maximum and minimum demands of each feeder of all substations will be collected. In doing this, it is important to remember that some substations have restricted demands while some others have malfunctioning (recording) instruments/equipments. Therefore, some kind of cross-checking mechanisms will have to be developed if we have to gather true demands of every substation.
4. As for the various standards being currently adopted by the DoE/BPC, JICA study mentioned that in order for the JICA study team to come up with a suitable standard, three main factors viz. Safety, Reliability and Cost will be considered. Besides these three factors, it will be also important to consider the suitability/adaptability of technology. We neither wish to adopt a technology, which will become obsolete after few years of their commissioning nor that technology which is too advanced and their operation and maintenance including purchase of spares become too expensive in future.
5. With regard to the power systems map showing the power infrastructure expected by 2020, it has been mentioned at the presentation that the map was reproduced from the PSMP Update of NORAD. JICA Study team further mentioned that during the course of their study, they might propose another suitable map of their own. In this respect, our request to Team is come up with harmonized map that is acceptable to all the counterparts of Bhutan.
6. It was also mentioned during the presentation that the JICA study team do not fully agree with the demand forecasts made in the PSMP Update. We strongly agree with the views expressed by the JICA study team and therefore we look forward to more comprehensive and realistic demand forecasts to be made by JICA study team in the course of their study.

7. In one of the presentations, it was pointed out that the least cost method of electrification will be applied to select grid extension or off-grid supply electrification. While this methodology will be acceptable in general, we may encounter some sites in Bhutan whereby both the grid extension and off-grid supply may become unfeasible in economic terms. This may have to be kept in mind while rigorously applying the principles of economics.

Annex -I

The Integrated Master Plan Study for Dzongkhag wise Electrification in the Kingdom of Bhutan

First Workshop (AGENDA)

30 January 2004, in Thimphu

Venue: *RICB Conference Hall, Near BPC Main office, Thimphu Town.*

9.00-9.30	Arrival of Delegates (Registration)	
9:30 -9:40	Welcome and Introduction	Director DoE
9:40 -9:45	Greetings by JICA Bhutan Office	Representative of JICA Bhutan Office
9:45 -10:00	Introduction of Study Team Members and Explanation of General Flow of the Study	Team Leader, JICA Study team
10:00 -10:30	Presentaion on Rural Electrification Program overview	The Head, Planning & Coordination Division, Department of Energy
10:30 -10:50	Coffee Break	
10:50 -12:30	Presentation of Methodology of Master Plan Study	Study Team Members
12:30 -13:00	Questions and Answers	
13:00 -14:00	Lunch	
14:00 -15:00	Presentation on "A perspective of electrification in your Dzongkhag - an articulation of rural folks that need to be focused in the study"	Planning Officer, Samdrupjongkhar Dzongkhag Planning Officer & DYT Chairman, Dagana Dzongkhag
15:00 -15:30	Discussions	
15:30 -15:45	Coffee break	
15:45 -16:00	Presentation of New Technology	Study Team Members
16:00	Closing Remarks	Director DoE

**List of Participants for 1st Workshop
on Integrated Master Plan Study for Dzongkhag-wise Electrification in Bhutan**

No	NAMES	TITLE	ORGANIZATION
DZONGKHAGS			
1	BP Rai	Sr. Planning Officer	Paro Dzongkhag
2	Sonam Tshering	DYT Chairman	Paro Dzongkhag
3	Nado	Dzongrab	Sarpang Dzongkhag
4	Jambay	DYT Chairman	Bumthang Dzongkhag
5	Kunzang N Tshering	Dzongda	Bumthang Dzongkhag
6	Lobzang Dorji	Planning Officer	Bumthang Dzongkhag
7	K.B. Rai	Planning Officer	Trongsa Dzongkhag
8	Kunzang L Sangay	Planning Officer	Thimphu Dzongkhag
9	Lhawang Dorji	DYT Chairman	Dagana Dzongkhag
10	Sangay Penjore	Planning Officer	Dagana Dzongkhag
11	Namgyal Phuntsho	DYT Chairman	Punakha Dzongkhag
12	Namgyal Wangchuk	Planning Officer	Samdrupjonghar
13	NB Tamang	Planning Officer	Gasa Dzongkhag
14	Sabadev Maps	Planning Officer	Yangtse Dzongkhag
15	Singye Dorji	DYT Chairman	Chukha Dozngkhag
16	Tshering Dorji	Planning Officer	Chukha Dozngkhag
17	Tshewang Dorji	DYT Chairman	Haa Dzongkhag
18	Ugyen Dema	JE, Dagana Dzongkhag	Dagana Dzongkhag
OTHER ORGANIZATIONS			
19	Jigme Tobgyal	Programme Assistant	UNDP
20	Deki Choden	Reporter	Bhutan Broadcasting Service
21	Samten Wangchuk	Reporter	Kuensel Corporation
22	Monira Tsewang	Deputy Director, Department of Planning	Ministry of Finance
DEPARTMENT OF ENERGY			
23	Sonam Tshering	Director	DOE
24	Bharat Tamang.	Chief Engineer, PCD	DOE
25	Karma P Dorji	National Project Manager	DOE
26	Karma Tshering	Executive Engineer, PCD	DOE
27	Karma Yonten	Head, BAE	DOE
28	Mewang Gyeltsen	RED	DOE
29	Ngwang Choeda	Assistant Engineer, PCD	DOE
30	Satchi	Assistant Engineer, RED	DOE
31	Tashi Dorji	Hydropower Development Engineer, PCD	DOE
32	Thukten Wangmo	Assistant Engineer, BAE	DOE
33	Karma Tsewang	Assistant Engineer, PCD	DOE
34	Dechen Wangmo	JE, PCD	DOE
35	Wangmo	JE, PCD	DOE
BHUTAN POWER CORPORATION			
36	Jigme Tobgyal	Sr. Manager, Planning & IT Division	BPC
37	CM Rai, Manager*	ESD, Yangtse Dzongkhag	BPC
38	Dechen Dema	Engineer, CSD	BPC
39	Gem Tshering	GM, Transmission Department	BPC
40	K.B. Wakhlay	GM, D&CD	BPC
41	K.B. Gurung*	Sr. Supervisor, ESD, Zhemgang Dzongkhag	BPC
42	Sam Tshewang*	Assistant Manager, Sr. Supervisor, Wangdi Dzongkhag	BPC
43	Norbu Tshering*	JE, Lhuntsi Dzongkhag	BPC
44	Sonam Palden	Deputy Manager	BPC
45	Sonam Tobgay	Sr. Manager Finance	BPC
46	Sunil Rasaily	Engineer, CSD	BPC
47	Suresh Nepal	Manager, D&CD	BPC
48	Tashi Dorji	Hydropower Development Engineer, PCD	BPC
49	Tashi Tobgay *	JE, CSD, Punakha Dzongkhag	BPC
50	Ugyen Dorji	CSD	BPC
51	Ujjwal Dahal	Deputy Manager	BPC
52	Chencho Tshering Namgyal	Dy. Manager, DCD	BPC

Attachment-3 (9/9)

JICA			
53	Sugimoto Mitsukuni	Resident Representative	JICA
JICA STUDY TEAM			
54	Tomoyasu Fukuchi	Team Leader	Nippon Koei Co., Ltd.
55	Keiji Shiraki	Distribution System and Design standard planning	Nippon Koei Co., Ltd.
56	Kazunori Ohara	Power Transmission Planning	Nippon Koei Co., Ltd.
57	Ko Nakajima	Power Supply and Demand Planning	Nippon Koei Co., Ltd.
58	Toshiyuki Arita	Power Distribution Facility Planning	Nippon Koei Co., Ltd.
59	Kyoko Usuda	GIS/Database	Nippon Koei Co., Ltd.
60	Kiyoshi Hirata	Small Hydro Power / Power Demand and Supply Panning (village level)	Nippon Koei Co., Ltd.
61	Hiroshi Nishimaki	Financial and Economic Analysis	Nippon Koei Co., Ltd.
62	Kazuhiko Dobeta	Socio Economic Study	Nippon Koei Co., Ltd.
63	Deepak Bista	Solar Power and Renewable Energies Planning	Nippon Koei Co., Ltd.
64	Takahiro Kamishita	Environment Impact Analysis	Nippon Koei Co., Ltd.
65	Kensuke Yamamura	Coordinator	Nippon Koei Co., Ltd.
66	Kesang Anayat	Secretary	Nippon Koei Co., Ltd.

* Note: These persons were representing Dzongkhags

BPC	: Bhutan Power Corporation
ESD	: Electricity Service Division
CSD	: Customer Services Department
DYT	: Dzongkhag Yargay Tshogdue
D&CD	: Development and Construction Depart
BEA	: Bhutan Electricity Authority
PCD	: Planning and Coordination Division
RED	: Renewable Energy Division
JICA	: Japan International Cooperation Agency
JE	: Junior Engineer
UNDP	: United Nations Development Programme

Overview of Non-Electrified Villages after RE-3

Sl.#	Dzongkhag	No of Gewogs	No of vVllages	No of Non-Electrified Households	Remarks
1	Bumthang	4	36	600	
2	Chukha	11	121	2603	
3	Dagana	11	84	2142	
4	Gasa	2		233	Estimated
5	Haa	3	8	307	
6	Lhuentse	8	170	2494	
7	Mongar	9	77	2912	
8	Paro	5	35	430	
9	Pemagatshel	4	27	662	
10	Punakha	8	73	357	
11	Samdrup Jongkhar	11	138	3449	
12	Samtse	16		5028	Number of households listed in Gewog-wise only
13	Sarpang	13	100	2104	
14	Thimphu	9	38	243	
15	Tashigang	12	91	1745	
16	Tashiyangtse	6	65	1607	
17	Trongsa	5	39	1030	
18	Tsirang	12	73	2643	
19	Wangdue	12	188	1531	
20	Zhemgang	8	54	1639	
	Grand Total	169	1417	33759	

Note: This list of the unelectrified villages after RE-3 was prepared by Planning and Coordination Division of Department of Energy in February 2004, in close cooperation with all 20 Dzongkhag Administrations.



ལྷན་སྐྱོང་གི་ལྷན་པོ།

Bhutan Power Corporation

Planning & IT Division

Thimphu, Bhutan

BPC/PLANNING/F-2(A)/ 020

29 January 2004
30

INTER OFFICE MEMO

To:

✓ The National Project Manager, Planning & Coordination Division, DoE

From:

Sr. Manager, Planning Division, BPC

Copy to:

- 1) The Managing Director, BPC
- 2) The GM, CSD, BPC
- 3) The GPS/GIS counterparts, BPC

Subject:

Data for the Integrated Master Plan Study for Dzongkhag-wise Electrification in Bhutan

Dear Sir:

Please refer to your letter no. DOE/PCD/RE/2003-2004/337 dated December 12, 2003, seeking data for the RE-master plan studies. In this regard, I would like to submit the following data compilations based on what I have received from the other BPC departments: (i) Existing power system infrastructure, (ii) The ESD-wise customers and energy sales (from July 2002 – June 2003), (iii) Details of ESD infrastructure and customers (as of October 2003), (iv) For Semtokha substation, the daily energy (MWh), daily feeder peak (MW) for the months of January 2003 and July 2003, hourly peak MW records for the 15th January and 15th July 2003, (v) For Haa substation, monthly peak load from August 2002 to February 2003.

In relation to GPS data, we have called the focal persons from the various ESDs, conducted the training on the use of GPS, and also prepared the framework (i.e. terminology and nomenclature for naming feeders, sub-feeders, transformers, poles, the data required, etc). It has been finalized after much discussion amongst ourselves. As scheduled, the GPS data collection team members are to complete the entire GPS data collection for the existing system by the 15 April 2004 so that the complete and correct GPS data (including substations, 33 kV, 11 kV, and 6.6 kV feeders and sub-feeders, poles, and distribution transformers) can be provided by the end of April 2004.

Kindly share the above information and that attached with the RE-Master Plan study team.
Thanking you.

Yours faithfully,

(Jigme Tobgyel)

List of Participant For GIS Training

No	Name	Title	Division / Organization
1	Mr. Sunil Rasaily	Engineer	Planning Cell CSD Head Office Thimphu, BPC
2	Ms. Dechen Dema	Engineer	Planning Cell CSD Head Office Thimphu, BPC
3	Mr. Sonam Dorji	Supervisor	Planning Cell CSD Head Office Thimphu, BPC
4	Mr. Ujjwal Deep Dahal	Deputy Manager	Planning Division Head Office Thimphu, BPC
5	Mr. Sonam Palden	Deputy Manager	Environment Cell Head Office Thimphu, BPC
6	Mr. Suresh Nepal	Manager	D&CD Head Office Thimphu, BPC
7	Mr. Tshewang Jamtsho	Associate Engineer	TD Head Office Thimphu, BPC
8	Ms. Wangmo	Junior Engineer	DOE
9	Ms. Dechen Wangmo	Junior Engineer	DOE

BPC: Bhutan Power Corporation

CSD: Customer Service Department

D&CD: Development and Construction Department

TD: Transmission Department

DOE: Department of Energy

List of Participant For GPS Training

No	Name	Title	Division / Organization
1	Mr. Sunil Rasaily	Engineer	Planning Cell CSD Head Office Thimphu, BPC
2	Ms. Ugyen Tshomo	Senior Supervisor	ESD, Thimphu, BPC
3	Ms. Namgay Lhamo	Technician	ESD, Thimphu, BPC
4	Mr. Sandeep Rai	Deputy Manager	ESD, Tashigang, BPC
5	Mr. Kumba Rai	Manager	ESD, Paro, BPC
6	Mr. Sonam Tsewang	Senior Supervisor	ESD, Wangdue, BPC
7	Mr. Sangay Tenzing	Senior Supervisor	ESD, Haa, BPC
8	Mr. Tshenga Dorji	Associate Manager	ESD, Tsirang, BPC
9	Mr. Norbu Tshering	Associate Manager	ESD, Paro, BPC
10	Mr. Kuenzang Thinley	Supervisor	ESD, Gelephu, BPC
11	Ms. Wangmo	Junior Engineer	DOE
12	Ms. Dechen Wangmo	Junior Engineer	DOE

BPC: Bhutan Power Corporation
CSD: Customer Service Department
ESD: Electricity Supply Division
DOE: Department of Energy

Dzongkhag I.D. & Gewog I.D.
for
Village Baseline Survey for Rural Electrification

Number of Dzongkhag (District) = 20

Number of Geog (Block) = 201

1. Thimphu Dzongkhag

- 1-1 Bapisa
- 1-2 Chang
- 1-3 Dagala
- 1-4 Genye
- 1-5 Kawang
- 1-6 Lingzhi
- 1-7 Mewang
- 1-8 Naro
- 1-9 Soe
- 1-10 Toepisa

2. Chukha Dzongkhag

- 2-1 Bhalujhora
- 2-2 Bjachho
- 2-3 Bongo
- 2-4 Chapchha
- 2-5 Dala
- 2-6 Dungna
- 2-7 Geling
- 2-8 Getana
- 2-9 Logchina
- 2-10 Metap
- 2-11 Phuentsholing

3. Haa Dzongkhag

- 3-1 Bji
- 3-2 Katsho
- 3-3 Sama
- 3-4 Sangbay
- 3-5 Uesu

4. Paro Dzongkhag

- 4-1 Doga
- 4-2 Dopshari
- 4-3 Doteng
- 4-4 Hungrel
- 4-5 Lamgong
- 4-6 Lungnyi
- 4-7 Naja
- 4-8 Shapa
- 4-9 Tsento
- 4-10 Wangchang

5. Samtse Dzongkhag

- 5-1 Bara
- 5-2 Biru
- 5-3 Chorgharay
- 5-4 Chengmari
- 5-5 Denchhukha
- 5-6 Dorokha
- 5-7 Dungtoe
- 5-8 Mayona
- 5-9 Namgyeltchholing
- 5-10 Pagli
- 5-11 Samtse
- 5-12 Sipsu
- 5-13 Tading
- 5-14 Tendu
- 5-15 Ugyentse
- 5-16 Yoeseltse

6. Tsirang Dzongkhag

- 6-1 Barshong
- 6-2 Beteni
- 6-3 Dunglegang
- 6-4 Gosaling
- 6-5 Kikhorthang
- 6-6 Mendrelgang
- 6-7 Patala
- 6-8 Phuentsenchhu
- 6-9 Rangthang Ung
- 6-10 Semjong
- 6-11 Tshokhorlong
- 6-12 Tsirangtoe

7. Dagana Dzongkhag

- 7-1 Dorona
- 7-2 Drugyelgang
- 7-3 Gesarling
- 7-4 Gozhi
- 7-5 Kalidzinkingha
- 7-6 Khipisa
- 7-7 Lajab
- 7-8 Trashidhing
- 7-9 Tsangkha
- 7-10 Tsendagang
- 7-11 Tseza

8. Punakha Dzongkhag

- 8-1 Chhubu
- 8-2 Dzoma
- 8-3 Goenshari
- 8-4 Guma
- 8-5 Kabjisa
- 8-6 Lingmukha
- 8-7 Shenga- Bjime
- 8-8 Talo
- 8-9 Toewang

9. Gasa Dzongkhag

- 9-1 Goenkhamé
- 9-2 Goenkhatoe
- 9-3 Laya
- 9-4 Lunana

10. Wangduephodrang Dzongkhag

- 10-1 Athang
- 10-2 Bjena
- 10-3 Daga
- 10-4 Dangchhu
- 10-5 Gangte
- 10-6 Gasetsho Gom
- 10-7 Gasetsho Wom
- 10-8 Kazhi
- 10-9 Nahi
- 10-10 Nyisho
- 10-11 Phangyuel
- 10-12 Phobji
- 10-13 Ruepisa
- 10-14 Sephu
- 10-15 Thedtsho

11. Bumthang Dzongkhag

- 11-1 Chhoekhor
- 11-2 Chimume
- 11-3 Tang
- 11-4 Ura

12. Sarpang Dzongkhag

- 12-1 Bhur
- 12-2 Chhuzagang
- 12-3 Dekiling
- 12-4 Deorali
- 12-5 Doban
- 12-6 Gelephu
- 12-7 Hiley
- 12-8 Jigmechhoeling
- 12-9 Lhamoi Zinkha
- 12-10 Nichula
- 12-11 Sarpang
- 12-12 Senge
- 12-13 Serzhong
- 12-14 Taklai
- 12-15 Umling

13. Zhemgang Dzongkhag

- 13-1 Bardo
- 13-2 Bjoka
- 13-3 Goshing.
- 13-4 Nangkhor
- 13-5 Ngangla
- 13-6 Phangkhar
- 13-7 Shingkar
- 13-8 Trong

14. Trongsa Dzongkhag

- 14-1 Dragteng
- 14-2 Korphu
- 14-3 Langthil
- 14-4 Nubi
- 14-5 Tangsibji

15. Lhuntse Dzongkhag

- 15-1 Gangzur
- 15-2 Jaray
- 15-3 Khoma
- 15-4 Kurtoe
- 15-5 Menbi
- 15-6 Metsho
- 15-7 Minjay
- 15-8 Tsenkhar

16. Mongar Dzongkhag

- 16-1 Balam
- 16-2 Chaskhar
- 16-3 Chhali
- 16-4 Drametse
- 16-5 Drepung
- 16-6 Gongdue
- 16-7 Jurme
- 16-8 Kengkhar
- 16-9 Mongar
- 16-10 Ngatshang
- 16-11 Saleng
- 16-12 Shermung
- 16-13 Silambi
- 16-14 Thangrong
- 16-15 Tsakaling
- 16-16 Tsamang

17. Pemagatshel Dzongkhag

- 17-1 Borang
- 17-2 Chhimung
- 17-3 Dungme
- 17-4 Khar
- 17-5 Shume
- 17-6 Yurung
- 17-7 Zobel

18. Samdrup Jongkhar Dzongkhag

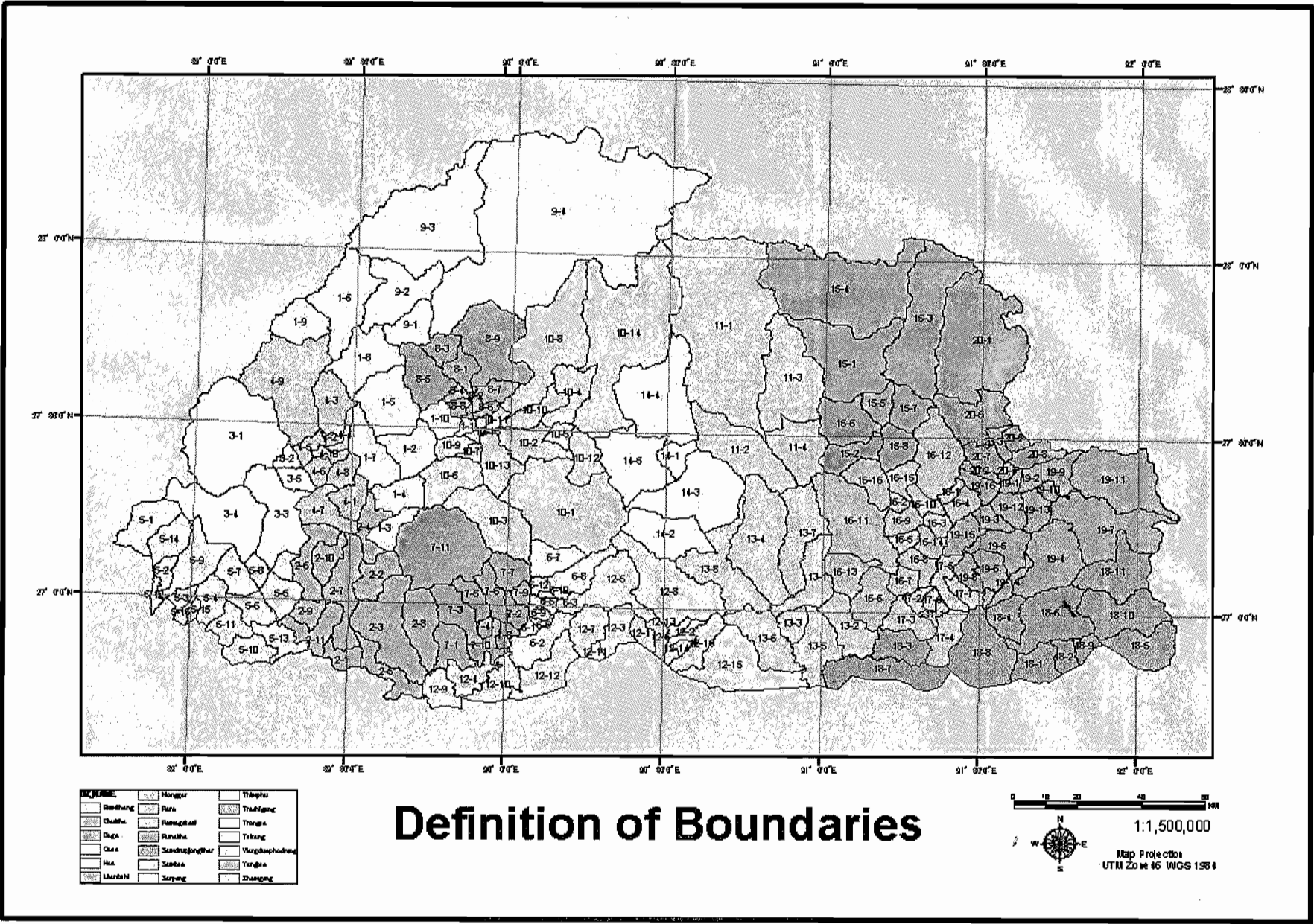
- 18-1 Dechenling
- 18-2 Gomdar
- 18-3 Hastinapur
- 18-4 Lauri
- 18-5 Martshala
- 18-6 Norbugang
- 18-7 Orong
- 18-8 Pemathang
- 18-9 Phuentshothang
- 18-10 Samrang
- 18-11 Serthig

19. Trashigang Dzongkhag

- 19-1 Bartsham
- 19-2 Bidung
- 19-3 Kanglung
- 19-4 Kangpara
- 19-5 Khaling
- 19-6 Lumang
- 19-7 Mera
- 19-8 Nanong
- 19-9 Phongme
- 19-10 Radi
- 19-11 Sakteng.
- 19-12 Samkhar
- 19-13 Shongphu
- 19-14 Thrimshing
- 19-15 Udзорong
- 19-16 Yangnyer

20. Yangtse Dzongkhag

- 20-1 Bumdeling
- 20-2 Jamkhar
- 20-3 Khamdang
- 20-4 Ramjar
- 20-5 Tashi Yangtse
- 20-6 Toetsho
- 20-7 Tomzhangtshen
- 20-8 Yalang



Draft Design of Technology Transfer

Final Target : For DOE/BPC to be able to update the Master Plan by themselves after this Master Plan Study

*) 1st site work : Dec 2003 to Feb 2004
 2nd site work : Jun to July 2004
 3rd site work : Sept to Nov 2004
 4th site work : Feb 2005
 5th site work : Jun 2005
 6th site work : Sep 2005

*) 1st workshop : Jun 2004 (in 1st site work)
 2nd workshop : Oct 2004 (in 3rd site work)
 3rd workshop : Jun 2005 (in 5th site work)

No.	Key Subject	Target	Way of Technology Transfer	Time *) of Technology Transfer	Benchmark for Evaluation	Time *) of Evaluation	Personnel who receive Technology
1	GIS Data Base	Master basic operation of GIS program	Training class	1st site work	Achievement test	1st site work	9 persons from BPC & DOE
		Master planning skill and methodology of distribution line extension on GIS	Training class On-the-Job training	2nd site work 3rd and 5th site works	Achievement test Result of the job and presentation at 2nd and 3rd workshops	2nd site work 3rd site and 5th site works	to be named later
2	GPS	Master basic operation of GPS	Training class	1st site work	Accurate data collection of distribution facilities	At the beginning of 2nd site work	12 persons from BPC & DOI
3	Power System Analysis	Master how to apply system analysis to distribution expansion planning	Training class On-the-Job training	2nd site work 2nd and 3rd site works	Result of the job and presentation at 2nd and 3rd workshops	3rd site and 5th site works	to be named later
4	Transmission System Expansion Planning	Master basic methodology of transmission system expansion planning	On-the-Job training	2nd to 5th site works	Result of the job and presentation at 2nd and 3rd workshops	3rd site and 5th site works	to be named later
		Understand the background and philosophy to decide proposed plan	ditto	ditto	ditto	ditto	to be named later
5	Demand Forecast	Understand the procedure of data collection and actual meaning of collected data	ditto	2nd site work	ditto	ditto	to be named later
		Master the methodology of demand forecast	ditto	2nd and 3rd site works	ditto	ditto	to be named later
6	Distribution Line Expansion Planning	Understand the procedure and background to decide the design standard	ditto	2nd to 5th site works	ditto	ditto	to be named later

Draft Design of Technology Transfer

Final Target : For DOE/BPC to be able to update the Master Plan by themselves after this Master Plan Study

*) 1st site work : Dec 2003 to Feb 2004
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 3rd site work : Sept to Nov 2004
 4th site work : Feb 2005
 5th site work : Jun 2005
 6th site work : Sep 2005

*) 1st workshop : Jun 2004 (in 1st site work)
 2nd workshop : Oct 2004 (in 3rd site work)
 3rd workshop : Jun 2005 (in 5th site work)

No.	Key Subject	Target	Way of Technology Transfer	Time *) of Technology Transfer	Benchmark for Evaluation	Time *) of Evaluation	Personnel who receive Technology
		Master skill and methodology of cost estimates for construction and operation and maintenance	ditto	ditto	ditto	ditto	to be named later
		Understand the procedure and background to decide the proposed expansion plan	ditto	ditto	ditto	ditto	to be named later
		Understand the procedure and background to decide the proposed operation and maintenance plan	ditto	3rd to 5th site works	ditto	ditto	to be named later
7	Economic Evaluation	Master skill and methodology of economic evaluation	ditto	2nd to 5th site works	ditto	ditto	to be named later
		Understand and master the on/off-grid cutoff point methodology	ditto	ditto	ditto	ditto	to be named later
8	Off-grid Power Supply Planning with Renewable Energy	Understand the current situation of meteorological observation stations	ditto	ditto	ditto	ditto	to be named later
		Master skill and methodology of power supply planning by solar, wind and biomass	ditto	ditto	ditto	ditto	to be named later
		Master skill and methodology of power supply planning by small hydro	ditto	ditto	ditto	ditto	to be named later
		Understand the procedure and background to decide the proposed operation and maintenance plan	ditto	ditto	ditto	ditto	to be named later

Draft Design of Technology Transfer

Final Target : For DOE/BPC to be able to update the Master Plan by themselves after this Master Plan Study

*) 1st site work : Dec 2003 to Feb 2004
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 6th site work : Sep 2005

*) 1st workshop : Jun 2004 (in 1st site work)
 2nd workshop : Oct 2004 (in 3rd site work)
 3rd workshop : Jun 2005 (in 5th site work)

No.	Key Subject	Target	Way of Technology Transfer	Time *) of Technology Transfer	Benchmark for Evaluation	Time *) of Evaluation	Personnel who receive Technology
9	Strategic Environment Assessment	Understand the overview of the master plan	ditto	ditto	ditto	ditto	to be named later
		Master skill and methodology of strategic environmental assessment	ditto	ditto	ditto	ditto	to be named later
10	Total Management for updating Master Plan	Understand the overall procedure and background to formulate the master plan	ditto	ditto	ditto	ditto	Mr. Karma P Dorji, DOE
		Understand the ability and achievement of each personnel who receive technology transfer	ditto	ditto	ditto	ditto	Mr. Karma P Dorji, DOE
		Build planning, scheduling and coordination ability for the collaboration work to update the master plan	ditto	ditto	Presentation of schedule and methodology of updating work of the master plan in 5th workshop	5th site work	Mr. Karma P Dorji, DOE