11　収集資料

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(1) Final Report for Northern Area Rural Power Distribution Project (TA3087-Lao) Appendices (Sep.2002) ACRES International

(2) Power Sector Development Plan For LAO PDR Draft Inception Report (Sep. 2003) Meritec Limited

(3) Power Development Plan PDP 2002-12 (Jul. 2003) EDL

(4) Priject Performance Audit Report on The Nam Ngum-Luang Prabang Power Transmission Project (Jun. 2002) ADB

(5) Project Completion Report on The Nam Ngum-Luang Prabang Power Transmission Project (Nov. 1999) ADB

(6) Minutes of Loan Negotiations Northern Area Rural Power Distribution Project (Jul. 2003) ADB

(7) Report and Recommendation of the President to the board of Directors on a Proposed Loan to Northern Area Rural Power Distribution Project (Apr. 2003) ADB

(8) The National Poverty Eradication Program (Sep. 2003)

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SCOPE OF WORK
FOR
THE MASTER PLAN STUDY ON
SMALL HYDROPOWER DEVELOPMENT PROJECT
IN NORTHERN PART
OF THE LAO P.D.R.

AGREED UPON BETWEEN
JAPAN INTERNATIONAL COOPERATION AGENCY
AND
THE MINISTRY OF INDUSTRY AND HANDICRAFTS

SEPTEMBER 18, 2003

VIENTIANE, LAO PDR

Dr. Akira NIWA
Leader,
The Preliminary Study Team,
Japan International Cooperation Agency

Dr. Somboune MANOLOM
Permanent Secretary,
Cabinet Office,
Ministry of Industry and Handicrafts

I. INTRODUCTION

In response to the request of the Government of Lao People's Democratic Republic (hereinafter referred to as "Lao PDR"), the Government of Japan decided to conduct the Master Plan Study on Small Hydropower Development Project in Northern Part of the Lao PDR (hereinafter referred to as "the Study") in accordance with the relevant laws and regulations in force in Japan.

Accordingly, the Japan International Cooperation Agency (hereinafter referred to as "JICA"), the official agency responsible for the implementation of technical cooperation programs in the Government of Japan, dispatched the Preliminary Study team to discuss scope of work of the Study in close cooperation with authorities concerned in Lao PDR.

The present document sets forth the scope of work with regard to the Study.

II. OBJECTIVE OF THE STUDY

The Government of Lao PDR (GOL) places a high priority to rural electrification in order to promote socio-economic development and improve people's living standards. The GOL aims to achieve 90% household electrification by the year 2020. Off-grid hydropower development is an important component of electrification scheme, and will be contributing to raising the electrification rate in remote areas. Also, off-grid hydropower development is important for local economy development and energy import reduction.

The northern part of Lao PDR, where grid extension requires considerable time and investment to complete, is endowed with rich hydropower resources. Hence, accelerating off-grid hydropower development is the key to early development of the region. In the long run, many off-grid small hydropower stations would be eventually grid-connected. A major obstacle of early off-grid small hydropower development is that hydropower resources in the region have not been thoroughly explored due to limited financial and institutional capacity of responsible authorities. This hinders timely and least-cost development of hydropower resources.

It is, therefore, strongly desired that the institutional capacity building targeting state/provincial authorities be implemented to accelerate hydropower development in remote areas. Also, a policy framework for small hydropower development needs to be worked out to facilitate smooth development of off-grid small hydropower that is generally less attractive to investors.

The main objective of the Study is to develop a comprehensive strategy/plan for developing off-grid small hydropower targeting the northern part of Lao PDR. In the Study, potential sites of off-grid small hydropower shall be studied, and candidate sites for early development shall be identified. At the same time, the Study places an emphasis on technology transfer and capacity building to create a fundamental technique and knowledge base for hydropower exploration in the Lao counterpart organizations. The GOL is expected to continue for more detailed surveys on small hydropower resources after the Study.

III. THE STUDY AREA

The Study shall cover eight northern provinces: Phongsaly, Luangnamtha, Oudomxay, Bokeo, Luangprabang, Huaphanh, Xayabury and Xiengkhuang.

IV. SCOPE OF THE STUDY

The Study shall be carried out in the following three stages:

Stage 1: Preliminary Study on Small Hydropower Planning
Stage 2: Investigation of Selected Off-grid Small Hydropower
Stage 3: Master Plan Formulation

Details of undertakings at each stage are itemized as follows:

Stage 1: Preliminary Study on Small Hydropower Planning

(1) Workshop to define Role and Undertakings of Local Authorities

The Ministry of Industry and Handicrafts/Department of Electricity (hereinafter referred to as "DOE") and the JICA study team shall hold a workshop at the DOE inviting local authorities, and jointly prioritize districts in need of off-grid small hydropower.

Also in the workshop, the principal role of province/district authorities in off-grid electrification is discussed and assessment is made of their adequate undertakings in the survey and planning of small hydropower.

(2) Identify Load Centers in District-wise Electrification Plan

The baseline survey shall be conducted at each of the prioritized districts to collect relevant data and information on current district-level electrification condition and mid-term and long-term electrification plan, which shall also include EDL/ADB grid extension plan, off-grid electrification plan, diesel power supply, import power supply and other relevant study results. Also, policy relevant to small hydropower development shall be reviewed and assessed.

After analyzing EDL/ADB grid extension plan up to year 2010, areas which require off-grid small hydropower ("load centers") shall be identified.

The load centers may consist of the following categories.

1) un-electrified district centers and priority area in the district
2) electrified district-centers which require additional power supply
3) area currently supplied by diesel power in need of improving power supply
4) area currently supplied by import power in need of improving power supply

(3) Technology Transfer and Capacity Building Program

Technology transfer and capacity building program including Basic Training and on the Job Training (OJT) program shall be formulated jointly by JICA study team and the DOE.

Manuals for the training shall be prepared by the JICA Study team. Under the training program, JICA study team shall give training to develop the capacity of counterparts to conduct reconnaissance survey and Pre-FS survey.

(4) Desk Planning of Candidate Small Hydro Sites

Desk planning on small hydropower development potential sites shall be conducted on those of the DOE proposal, river basin potential survey and other relevant study reports from technical and socio-economic view points. Sites which are highly prospective in electrification of the previously identified load centers will be screened out for continuation of the subsequent study stages. Also, an outline of master plan on district-wise electrification shall be worked out.

Stage 2: Investigation of Selected Off-grid Small Hydropower

(1) Reconnaissance site survey

For the sites selected after the desk planning, reconnaissance site survey shall be conducted to verify viability of small hydropower development against actual site conditions, including river discharge, topography, geology, irrigation and other water use, and road access.

Socio-economic survey of the load centers shall be conducted as a part of the site survey. Items to be surveyed shall include, village name, location, population, number of households, ethnic groups, road access condition, income, electricity usage, willingness to pay and on-grid or off-grid electrification plan.

(2) Pre-feasibility study on candidate small hydropower sites

Among the hydropower sites surveyed, candidate sites for early development shall be selected. Pre-feasibility study shall include followings:

1) site-investigation work
2) meteorological and hydrological evaluation
3) optimum power supply plan
4) design of civil structures and electro-mechanical equipment and transmission line
5) construction plan and cost estimation
6) financial analysis
7) initial environmental examination

The proposed Lao Electric Power Technical Standard shall be taken into account in the process of scheme design. In financial analysis, operation and maintenance costs as well as initial investment shall be considered. Hence, sustainable operation and maintenance mechanism of off-grid small hydropower shall be studied taking local conditions into account.

At the Stage 1 and 2, the involvement of Provincial Department of Industry and Handicrafts (PDIH) shall be secured for encouraging local initiatives after the Study.

Stage 3: Master Plan Formulation

(1) Recommendation of policy measures for accelerating off-grid small hydropower

Review and assess necessary policy measures to facilitate off-grid small hydropower development. Items to be discussed shall include:

1) Legal framework
2) Institutional framework (investment and operation)
3) Financing strategy
4) Organizational development to enhance the capacity of the DOE and PDIH staff
5) Coordination with other sectors

The policy recommendations shall be incorporated in the final output of the Study (Master Plan).

(2) Compilation of off-grid small hydropower project list

Based on the results of Pre-FS study, a list of small hydropower projects shall be compiled and incorporated in the Master Plan. Technical, financial and institutional aspects shall be clearly addressed for each project. Appropriate GIS technology may be applied for data processing and visual presentation.

(3) Workshop to present the Master Plan

The DOE and JICA study team shall hold a workshop inviting relevant organizations to present and exchange views on the Master Plan.

(4) Preparation of small hydropower planning manuals

Manuals for small hydropower planning shall be worked out integrating the methodologies used in the Study. These manuals are to be used by the counterpart personnel in exploration and evaluation of future small hydropower projects.

V. WORK SCHEDULE

The Study will be carried out for a period of 24 months in accordance with the tentative schedule shown in Appendix I.

VI. REPORTS

JICA shall prepare and submit the following reports in English to Ministry of Industry and Handicrafts of Lao PDR at the due timing shown in the schedule.

(1) Inception report: Thirty (30) copies

(2) Progress report: Thirty (30) copies

(3) Interim report: Forty (40) copies

(4) Draft final report: forty (40) copies (main reports and summaries)

The Ministry of Industry and Handicraft (hereinafter referred to as "MIH") shall provide its comments on the draft final report within one (1) month after the submission of the report

(5)Presentation

The presentation of the draft final report shall be made to authorities concerned of the Government of Lao PDR.

(6) Final report: Fifty (50) copies (main reports and summaries)

JICA will submit these reports within six (6) weeks after receiving the comments from Lao side on the draft final report.

During the field survey in Lao PDR, monthly meetings will be held, and monthly reports will be prepared and submitted to the meetings.

VII. DIVISION OF TECHNICAL UNDERTAKING

The division of technical undertakings by MIH and JICA of the Study is detailed in Appendix II.

VIII. UNDERTAKING OF THE GOVERNMENT OF LAO PDR

1. To facilitate the smooth conduct of the Study, the Government of Lao PDR shall take necessary measures;

(1) to secure the safety of JICA study team

(2) to permit the members of JICA study team to enter, leave and sojourn in Lao PDR for the duration of their assignment therein, and exempt them from foreign registration requirements and consultant fees,

(3) to exempt the members of JICA study team from taxes, duties, fees and other charges on equipment, machinery and other materials brought into, and out of , Lao PDR for the conduct of the

Study,

(4) to exempt the members of JICA study team from income taxes and charges of any kind imposed on, or in connection with, any emoluments or allowances paid to them for their services for the implementation of the Study,

(5) to provide necessary facilities to JICA study team for remittance as well as utilization of the funds introduced into Lao PDR from Japan in connection with the implementation of the Study,

(6) to secure permission for entry into private properties or restricted areas for the implementation of the Study,

(7) to secure permission for JICA study team to take all data and documents including maps and photographs related to the Study out of Lao PDR to Japan,

(8) to provide medical services as needed (expenses will be chargeable to members of JICA study team) and

(9) to facilitate prompt clearance through customs and inland transportation of equipment, materials and supplies required for the Study and of the personal effects of members of JICA study team.

2. The Government of Lao PDR shall bear claims, if any arises, against members of JICA study team resulting from, occurring in the course of, or otherwise connected with, the discharge of their duties in the implementation of the Study, except when such claims arise from gross negligence or willful misconduct on the part of the members of JICA study team.

3. The MIH shall act as the counterpart agency to the JICA study team and also as the coordinating body in relation with other governmental and non-governmental organizations concerned for the smooth implementation of the Study. Especially, involvement of PDIH personnel from each of eight provinces should be arranged for the duration of the Study. The DOE shall be continuously responsible for instructing PDIH personnel from each of eight provinces.

4. The MIH shall, at its own expense, provide JICA study team with the following, in cooperation with other organizations concerned:

(1) available data and information related to the study,

(2) counterpart personnel,

(3) suitable office space with necessary equipment in Vientiane,

(4) identification cards,

IX. UNDERTAKING OF JICA

For the implementation of the Study, JICA shall take the following measures:

(1)to dispatch, at its own expense, study teams to Lao PDR, and

(2)to pursue technology transfer to the Lao PDR counterpart personnel in the course of the Study.

X. OTHERS

JICA and the MIH shall consult with each other in respect of any matter that may arise from or in connection with the Study.

Item/Project Month	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
A. Preliminary Study on Small Hydropower Planning																								
B.Investigation of Selected Off-grid Small Hydropower																								
C. Master Plan Formulation																								
Reports		▼ Ic/R								▼ P/R								▼ It/R				▼ Df/R		▼ F/R
		△ WS1																				△ WS2		

:Work in Laos

:Work in Japan

WS :Workshop

Technical Undertaking

Stage	Item	JICA	MIH/DOE
A. Preliminary Study on Small Hydropower Planning	**1.Workshop1**	1) Provision of support to DOE/MIH	1) Arrangements for workshop
	2.Identify Load Centers in District-wise Electrification Plan	1) Data collection and analysis	1) Provision of data and information 2) Provision of comments
	3.Technology Transfer and Capacity Building Program	1) Carry out training including OJT	1) Participation in the training 2) Involvement of PDIH
	4.Desk Planning of Candidate Small Hydro Sites	1) Data collection and analysis	1) Provision of data and information 2) Provision of comments
B. Investigation of Selected Off-grid Small Hydropower	**5.Reconnaissance site survey**	1) Survey and analysis 2)Jointly design the role and assignment of DOE and PDIH	1) Arrangements for survey 2) Participation according to the role and assignment in survey
	6.Pre-feasibility study on candidate small hydropower sites	1) Carry out Pre-FS study 2)Jointly design the role and assignment of DOE and PDIH	1) Participation according to the role and assignment in Pre-FS study
C. Master Plan Formulation	**7.Recommendation of policy measures for accelerating off-grid small hydropower**	1) Data collection and analysis	1) Provision of relevant information and data 2) Provision of comments
	8.Compilation of off-grid small hydropower project list	1) Review and provision of comments	1) Preparation of data sheet 2) Provision of a draft of project list
	9.Workshop 2	1) Provision of support to DOE/MIH	1) Arrangements for workshop
	10.Preparation of small hydropower planning manuals	1) Jointly design manuals 2) Finalize manuals	1) Jointly design manuals 2) Translation into Lao

MINUTES OF MEETING
FOR
THE MASTER PLAN STUDY ON
SMALL HYDROPOWER DEVELOPMENT PROJECT
IN NORTHERN PART
OF THE LAO P.D.R.

BETWEEN

JAPAN INTERNATIONAL COOPERATION AGENCY

AND

THE MINISTRY OF INDUSTRY AND HANDICRAFTS

SEPTEMBER 18, 2003

VIENTIANE, LAO PDR

Dr. Akira NIWA
Leader,
The Preliminary Study Team,
Japan International Cooperation Agency

Dr. Somboune MANOLOM
Permanent Secretary,
Cabinet Office,
Ministry of Industry and Handicrafts

The preliminary study team (hereinafter referred to as " the Team") sent by the Japan International Cooperation Agency (hereinafter referred to as "JICA"), headed by Dr. Akira NIWA, the Leader of the Team, had a series of discussions on "The Master Plan Study on Small Hydropower Development Project 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 September 8 to September 18 , 2003. After exchanging views on the scope of the Study, both sides discussed the following issues. And they agreed and finalized the Scope of Work. This minutes of meeting records the results of the discussion that supplement the Scope of Work.

The list of participants is attached as APPENDIX I.

1. Study Area

The DOE agreed that the JICA Study team will not conduct field survey at Huaphanh and Xiengkhuang provinces under the current security conditions.

2. Undertaking between the DOE and JICA Study team

(1) Reconnaissance survey

The DOE and JICA agreed that maximum of twenty-four (24) reconnaissance survey are suitable for the off-grid small hydropower development in northern eight (8) provinces. In principle, the DOE will carry out reconnaissance survey at four (4) provinces including Huaphanh and Xiengkhuang province with assistance of JICA Study team. And JICA Study team will conduct reconnaissance survey at the remaining four(4) provinces.

Totally, eighteen (18) sites will be surveyed during the Study.

(2) Pre-FS study

The DOE and JICA agreed that maximum of sixteen (16) Pre-FS study are suitable for the off-grid small hydropower development in northern eight (8) provinces. In principle, the DOE will carry out Pre-FS study at four (4) provinces including Huaphanh and Xiengkhuang province with assistance of JICA Study team. And JICA Study team will conduct Pre-FS study at the remaining four (4) provinces.
Totally, ten (10) sites will be studied during the Study.

3. Organization of Counterpart

JICA shall inform the DOE of the name and assignment of the JICA Study team members as soon as the JICA Study team is selected. The DOE shall designate appropriate personnel to organize the counterpart study team that will fully cover the work items of the Study. The DOE shall nominate the leader and training coordinator prior to the first survey of the JICA Study team.

4. Involvement of PDIH

The DOE and JICA agreed that involving the PDIH of eight provinces in the Study is essential. The DOE shall take necessary measures to ensure the involvement of PDIH, and submit the name list of PDIH participants to JICA by the time of the first survey in Lao PDR.

5. Cooperation of EDL

The DOE agreed to ensure that EDL continue to provide updated information concerning the PTD2 plan and the PTD3.

The JICA Study team shall keep regular contact with EDL regarding their project titled "Impacts and Benefits of Rural Electrification in Northern Area".

The DOE agreed to make necessary arrangement to transfer of PTD2&PTD3 GIS data to JICA Study team.

6. Coordination Meeting

In order to facilitate the smooth implementation of the Study, Coordination meetings shall be held in a timely manner to ensure information exchange with other relevant sectors. The Coordination meetings shall be arranged by the DOE.

7. Methodology of Capacity Building

The DOE and JICA agreed that basic training shall be conducted to cover the following subjects:

1) Hydrological analysis including field investigation
2) Demand forecast
3) Hydropower planning
   - site reconnaissance
   - optimization of hydropower plan
4) Preliminary design including cost estimation
   - civil structure
   - electro-mechanical equipment
   - transmission line
5) Economic and financial evaluation

The DOE mentioned that operation and maintenance needs to be included in the training for some provinces, and "training for trainer program" is effective to conduct the training for PDIH. Also, the DOE requested that procedure guideline for reconnaissance survey and Pre-FS study shall be prepared by the JICA Study team. The Team acknowledged to include these issues in the capacity building.

8. Workshop

The DOE requested JICA that expenses for the workshops shall be borne by JICA Study team. The Team understood the necessity of these expenses and will convey the request to JICA Headquarters.

9. Provision of Digital maps

The DOE requested JICA to provide GIS maps necessary for the Study. The Team will convey the request to JICA Headquarters.

10. Expenses of field survey and office equipment

The DOE requested JICA to cover expenses for necessary vehicles with drivers, fuel and maintenance services for carrying out the field survey, costs of DOE and PDIH incurred in the field survey during the Study, and necessary communication facilities during the Study, such as telephone, facsimile etc., if necessary. The Team will convey the request to JICA Headquarters.

11. Software and equipment to be used in the Study

The DOE requested JICA to provide software and equipment as follows, and the Team will convey the request to JICA Headquarters.

1)GIS Software

2)Equipment: Current meter, GPS, altimeter, laptop computer, digital camera

12. Sub-Contracting Work

The Team recommended that topographical-Survey required for the Pre-FS sites may be conducted to the scale of 1:10,000, and sub-contracted to local consultant.

The DOE requested to JICA that capacity building will include improvement of the ability of the DOE survey staff and the Team agreed it.

List of Participants

JICA Preliminary Study Team

Dr. Akira NIWA
Team Leader, Senior Advisor for Power Development, JICA
Mr. Masami KIDO
Study planning, Energy and Mining Development Study Division, Mining and Industrial Development Study Department, JICA
Mr. Katsuhiko OTAKI
Institutional issues, Consultant, Proact International Co., Ltd.
Mr. Shigeru TKARA
Small Hydropower Planning, Consultant, Katahira & Engineers International
Mr. Kazuaki ISHIKAWA
Transmission and Distribution Planning, Consultant, Chubu Electric Power Co., Ltd.

Embassy of Japan

Mr. Kazunori KAWADA
First Secretary

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Mr. Hidetaka NISHIWAKI
Resident Representative
Mr. Shuichi IKEDA
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Vice-Minister
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Permanent Secretary,
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Mr.Houmphone BULYAPHOL
Director General, Department of Electricity
Mr. Chansaveng BOUNGNONG
Head of Power System Planning Division, Department of Electricity
Mr. Chantho MILATTANAPHENG
Head of Social and Environment Management Division, Department of Electricity
Mr. Bouathep MALYKHAM
Head of Rural Electrification Division, Department of Electricity
Mr. Phetsavanh RATTANATHONGXAY
Chief of Administration Division ,Assist to Director ,Department of Electricity
Mr. Masayuki SEINO
JICA expert

Questionnaire Answer on

"Preliminary Study on the Master Plan Study on Small-Scale Hydropower Development Project in Northern Part of Lao PDR" at September 2003.

A. Overall & Institutional and Financial Issues

A-1 Capacity building:	The topic, curriculum for the capacity building on small-scale hydropower planning, we are kindly requested you to include as following: 1. Hydrological training to the Counterparts are ~~might~~ possibly transferred by organizing lectures and on job training particularly hydrological analysis, hydrological data processing, field data collection. 2. Design of whole electric power system including selection of turbine, generator, design of weir, waterway and transmission line. Those should be trained by lectured transfer and also during site survey.
A-2 Counterpart Organization	Organization chart of DOE' counterpart regarding the Study are: 1 Mr. Chansaveng BOUNGNONG, Counterpart Leader (Chief of Power System Planing Division, DOE, Hydropower planer, Electrical Engineer) 3. Mr. Khonepheth SAMOUNTY, Counterpart Sub-Leader (Deputy Chief of Power System Planing Division, DOE. Executive Civil Engineer, Topographical Specialist) 3. Mr. Sanhya SOMVICHITH, Electro-Mechanical Engineer, Hydropower planer 4. Mr. Phonesavanh PHIMMASONE, Civil Engineer, Geologist, CAD operator 5. Mr. Vithounlabandid THOUMMABOUT, Electrical Engineer, Hydrological Specialist. 6. Mr. Litthanoulok LASPHO, Electrical Engineer, Electric Substation. 7. Mr. Lamphone DIMANIVONG, Electrical Engineer, Hydrologist.
A-3 Coordinating Committee	The coordinating committee includes DOE, MIH, EDL, Provincial Division of industry and Handicrafts, and other relevant Ministries and Organizations.
A-4 Participants from Province	For the participation from the province is not yet clearly identified right now, but however, Provincial Division of Industry and Handicrafts are surely belong to MIH and easily working together with our Project.
A-5 Working Group	It is not clear for organizing the working group, and it may be discussed further.
A-6 Educational Materials	The textbooks regarding the small hydropower development and so on, that we have, it could be used during the study.
A-7 Cooperation of EDL	It's possible to cooperate working with EDL regarding their planing for grid extension.
A-8 Sub-Contractor	It would be discussed together later.
A-9 Relevant sector development program	Information for development program regarding industry sector, telecommunication sector, road, etc., will be available during doing site survey at the province.
A-10 EIA at province level	Information on EIA process of provincial level might be obtained during field data collection.
A-11 CDM	We have no any ideas to applying CDM to the small hydropower development project, this would be discussed together later.

A-12 IPP and Aid	At the present, there have not much activities regarding the small-scale hydropower development, the government has just signed an agreement with Energy Development As, Norway to develop Nam Sim and Nam Nua small hydropower projects as IPP project in Houaphan province. Otherwise the Government has to put its budget to develop as Nam Ngai, Nam Tha-3 (Underconstruction) and Nam Ko, but there are some plants that were donated by Japan and USA Governments like Nam Mong, Nam Sat, Nam Et, Nam San repectively.

B. Small Hydropower Development Planning

B-1 Inventory of Proposed Plan	Please refer to sheet No.1
B-2 Power consumption at each province	Please refer to sheet No.2
B-3 Electrification Growth	Please refer to sheet No.3
B-4 Discharge data at Existing dam sites	Please refer to sheet No.4
B-5 Topographical maps (1/50,000)	Some of maps listed on the sheet are missing, but have to check again with National Geographic Department, to make sure they are available or not.
B-6 Topographical maps (1/50,000) Nam Hao	They are available at the National Geographic Department
B-7 Topographical maps (1/50,000) Nam Ngao	They are available at the National Geographic Department
B-8 List of Construction Material costs	Unit costs for excavation, concrete and rebar works will be available at DOE, Power System Planning Division.
B-9 Red Book	The Red Book for endemic and endangered spices in projected province might be obtained from Lao Red Cross or Ministry of Public Health.
B-10 Map of reserved and Protected area	For the Map of reserved and protected area in projected province will be obtained in our Department as Environmental Management Division.
B-11 Estimation method of construction costs	The estimation method of construction costs for civil engineering, electrical, and transmission and distribution facilities. These can be obtained at Power System Planing Division.
B-12 Need of GIS system	GIS information for within the study area. We are now preparing proposed project locations on Arview GIS program, it's almost completed
B-13 Status of GPS Socio-Economic survey by EDL (WB)	Have to check with EDL they are available or not.
B-14 Geological Map	For the Geological Map of the listed project sites are available at National Geographic Department.
B-15 Hydrological Data	Hydrological Data for each project site, up to present time we have some Hydrological Data that was collected for many years, but need to check again together they are useful for the Study or not. Anyway we can get them

from Meteorology and Hydrology Department, Ministry of Agriculture and Forestry.

C. Transmission and Distribution Planning

C-1 Electrification Priority

The order of priority (district order) at the Province.

1. **Phongsaly:** Gnot Ou, Mouang Khoua, Samphan, M.Mai, Boun Neua, Boun Tai and Phongsaly.
2. **Oudomsay:** Mouang Beng, M.Hune, M.La, M.Nga, Na Mor, Pak Beng and M. Xai.
3. **LouangNamtha:** M.Long, M.Viengphukha,, M.Nale, M.Sing and Louangnamtha.
4. **Bokeo:** Pak Tha, Phaoudom, M.Meung, Nam Gnou and Houay Xay.
5. **Sayaboury:** M.Hong Sa, Xieng Hon, M.Ngeun, M.Khoh, Thongmixay, Pak Lay, Bo Tene, Kene Thao, M. Phieng, and Sayaboury.
6. **Louangphrabang:** Pak Seng, Phone Xay, Vieng Kham, M.Ngoi, Nam Bak, Pak Ou, Chom Phet, Phou Khun, M.Nan, Xieng Gneun, Louangphrabang.
7. **Xieng Khoung:** Nong Het, M.Mork, M. Kham, M.Phaxay, Phou Kout, M.Khoun, M.Pek.
8. **Houaphan:** Vieng Thong, Xieng Khor, M.Et, Sam Tai, Hua Mouang, Sob Bao, Vieng Xai, Xam Nua.

C-2 Electrification Situation

- Present electrification situation at each Province.

The electricity consumption in northern provinces of Laos right now is limited due to the governmental budget is insufficient to put into extensive transmission line construction from main existing hydropower sources in central part as Nam Ngum-1 except Louangphrabang, Xiengkhoung and Sayaboury province that already connected. However, The Lao government will receive the loan ADB to extend the grid form Nam Ngum-1 to Louangphrabang- Oudomsay in 2005, 2006 and Oudomsay-Louangnamtha-Phongsaly in 2008. These will reduce the percentage of people who were not yet access to electricity and improving their living standard, economic, trading, tourism in the area to be better.

1. **Phongsaly:** Located in northerner of Laos, one of poorest provinces in northern Laos, most of its landscape covered by mountain and rained forest, but rich of hydropower potential sources. The population comprises of more than 10 different ethnic groups, provincial main production comes from natural agriculture such as upland cultivation, shifting cultivation etc., infrastructure of the Province is poor includes road, electricity, cleaned water supply. At the present, number of people access to electricity is few compared to other provinces, provincial capital Phongsaly is just connected to stability of electric power supply in beginning of this year when Nam Ngai 1.2 MW completed. But other areas still encounters with power supply leakage according to insufficient budget of the Government and Province. In the province, Pico hydro is now popularly in use, some district uses diesel for power generation as Mouang Mai and Mouang, however these are not enough, just supplies for down town area only.

2. **Oudomsay:** It is located in central part of northern Provinces, mountainous area, comprising of different ethnic groups, main productions are from upland agriculture, livestock, trading, etc. Provincial capital has been accessing to electric power supply from Nam Ko (1,600KW) hydropower plant sine 1996 order to replace diesel

generation t hat could not met increased power demand of the area. But, other districts still have no stable on power supply, some uses diesel generation and some uses individual diesel, battery and Pico hydro for lighting purpose only that's why it reflected to economic development of those district slowly. Right now there are some places such as Pak Beng, which has been connecting to the Houay Kasen (200KW) power grid that was finished construction in 1999. Now the Government has signed an agreement with International Blaster Co. (Thailand) to develop Nam B_ng hydropower project with installed capacity around 30 MW, some produced energy are allocated to supply for Oudomsay province especially Mouang Xay.

3. **Louangnamtha**: It is located in northerner-west between Oudomsay, Bokeo and south China, ethnical province, main productions are from rice, industrial woods, vegetable plantation and livestock. Electric power supply for the major city has been used, by extension power import from China via Mouang Sing-Chinese border by 35kV such Louangnamtha, M.Sing. Currently, small hydropower project Nam Tha-3 (1.6MW) is nearly completed construction and will be used for supplying electricity to surrounding areas. For other district are still supplied by micro hydropower plant and diesel generation.

4. **Bokeo:** It is located in north-west, main productions are from agriculture, vegetable plantation, trading with Thailand and China, non timber forest product export. In provincial capital (Houay Xay) which has been supplying by electricity import from Thailand by 22kV, other districts are still used by diesel generation with insufficient installed capacity.

5. **Sayaboury:** It is located in western, major productions are from agriculture, rice export, crops, wood processing and livestock. Power supply to provincial capital is mainly connected with electric power that has been extended from Num Ngum-1 via Louangphrabang by 115kV and just finished construction in middle of this year. In addition Bor Tene, Kene Thao and Pak Lay districts are imported electric power from Thailand by 22kV and currently, there are two more places such as Hong Sa and Xieng Hon are just imported power from Thailand and the construction was completed. But other districts still uses electricity by diesel generation and envisaging with unstable power supply.

6. **Louangphrabang:** It's a major province in northern of Laos, located in the central between Oudomxay, Sayaboury, XiengKhouang and Vientiane province. Population is larger compared to other northern provinces, it's a center of trading, tourism industry, agricultural trading, world heritage site. The major provincial revenues are from tourism, trading, agriculture and livestock. The major city such as Louangphrabang, Xieng Gneu, Mouang Nan, Nam Bak, Mouang Ngoi, Phou Khoun are supplied by Nam Ngum-1 grid by 115 Kv and other district as Nam Ou, Pak Seng, Phone Xay, Chome Phet and Vieng Kham are not yet connected to the Num Ngum-1 grid according to economic and the governmental and provincial budgets, present time they use diesel generation and Pico hydro for lighting purpose only.

7. **XiengKhoung:** It's located in between Louangphrabang, Houaphan, Xaysomboun. It's a second large northern provinces, comprises of two major ethnic groups such as Lao Sung, Lao Lum, the major income

sources are from upland cultivation, crops, rice and livestock. Electricity supply to the province are now mainly from Num Ngum-1, Nam Luek by 115kV, which was just finished connection with those power stations. Now EDL had a plan to extend the grid by 22 kV to two more districts as M.Kham and Phou Kout in near future order to replace diesel power generation. Other district like Nong Het, M.Phaxay and M.Mork they uses small diesel for power generation but not really enough power supply to meet the need of power consumption in the areas. Otherwise the people they are popular to use Pico hydro in remote area where the grid could not access.

8. **Houaphan:** It's located in north-easterner of the country. Major incomes are from rice cultivation, crops, livestock, due to its location, it would not be connected to national grid, electric power supply to the areas are imported by 35 kV power transmission line from Vietnam that there are Xam Nua, Vieng Xay, Sob Bao, Xieng Khor and M.Et are used electricity by that grid. But up to now the grid has not been improved with power system stability. For other districts such as Sam Tai, Hoa Mouang, Vieng Thong use an electricity from small-scale hydropower plants, these are supplied only down town area but other surrounding areas still have no electricity supplies.

- Electrified area (graphic presentation data on map). See attached file. (Would be given to you later, at the present we do not have electronic file due to computer broken with losing that file)

C-3 Import Electric Power

The following data related to transmission and distribution facility for import electricity from Thailand, Vietnam and China in each Province and Grid.

- Import from China via Mouang Sing District, Louangnamtha Province: Voltage 35/22 kV step down at Mouang Sing, Single circuit, Conductor Size 150mm2, ACSR, Designed capacity 2-6MW.

- Import from Thailand, Borkeo Privince: Voltage 22 kV, Single circuit, Conductor Size 95mm2, ACSR, Designed capacity 2W.

- Import from Thailand, Xayabouly Province:
  - Ken Thao District: Voltage 22 kV, Single circuit, Conductor Size 240 mm2, ACSR, Designed capacity 2MW, right now possibly increased.
  - Houay Khown (Hong Sa District): No data.

- Import from Vietnam via Sob Bao District, Houaphanh Province: Voltage 35 kV/0.4 kV step down at Xam Nua, Single circuit, Conductor Size 95mm2, ACSR, Designed capacity 2MW (at the present, the consumption increased up to around 4MW).

For the peak power flow (kW) in each month on and after Year 2002, this information could be not possibly collected with obtained limited time. It might be available during Study and field data collection in each Province.

C-4 Northern Area Rural Power Distribution Project

The latest committed and planned Power System Diagram (PTD Phase2 and Phase3), these are available in EDL

(ADB/DOE)

C-5 Off-Grid Map	Off-Grid distribution system map under 22kV in Northern Area (at each 8 Province). Some provinces that belong to EDL supply may be available in EDL or provincial EDL's branch.
C-6 Situation of Electrification in Northern Area ~On Grid Supply~	Power flow (kW) on Num Ngum - Louangphrabang system: actual data in each month on and after Year 2002, Designed capacity and etc., These are available in EDL.
C-7 Electrification policy and procedure.	- Off-Grid Power Source: The reason why some diesel power plants are stand-by: because power system stability is low, has no power self-sufficiency. The power supply of the country, mainly based on Nam Ngum-1, if there are some thing happen to Nam Ngum Power Plant, So that, we have no other alternative sources to supply electricity for Country's requirement. For the provincial off-grid, however electricity supply is still not enough with yearly increase of demand. In the further if the national transmission line is connected, the stand-by power plant may be not in use and possibly transfer to remote areas in the Country. - Alternative Power Source: We had a Study regarding the Power Sector Strategy Study, finished in 1999, which stated clearly that if the Country secure domestic power supply by its self, sources by hydropower, the diesel power supply system would be entire replaced into supplying by hydropower, except isolated area where the Grid could not access. In the foreseeable future the development of medium sized hydropower schemes to meet the domestic generation needs remains the best and economic policy. Major dependence on offtakes from IPPs and imports is not mentioned.
C-9 The situation of ESCO's	The prospective role and authority of ESCO's in Off-Grid Operation: - Planning, Site Survey, Design, Installation, Operation, Maintenance and Service (collection monthly fee) relevant to Pico hydropower, Diesel power generation, Solar (solar home system), the activities and project implementation of ESCOs are based on provincial focal development areas especially in northern provinces. In addition, the ESCOs shall train/teach local people the management, technical and operation as well.

Please refer to Documents/Reports regarding the small hydropower development that are available in DOE,such as:

1. Study on Existing Hydropower Project (Project Portfolio Report),1999, prepared by DOE.
2. Project Development and Resource Assessment for Small, Mini hydro Report, studied by ADB, 2001.
3. Northern Area Rural Power Distribution Project Report, studied by ADB, 2002 (EDL)

Signed Copy

参 考

ASIAN DEVELOPMENT BANK

MEMORANDUM OF UNDERSTANDING

OF THE

APPRAISAL MISSION

FOR THE

NORTHERN AREA RURAL POWER DISTRIBUTION PROJECT

Vientiane, Lao PDR

March 6, 2003

7.2 Competition within a Restructured Sector

- **Type of competition between generators?**

  - Bid based (power pool) – this may be too sophisticated for a market of the size of Lao PDR.
  - Bilateral contracting

- **How effective would restructuring be in promoting competition:**

  Restructuring may be effective in other regards but it may not be promote competition because:
  - The size of the sector is small
  - The main load centers are dominated by several generators
  - The transmission system is not interconnected

- **Would restructuring achieve its objectives?**

  - A national competitive power market in Lao PDR is not realistic for the present.
  - Need to look at the objectives of [illegible]nbundling exercise and evaluate which ones are achie[illegible]he Lao sector.
  - Closer cooperation and integrati[illegible] Thailand provides options

8. TRANSITION TO A COMPETITIVE SECTOR

In summary, in planning a transition for the Lao power sector into a more competitive sector, the following should be considered:

- Choose approach that optimizes the benefits and costs associated with different strategies for introducing competition. Need to also consider the risks of each option.

- Approach to reform depends to some extent on developments in Thailand and the wider GMS region. Until reforms have been implemented there, a number of options are not available to Lao planners.

- In the meantime, strategies available to the sector planners include mobilizing competitive forces by tendering services, tendering procurement, competitive award of off-grid concessions (franchises), and, where possible, IPP concessions.

I. INTRODUCTION

1. A Loan Appraisal Mission (the Mission)[1] of the Asian Development Bank (ADB) visited the Lao People's Democratic Republic (Lao PDR) from 24 February to 7 March 2003 to undertake appraisal for the Northern Area Rural Power Distribution Project (the Project). Representatives from the Nordic Development Fund (NDF)[2], the co-financing agency for the Project, participated in the Mission from 28 February to 7 March 2003. The objective of the Mission was to discuss with the Government of Lao PDR on sector policy and operational issues associated with the proposed Project, and to finalize the scope, content, financing, and implementation arrangements of the Project. The Mission reviewed progress made in resolving the outstanding issues raised during ADB's Loan Fact-Finding Mission in April 2002, examined all matters related to Project implementation, and updated the analysis of all aspects of the Project. The Mission reached understandings with the Government on important assurances and key actions required to ensure Project success.

2. The Mission met with officials from Committee for Planning and Cooperation (CPC), Ministry of Industry and Handicraft (MIH), Ministry of Finance (MOF), Electricité du Laos (EdL), and other relevant international financing agencies in Vientiane. A list of officials met by the Mission is attached as Appendix 1.

3. A final wrap-up meeting was held on 6 March 2003 to finalize the scope and implementation arrangements of the Project and other related issues. This Memorandum of Understanding (MOU) summarizes the discussions held and the agreements reached, which are subject to approval by the higher authorities of the Government and ADB by 21 March 2003.

II. THE PROJECT

A. The Background

4. Lao PDR has one of the lowest per capita rates of electricity consumption in all of Southeast Asia, with annual per capital electricity consumption of only 123 kilowatt-hour (kWh) in 2000.[3] Only about 20% of total villages and 34% of the households have access to electricity supply. Electricity access is unevenly distributed between the different regions. In the northern region, with 18% of the total population, only about 14% of villages have access to electricity. Rural households and communities with no access to the grid, either have no electricity supply or rely on more expensive and limited off-grid power supplies. This has hampered existing economic activities and the potential for economic growth in agricultural, service and industrial sectors.

5. Despite an overall reduction in poverty resulting from significant GDP growth rates during the 1990's, the northern region experienced only marginal reductions in poverty. The northern region remains the poorest in the country with over 52% of the population living below the poverty

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1 The Mission consisted of T. Luo, Energy Sector Specialist/Mission Leader; D. Graczyk, Sr. Energy Sector Specialist; D. Purka, Financial Analyst; C. Litwin, Poverty Reduction Specialist; and M. Noguchi, Counsel. Mr. Edvard Baardsen, Deputy Head of Mission/Project Implementation Officer, LRM participated in discussions with Government agencies and provided valuable guidance to the Mission.

2 NDF team consisted of Ms. Leena Saavalainen, Regional Manager; and Mr. Bengt Moreau, Sr. Advisor.

3 Comparable figures for some other developing member countries (DMCs) were India 443 kWh in 1997, Sri Lanka 253 kilowatt-hour (kWh), Pakistan 320 kWh in 1999 and Thailand 1382 kWh in 1998.

9. CASE STUDY 1

Competitive Bidding of IPP Concessions

Kerawalapitiya Power Project, Sri Lanka

9.1 Background

- Sri Lanka has been experiencing a power crisis during which power has been cut to all customers for up to 5 hours per day.
- Competitive solicitations held for procuring emergency power.
- In parallel, the Government of Sri Lanka will invite bids from IPPs to develop a combined cycle gas turbine power station of about 300 MW on a BOT basis.
- Developers will be asked to bid either for a 300 MW plant or a 150 MW plant. If the latter, GOSL may accept two 150 MW bids and have the two power plants developed concurrently on adjacent sites.

9.2 Advantages of Competitive Bidding

- A competitive process offers many advantages over direct negotiation. The advantages and disadvantages are analyzed:

Disadvantages for the Government	Benefits for Government:
• Depending on the structure of the solicitation, developers may be given little flexibility for innovation. They must respond to the bidding documents.	• Lengthy and costly negotiations may be avoided
• Cost of project studies and preparation must be met up-front by the public sector.	• There is greater control over timing of implementation
• Time is needed to prepare project studies and bidding documents.	• Generally results in lower tariff (or higher royalties / taxes)
	• Generally results in a more reasonable risk allocation;
	• Lenders and multilateral and bilateral agencies are more comfortable with a competitive process.

line[4]. With only basic infrastructure, the northern region has not been able to benefit from economic growth to the extent that the other regions have.

6. The Government of Lao PDR (GoL) has recognized the need for further investments in the northern region to accelerate socio-economic development and poverty reduction. In the *Power Sector Policy Statement* published by MIH in March 2001, the Government set out its four policy priorities and the first priority was to maintain and expand an affordable, reliable and sustainable electricity supply in Lao PDR to promote economic and social development.[5] By improving power supply and increasing access to electricity, jointly with other infrastructure investments, including roads and irrigation, the GoL plans to facilitate the regions' comparative advantage in attracting private investments. ADB's country strategy for Lao PDR supports the GoL's efforts in promoting sustainable development and poverty reduction in the northern region.

7. The proposed Project supports both the Government and ADB's sector development strategy. The Project is expected to strengthen and expand the existing transmission and distribution facilities to the northern area and thus provide electricity in an efficient and reliable manner to rural villages and towns. Reinforcement and extension of the existing 115 kilovolt (kV) transmission line and substation facilities will also improve the service to industrial and commercial consumers, and reduce system losses.

B. Objectives

8. To enable EdL to extend its northern grid, ADB is currently assisting EdL in the construction of a backbone high-voltage transmission network through a Power Transmission and Distribution (PTD) Project.[6] On completion of this project in mid 2003, these backbone lines will permit further high-voltage extension of the northern grid while the substations will enable expanded coverage at 22-kilovolt (kV) or 34.5-kV distribution level.

9. The proposed Project is therefore designed to improve utilization of previous investment in transmission and distribution facilities and further extend the distribution network. The feasibility study completed in September 2002, covers potential project areas in six provinces of Xieng Khouang, Phongsali, Louang Namtha, Oudomxai, Louang Phrabang, Sayaburi, and the Special Region of Xaisomboun, which are earmarked by the Government for special development assistance, as they are at a lower level of economic development compared to other parts of the country. On account of capital limitation and project financial viability, it is not advisable to start all the distribution work at the same time. It was agreed between the Government and ADB during the Fact-Finding Mission, to divide the northern area rural electrification into three development phases. The proposed Project is phase one and will give preference for intensification in areas, which are near the backbone 115 kV transmission lines being constructed under the ongoing PTD Project. The targeted project areas include part of districts in Xieng Khouang, Sayaburi, Oudomxai and Louang Namtha provinces and Xaisomboun Special Region. Those areas not covered under the Project will be electrified in the follow-on phases.

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4 LECS2 1997/98

5 The other three policy priorities are to promote power generation for export to provide revenues to meet GoL development objectives, develop and enhance the legal and regulatory framework to effectively direct and facilitate power sector development, and reform institutions and institutional structures to clarify responsibilities, strengthen commercial functions and streamline administration.

6 Loan 1558-LAO (SF): Power Transmission and Distribution, for $30 million, approved on 30 September 1997. The network facilities consist of 115-kV lines from Nam Leuk to Xieng Khouang, Xieng Ngeun to Sayaburi, and Thalat to Muang Feuang and 115/22 kV substations at the end of each line.

9.3 Bidding Strategy

- Two-stage bidding process is being adopted:

  1. *Prequalification:*
     Applicants judged on: BOT Financing Record
     Power Sector and CCGT Experience
     Financial Strength

  2. *Request for Proposals (RFP):*
     - Bids will be be invited from prequalified parties;
     - Bids will be evaluated and a preferred bidder chosen;
     - Negotiations will be conducted to resolve any deviations in the bidder's proposal.

- While the process seems similar to a normal ICB procurement process, there are important differences:

- RFP leaves as much of the technical detail to the bidders. Sets out only the government's basic requirements:
  - power outputs,
  - milestone dates,
  - quality standards, performance testing, etc.
  - constraints (e.g. environmental)

- The complex BOT risk allocations are specified.

- Bids will contain more deviations from the bidding documents because of the bidders' need to tailor the security package to the requirements of their lenders.

- Negotiation of these deviations can be tortuous and long. There is a danger that the competitively tendered tariff and risk allocation will be lost in the negotiations.

9.4 RFP Package

- A properly prepared "Request for Proposals" (RFP) is critical to the success of a BOT bid solicitation.

- An RFP should provide all the information a developer needs to prepare a bid that is:
  - informed and complete,
  - properly formatted,
  - binding, and
  - bankable

10. The Project's objectives are to (i) extend the transmission and distribution system in northern area to provide electricity to rural low-income communities, and to improve their living standards and local economic conditions; and (ii) promote the Government's implementation of the power sector restructuring, and strengthen EdL's project management capacity and operational efficiency. The Project Framework is attached as Appendix 2.

11. By extending the existing transmission and distribution networks and those under construction, the Project will provide efficient and economical means to electrify those areas, and thus, lead to better living conditions and substantial saving on energy expenditures by poor households. Rural electrification provided by the Project will also contribute to gains in agricultural productivity, increase of small-scale family enterprises, and create new income opportunities for rural population. With electricity, improved education, health care and communication facilities will strengthen overall community development.

12. Although rural electrification has been identified as a significant goal in the Government's long-term socio-economic development programs, EdL cannot currently meet the substantial capital requirements of rural electrification and maintain a sound financial position. EdL needs to further improve its financial and operational performance. The Project will also assist EdL to further improve its operational efficiency through strengthening its project management and implementation capacity with the consultant's assistance provided from the Project.

C. Project Components and Outputs

13. The project components were developed following technical, economic and financial studies that have taken into consideration environmental and social aspects. The feasibility study considered various alternatives of extending rural electrification, including comparisons of on-grid and off-grid options, and concluded that grid extension was the most cost-effective option in the target areas which have demonstrated potential for growth and would generate acceptable economic returns. The Mission reassessed the project scope and components, which were initially agreed during the Fact-Finding Mission, and found that no significant revisions in project scope and components were required. The specific construction quantities will be revised after detailed design is conducted during the implementation period. Specifically, the Project will consist of the following components:

(i) Extension of high voltage 115 kV transmission lines with a total length of about 303 km, including 173 km line from Louang Prabang to Oudomxai, and 79 km line from Oudomxai to Louang Namtha, 46 km line from Hin Heup to Vang Vieng, and 5 km line from Nam Ngum to Thalat;

(ii) Construction of 115/34.5/22 kV substations at Oudomxai, Louang Namtha, Luang Prabang (extension), "T" tap at Hin Heup substation, "Interface" at Sayaburi and Phonsavan substations and some minor extension work at Vang Vieng and Nam Ngum substations;

(iii) Erection of mid-voltage (34.5/22 kV) distribution lines with a total length of approximately 796km, 237 distribution transformers, low-voltage (380 V) distribution lines 608 km, and electricity connection of approximately 33,800 households in 342 villages;

(iv) Clearance of unexploded ordnance (UXO) in project areas;

- The functions of a "Request For Proposals" (RFP) are:

  1. To inform a bidder about:
     - technical requirements of the project
     - the process for submitting bids
     - the information the bidder must provide in its bid
     - the evaluation process and criteria

  2. To set out models of the legal documents which:
     - provide clear parameters against which bids are to be prepared - e.g. LDs, government support, force majeure, change-in-law pass through, etc.
     - enable bidders to "price" the risk allocation

- The RFP for Kerawalapitiya contains the following documents:

1. Bidding Document	• Invitation to bidders • Information for bidders (inc. evaluation criteria) • Instructions to bidders
2. Bidder's Proposal and Supporting Data:	• Format and scope of technical information to be provided • Format and scope of financing [illegible] be provided
3. Model Contracts:	• Concession Agreement • Power Purchase Agreement • Fuel Supply Agreement • Land Lease Agreement
4. Minimum Technical Specifications	• Performance specification • Drawings

9.5 Application to Lao PDR

- If projects are not straightforward, competitively determined prices may be compromised during negotiation of "deviations" from bid documents.

- If this is a problem for combined cycle projects, competitive IPP solicitations in Lao PDR would have features that would greatly add to the difficulties. Lao projects would be more difficult to put out to competitive tender because they are:

  (i) hydropower projects,

  (ii) export projects.

(v) Miscellaneous works including benefit monitoring program, resettlement and compensation program;

(vi) Consulting services to assist EdL in detailed Project design, implementation supervision and other capacity building support; and

(vii) Consulting services to the Government to further study the separation of the Government's existing shareholdings and future IPP investments from EdL, and development of proper IPP project selection and implementation procedures which maximizes revenue and non-revenue benefits from IPP projects.

D. - Cost Estimates

14. The total cost of the Project is estimated at $51.5 million equivalent, comprising $35.9 million equivalent (70%) in foreign exchange cost and $15.6 million equivalent (30%) in local currency cost. The cost estimates are based on 2003 price levels for base costs, and include physical contingencies, price contingencies, taxes and duties, and interest charges during construction. Physical contingencies have been estimated at 10% of base costs and price contingencies were calculated using ADB's current rates of inflation for foreign goods and services. The cost estimates are summarized in Table 1 and details in Appendix 3.

TABLE 1: SUMMARY OF PROJECT COST ESTIMATES

($ Million)

Item	Foreign Exchange	Local Currency	Total Cost
A. Base Cost			
1. Civil Works [a]	17.60	5.44	23.04
2. Materials and Equipment	7.90	2.90	10.80
3. Miscellaneous Works (land acquisition, compensation, and benefit monitoring program)	0.00	0.26	0.26
4. Consulting services for project implementation	2.80	0.30	3.10
5. Other consulting services	0.36	0.04	0.40
Subtotal A	28.66	8.94	37.60
B. Contingencies			
1. Physical contingencies	2.63	0.84	3.47
2. Price contingencies	3.94	1.45	5.39
Subtotal B	6.57	2.29	8.86
C. Interest During Construction (IDC)	0.69	3.39	4.07
D. Taxes and Duties	0.0	0.98	0.98
Total (A+B+C+D)	35.90	15.61	51.51
Percentage of Total	70%	30%	100%

[a] Civil works include turn-key contracts and installation contracts.

(i) Problems with <u>hydropower projects</u> (compared to thermal):

- revenues are less certain (hydrological variation)
- capital costs are difficult to estimate (site-specific design)
- risks are greater (hydrology, ground conditions, etc.)
- environmental problems are harder to identify and price
- front-end capital requirements are higher
- export credit coverage is smaller
- construction times are longer and less certain

More must be known about a hydro project before it can be put out to competitive bid.

(ii) Problems with <u>export projects</u> :

- PPA and tariff are under the control of a third party who must agree a tariff, provide a PPA model and make no changes after closing date.

- Could base bids on a fixed tariff and tendered royalties

9.6 Bidding Hydro Concessions

- Hydropower is more difficult to tender than thermal projects because much more needs to be known about the site before a meaningful bid can be prepared. Even with abundant and reliable information, a bid is still more difficult to put together because of the site-specific nature of the design and the greater uncertainties.

- Problem of bidding hydropower concessions was studied under a World Bank paper, "*Financing of Private Hydropower Projects*", 1999. Three hydropower project bidding models were proposed:
  - One Stage
  - Two Stage
  - Hybrid

- Features of the **One Stage** process:

  - Full site investigations, EIA and preliminary design in the public sector

  - A bankable RFP package containing model agreement, studies, etc. to define risk allocation, tariff structure and other conditions of the bid.

  - High cost of project preparation borne by the public sector.

E. Financing Plan

15. The Mission confirmed that ADB will provide a $30 million loan from its Special Fund resources equivalent to finance 58.2% of total project costs. The loan will finance $26.6 million of the foreign exchange cost of the Project, including interest during construction on the loan to the Government. The loan will also finance $3.4 million of local costs of the 115 kV transmission line component. The proportion of local currency funding proposed under this loan is justified by the nature of the Project, particularly its focus on poverty alleviation, electrification of rural areas and current fiscal conditions of the Government of Lao PDR. The Nordic Development Fund (NDF) will cofinance Euro 10 million (approximately $10.0 million) for the substation package and project implementation consulting services of the Project, representing 19.4% of total Project costs.[7] EdL will fund $11.5 million of local costs (representing 22.3% of total Project costs) from its own internally generated funds. Based on these assumptions, the proposed financing plan is presented below in Table 2.

16. The ADB loan will have a maturity of 32 years, including an eight-year grace period, with an interest rate of 1% during the grace period and 1.5% during principal amortization and other terms and conditions set forth in the draft Loan and Project Agreements. The borrower will be the Lao PDR, and the proceeds of the loan will be relent to EdL pursuant to a subsidiary loan agreement with terms and conditions acceptable to ADB. MOF will relend the ADB loan to EdL for 20 years maturity, including a 5-year grace period, at interest rates entirely consistent with the relending terms included in the Financial Recovery Plan (3.0 percent interest 2004-2005, 6.0 percent interest in 2006 and thereafter). MOF will relend NDF's loan to EdL on the same terms. The Government requested ADB management to reconsider the increased interest rate after 2005. EdL agrees to bear the Government's foreign exchange risk of the proposed loans, as EdL's foreign currency earnings from export sales of electricity should mitigate this risk.

TABLE 2: PROPOSED FINANCING PLAN

($ Million)

Source	Foreign Currency	Percent Total	Local Currency	Percent Total	Total	Percent Total
ADB Loan	26.60	51.6%	3.40	6.6%	30.00	58.2%
NDF Loan	9.30	18.1%	0.70	1.4%	10.00	19.5%
Government/EdL Counterpart Funding	0.00	0.0%	11.51	22.3%	11.51	22.3%
TOTAL	35.90	69.7%	15.61	30.3%	51.51	100.0%

ADB - Asian Development Bank, EdL - Electricité du Lao, NDF - Nordic Development Fund.

F. Implementation Arrangements

1. Project Management

17. MIH advised the Mission that the executing agency (EA) for the Project will be EdL. The General Manager of EdL will be responsible for overall management of the Project. The

[7] The NDF Board confirmed on 13 June 2002 that the project would be included in the NDF pipeline. NDF agreed to provide its commitment to ADB on the cofinancing arrangement, after their loan proposal is discussed and approved by NDF Board, which is scheduled for mid April 2003. The NDF loan will be denominated in Euros and have a maturity of 40 years, 10 year grace period, 0.75% service charge, and 0.50% commitment fee.

- Features of the **Two Stage** process:

  Stage 1:
  - Less detailed feasibility and EIA studies by GOL
  - RFP documents include drafts of project agreements, etc. and provisional cost estimate
  - Concession awarded to lowest tariff (or highest royalty) based on provisional project cost estimate

  Stage 2:
  - Developer does detailed investigation and design
  - EPC contract is put out to competitive bidding and provisional cost estimate is updated to a binding EPC cost.
  - Using a pre-agreed formula, the tariff (or royalty) is adjusted to reflect the binding EPC cost.

- Features of the **Hybrid** model

  The Hybrid Model takes the form of a public-private partnership on multi-purpose projects with the government taking responsibility for the major civil works for an irrigation or water supply project and the private sector taking responsibility for the lower risk power components. The model probably has limited application in Lao PDR where the projects tend to be single purpose.

- None of the models deals with the complexities introduced by cross border off-take. The involvement of a power purchaser in another country would need to be thought through carefully.

9.7 Bidding Export Projects

- Bidding of hydropower can either be on the basis of the lowest offered energy price or the highest payment for the water rights (royalty). With export projects, where the price is under the control of a foreign power purchaser, the royalty approach would be more effective.

- Export of off-take complicates competitive bidding. PPA and tariff are outside the control of GOL. Pre-tender agreement would therefore need to be reached on the tariff value and PPA in government-to-government negotiations. Inevitably, bidders will include deviations to the PPA in their bids and solidarity between GOL and the power purchaser would be needed during the negotiation of these deviations. Lack of solidarity would risk losing the competitive advantage of the bid in a drawn out three-way negotiation process. The process might involve:

  - GOL and the power purchaser agree a tariff and a PPA model prior to solicitation.

Government has agreed that a Project Management Unit (PMU) will be established in the Development Department of EdL by 31 March 2003, including the appointment of the project manager, project accountant, procurement specialist and project engineer. The project manager will be involved in loan processing and participate in loan negotiations. The PMU, under the supervision of the Deputy General Manager of the Development Department will be responsible for all aspects of project implementation, including (i) overall planning of the project implementation, budgeting, and financing planning and accounting; (ii) recruitment of consultants; (iii) supervision and coordination in detailed Project design; (iv) procurement of goods and services; (v) implementation, supervision and commissioning of all project components; (vi) organize project performance monitoring system; and (vii) preparation of periodic progress reports and project completion report. A team of international consultants will assist PMU's day-to-day operations. Consultant services and construction work will be carried out under contracts administered by EdL. The Government and EdL assured the Mission that the PMU would effectively cooperate with the consultant team and other stakeholders concerned to ensure the Project will be executed within the required time frame and in accordance with international standards. Under the PMU, EdL agreed to establish a socio-economic cell, which will become a permanent unit within EdL.

2. Period of implementation

18. The Project will be implemented over a four year period beginning in the third quarter of 2003. Physical works are expected to be completed by the third quarter 2007, with loan closing in early 2008 (six months following completion of works). The four-year implementation period is considered appropriate, given the large number of project components, distances of the Project sites and the difficult terrain. The implementation schedule is shown in Appendix 4.

3. Procurement

19. Procurement of goods and services to be financed from the proposed ADB loan will be carried out in accordance with ADB's *Guidelines for Procurement*. International competitive bidding (ICB) procedures will be used for major civil works contracts estimated to cost over $1.0 million, and supply contracts valued over $500,000. For civil works contracts not exceeding $1.0 million, local competitive bidding (LCB) procedures will be used. The Government's procurement guidelines (Implementing Rules and Regulations on Government Procurement of Goods, Construction, Repairs and Services, Dec.1988), prepared under an ADB technical assistance, are satisfactory. For supply contracts valued $500,000 or below, international shopping (IS) procedures will be followed. Indicative Procurement Packages is shown in Appendix 5.

20. To conform to the guidelines, contracts will be packaged in the following manner:

(i) Contracts for the construction of 115 kV transmission line, including shield-wire schemes, will be procured through ICB procedure on turnkey basis, with three lots for (i) Louang Prabang – Oudomxai, (ii) Oudomxai – Namo- Louang Namtha, and (iii) Hin Heup – Vang Vieng and Nam Ngum – Thalat. In addition, a contract for unexploded clearance for working areas along the transmission lines will be procured separately through ICB procedure or included under the turnkey contracts mentioned above, which will be determined after detailed design being conducted.

(ii) Supply contracts for medium voltage (MV) and LV distribution material and equipment valued above $500,000, will be procured through ICB. Supply contracts

- Bidders are invited to tender a royalty figure on the basis of a known and fixed tariff and PPA.

- During negotiations, the power purchaser and GOL must present a single voice to the preferred bidder and resolve issues between them behind closed doors.

9.8 Is Direct Negotiation Justified?

- Direct negotiation of an unsolicited proposal involves greater risks to Government. However, it might be justified where a hydropower project involves features that make it unsuitable for bidding.

- If direct negotiation is used, a strict framework and procedures should be designed to control the process.

- Some recommended conditions for direct negotiations:

  - A rigid implementation procedure is defined and adhered to.

  - Strict milestone and expiry dates are specified in MOUs and concession agreements to control implementation progress.

  - All engineering procurement and construction contracts procurement should be awarded by ICB or LCB to ensure that the construction cost is fair.

  - Government engages international advisers with relevant experience to ensure parity across the negotiating table.

  - Government prepares drafts of agreements for negotiation based on standard models prepared for GOL.

  - Swiss Challenge provisions could be considered to encourage competitive prices – i.e. testing the developers' proposals by inviting others to bid on them.

valued at $500,000 or less per contract will be procured through IS procedures. Supply contracts will be limited to equipment such as transformers, distribution panels, lighting arrestors, meters, switchgear, poles and conductors.

(iii) The MV and LV distribution installation package will be financed entirely by EdL and carried out by EdL or other local qualified contractors. A contract for unexploded ordnance clearance for areas along the distribution lines will be procured separately through ICB procedure.

(iv) Contracts for 115 kV substations and extension, will be financed entirely by Nordic Development Fund (NDF). Consultant services for project implementation will also be financed entirely from the proposed NDF loan. Consultants will be recruited by EdL, in accordance with NDF's *General Procurement Guidelines* (will be enclosed to the Credit Agreement) based on Nordic Competitive Bidding (NCB), and in full consultation with ADB; and

(v) Consulting services for sector restructuring will be financed by ADB and in accordance with ADB's *Guidelines for the Use of Consultants* and other arrangements satisfactory to ADB for engaging domestic consultants.

4. **Consulting Services for Project Implementation**

21. The Mission and EdL have evaluated the technical expertise required to implement the Project. It was agreed that about 100 person-months of international consulting services including experts on transmission, substation, distribution, environmental and socioeconomic survey, and will be required during implementation. The consultant team will assist EdL in detailed project design; procurement; supervision of installation and construction; final testing and commissioning; the land acquisition and compensation program; system loss reduction program, environmental management, and other technical inputs. Approximately four person-months of international quality assurance expert with experience in UXO detection and clearance will also be required.

22. In addition to the above-referenced consulting services on project implementation, the Mission proposed and EdL agreed that the following work would be included in the consultant services to further strengthen EdL's capacity for rural electrification projects. This will comprise approximately 10 person-months of additional input.

(i) Capacity Building for Socioeconomic Assessment – EdL is planning to establish a socio-economic cell to improve the coordination of data collection on electrification, build a consumer database and to build in-house capacity for benefit monitoring. In order to make efficient use of benefit monitoring data and to build future capacity for the evaluation of sub-projects, NDF and ADB agreed to support capacity building for economic, social and poverty impacts assessments of sub-projects.

(ii) Consumer Awareness Campaign – The consultants will assist EdL in the design and implementation of an information and awareness campaign to inform villagers on safe usage of electricity. The awareness campaign will also include informing consumers of connection cost policy, tariffs, billing statements and timing of bills and due payment, disconnection policy. The consumer awareness campaign will be implemented at least two months prior to connections being implemented under the loan. The campaign will take into account the possibility of language barriers in the design.

10. CASE STUDY 2

Competitive Bidding of EPC Contracts

Theun Hinboun vs. Houay Ho

10.1 Background

- Two IPP projects in Lao PDR have been completed and are selling power to EGAT:
  - Theun Hinboun
  - Houay Ho
- Superficially, there are similarities between the projects but their financial performances are in stark contrast.

	Theun Hinboun	Houay Ho
Type	Hydropower	Hydropower
Capacity	150 MW	240 MW
Capital Cost (inc. IDC)	USD 240 mill	USD 260 mill
GOL Equity	60%	20%

- Houay Ho has since been sold to Tractabel of Belgium and many of the conditions of the concession have been re-negotiated in the process.

10.2 Financial Performance

1. Theun Hinboun

- Was profitable from the first year of operation.
- Pays taxes & royalties to GOL and pays dividends to EdL. Effect on EdL cash flow was immediate, significant and beneficial.

23. The consultant team is encouraged to utilize local expertise to undertake services wherever possible. Project implementation consultant services will be entirely financed from the proposed NDF loan. Consultants will be recruited by EdL, in accordance with NDF's *General Procurement Guidelines* (will be enclosed to NDF's Credit Agreement) based on Nordic Competitive Bidding (NCB), and in full consultation with ADB. The general procurement principles and documents will follow and be based on ADB's practice and standard documents. The terms of reference (TOR) for project implementation consulting services for project implementation are attached in Appendix 6.

24. NDF will assist EdL in the preparation of the short list of eligible bidders and bidding documents, applicable for NCB. Invitation for pre-qualification will be advertised on NDF's website together with the TOR for consulting services and the criteria for short-listing. EdL will evaluate the submitted pre-qualification documents, and submit the final proposed short list to NDF for approval in accordance with NDF's *General Procurement Guidelines.*

5. Other Consultant Services

25. The Mission and the Government agreed to include consulting services in the loan to support the Strategy for Implementing Sector Strengthening (draft, March 2003). These consulting services will include the following objectives contained in the time-bound implementation plan:

(i) Develop transparent IPP project selection criteria and introduce clear IPP project implementation procedures;

(ii) Maximize Lao revenue and non-revenue benefits from IPP developments;

(iii) Identify and structure an appropriate Government agency to assume ownership of the Government's existing IPP shareholdings and future IPP equity investments, removing such ownership from EdL.

These services will comprise approximately 13 person-months of input, including experts on IPP hydropower project development, private sector investment and financing, legal aspects and power sector reform aspects. MIH agreed to submit draft Terms of Reference for these services to ADB by 20 March 2003 for its review and comment.

6. Disbursement Procedures

26. For ADB loan funds, direct payment and reimbursement procedures in accordance with ADB's *Loan Disbursement Handbook* will be used. Disbursements under the Project will be for supply and installation of power distribution and transmission equipment and accessories. The Mission assessed the expected contract packages and determined that an imprest account would not be required. The Government agreed with this decision.

7. Accounts, Reports and Audits

27. EdL will maintain separate accounts for the proposed Project and will submit to ADB within six months after the end of its fiscal year audited Annual Project Accounts (APA) containing detailed descriptions of fund sources and expenditures. EdL will also submit within 6 months after the end of its fiscal year audited annual financial statements (AFS). An external auditor, acceptable to the ADB, will audit EdL's AFS and APA, and the audit report together with the memorandum on issues identified during the audit process will be attached to the respective

2. **Houay Ho:**

- Prior to its sale to Tractabel recently, it paid no taxes or royalties to GOL and no dividends to EdL. It was not expected to be profitable within its concession period.

- EdL borrowed money to purchase its equity in the project. Interest and principal repayments associated with this loan meant that the impact of the project on EdL's cash flow was immediate, significant and negative.

10.3 Reasons for Theun Hinboun's better performance

- It occupies a superior hydropower site

- It had Multilateral Agency backing - guarantee plus concessionary money to pay for EdL's equity

- It negotiated a more favorable tariff with EGAT

- It benefited from delays to Nam Theun 2 (windfall streamflow benefit)

- It used International Competitive Bidding for its construction contracts, while Daewoo awarded the contract to its own construction company without competition.

10.4 Advantages of ICB

- Theun Hinboun Power Company benefited from competitively tendering its contracts:

  - transparency resulted in multilateral and lender acceptance;
  - no due diligence processes needed to justify the price;
  - competition resulted in lower prices;

- The most significant benefit was the competitive price. (20% below estimate, c.f. Houay Ho which exceeded its estimate by about 60%)

- Nam Theun 2 is following a similar path: multilateral support and ICB award of its construction subcontracts.

reports. The Mission advised the Borrower that any delay in submission of audit report after the due date may result in loan suspension.

28. EdL will continue the current practice of hiring external auditors to audit its AFS and APA. For future contracts and revisions, the auditors' TOR will be approved by ADB prior to commencement of work. While the accounts will be prepared using Lao accounting standards (LAS), the audit will be carried out using International Standards of Auditing. The auditors will provide detailed comments on any divergence from International Accounting Standards (IAS) identified during the course of audit. The auditors will be obliged to provide opinions on compliance of ADB's financial covenants and indicate the details of the actual calculation for all ratios, in conformity with the definitions contained in the Loan and Project Agreements.

29. Regular progress reports for the proposed Project will be prepared by the PMU of EdL and submitted to the ADB and NDF on a quarterly basis. The reports will include a description of the physical progress, procurement and contractual status, highlights of implementation issues, total number of consumers connected and a summary of project components, with details of the latest project disbursements of incremental expenditures and contract amounts. A project completion report (PCR) will be submitted to the ADB and NDF within three months after the completion of the Project. Aside from assessment of the execution and operation of the Project, the PCR will indicate the compliance with the loan covenants.

8. Project Performance Monitoring and Evaluation (PPME)

30. EdL ensures that a comprehensive program for project performance monitoring and evaluation (PPME) acceptable to ADB will be carried out during implementation and subsequent operation to assess the achievement of the Project's objectives. The overall PPME will be based on the Project Framework as shown in Appendix 2, including monitoring and evaluation of the project physical progress, operations, and project benefits and impacts. A set of PPME indicators will be developed at the start of the Project by PMU, with assistance from the consultants to be engaged and in consultation with the local communities. The PMU of EdL will be responsible for carrying out the PPME activities, including initial baseline physical and socioeconomic surveys, data collection, and analysis. For the purpose of setting a benchmark for the monitoring and evaluation of social, poverty and economic benefits, a baseline socio-economic survey will be carried out before connections are made in the project areas. A second round socio-economic survey will be carried out 3 years after the first connections are made to evaluate the effectiveness of the project in targeting the poor and enhancing welfare of the electrified households and communities. The surveys will cover both electrified and un-electrified areas in order to estimate the economic and social benefits of electrification.

31. The PPME will be integrated into the regular progress reports as well as EdL's management information system to be developed, so that the monitoring of social and economic benefits can continue beyond project implementation. The content and format of the PPME will be in accordance with ADB's guidelines for the Project Performance Management System. EdL will submit a detailed implementation plan of the PPME for ADB's review and concurrence within six months of loan effectiveness and annual PPME reports.

9. Project Review

32. A project inception mission will be fielded soon after approval of the proposed loan to initiate the implementation process. ADB will also conduct regular reviews (at least twice annually) throughout project implementation. If the results of such reviews indicate serious implementation