別添資料

●別添１　署名した M/M

●別添２　DOE 提示の小水力地点ポテンシャルリスト

参考資料

●参考資料１　DOEプレゼンテーション資料（Power Strategy and Northern Expansion Plan）

●参考資料２　LAO POWER SECTOR POLICY ;STRATEGY FOR IMPLEMENTING SECTOR STRENGTHENING　(DRAFT 6)

MINUTES OF MEETING
FOR

THE PROJECT FORMULATION STUDY
ON

THE MASTER PLAN STUDY FOR
SMALL HYDROPOWER DEVELOPMENT
IN THE NORTHERN PART
OF THE LAO PDR

AGREED UPON BETWEEN

JAPAN INTERNATIONAL COOPERATION AGENCY
AND
DEPARTMENT OF ELECTRICITY
THE MINISTRY OF INDUSTRY AND HANDICRAFTS

MARCH 12, 2003

VIENTIANE, LAO PDR

Dr. Akira NIWA
Leader
The Project Formulation Study Team
Japan International Cooperation Agency

Mr. Houmphone BULYAPHOL
Director General
Department of Electricity
Ministry of Industry and Handicrafts

The Project Formulation Study Team (hereinafter referred to as "the Team") organized by the Japan International Cooperation Agency (hereinafter referred to as "JICA") and headed by Dr. Akira NIWA, had a series of discussions on "The Master Plan Study for Small Hydropower Development in the Northern Part of the Lao PDR" (hereinafter referred to as "the Study") with the officials of the Department of Electricity of the Ministry of Industry and Handcrafts (hereinafter referred to as "DOE") and other related ministries, divisions, organizations from March 3 to March 12, 2003. After exchanging views on the need and scope of the Study, both sides agreed to record the following points as a summary of the discussions.

1. Background

Laos is endowed with rich hydropower resources and pursuing electrification by utilizing the indigenous hydropower resources. The Government of Laos places a high priority to rural electrification in order to promote socio-economic development and improve people's living standards. The national goal of electrification is to achieve 90% household electrification by the year 2020. In remote areas where the prospect of grid extension is very small due to financial and technical difficulties, off-grid hydropower is expected to play a key role in raising electrification rate.

In March 2003, ADB made appraisal mission to Lao PDR for the Northern Area Rural Power Distribution Project in which a backbone 115 kV transmission line from Luang Prabang to Luang Namtha and associated substations and distribution lines are to be completed by 2007. More than 33,000 households will be electrified in this project. On the other hand, under the support of World Bank, DOE has been undertaking an off-grid rural electrification program that follows through the previous JICA solar project. In the program, a framework for business initiative to install solar and pico-hydro systems in remote villages has been developed and some preliminary operations are underway. Furthermore, Off-grid Fund to financially support private undertakings for off-grid rural electrification has been discussed with the World Bank and will be established next year. Thus, to promote rural electrification in northern Laos, both grid extension and individual electricity system are expanding fairly well.

DOE presented to the Team that small hydro potentials have not been fully studied especially in the northern part of Laos, which hinders timely and least-cost development of hydropower resources. DOE is aiming to formulate a strategic hydropower development plan to reduce dependency on energy imports, to improve energy efficiency and to support socio-economic development in remote areas. In this regard, technology transfer on hydropower survey and potential evaluation, less than 5MW in particular, is requested. The Team acknowledged that both micro- and mini-hydro are integral part of rural electrification. Micro-hydro scheme would supply electricity to district center or sub-district, on the other hand mini-hydro scheme would supply back-up of grid system to enable distribution line extension into further remote areas. However, off-grid rural electrification, in general, requires small-scale projects

because electricity demand is very low and, therefore, study on MW-class hydropower has to contribute to above-mentioned rural electrification. Technology transfer through the Study also serves capacity building of DOE including methodology, software and hardware.

The Team expressed the importance of accelerating off-grid rural electrification in northern Laos to achieve the goal of 90% household electrification by 2020, which will contribute to poverty reduction and rural development. The Team stressed that the Study be designed within the context of fostering rural electrification by off-grid hydropower in northern Laos.

2. Objectives of the Study

After sorting out various issues regarding the Study, its objectives have been re-defined as follows:

(1) Review of current electrification program at each district in the northern part of Laos
(2) Study of off-grid hydropower potentials for the districts and sub-districts not connected to the EDL grid by the year 2010
(3) Study of off-grid hydropower potentials for the districts covered by isolated provincial grid at the time of 2010
(4) Formulation of feasible off-grid hydropower development plans (Pre-F/S) for both isolated scheme as well as periphery back-up of grid extension plan to increase rural electrification rate
(5) Assurance of compliance to the Lao Electric Power Technical Standard in the process of Pre-F/S
(6) Study of financial arrangements for the proposed off-grid hydropower sites
(7) Study of operation and maintenance system for sustainable operation of off-grid hydropower in rural areas
(8) Capacity building of provincial and district technical staff for accelerating off-grid hydropower development
(9) Provision of recommendations for policy and action plan

3. Tentative scope of the Study

Both the Team and DOE made a review on the Terms of Reference for the Study and agreed on the following points. See Attachment-1.

Stage 1: Preparatory Work for Master Plan

Major work items to be conducted in this stage are as follows:

(1) Interview survey at each province regarding district-wise electrification plan
(2) Workshop to define necessary work and involve local authorities
(3) Socio-economic survey, present electricity supply condition and electricity demand

projection at target areas up to the year 2020 (Including a review of JICA's Transmission System Master Plan)

(4) Desk study on hydropower potentials in northern Laos

(5) Field survey to identify high-potential off-grid hydropower sites in target areas

(6) Pre-Feasibility Study including environmental evaluation for the selected sites

In this stage, involvement of Provincial Department of Industry and Handicrafts (PDIH) should be secured for smooth project implementation after the Study. In particular, on-the-job technology transfer to DOE and PDIH in the areas of hydropower survey and potential evaluation should be focused.

Stage 2: Master Plan Formulation

Major work items to be conducted in this stage are as follows:

(1) Financing strategy for the selected sites based on the study on available funds, tariff, operating costs, etc.

(2) Development of mechanism and training program for the sustainable operation and maintenance of off-grid hydropower in remote areas

(3) Province-wise rural electrification planning in northern Laos

(4) Summary of investigated off-grid hydropower potential data (High-feasibility hydropower inventory)

(5) Discussions and recommendations to facilitate off-grid hydropower resources

(6) Proposal of a demonstration project

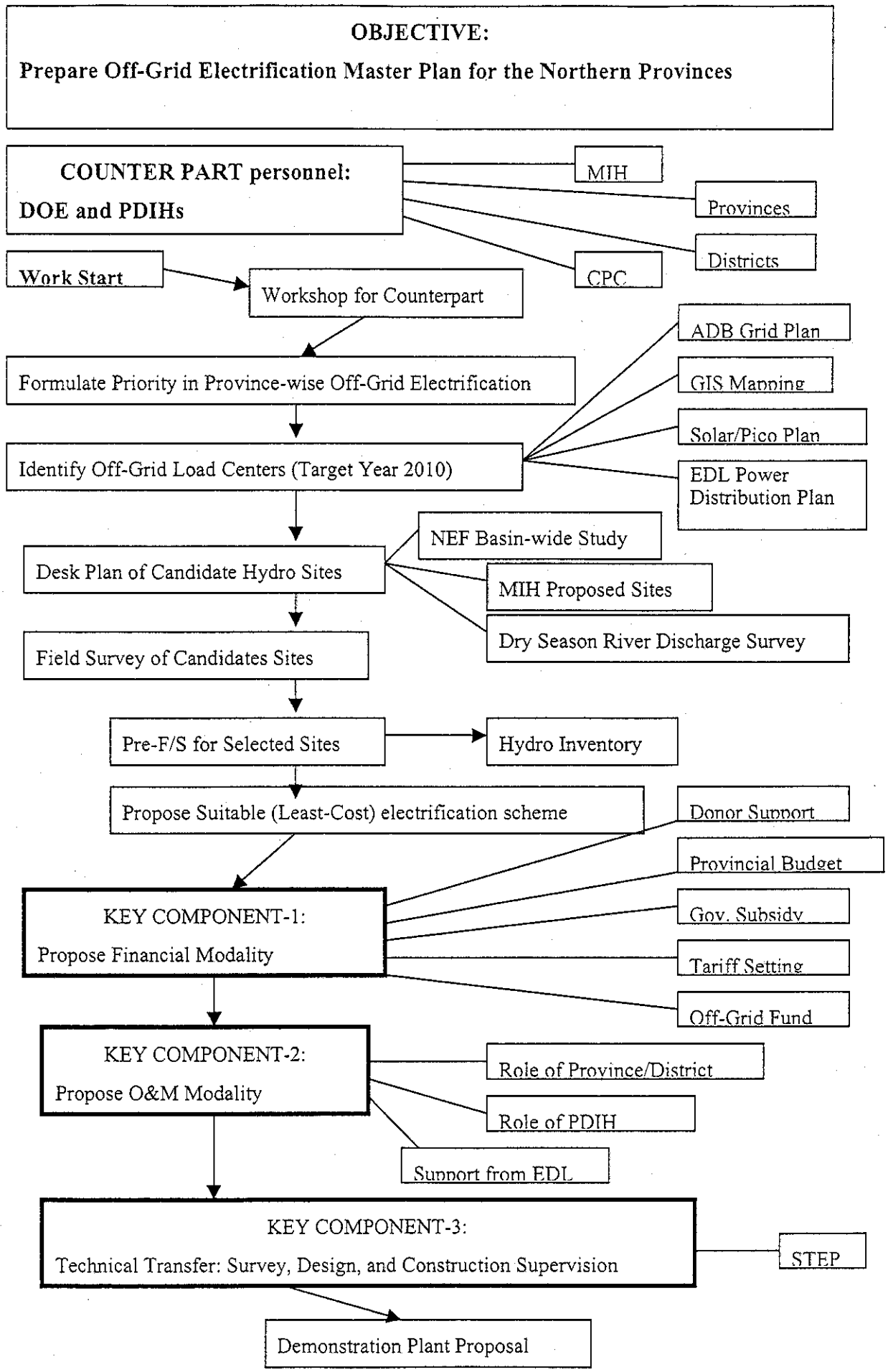
DOE requested the Team to consider a 100kW class demonstration project, as the first application of the Lao Electric Power Technical Standard, to confirm the accomplishments of capacity building of DOE in the Study. Also, DOE requested to complete the Study within two years. The Team requested to DOE to ensure security during site survey.

4. Counterpart organization

DOE is responsible for electricity planning and will act as the counterpart agency of the Study. Also, the involvement of PDIH throughout the Study is mandatory for technology transfer.

5. Next steps

DOE requested the Team to implement the Study as soon as possible. The Team explained that the final decision of the Study implementation would be subject to relevant reviews by JICA and consultation with officials concerned in the Government of Japan.


OBJECTIVE:
Prepare Off-Grid Electrification Master Plan for the Northern Provinces
COUNTER PART personnel:
DOE and PDIHs
MIH
Provinces
Districts
CPC
Work Start
Workshop for Counterpart
Formulate Priority in Province-wise Off-Grid Electrification
Identify Off-Grid Load Centers (Target Year 2010)
ADB Grid Plan
GIS Mapping
Solar/Pico Plan
EDL Power Distribution Plan
Desk Plan of Candidate Hydro Sites
NEF Basin-wide Study
MIH Proposed Sites
Dry Season River Discharge Survey
Field Survey of Candidates Sites
Pre-F/S for Selected Sites
Hydro Inventory
Propose Suitable (Least-Cost) electrification scheme
Donor Support
Provincial Budget
KEY COMPONENT-1:
Propose Financial Modality
Gov. Subsidy
Tariff Setting
Off-Grid Fund
KEY COMPONENT-2:
Propose O&M Modality
Role of Province/District
Role of PDIH
Support from EDL
KEY COMPONENT-3:
Technical Transfer: Survey, Design, and Construction Supervision
STEP
Demonstration Plant Proposal

Attachment 2

List of the Members

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Mr. Azuma Tsunoda
JICA expert

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List of Hydropower Potential sites in Laos (in the North)

No :	Project Name	catchment area(k	Capacity Kw	District	Province	Latitude N	Longtitude E	No : of maps	Nearest Village	Remark
1	Nam Ou neau		500	Gnod Ou	Phongsaly	22-10- 20	101 - 48 - 55	F 48 - 72	Pho	OK
2	Nam May		100	Gnod Ou	Phongsaly	22-20-10	101- 45 - 10	F47 - 60	Souayngam	OK
3	Nam Pe	185.8	700	Phongsaly	Phongsaly	21-37 - 00	102 - 08 - 00	F 48 - 85	Kodeng	OK
4	Nam Pok	407.2927	1200	Samphan	Phongsaly	21-20- 20	102-15-20	F 48 - 85		OK
5	Nam Boun2	312.0949	2000	Bouaneau	Phongsaly	21-34- 25	101-55-20	F 47 - 96	Houaylek	OK
6	Nam Kay		500	Khoua	Phongsaly	20 - 59 - 10	102 - 25 - 10	F 48 - 109	Sopkay	OK
7	Nam Nga	87.8588	200	Mai	Phongsaly	21-11- 30	102-42- 45	F 48 - 98		OK
8	Nam Ngao	297.4186	2000	Beng	Oudomxay	20 - 07 - 40	101 - 41 - 00	F 47 - 144	Nahom	OK
9	Houay Se	38.3	150	Nga	Oudomxay	20 - 18 - 20	101 - 57 - 30	F 47 - 144		OK
10	Houay Lap	45.9189	100	Namo	Oudomxay	20 - 50 - 00	101 - 45 - 00	F 47 - 120	Pheng	OK
11	Nam Sing	73.5681	200	Sing	Louangnamtha	21 - 08 - 00	101 - 11 - 50	F47 - 107		OK
12	Nam Hao		5,000	Viengxay	Houaphan	20 - 31 - 00	104 - 21 - 30	F48 - 125	Houaycha	OK
13	Nam Xam		2500	Xamneua	Houaphan			F48 125		OK
14	Nam Peun		300	Houamouang	Houaphan	20 - 08 - 30	103 - 56 - 10	F48 - 136	Khohai	OK
15	Nam Hang		300	Viengthong	Houaphan	20 - 08 - 30	103 - 16 - 00	F48 - 135		OK
16	Houaythong		100	Xamtai	Houaphan	19 - 50 - 40	104 - 33 -30	E 48 - 6	Mouangkouan	OK
17	Nam Gnon		500	Houaysay	Bokeo	20 - 26 - 07	100 - 23 - 20	F47 - 129		OK
18	Nam Ham 2	126.5716	2000	Boten	Xayabury	17 - 45 - 25	101 - 08 - 00	E47 - 83	Mouang Ham	OK
19	Nam Houng		650	Xayabury	Xayabury	19 -18 - 50	101 - 29 - 20	E47 - 35		OK
20	Nam Pouy 1	733.9924	300	Phieng	Xayabury	18 - 51 - 30	101 - 26 - 40	E47 - 47	Viengxai	OK
21	Nam Pouy 2	322.2961	650	Paklay	Xayabury	18 - 55 - 20	101 - 35 - 20	E47 - 48	Namngiao	OK
22	Nam Lay	1412.5084	1200	Paklay	Xayabury	18 - 16 - 30	101 - 20 25	E47 - 71	Muangya	OK
23	Nam Gnang		650	Paklay	Xayabury	18 - 13 - 00	101 - 20 - 00	E47 - 71	Lat	OK
24	Nam Fhoun		650	Paklay	Xayabury	18 - 28 - 10	101 - 25 - 15	E47 - 59		OK
25	Nam Gnam	1122.5346	650	Paklay	Xayabury	18 - 30 - 20	101 - 28 - 20	E47 - 59	Nakhagnang	OK
26	Nam Ngeun 1			Ngeun	Xayabury	19 - 49 - 00	101 - 14 - 50	E47 11		OK
27	Nam Ngeun 2			Ngeun	Xayabury	19 - 46 - 50	101 - 07 - 50	E47 11		OK
28	Nam Yang		100	Ngeun	Xayabury	19 - 38 - 50	101 -09 - 10	E 47 - 23		OK
29	Nam Ken	311.7614	1200	Hongsa	Xayabury	19 - 44 - 20	101 - 18 - 20	E47 - 11	Namaignom	OK
30	Nam Met	409.8274	1800	Xayabury	Xayabury	19 - 31 - 42	101 - 31 - 40	E 47 - 24		OK
31	Nam Um		100	Viengkham	Louangphabang	20 - 46 - 30	103 - 06 - 40	F48 - 111	Um	OK
32	Houay Kouang	474.1786	200	Viengkham	Louangphabang	20 - 29 - 11	102 - 51 - 58	F 48 - 122		OK
33	Nam Ngan	174.743	600	Khouan	Xiengkhouang	19 - 28 - 10	103 - 48 - 55	E -48-28	Peun	OK
34	Nam Sen	577.7721	400	Phasay	Xiengkhouang	19 - 17 - 55	103 - 10 - 50	E -48-27	Hat	OK
35	Nam Pot		2000	Phasay	Xiengkhouang	19 - 09 - 10	103 - 16 - 00	E -48-27	Nomg On	OK
36	Nam Ma	33.0556	800	kham	Xiengkhouang	19 - 39 -35	103 - 41 - 25	E -48-16		OK
37	Nam Phot	158	600	kham	Xiengkhouang	19 - 40 -00	103 - 40 -00	E -48-16		OK
38	Nam Houay	134.8555	450	Nong Het	Xiengkhouang	19 - 37 - 00	103 - 57 -00	E -48-16		OK
39	Nam Kuang	23.9454	700	Nong Het	Xiengkhouang	19 - 28 - 00	103 - 48 - 55	E -48-16	Chameun	OK

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