

**Department of Energy Management (DEM)
Ministry of Energy and Mines
Lao People's Democratic Republic
Japan International Cooperation Agency (JICA)**

**The Project for
Improvement of Power Sector
Management
in the Lao People's Democratic Republic**

Project Completion Report

March 2013

**Chubu Electric Power Co., Inc.
The Kansai Electric Power Co., Inc.**

Table of Contents

Table of Contents	i
Acronyms and Abbreviations	iv
1. Introduction	1
1.1. Background	1
1.2. Project design	2
(1) Objective of the Project	2
(2) Project Goal	2
(3) Overall Goal	2
(4) Project outputs and major indicators	2
(5) Project Area	3
(6) Implementing Agencies	3
(7) Target group	3
1.3. Work schedule	3
2. Status and issues before the Project	4
2.1. Laws related to power sector and organizational setups	4
(1) Promulgation of LEPTS	4
(2) Setup for examination and inspection of power facilities	4
2.2. Division of roles in examinations and inspections based on technical standards	5
(1) Roles of DOE and PDEM	5
(2) Roles of DOE and EDL	6
2.3. Individual fields of technology in LEPTS	6
(1) Hydropower (civil engineering and electrical engineering)	6
(2) Transmission lines and substations	7
(3) Distribution lines	8
2.4. Human resource development in LEPTS	9
(1) Preparation of manuals	9
(2) Training by EDL	10
3. Situation of the Counterpart Organization	11
(1) Electric Power Management Division, DOE (October 2010 to April 2012)	12
(2) Department of Energy Management (May 2012 to March 2013)	12
4. Inputs from both countries	14
5. Record of dispatched Japanese Experts	15
6. Results of activities	17
6.1. Drafting of activity plan and establishment of project implementation structure	17
(1) First phase (15 months from October 2010 to December 2011)	17
(2) Second phase (15 months from January 2012 to March 2013)	17
6.2. Drafting of Review Report and specific suggestions for improvement	18
(1) Drafting of Review Report	18

(2) Specific suggestions for improvement.....	18
6.3. Formulation of instructions and case books, and implementation of examination and field inspection using instructions.....	21
(1) Review of procedures for examination and inspection.....	21
(2) Formulation of Instructions and Casebooks	21
(3) Results of actual field inspections using instructions	21
(4) Field OJT on inspection	22
(5) Technical assistance to DEM (DOE) for capacity development of PDEM.....	23
6.4. Institutional improvement for enhancing regulatory function of DOE.....	25
(1) Institutional arrangement for strengthening of regulatory function in the first stage of the Project.....	25
(2) Clarification of roles of relevant agencies and optimization of regulatory flow diagram ...	26
(3) Implementation of well-planned examination and inspection.....	28
(4) Revision of LEPTS and the Guideline	29
6.5. Strengthening of capacity for examination and inspection process	34
(1) Competency Analysis	34
(2) Strengthening inspection capacity.....	35
(3) Strengthening examination capacity	35
(4) Behavioral change (improvement of E&I capacity)	39
(5) Utilization of Resources of EDL Training Center	42
(6) Review of Needs for LEPTS Training Curriculums and Training Materials	42
(7) Issues on HRD at MEM for Enforcement of LEPTS	43
6.6. Seminars on promotion of LEPTS understanding in pilot provinces	44
(1) Pre-seminar on promotion of LEPTS understanding for IPSM (February 25, 2011)	44
(2) Improvement of seminars and development of a set of teaching materials	45
(3) Seminars on the promotion of LEPTS understanding in pilot provinces	45
6.7. Counterpart trainings in Japan	50
(1) First counterpart training in Japan (September 1 to 13, 2011)	50
(2) Second counterpart training in Japan (September 6 to 19, 2012).....	51
7. Records of Joint Coordinating Committee	52
7.1. First JCC meeting	52
7.2. Second JCC meeting	52
7.3. Third JCC meeting.....	53
7.4. Fourth JCC meeting	54
8. Other activities	56
8.1. Participation in World Bank seminar in Bolikhamxay Province	56
8.2. Seminar on JICA Group Training & IPSM	57
8.3. Accompanying field trip to PDEMs in Bolikhamxay and Luang Prabang	57
(1) Interview to Bolikhamxay PDEM.....	57
(2) Interview to Luang Prabang PDEM and site survey to small hydropower plant	58
8.4. Participation in the seminar on the dissemination of the LEPTS procedure	58

9.	Recommendations	60
9.1.	Overall management of electric facilities	60
(1)	Review of overall activities on LEPTS	60
(2)	Analysis and evaluation	62
(3)	Recommendations	67
10.	Provision of equipment	77
11.	Local expenses report	78
12.	Ingenuity for implementation of the Project and lessons learnt	79
12.1.	Procedure on the examination and inspection (E&I) in the Project	79
13.	List of outputs of Project	82
(1)	Reports	82
(2)	Outputs for technical cooperation	82
14.	Attachment	83
Attachment I	R/D and M/M Work schedule	
Attachment II	Work schedule	
Attachment III	Organization chart of counterpart organization (DEM)	
Attachment IV	Documents for results of activities	
Attachment V	Documents for the Joint Coordinating Committee (JCC)	

Acronyms and Abbreviations

ASEAN	Association of South - East Asian Nations
BD, B/D	Basic Design
CA	Concession Agreement
COD	Commercial Operation Date
C/P(s)	Counterpart(s)
DD, D/D	Detailed Design
DDEM	District Department of Energy and Mines
DDG	Deputy Director General
DEB	Department of Energy Business
DEM	Department of Energy Management
DEPD	Department of Energy Promotion and Development
DEPP	Department of Energy Policy and Planning
DG	Director General
DL, D/L	Distribution Lines
DOE	Department of Electricity
E&I	Examination and Inspection
ECI	Electricity Construction and Installation
EDL	Electricité du Laos
EDL-Gen	EDL Generation Public Company
EDL-TC	EDL Training Center
EEMD	Energy Enterprise Management Division
EPC	Engineering, Procurement and Construction
EPDC	Electric Power Development Co.,Ltd
EPMD	Electric Power Management Division
FS, F/S	Feasibility Study
FY	Fiscal Year
GMS	Greater Mekong Sub-region
GOL	The Government of Lao PDR
HC	Hydro Civil Engineering
HE	Hydro Electrical Engineering
HPP	Hydropower Plant
HR	Human Resources
HRD	Human Resources Development
ICTC	International Cooperation and Training Center
ID	Identification
IEE	Initial Environmental Examination
IPP	Independent Power Producer
IPP (d)	IPP for domestic supply
IPP (e)	IPP for export

IPSM	Project for Improvement of Power Sector Management
IREP	Institute for Renewable Energy and Promotion
JAPC	The Japan Atomic Power Company
JCC	Joint Coordinating Committee
JEPIC	Japan Electric Power Information Center
JICA	Japan International Cooperation Agency
LEPTS	Lao Electric Power Technical Standard
LHSE	Laos Holding State Enterprise
MEM	Ministry of Energy and Mines
MIH	Ministry of Industry and Handicraft
MHI	Mitsubishi Heavy Industries Ltd,
MM, M/M	Minutes of Meeting
MOU	Memorandum of Understanding
MPI	Ministry of Planning and Investment
NISA	Nuclear and Industrial Safety Agency
NRA	Nuclear Regulation Authority
OJT	On the Job Training
PCM	Project Cycle Management
PDA	Project Development Agreement
PDEM	Provincial Department of Energy and Mines
PDIH	Provincial Division of Industry and Handicraft
PDM	Project Design Matrix
PDP	Power Development Plan
PEPMD	Power Export Project Management Division
PO	Plan of Operation
PPA	Power Purchase Agreement
RE	Rural Electrification
RAEPD	Responsible Agency for Electric Power Development
RD, R/D	Record of Discussions
SOEMD	State Owned Enterprise Management Division
SPC	Special Purpose Company
SS, S/S	Substation
STEP I	Electric Power Technical Standard Establishment in Lao P.D.R.
STEP II	Lao Electric Power Technical Standard Promotion Project
SwS, Sw/S	Switch Station
TL, T/L	Transmission Lines
TA	Technical Assistance
TOR	Terms of Reference
TPP	Thermal Power Plant

1. Introduction

1.1. Background

In the Lao People's Democratic Republic (hereinafter referred to as "Laos"), the power sector plays a vital role in national socio-economic development. Many projects are being planned and implemented for such agenda as power source development and improvement of the transmission and distribution network to increase the electrification rate. Recognizing that conditioning of administrative structures and legislative provisions is essential for infrastructural improvement, the Government of Laos (GOL) requested support with this task. Based on this request, the Japan International Cooperation Agency (JICA) provided technical assistance to Laos through two projects: one entitled "the Project on Electric Power Technical Standard establishment in the Lao People's Republic Democratic (hereinafter refer to as "STEP I" (implemented from May 2000 to April 2003)" and another entitled "the Project for Lao Electric Power Technical Standards Promotion "hereinafter referred to as "STEP II" (implemented from January 2005 to January 2008)".

In accordance with the standards prepared with JICA assistance, i.e., the Lao Electric Power Technical Standards (LEPTS), the administrative institutions in charge of the power sector in Laos (the Department of Electricity (DOE) on the national level and the provincial departments of energy and mines (PDEMs) on the provincial level) perform administrative procedures for authorization and approval of plans for construction of all sorts of power facilities. The DOE is in charge mainly of examination and inspection related to construction of hydropower stations and improvement of the transmission network and large-scale distribution networks in urbanized districts. The PDEMs are in charge of administrative procedures for improvement of distribution networks up to a certain size and plans for construction of small-scale hydropower plants. Besides being the enterprise in charge of power facilities based on LEPTS, Electricité du Laos (EDL) plays the role of managing matters such as the construction of its own power facilities in line with LEPTS.

Along with preparation of LEPTS, assistance was provided with the holding of seminars to promote understanding of the standards at the introductory stage. Nevertheless, there is a strong need for promotion of further diffusion and rooting as well as deeper understanding of the substance of LEPTS among the concerned administrative institutions. This is especially so because a bigger role is going to be discharged by provincial administrative entities in application and operation of LEPTS in the future.

Nevertheless power sector administration on the national level is in the process of capacity development and not fully able to act as a powerful engine pulling the provincial authorities forward. The task of maintaining and further developing the power infrastructure to be installed in a sustained manner requires an improvement of power sector administration and the capacity for project management on both national and provincial levels. Against this background, the Lao government requested the Japanese government for technical assistance (TA) with reinforcement of capacity for

project management in the power sector based on improvement of capabilities for LEPTS operation. In response to this request, two studies were made in August and November 2009 for preparation of a detailed plan, to examine the project activities and schedule with the implementing institution in Laos. Based on the findings of these studies, the two sides signed a record of discussions (R/D) related to the TA in July 2010, and agreed on provision of the assistance through a project scheduled to run for a period of two years and six months beginning in September 2010 (hereinafter referred to as the "Project"). The R/D and minutes of meeting (M/M) are shown in Attachment I(1)(1) and (2), respectively.

1.2. Project design

According to the project design matrix (PDM) in M/M signed on July 16, 2010, the project design is summarized as follows:

(1) Objective of the Project

Improvement of the regulatory function for reinforced operation of LEPTS and authorization and approval of power projects

(2) Project Goal

Regulatory function in the power sector is enhanced.

(3) Overall Goal

The number of electric power facilities that suit LEPTS increases and the electric power is stably supplied.

(4) Project outputs and major indicators

Output 1: DOE's examination and inspection capabilities are enhanced.
Output 2: The capacity of DOE for supervising PDEM is enhanced.
Output 3: Understanding on LEPTS in target provinces is improved.

Project Purpose Indicators:

- A. The number of reviewed project documents by DOE based on the practical examination instructions.
- B. The number of inspection activities by DOE based on the practical inspection instructions.
- C. The number of reviewed project documents by PDEM based on the practical examination instructions.
- D. The number of electric power facilities reports from PDEM to DOE.
- E. The number of internal inspection activities by EDL based on the practical inspection instructions.
- F. Electric Power facilities reports from EDL to DOE include the matter related to LEPTS.

Overall Goal Indicators:

- A. The total number of DOE-approved electric power facilities.
- B. The total number of unplanned power cuts.

Output 1 Indicators:

- A. The practical examination and inspection instructions from DOE are formulated.
- B. Examination of documents and on-site inspections are conducted properly based on LEPTS.
- C. Improvement of institutional arrangement for regulatory function of DOE.

Output 2 Indicators:

- A. LEPTS trainers' ability as trainer is improved.
- B. The practical examination and inspection instructions are formulated.
- C. Inspection recording forms for PDEM are revised.
- D. Case books are continuously revised.

Output 3 Indicators:

- A. Seminars on LEPTS are conducted in target provinces.
- B. Participants' understanding on LEPTS is improved.
- C. User-friendly case books are formulated.
- D. Case books are continuously revised.

(5) Project Area

The Project area is all of Laos.

(6) Implementing Agencies

(Laos) DOE and PDEM

(Japan) JICA

(7) Target group

(Primary) DOE and selected PDEMs (Champasak, Savannakhet and Xieng Khouang)

(Secondary) EDL

1.3. Work schedule

The Project was implemented approximately for 2 and half years divided into 2 phases: the 1st phase from September 2010 to December 2011; and the 2nd Phase from January 2012 to March 2013. Attachment II shows the work schedule which indicates each activity and conducted period (result).

2. Status and issues before the Project

This Section highlights the status and issues related LEPTS and its implementation such as regulatory and organizational framework, technical level of the counterparts (C/Ps), results and plan of examination and inspection (E&I) and human capacity development when the Project started in October 2010.

2.1. Laws related to power sector and organizational setups

(1) Promulgation of LEPTS

With the assistance of JICA through the STEP I (implemented from May 2000 to April 2003), GOL promulgated LEPTS in the form of a ministerial decree based on Article 23 of the Electricity Law, which was effectuated in 1997. The major aims are a stable supply of electricity, assurance of public safety and security, and protection of the environment. In May 2007, it embarked on development of the human resources required for guidance in power technology and examination and inspection based on LEPTS, again with assistance provided by JICA through the STEP II (implemented from January 2005 to January 2008). In the STEP II, it also prepared the Guideline on Operating and Managing Lao Electrical Power Technical Standards (hereinafter referred to as the "Guideline") and the Safety Rules for Operation and Maintenance (hereinafter referred to as the "Safety Rules"), and promulgated them in the form of an decree of the Ministry of Energy and Mines (MEM).

The DOE had used LEPTS, the Guideline, and internal manuals such as examination and inspection manuals and explanations in its examination of power facilities. However, besides improvement of skills in the technical aspect due to a shortage of experience and knowledge, it faced the need for conditioning of organizational setups in areas such as arrangements for examination and inspection, and fines for violation of standards.

(2) Setup for examination and inspection of power facilities

The electric power enterprises made applications to the DOE for E&I, and eight members of the LEPTS Regulatory Unit (established in September 2007) of the DOE Electricity Power Management Division implemented the E&I as one of the major works. There was a worldwide trend toward separation of regulations in the power sector (i.e., business licenses, tariff-setting, and examination/inspection) from governmental functions such as policy-making and promotion of development, and to have the former seated in independent institutions established for this purpose. Steps such as a rise in the status of the Unit to that of a division and creation of an independent examination institution are under consideration, but there had been no actual movement in this direction. On the provincial level, the DOE was trying to assist PDEM for PDEMs to conduct inspections, however, there were not so many activities recorded.

Meanwhile, applications for hydropower independent power producers (IPPs) were made not to the DOE, but to the Department of Energy Promotion and Development (DEPD¹) under the MEM. The IPPs were then awarded contracts as contracts for development agreements (FDA), as well as submission of quarterly reports. For this reason, applications for examination and inspection were received at the DEPD and forwarded to the DOE. In addition, staffs of the DOE Power Sector Planning Division implemented technical examinations for feasibility studies (F/S) for hydropower IPPs, and there consequently seemed to be two examination routes, as shown in the following diagram.

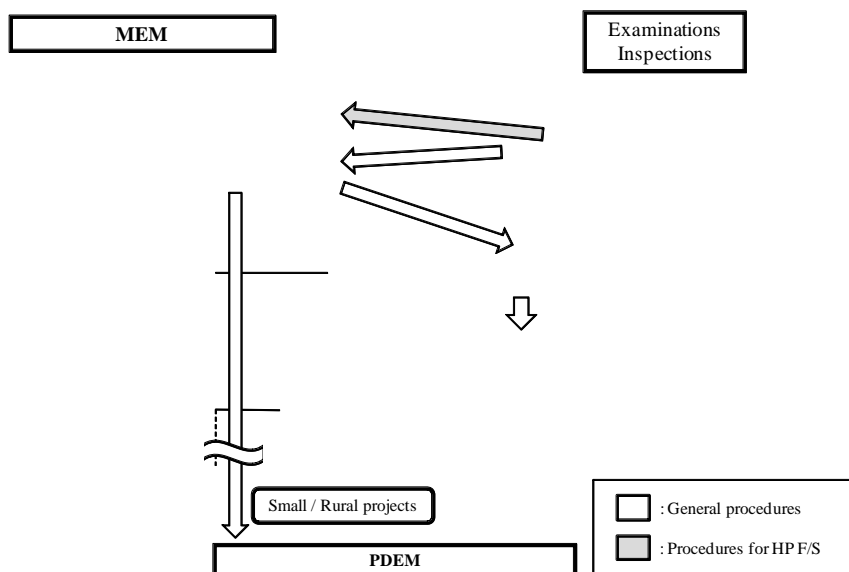


Figure 2-1: Setup for power facility examination and inspection (MEM - PDEM)

For newly begun work of examination and inspection, however, a group of only eight personnel at the LEPTS Regulatory Unit was handling applications, and this was in addition to their regular duties. There were issues to be solved in respect of the shortage of travel expenses and the technology level and budget shortages at the PDEMs.

2.2. Division of roles in examinations and inspections based on technical standards

(1) Roles of DOE and PDEM

In the Guideline, a clear distinction was drawn in some cases between examinations and inspections that were to be performed by the national government (DOE) and those that were to be performed by the provincial governments (PDEM and district departments of energy and mines; DDEM), but not in others. The table below shows the division of roles in each field of

¹ The title has been changed into the Department of Energy Business (DEB) since December 2011.

technology. Aside from the field of hydropower, the Guideline merely indicated the need for examination and inspection at the stages of study, construction, and operation in certain output classes. As such, it could not be asserted that the division of roles between the national and provincial authorities was clearly defined.

Table 2-1: Categories of examination/inspection and roles in the Guideline

Field	Examination/ inspection category (roles)	Remarks
Hydropower	Responsibility for approval of applications lies with the MEM (DOE) for an output of more than 2,000 kW, PDEMs for not more than 2,000kW, and DDEMs for one of not more than 100 kW.	
Transmission/ Substation	Need for application and approval, and reporting obligation, in the case of facilities with a voltage of 100 kV or over. Need only for reports in the cases of sub-100-kV facilities.	
Distribution	Division of facilities into three classes (big, medium, and small) based on the size of transformers and distance of distribution line extension, and statement of need for application and approval in each class	No clear role demarcation between national and provincial authorities

(Source) Guideline on Operating and Managing Lao Electric Power Technical Standards.

(2) Roles of DOE and EDL

The EDL is a state enterprise under the MEM's umbrella, owned wholly by the government. It performs all generation, transmission, and distribution operations in the major power systems of Laos (later, generation section became privatized as the EDL-Gen). It had its engineer take part in the formulation of LEPTS, the Guideline, and the Safety Rules in STEP I and STEP II. Many of its engineers also passed the exam for the LEPTS trainers (of the 23 people who had passed the exam by the end of STEP II, 14 were EDL technicians). As this indicated, it had constantly played an important role. Even after the completion of the STEP II, the EDL training center recruited personnel from EDL branches and hydropower stations to take part in the LEPTS training it implemented. As the power utility, the EDL has the responsibility to observe the Electricity Law and LEPTS.

2.3. Individual fields of technology in LEPTS

(1) Hydropower (civil engineering and electrical engineering)

i) Projects subject to examination and inspection

In the field of hydropower, development is mainly by private concerns acting as IPPs. As a result, many of the large-scale projects that are subject to examination and inspection are IPP projects executed by enterprises from other countries. Many of these IPP projects are facilities with an output of at least 100 MW and dams with a height in the area of 100 meters. These projects encompass important structures that contribute to public safety and security through stable operation of dams and flood control.

Table 2-2 lists major hydropower IPP projects under study or construction at the moment in Laos. Construction was to be undertaken during the period of the Project at several sites, including the Theun-Hinboun Expansion Project.

Table 2-2: Major hydropower IPP projects under way (as of August 31, 2010)

Project Name	Output (MW)	Province	Developer	Completion Year	Current Status
Theun-Hinboun Expansion	280	Bolikhambxay	EDL 60% Nordic GP 20%, etc.	2012	Inspection of dam foundation completed
Nam Ngum 2	615	Vientiane	EDL 25% C.Kanchang 28.5%, etc.	2010	Under test filling
Nam Ngum 5	120	Luangprabang	EDL 15%, Sinohydro 85%	2012	
Xekaman 3	250	Sekong	EDL 15%, VLP 85%	2010	
Nam Mouan	133	Bolikhambxay	Chubu Electric	—	MOU signed
Nam Ngiep 1	262.9+ 19.6	Bolikhambxay	Kansai 45% EGAT 30%, LHSE 25%	2018	PDA signed
Xe Katam	61.6	Champasak	Kansai Electric	2015	PDA signed

(Source) prepared by the consultant based on the DEPD website and interviews with the DOE.

ii) Status and issues related to hydropower technology

The diagram below shows the basic flow of examination and inspection for hydropower based on LEPTS.

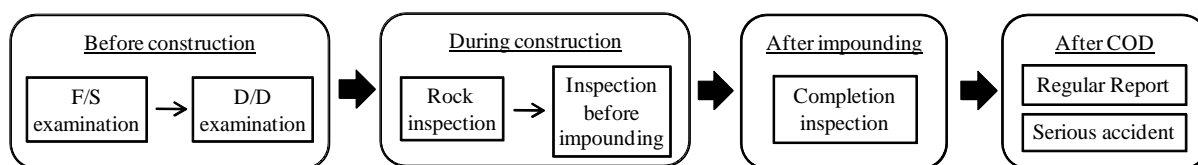


Figure 2-2: Flow of examination and inspection related to hydropower

Before construction, there is a two-stage examination of the F/S and the detailed design (D/D). The F/S assesses the feasibility of the project based on the generation plans and design of basic structures. The D/D concerns the detailed technical design of projects whose implementation has been determined. It was also noted that inspections of bedrock and inspections before first impounding during construction required a wide variety of checking items, and also noted that inspections of electrical facilities before operation required a wide variety of checking items. It was therefore necessary to determine minimum requisite examination and inspection methods that could be used even by the technically less-experienced inspectors.

(2) Transmission lines and substations

i) Projects subject to examination and inspection

Table 2-3 shows the major transmission and substation projects that were under construction or had recently commenced operation in Laos at that time. The transmission line between Nam Ngum 2 and Nabong - Udon 3 to send power from the Nam Ngum 2 power station to Thailand

was to be completed in 2010. The yen-loan project for construction of a 115-kV transmission line linking Pakxan, Thakhek, and Pakbo was also to be reach completion in 2011. Several other projects are slated for completion during the term of the Project.

Table 2-3: Major transmission and substation projects

Project name	Outline	Completion year
Pakxan -Thakhek - Pakbo	115-kV transmission lines (two circuits), reinforcement of three substations	2011 completed
Xeset1 - Saravan	115-kV transmission lines (two circuits), addition of one new substation equipped with two 115/22-kV transformers	2011
Ban Hat - SteungTreng (Cambodia)	115-kV transmission lines (two circuits), reinforcement of one substation (Laos side)	2011
Nam Ngum 2 - Nabong	230-kV transmission lines (two circuits)	2010 completed
Nabong – Udon 3 (Thai)	500-kV transmission lines (two circuits, operation at 230 kV)	2010 completed
Xeset 2 - Paxong	115-kV transmission lines (two circuits), addition of one new substation	2009 completed
Nam Theun2 -Roi Et (Thai)	500-kV transmission lines (two circuits), addition one new substation (Laos side)	2009 completed

ii) Status and issues related to transmission and substation technology

The diagram below shows the basic flow of examination and inspection for transmission and substation based on LEPTS.

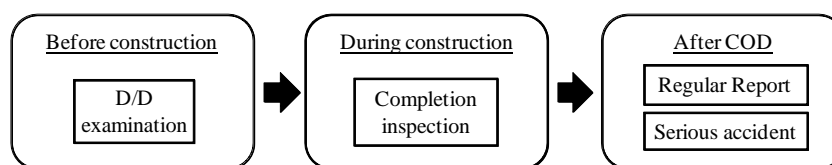


Figure 2-3: Flow of examination and inspection related to transmission and substation

In Laos, the power system was still frail, and there was a high risk that a single accident would immediately disrupt supply of power. The future would presumably bring an increase in facilities with an extra-high voltage (230 - 500 kV) on international interconnection lines, for example.

(3) Distribution lines

i) Projects subject to examination and inspection

Many distribution projects were under way for improvement of distribution networks for rural electrification (RE) and in connection with power source development. Examination and inspection of distribution facilities based on LEPTS were stipulated to be executed through the same flow as for transmission and transformation facilities.

ii) Status and issues related to distribution technology

Improvement of distribution networks was being undertaken throughout Laos in connection with RE and other projects. This pointed a need for an improvement of the technical level not only at the DOE but also at PDEMs, which had jurisdiction over provisional areas. Because they had limited staffs and may have lacked the requisite knowledge, PDEMs had weak organizational setups. For this reason, DOE personnel were sent to the provinces to implement on-site studies. In light of this situation, studies must be made to determine minimum requisite examination and inspection methods that may be applied by both the DOE and PDEMs for distribution network improvement.

Considering the large number of distribution network projects, it was thought to be difficult for the DOE and PDEMs to conduct proper examinations and inspections for all of them, given the current size of their staffs. This situation called for studies of ways to lighten the load of work accompanying examination and inspection, by approaches such as analysis of cases in which facilities failed to pass examinations and inspections under the existing setup, revision of the existing examination and inspection setup in correspondence with the scale of construction, and introduction of spot-check inspection.

2.4. Human resource development in LEPTS

(1) Preparation of manuals

Apart from LEPTS, the Guideline, and the Safety Rules, which had been legislated, the TA output included the Examination Manual, Inspection Manual, and Explanation for Lao Electric Power Technical Standards. These manuals were extensively used by the DOE as internal technical documents for its examinations and inspections. Refer to the table below.

Table 2-4: List of documents related to technical standards in Laos

Name	Language	Remarks
The Lao Electric Power Technical Standard	English -Lao	Ministerial Decree
Guideline on Operating and Managing Lao Electric Power Technical Standards and Safety Rules for Operation and Maintenance	English -Lao	Ministerial Decree
Examination Manual	English -Lao	Internal
Inspection Manual	English -Lao	Internal
Explanation for Lao Electric Power Technical Standard	English -Lao	Internal
Glossary for Terminology	English -Lao	Internal

The basic types of manual had been prepared, but it was necessary to check them for problems and ease of use. This was because, as indicated in the JICA report on the study for plan formulation, DOE personnel commented that they were not confident about whether the manuals covered the key points in the examination and inspection process for F/S and D/D.

(2) Training by EDL

Since STEP II, the EDL training center has provided a basic-level LEPTS training course to newly employed EDL and IPP engineers. Typical training course accepted between 12 and 15 participants, and carried out three to seven times annually in such areas as hydropower engineering and construction, hydropower generation, transmission, transformation, and distribution. The training course was taken place in a class room lecture in all subjects. Thus far, more than 500 personnel have received the training, which has become solidly established as a voluntary program on the Laotian side. The courses in more advanced level were, according to the center, integrated into the conventional training courses covering a variety of technical subjects.

Upon the completion of STEP II, a total of 23 DOE and EDL engineers had been trained and certified to act as the LEPTS trainers. Nevertheless, almost all the trainers in the EDL Training Center currently conducting the LEPTS course reportedly do not have much practical experience. This situation is a constraint as regards implementation of the LEPTS training, which requires practical knowledge.

Over the short or medium term, collection of a certain level of training fees enabling retrieval of the operating costs at the very least must be taken as a target. Over the longer term, it would be advisable to make a clear division of roles between DEM and EDL also in operation and guidance for the training itself.

3. Situation of the Counterpart Organization

As stipulated in the R/D, DOE under the MEM was the original counterpart organization the Project commenced. The Director General (DG) of DOE was assigned as the project director and the Deputy Director of Electric Power Management Division (EPMD), DOE was project manager.

DOE had long been solely in charge of the government administration of power sector in once under the Ministry of Industry and Handicraft (MIH) and then under the MEM since until the DEPD was established under MEM in 2006 as the coordinating organization power sector to promote private power development.

From the end of 2011 to the beginning of 2012, the organization of MEM was restructured as shown in Figure 3-1, and five technical divisions under DOE were reorganized into two departments and one institution, succeeding to DOE, as shown in Figure 3-2. New organizations started functioning after the assignment of management in February 2012, and the mandates (TOR: terms of reference) of DEPP, DEM and Institute of Renewable Energy and Promotion (IREP) were stipulated by the ministerial decree in May 2012.

Along with the restructuring of MEM, Mr. Viraphone VIRAVONG, the Director General of DOE and the project director of IPSM, has been promoted to a Vice-Minister of MEM, and Mr. Khammany INTHIRATH, the Managing Director of EDL, has also been appointed as a Vice-Minister of MEM. Mr. Khammany has taken charge of the Department of Energy Management, and succeeded to the project director of IPSM.

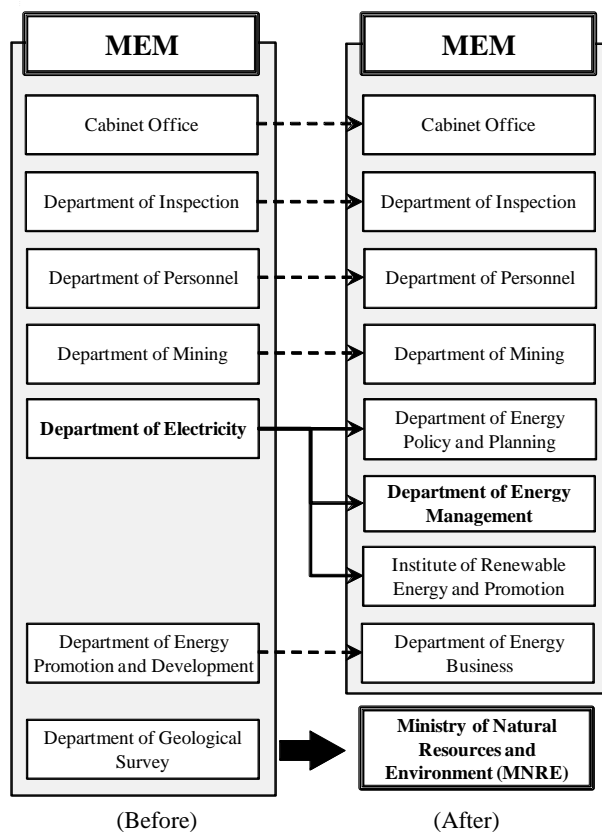


Figure 3-1: Restructuring of MEM

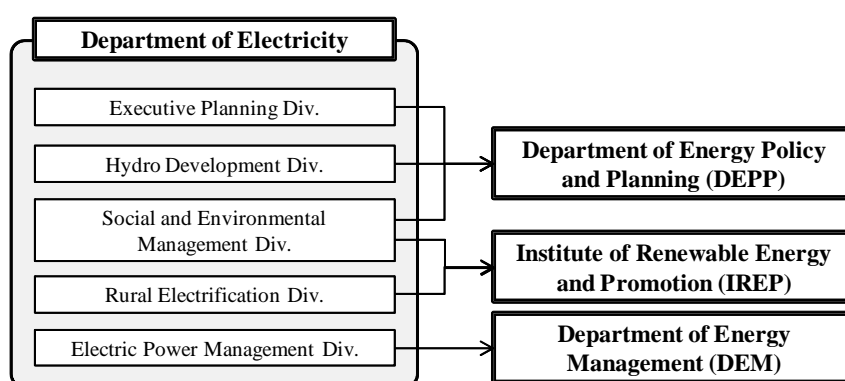


Figure 3-2: Reorganization of DOE

In this way, the counterpart organization was changed before and after the restructuring of MEM.

(1) Electric Power Management Division, DOE (October 2010 to April 2012)

The primary counterpart organization was the Electric Power Management Division (EPMD) of Department of Electricity (DOE) under the Ministry of Energy and Mines (MEM) from the beginning of the Project (October 2010) to April 2012. EPMD had 10 personnel under the Director, Mr. Bouatthep MALAYKHAM, and had the following functions:

- i) Drafting the legislation concerning electric power business,
- ii) Issuance and management of Licensing for private power entities,
- iii) Implementation of examination and inspection in compliance with LEPTS, and
- iv) Promotion of energy conservation.

Table 3-1: List of EPMD members (as of November 2011)

NAME	POSITION
1. Mr. Bouatthep MALAYKHAM	Director of Division
2. Mr. Houmphanh VONGPHACHAN	Deputy Director (IPSM Project Manager)
3. Mr. Veingsay CHANTHA	Substations, Hydropower Electrical Engineering, (Civil Engineering)
4. Mr. Thammanoune NAKHAVITH	Distribution Lines, Private Company
5. Ms. Santisouk PHIMPHACHANH	Ministerial Decree, Transmission Lines
6. Dr. Xayphone BOUNSOU	Ministerial Decree, Transmission Lines, Nuclear Power, (Civil Engineering)
7. Dr. Phoukhong SENGVILAY	Civil Engineering
8. Mr. Phouxay VIENGVIXAY	Distribution Lines, Private Company
9. Mr. Va YATHOTU	Hydropower Electrical Engineering, Substation
10. Mr. Lair PHIMPHISAME	Distribution Lines, Civil Engineering

(2) Department of Energy Management (May 2012 to March 2013)

As a result of restructuring of MEM, the primary counterpart organization, the Electric Power Management Division (EPMD) of Department of Electricity (DOE) under the Ministry of

Energy and Mines (MEM) was promoted to the department of energy management (DEM).

As shown in Attachment III, the Department of Energy Management (DEM) has four divisions: Administration Division, Power Export Projects Management Division (PEPMD), State-Owned Enterprises Management Division (SOEMD), and Energy Enterprise Management Division (EEMD). The authorities of three technical departments in the power sector regulation are summarized as below:

Division	Authorities in power sector regulation
PEMPD	IPP projects for export purpose
SOEMD	IPP projects for domestic supply and state-owned enterprises such EDL and ECI
EEMD	Licensing for private companies and distribution line projects

After the establishment of DEM, 10 engineers have been newly assigned to the three technical divisions in DEM. The members of three divisions under the Director General and two Deputies of the department are listed in Table 3-2.

Table 3-2: Counterpart members of IPSM project (as of November 2012)

	NAME	POSITION
1.	Mr. Sisoukane SAYARATH	Director General, DEM
2.	Mr. Bouathep MALAYKHAM	Deputy Director General, DEM
3.	Mr. Bounsy DETHAVONG	Deputy Director General, DEM
4.	Mr. Houmphanh VONGPHACHAN	Director, PEPMD, IPSM Project Manager, Substation
5.	Mr. Veingsay CHANTHA	Acting Director, SOEMD
6.	Mr. Thammanoune NAKHAVITH	Acting Director, EEMD
7.	Dr. Phoukhong SENGVILAY	Deputy Chief, PEPMD, Civil Engineering
8.	Mr. Phouxay VIENGVIXAY	PEPMD, Transmission Lines
9.	Mr. Va YATHOTU	PEPMD, Hydropower Electrical Eng.
10.	Mr. Lair PHIMPHISAME	SOEMD, Distribution Lines/Civil Eng.
(1)	Mr. Minist SYLTTANAYONG	SOEMD, Transmission Lines
(2)	Mr. Oudomsine KHAMSISOPHA	EEMD, Private Company
(3)	Mr. Sengphet KHOUNVISITH	EEMD, Distribution Lines
(4)	Mr. Soulisack LOUNTHALANGSY	EEMD, Distribution Lines
(5)	Ms. Khonesavanh SAKOUNKHOU	EEMD, Energy Efficiency
(6)	Mr. Kila KHONGSOMBOUN	PEPMD, Substations
(7)	Mr. Vannaphone VANNOUVONG	PEPMD, Transmission Lines
(8)	Mr. Southaphone SOUNDARA	SOEMD, Transmission Lines
(9)	Mr. Sonephuang LAWBOUNHOM	SOEMD, Substations
(10)	Mr. Hagla SAYSANASONGKHAM	SOEMD, Substations

4. Inputs from both countries

Laotian side and Japanese side prepared necessary inputs for the project implementation as stipulated in the record of discussions (R/D) and the minutes of meetings (M/M).

Laotian side assigned technical and administrative staff as the counterpart personnel detailed in Chapter 3, including the project director and the project manager, and provided an office space and necessary logistic support for the project implementation, including electricity, air-conditioning, water-supply and others.

Japanese side dispatched Japanese experts (the Experts) in the fields of hydropower civil engineering, hydropower electrical engineering, distribution lines, transmission lines/substations and development of training as detailed in the Chapter 5, and provided office equipment such as PCs and printers, and measuring instruments as detailed in the Chapter 10. Japanese side has also borne the local activity costs required for the project implementation such as transportation, fuel, office consumables and others, detailed in the Chapter 11.

5. Record of dispatched Japanese Experts

The table below shows the names and period of dispatch of the Japanese experts.

Assignment	Name	Period	
		Work-in Laos	Travel inclusive
Chief Advisor/ Hydropower Civil Engineering 1	MIURA Masahiko	Oct.25 - Nov.24, 2010	Oct.24 - Nov.25, 2010
		Dec. 9 - Dec.21, 2010	Dec. 8 - Dec.22, 2010
		Jan.18 - Mar.22, 2011	Jan.17 - Mar.23, 2011
		May 6 - Jun. 6, 2011	May 5 - Jun. 5, 2011
	NAKANISHI Hirokazu	Sep.26 - Oct. 22, 2011	Sep.25 - Oct.23, 2011
		Nov. 7 - Nov.30, 2011	Nov. 6 - Dec. 1, 2011
		Feb. 9 - Mar. 7, 2012	Feb. 8 - Mar. 8, 2012
		Apr.20 - May 1, 2012	Apr.19 - May 2, 2012
		May 31 - Jun.22, 2012	May 30 - Jun.23, 2012
		Aug.16 - Aug.28, 2012	Aug.15 - Aug.29, 2012
		Nov.22 - Dec.19, 2012	Nov.21 - Dec.20, 2012
		Jan.18 - Jan.30, 2013	Jan.17 - Jan.31, 2013
	Feb.27 - Mar.16, 2013	Feb.26 - Mar.17, 2013	
	Deputy Chief Advisor/ Hydropower Civil Engineering 2/ Institutional and Organizational Management	KAWAKAMI Yasuhiro	Oct.25 - Nov. 9, 2010
Dec. 7 - Dec.21, 2010			Dec. 6 - Dec.22, 2010
Feb.14 - Mar. 3, 2011			Feb.13 - Mar. 4, 2011
May 24 - Jun.25, 2011			May 23 - Jun.26, 2011
Jul.18 - Jul.29, 2011			Jul.17 - Jul.30, 2011
Sep.16 - Sep.29, 2011			Sep.15 - Sep.30, 2011
Oct.31 - Nov.12, 2011			Oct.30 - Nov.13, 2011
Jan.17 - Jan.26, 2012			Jan.16 - Jan.27, 2012
May 14 - May 26, 2012			May 13 - May 27, 2012
Oct. 9 - Oct.24, 2012			Oct. 8 - Oct.25, 2012
Feb. 8 - Feb.22, 2013	Feb. 8 - Feb.23, 2013		
Hydropower Electrical Engineering	FUJITA Hirofumi	Nov. 1 - Nov.19, 2010	Oct.31 - Nov.20, 2010
		Dec. 3 - Dec.21, 2010	Dec. 2 - Dec.22, 2010
		Feb. 4 - Feb.26, 2011	Feb. 3 - Feb.27, 2011
		May 26 - Jun.16, 2011	May 25 - Jun.17, 2011
		Aug. 5 - Aug.25, 2011	Aug. 4 - Aug.26, 2011
		Apr.20 - May 1, 2012	Apr.19 - May 2, 2012
		Feb.18 - Mar. 4, 2011	Feb.17 - Mar. 5, 2011
	KINOSHITA Hirokazu	May 9 - May 27, 2011	May 8 - May 28, 2011
		Jun.27 - Jul.15, 2011	Jun.26 - Jul.16, 2011
		Nov. 1 - Nov.22, 2011	Oct.31 - Nov.23, 2011
		Feb.14 - Mar. 8, 2012	Feb.13 - Mar. 9, 2012
		Oct.10 - Oct.30, 2012	Oct. 9 - Oct.31, 2012
		Feb.22 - Mar.14, 2013	Feb.21 - Mar.15, 2013
	NISHIO Akira	Apr.20 - May 1, 2012	Apr.19 - May 2, 2012
May 22 - Jun.22, 2012		May 21 - Jun.23, 2012	
Distribution Lines 1	FUKUNAGA Tatsumi	Nov.22 - Dec. 9, 2010	Nov.20 - Dec.10, 2010
		Feb.23 - Mar.11, 2011	Feb.22 - Mar.14, 2011
		Jun. 3 - Jun.15, 2011	Jun. 2 - Jun.16, 2011
	SHIKIMACHI Koji	Feb.28 - Mar.17, 2012	Feb.27 - Mar.18, 2012
		Jun.19 - Jul. 7, 2012	Jun.18 - Jul. 8, 2012
		Sep.20 - Oct.11, 2012	Sep.19 - Oct.12, 2012
		Jan.15 - Feb. 5, 2013	Jan. 14 - Feb. 6, 2013

Assignment	Name	Period	
		Work-in Laos	Travel inclusive
Distribution Lines 2	WADA Hideki	Nov.29 - Dec.16, 2010	Nov.27 - Dec.17, 2010
		Feb. 7 - Feb.25, 2011	Feb. 6 - Feb.27, 2011
		May 16 - Jun. 4, 2011	May 15 - Jun. 5, 2011
		Nov. 8 - Dec. 2, 2011	Nov. 9 - Dec. 3, 2011
		Feb. 14 - Mar. 2, 2012	Feb.13 - Mar. 3, 2012
		May 11 - Jun. 2, 2012	May 10 - Jun. 3, 2012
		Oct.10 - Oct.30, 2012	Oct. 9 - Nov. 1, 2012
Transmission Lines	MARUOKA Yoshio	Nov. 2 - Nov.23, 2010	Nov. 1 - Nov.24, 2010
		Jan.18 - Feb. 8, 2011	Jan.17 - Feb. 9, 2011
		May 26 - Jun.16, 2011	May 25 - Jun.17, 2011
		Sep.22 - Oct.13, 2011	Sep.21 - Oct.14, 2011
		Jan.31 - Feb.11, 2012	Jan.30 - Feb.12, 2012
	FUJIWARA Hiroaki	Feb. 6 - Feb.17, 2012	Feb. 5 - Feb.18, 2012
		May 22 - Jun.12, 2012	May 21 - Jun.13, 2012
Substations	NAKAI Masao	Nov.22 - Dec.10, 2010	Nov.20 - Dec.13, 2010
		Feb.18 - Mar.11, 2011	Feb.17 - Mar.12, 2011
		Jun.10 - Jul. 1, 2011	Jun. 9 - Jul. 2, 2011
	TAKAHASHI Kenta	Nov. 8 - Nov. 29, 2011	Nov. 7 - Nov.30, 2011
		Feb. 9 - Mar. 1, 2012	Feb. 8 - Mar. 2, 2012
		May 17 - Jun. 7, 2012	May 16 - Jun. 8, 2012
		Jan.18 - Feb. 5, 2013	Jan.17 - Feb. 6, 2013
Development of Training	ONOZAWA Masato	Oct.25 - Nov.12, 2010	Oct.24 - Nov.15, 2010
		Nov.29 - Dec.21, 2010	Nov.28 - Dec.22, 2010
		Feb.10 - Feb.25, 2011	Feb. 9 - Feb.26, 2011
		May 2 - Jun. 4, 2011	May 1 - Jun. 5, 2011
		Jul. 8 - Jul. 29, 2011	Jul. 7 - Jul.30, 2011
		Oct.24 - Dec. 2, 2011	Oct.23 - Dec. 3, 2011
		Feb. 2 - Mar. 6, 2012	Feb. 1 - Mar. 7, 2012
		May 7 - Jun. 3, 2012	May 6 - Jun. 4, 2012
		Jun.29 - Jul. 6, 2012	Jun. 28 - Jul. 7, 2012
		Oct.15 - Nov.16, 2012	Oct.14 - Nov.17, 2012
Jan.18 - Feb.23, 2013	Jan.17 - Feb.24, 2013		
Coordinator/ Assistant Hydropower Civil Engineering	SAWAI Yosuke	Oct. 25 - Nov. 12, 2010	Oct.24 - Nov.13, 2010
		Jan. 24 - Feb. 4, 2011	Jan.23 - Feb. 6, 2011
		May 9 - May 27, 2011	May 8 - May 28, 2011
	ODA Koji	Oct.30 - Nov.16, 2011	Oct.31 - Nov.17, 2011
		Jan.19 -Feb. 3, 2012	Jan.18 - Feb. 4, 2012
		May 21 - Jun.15, 2012	May 21 - Jun.16, 2012
		Nov.20 - Dec.11, 2012	Nov.19 - Dec.11, 2012
		Jan.15 - Feb. 9, 2013	Jan.14 - Feb.10, 2013

6. Results of activities

Based on the record of discussions (R/D) and the project design matrix (PDM) exchanged on July 16, 2010 between JICA and the Government of Lao PDR, individual activities of the project were conducted with the assistance of Japanese experts in order to improve the capacity for examination and inspection of electric power facilities. The results of activities are concisely reported in this chapter item by item according to the PDM and the TOR directed by JICA. Attachment IV(1) shows the pictures of the activities.

6.1. Drafting of activity plan and establishment of project implementation structure

(1) First phase (15 months from October 2010 to December 2011)

Three meetings about the draft activity plan were held before the first Joint Coordinating Committee (JCC). The Experts and the C/Ps discussed the methodologies and procedures for the project, and Mr. Hashimoto (JICA long-term expert to DOE) gave suggestions from his experience in the Laotian power sector.

The role of EDL to the project became one of the biggest issues on the discussion. The main objective of the project is to enhance the DOE's examination and inspection capabilities, so that the project cannot cover all activities with EDL, different from STEP I and II. It was tentatively concluded that the project would focus on the technical cooperation such as participation in field trainings, technical seminar, or practical use for EDL Training Center with EDL. These issues were decided to be discussed in the JCC.

(2) Second phase (15 months from January 2012 to March 2013)

The Experts drafted the activity plan for the second phase of the project before starting the first activities in Laos and made discussion with the C/Ps on January 19 and 26, 2012. The points of discussions were as follows:

- The second local seminar on the promotion of LEPTS understanding in Savannakhet scheduled in February had been postponed to May 2012 due to insufficient preparation resulting from the organizational restructuring of MEM (after the capacity needs of PDEM and seminar contents prepared);
- Although the C/Ps acknowledged the necessity of long-term plan for power sector regulation, they insisted that the title should be changed into the "guidance expected to be a road map" since the word "roadmap" seemed too authoritative.
- Regarding the technical level of the examination, all C/Ps agreed that they would acquire at least Level 1 (formality examination) and Level 2 (preliminary examination) by the end of IPSM, and that further levels could be acquired based on the technical levels of the C/Ps.

- The C/Ps agreed that examination would be conducted targeting the Form 2 (basic technical features and attached documents such as calculation documents and relevant drawings), and that the design documents would be tentatively called the basic design (B/D) instead of the detailed design (D/D) to avoid misunderstanding and confusion²
- The C/Ps and the Experts prepare the list of documents, which should be submitted by the developer, for the procedure of examination and inspection. The list would be attached to PDA and CA after authorized by MEM.

The activity plan for the second phase was finalized taking into consideration the above discussion and agreement, and submitted to JICA and the C/Ps on March 16, 2012.

6.2. Drafting of Review Report and specific suggestions for improvement

(1) Drafting of Review Report

The draft Review Report was prepared in December 2010 through the interview to the C/Ps, site visits, participation in the examinations and the small workshop on the work analysis. Then the final Review Report was submitted to the DOE with additional information such as the OJT and the pre-seminar on the promotion of LEPTS understanding in Vientiane.

It was highlighted that the strong necessity of technical concept understanding for LEPTS articles with calculation methods together with the necessity of the efficiency for E&I procedures for the revision of the Guideline were raised. Also necessities of understanding were raised on the LEPTS procedures and field inspection methodologies for mini-hydropower and distribution facilities from PDEMs.

(2) Specific suggestions for improvement

The following five issues were suggested in the Review Report in March 2011 as important ones to reach the project goal, and the project activities were conducted considering these suggestions. This section describes the current status of the issues indicated in the Review Report.

i) DOE's power to enforce LEPTS as the GOL engineer to Developers

As of March 2011, the DEPD was the coordinating organization for the developers to submit regular report, application form for examination/inspection, etc in the Government. Those reports included financial, technical and social-environmental aspects. All reports had to be submitted through DEPD while DOE, which had 2 divisions for examination (F/S by Power System Planning Div. and D/D by EPMD), was in charge of technical issues, and this process sometimes made communication delay and misunderstanding between DOE and developers. It

²In most cases, developers conduct D/D after the conclusion of concession agreement (CA) while the information included in B/D is required to conclude CA and examination should be conducted before CA.

was necessary to create more efficient procedure to secure the DOE's position as the GOL engineer (regulator) as shown in Figure 6-1.

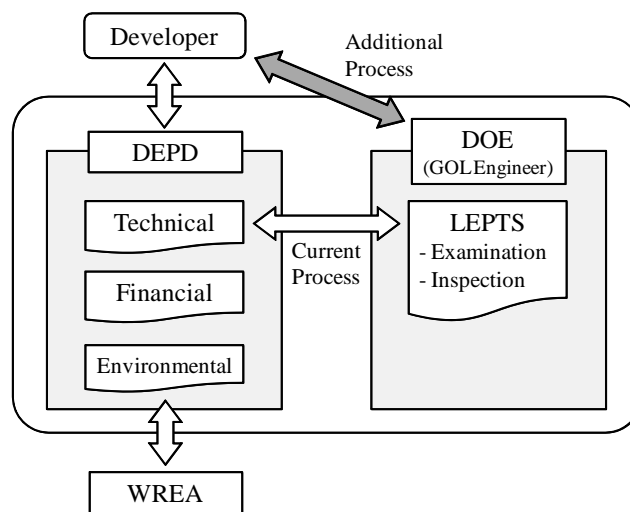


Figure 6-1: New procedure of project documents to DOE

Currently, the role of DEB (former DEP) to receive all documents from developers has not changed even if the internal organizational re-structure was made in May 2012. On the other hand, the EPMD promoted to the DEM and its responsibility as the regulator became clearer to the developer with some practical experiences of E&I.

ii) Target organization for examination/inspection as first priority

DOE had already started examination and inspection for the hydropower IPP projects, but had not started it for the EDL projects. For the JICA transmission project by EDL, though inspection was planned to be conducted in April 2011 as the first inspection in the field, application form for inspection was not submitted. So, the C/Ps joined field inspection as OJT with the Experts.

In phase 2 of the Project, the Experts confirmed E&I status of EDL through visit to EDL and interviews and proposed that the results of EDL self E&I can be acknowledged same level as the results following LEPTS. This issue is described in "Guidance to Roadmap for Power Sector Regulation (Draft)"

iii) Regulatory function regarding LEPTS

There were many issues still remaining regarding the operational aspects on LEPTS. For example, some developers may have not understood or neglected LEPTS and that caused the lack of the necessary procedure and presence of the malfunction facilities.

The GOL had already started taking some actions to let the developers understand the necessity of LEPTS (e.g. attaching LEPTS information and responsible agencies on MOU (table of contents of F/S)). In the second phase of the project, the Experts drafted the necessary procedure and documents as the attachment of CA.

These activities to promote the understanding of LEPTS should be conducted continuously with more confident and strong technical instructions. The DEM staff, therefore, as the regular should enhance the individual capacity with concrete technical concepts to ensure the public safety and stable power supply throughout the country.

iv) Recommendation on the steps to be taken for enhancement of the capacity

It was recommended in the Review Report to take the first step to understand and categorize the articles, flow (procedure) and forms. The Experts prepared the revised procedures for examination and inspection for both large and small scale projects were revised in April 2012 as described in 6.3 (1). The necessity for the C/Ps to understand the technical requirement with the calculation (methodologies) was pointed out. Some issues below were clarified in the Report as critical issues against the public safety and stable power supply:

- Design flood and dam stability (hydropower civil engineering);
- Design concept of emergency water interpretation devices (hydro electrical engineering), and
- Prevention of entry or touching from high-medium voltage electric facilities with sufficient distance and/or tall fences (transmission lines, substations and distribution lines).

Based on the preliminary concepts above, various instructions with OJT were prepared by the Experts step by step as described in 6.3.

v) Confirmation/ verification of the capacity development

The Project Design Matrix (PDM) of the Project signed between the DOE and JICA in July 2010 stipulates the indicators to verify the project goals as follows:

- A. The number of reviewed project documents by DOE based on the practical examination instructions.
- B. The number of inspection activities by DOE based on the practical inspection instructions.
- C. The number of reviewed project documents by PDEM based on the practical examination instructions.
- D. The number of electric power facilities reports from PDEM to DOE.
- E. The number of internal inspection activities by EDL based on the practical inspection instructions.
- F. Electric Power facilities reports from EDL to DOE include the matter related to LEPTS.

In the Review Report, the necessary was pointed out to consider how to measure or obtain these indicators, or to consider if other indicators to be selected or not. Discussions were made in the 2nd JCC in November 2011 and concluded to leave the indicators as stipulated in the PDM.

Indicators related to PDEM and EDL could not be achieved after the activities in the second phase of the Project. However, the consultation of the roles and responsibilities of PDEM and EDL has been carried out throughout the second phase and the Experts proposed in the”

Guidance to Roadmap for Power Sector Regulation (Draft)”.

6.3. Formulation of instructions and case books, and implementation of examination and field inspection using instructions

(1) Review of procedures for examination and inspection

Procedures (flow diagrams) for examination and inspection for both large and small scale projects were revised in April 2012 and attached to the Instructions and Casebooks with checklists for E&I. A clear framework of information sharing system within the MEM has not yet established, however, practically DEB, DEPP and DEM work closely rather than before the restructure within the MEM. The planned meetings of the information sharing on energy sector including regulation within MEM and outside MEM for PDEM and related Ministries have not been held yet.

Currently, F/S is examined by the DEPP and DEM is in charge of B/D and inspections. The roles of the divisions within the DEM are still unclear partly. The EPMD is in charge of the IPP projects for exportation and SOEMD is in charge of the state-owned companies such as EDL and Electricity Construction and Installation (ECI). The responsible division is not clear for the projects owned by IPPs for supplying electricity to the domestic market even if the EPMD has experienced inspections to the IPP projects by foreign investors to domestic supply.

(2) Formulation of Instructions and Casebooks

The Experts drafted the first Instructions and Casebooks in March 2011 and modified them in July 2011 through OJTs, actual inspections and discussion with the C/Ps. The Instructions was originally prepared for use in the site inspection including necessary forms to be submitted by the developers. The Casebooks was prepared to improve the understanding of LEPTS by visualized digest of the articles using actual pictures with good and bad cases.

It was requested by Lao side that contents related on examination to be included in November 2011 during the 2nd JCC. The Experts prepared the checklists for examination including several levels (explained hereafter). Finally the development procedure, checklists for examination, forms to be submitted, field checklists and Casebooks were combined field by field into one file in July 2012.

(3) Results of actual field inspections using instructions

Authoritative inspection in compliance with LEPTS was conducted for five IPP projects with the support of the Experts, as listed in Table 6-1. Most of the inspections were related to hydro civil engineering such as inspection of dam foundation and inspection prior to first impounding. Inspection for Nam Nhone was to be conducted by Bokeo PDEM with DOE's technical assistance.

Table 6-1: Inspection conducted with the Experts

No.	Date	Project & Stage	HC	HE	T/L	S/S	D/L
1	Jun. 14 - 16, 2011	Theun-Hinboun HPP Exp. (Inspection prior to first impounding)	✓				
2	Sep. 24 - 27, 2011	Nam Nhone HPP (Inspection before commercial operation)	✓	✓		✓	
3	Nov. 7 - 9, 2011	Nam Theun 2 HPP (Accident (landslide) investigation)			✓		
4	Feb. 6 - 9, 2012	Nam Ngum 5 hydropower project (Inspection prior to first impounding)	✓				
5	May 23 - 26, 2012	Hongsa Lignite Thermal Power Project (Inspection of dam foundation)	✓				
6	Jun. 4 - 6, 2012	Nam Ngum 5 Hydropower Project (Re-inspection prior to first impounding)	✓				

Other than those above, the C/Ps conducted inspections by themselves in the later period of the project as listed in Table 6-2. As output of Nam Sana (14MW) is less than 15MW, inspection should have been conducted by Vientiane PDEM. However, DEM carried out inspection instead of PDEM because PDEM did not have enough time and skills for the inspection.

Table 6-2: Inspection conducted by the C/Ps

No.	Date	Project & Stage	HC	HE	T/L	S/S	D/L
1	Feb. 13-16, 2012	Xekaman 1 hydropower project (Inspection of dam foundation)	✓				
2	Feb.16-19, 2012	Houay Lamphan Gnail (Inspection of dam foundation)	✓				
3	Jul. 5-10, 2012	Xekaman 3 hydropower project (Inspection before commercial operation)	✓	✓	✓	✓	
4	Oct. 4-5, 22-29 2012	Nam Ngum 5 hydropower project (Inspection before commercial operation)	✓	✓	✓	✓	
5	Jan.3-5,2013	Nam Sana (Inspection of dam foundation)	✓				
6	Jan.5-8, 2013	Nam Khan2 (Inspection of dam foundation)	✓				

(4) Field OJT on inspection

Japanese experts carried out OJT training on field inspection as shown in Table 6-3 in mostly the first phase of the project. The purposes of the training are 1) to identify current inspection method and procedures by attending DEM's field inspection, 2) to advise the C/Ps proper inspection following LEPTS requirements, and 3) to help the C/Ps attain appropriate attitude and behavior as LEPTS inspector through simulated situation of OJT. In addition, D/L field uses the OJT to test teaching materials prepared for the provincial seminar to improve the level of completion.

Table 6-3: Field OJT for simulated inspection

No.	Date	Project & Stage	HC	HE	T/L	S/S	D/L
1	Feb. 2 - 4, 2011	Paksan - Pakbo T/L (under construction)			✓		
2	Feb. 21 - 23, 2011	Theun - Hinboun HPP Exp. (under construction)	✓	✓	✓	✓	
3	Feb.17, 2011	D/L facilities in Vientiane Province					✓
4	May 18 - 20, 2011	Nam Ngum 2 HPP (existing)	✓	✓			
5	May 25 - 26, 2011	Phonhong, Vang Vieng D/L (existing and COD)					✓
6	Jul. 14, 2011	Nam Ngum 1 HPP (existing)		✓			
7	Aug. 18 - 19, 2011	Nam Ngum 1 HPP, Naxaython S/S (existing)		✓		✓	
8	Feb.28, 2012	Shifting DL facilities due to road expansion in Donenokhoum Village, Vientiane Capital					✓
9	Feb. 29, 2012	Thanaleng Substation				✓	
10	May 31, 2012	Nam Mang 3 Hydropower station (existing)		✓	✓	✓	
11	Jul. 2 - 3, 2012	D/L facilities in Vientiane Province					✓

Attachment IV(2) shows the record of actual field inspections and field OJT on inspections mentioned above.

(5) Technical assistance to DEM (DOE) for capacity development of PDEM

i) Conducting capacity needs assessment of PDEM

In order for MEM to extend support to PDEM, a needs assessment was proposed. To do so, a questionnaire was submitted to each PDEM prior to the seminar for small hydropower development in February 2012 to assess PDEM's general information and capacity related to LEPTS. Sample questions included general information (staff, education, technical fields, etc.) and LEPTS-specific issues (frequency of examination and inspection, etc.)

Initially, it was expected to collect all the questionnaire form prior to the seminar. Some PDEMs failed to submit the form for the deadline. In addition some data was not clear enough to analyze (due to shortage of data input, unclear hand-writing, missing of scanned document, and lack of translation, etc.). So the following analysis forced to be somehow sketchy and not complete.

ii) Results of the assessment

The assessment provided basic information to carry out tasks effectively to disseminate LEPTS wider to provinces. As a result, following issues related to the project were identified:

First of all, the current PDEM and its staffing level are very limited. A typical PDEM consists of 10 to 25 staff members to work in the three divisions of administration, energy (power) and mines. Those who work in the energy sector are limited to 10 staff members or less. It was found that most employees attained at least secondary education (diploma) and the half the employees are completed higher education (graduate). Of all employees of PDEM, a quarter of them completed engineering background. Of all electric power engineers, only four are civil engineering in training and another four staff are mechanical engineering. As the needs of development of small hydro, and the human resources needs in civil engineers are high, staffing

needs of the respective discipline is very high. Such human resources needs of civil engineer are quite common across offices of MEM. Shortage of well-trained civil engineers seems to be a fundamental technological challenge facing in Lao PDR.

Second, PDEM's organizational and institutional positioning determines its roles and responsibilities in power development in provincial level. It has contradicting mission of regulating (representing the authority of DEB) and promoting electric power development (representing the authority of DEB, DEPP and IREP) in Lao PDR. Because it is based on provinces, it has strong tie and relationship with provincial government. PDEM is expected to promote electric power development as a part of provincial administration because promotion of rural electrification in Lao PDR is one of top priority areas of the government of Lao PDR. In the response to the questionnaire survey, training needs of carrying out planning of electric power development and selection of potential sites are identified as high priority areas. In connection with such training needs, PDEM requests provision of tools and equipment necessary for conducting planning and site survey, etc. It was obvious that the role of promoting the power development is highlighted because electrification of rural area is considered one of the major priority areas of development of Lao PDR.

Third, their understanding on the Electricity Law, LEPTS and their procedures varied by province to province. Many PDEMs claimed that practical experiences were lacking. They shared concerns on examination and inspection of development of power facilities based on LEPTS is far from fully confident. Particularly, hydropower civil engineering and hydropower electric engineering were among the areas of difficulty.

Lastly, combined with the diversity of electrification in provinces in Lao PDR, development need of electric power sector in provinces has a great variety. Despite such diversity, (1) small hydro development, (2) D/L networks, and (3) photovoltaic were among the most interested areas of technology for them.

iii) Competency necessary for carrying out the works of PDEM

According to the result of the competency analysis for PDEM, the capacity necessary for PDEM included: a) administration capacity (including enforcement of LEPTS), b) promotion of electric power development, and c) technologically-specific capacity related to development of power facilities. In addition, d) engineering and project management capacity fundamentally support above three capacities was identified. These capacities were inter-related and were important for the services of PDEM. Of the four categories, c) is very different from others from the view of employees of the public sector. The item c) is important for respective field of engineers in the private sector such as developers or consultants. In reality, the C/Ps wanted to increase the capacity of c) technologically-specific capacity related to development of power facilities, and d) engineering and project management capacity fundamentally support above three capacities.

In addition, strengthening the item d) employing the framework of the Japanese technical cooperation schematics is very difficult if the target is in-service³.

Among these items, the most important ones for officers of PDEM as a branch of Lao government are the items a) and b). These two items are very significant because they are considered as one of “core competency” of executing PDEM and are not entrusted to anybody. In the other hand, the item c) may be substitutable to other entities. Similar outcomes derived from empowered item c) may be obtained as output from out-sourcing by hiring external consultants or, if requests are well designed, engineers employed by developers’ expenses⁴. In relation to the purpose of this project, the item a) shall be the highest priority among others. For example, LEPTS procedures prescribed in the Article should be strengthened with a highest priority. Out of many agenda, the proposed provincial seminars to be organized would cover practical examination and inspection. As discussed the Table 6-11 in section 6.5, the Level 1: Formality Examination shall be the minimum requirement for PDEM to understand and to practice.

iv) Preparation of revised inspection recording forms for PDEM

It was realized that uniform recording forms for PDEM did not exist throughout the consultation to the C/Ps and PDEMs (for example, a PDEM used the record of EDL self-inspection as the attachment of the letter of approval). It is advisable for DEM to continue holding seminars for PDEMs to use same checklists prepared by the Project.

6.4. Institutional improvement for enhancing regulatory function of DOE

(1) Institutional arrangement for strengthening of regulatory function in the first stage of the Project

In the beginning of the Project (from October 2010 to March 2011), DOE was in the process of establishing their internal operation on LEPTS and the Guideline. As first step, the Experts assisted DOE to formulate the Interim Letter of Approval for the F/S, Final Letter of Approval and Certificate of Completion for Commercial Operation Date (COD), and also advised DOE on the internal roles for examination/ inspection and the budgeting of examination/ inspection.

The work flow from F/S through the construction stage into the commercial operation was modified more practically and efficiently. Also TOR was drafted for DOE to represent themselves as the GOL Engineer to carry out regulatory works based on LEPTS. In addition,

³ Strengthening capacity of general subjects in engineering aims broad knowledge and skills to comprehend whole area of the subject. It is not an aim of training, and is an aim of formal education. This approach is not suitable for in-service “training”. If a donor would like to intervene the target population to strengthen this area, the most realistic and effective approaches include, study abroad or domestic colleges, or initiating them to study by oneself by giving various incentive such as promotion and salary raise. For new recruits, as a long-term strategy, improvement of examination allowing only technologically competent applicants is accepted.

⁴ The former is a proposal presented by the Vice Minister Viravong; the latter is an approach Japanese regulator practices commonly.

draft letters/certificates basically issued by DOE for interim F/S notification, F/S completion and completion of construction, and a list of necessary documents submitted each stage from the developers to DOE in were prepared in line with the above-mentioned works. For example, DOE experienced a series of regulatory works for THXP inspections prior to the first impounding. They include such tasks as: receiving necessary applications with technical forms from the developer in advance; preparing for the inspection; conducting the inspection at the site; and issuing the letter of completion with M/M. Because of the good experience, the flow of examination/inspection became more realistic.

The Policy for regulation within MEM and institutional issues were discussed through the series of discussions such as the meeting with EPMD members and the DG of DOE, and JCC meeting. One of the biggest issues is whether the regulatory function by LEPTS could start from F/S stage or not. Finally, it was decided that the DEPP would be in charge of the examination of F/S.

(2) Clarification of roles of relevant agencies and optimization of regulatory flow diagram

i) Discussion with DEB and DEPP

Before drafting the guidance (roadmap), the Experts and the C/Ps jointly made discussions on the following critical issues for power sector regulation with DEB and DEPP separately, which were raised and discussed in the second JCC in November 2011.

- 1) Role demarcation among the departments under MEM as the “Responsible Agency for Electric Power Development (RAEPD)” prescribed in the Guideline,
- 2) Dissemination of LEPTS and its Guideline to the private developers (IPPs), and
- 3) Measures of sharing information on the progress of on-going IPP projects among MEM.

With the material shown in the Attachment IV(3), the Experts explained the background and the necessity of discussion at first. The summary of discussion was as follows:

(a) Department of Energy Business (DEB)

Mr. Chanthaboun SOUKALOUNE, Deputy Director General and two officers from DEB, and Mr. Houmphanh, Mr. Veingsay and Ms. Santisouk from DEM attended the discussion along with the Experts on February 23, 2012.

Topic 1):

- DEB is the one-stop counter for IPP development, which should keep up with all the matters relating to IPP development including technical, environmental, economical, financial and other ones. However, DEB has no responsibility as an RAEPD according to its mandate, so that the role demarcation should be corrected as Attachment IV(3) (red-letter).
- The TOR of DEB has been unchanged from that of EPD, which are disclosed in its website.

Topic 2):

- DEB agreed on that CA is the final agreement with a developer and basic design should be approved by DEM before CA conclusion. In the past, CA's on some projects had been concluded without the approval of basic design due to the lack of understanding of LEPTS.
- DEB suggested that some explanation documents and seminars on LEPTS be necessary for the government officers concerned in the private electricity business to avoid such wrong procedures.
- DEB however has objected the attachment of summarized explanation on LEPTS to CA and/or PDA since LEPTS is a law of Lao PDR and every business entity should observe it completely. Such attachment may mislead developers into believing that they should observe only the attachment and not total LEPTS.

Topic 3):

- The Experts proposed that MEM have kind of periodical coordination meeting to share the information on the progress of IPP projects as agreed in the second JCC.
- DEB insisted that such meeting would be useless and unnecessary if the TORs of each department were defined explicitly and unambiguously without duplication or hiatus.

(b) Department of Energy Policy and Planning (DEPP)

Mr. Chansaveng BOUNEGNONG, Deputy Director General of DEPP, and Mr. Bouathep from DEM participated in the meeting on February 27, 2012.

Topic 1):

- Other responsibilities should be added than the existing ones. For example, the environmental division under DEPP has taken the responsibility for Initial Environmental Examination (IEE) of electric power projects, which should be included in the responsibilities of RAEPD.

Topic 2):

- The brief explanation should be attached to not only CA and PDA but MOU now that the Electricity Law has been amended and some of the existing MOU and PDA would be cancelled⁵.
- Mr. Chansaveng and Mr. Bouathep recognized such attachment would be effective and indispensable for IPP developers to understand the contents of LEPTS.

(c) Conclusions

- Although DEB, DEPP and DEM have different opinions on the summarized explanation attached to CA/PDA, they agreed that such explanation would be useful to understand the approval procedures prescribed in LEPTS and IPP procedures. The Experts prepared the

⁵Under the amended Electricity Law in 2012, the extension of MOU can be extended only once, and that of PDA can be twice for export projects.

procedure and the documents which will be attached in MOU, PDA/CA.

- Further information on the progress of IPP projects are necessary to conduct inspection during the project, such as excavation of dam foundation, first impounding and completion of construction.

(3) Implementation of well-planned examination and inspection

i) Projects in the pipeline

DEB provided the latest information on the progress of IPP projects on the occasion modifying the project list in Attachment IV(4). Those six projects are subject to inspection by DEM, and the inspection before first impounding at Nam Ngum 5 and the inspection of dam foundation at Xekaman 1 have actually been conducted during the period as stated in the following part.

Table 6-4: List of IPP projects under construction

No.	Name of Project	Location Province	Installed Capacity (MW)	COD	Planned Market	Remarks (As of Dec. '11)
1	Hongsa lignite thermal	Xayaboury	1,878	2015	Laos/Thailand	Progress Construction 9.1%
2	Nam Ngum 5	Luangprabang/ Xiengkhouang	120	2012	Laos	Progress Construction 80.6%
3	Nam Ngiep 2	Xiengkhouang	180	2015		Under Construction
4	Theun - Hinboun Expansion	Bolikhamxay	220+60	2012	Laos/Thailand	Progress Construction 96%
5	Xekaman 3	Sekong	250	2012	Laos/Vietnam	Progress Construction 96.18%
6	Xekaman 1	Attapeu	322	2015	Vietnam/Laos	Progress Construction 11.6%

In the meantime, small hydro projects with the capacity of less than 15 MW which are subject to inspection by PDEM are listed in Table 6-6.

Table 6-5: List of EDL projects under construction (As of Aug. 2012)

No.	Name of Project	Location Province	Installed Capacity (MW)	Annual Energy (GWh/y)	Commencement of construction	COD	EPC contractor
1	Houay Lamphan Gnai	Sekong	88	480	May 2011.	2015	Gezhouba Group (China)
2	Nam Khan 2	Luangprabang	130	558	Dec. 2011.	2015	Sinohydro (China)
3	Nam Sana	Vientiane	14	49.6		2014	NawaratPatanakarn PCL (Thailand)
4	Nam Song	Vientiane	6	25		2012	Angelique International Ltd. (India)

Table 6-6: List of small IPP projects (<15 MW) under construction

No.	Name of Project	Location Province	Installed Capacity (MW)	COD	Planned Market	Remarks (As of Dec. '11)
1	Nam Long	Luangnamtha	5	2013	Laos	CA completed
2	Nam Sim	Houaphan	8	2015	Laos	CA completed
3	Tad Salen	Savannakhet	3.2	2012	Laos	Progress Construction 40%

Among the IPP projects with PDA concluded as shown in Attachment IV(4), some projects have achieved little progress so far such as Mekong mainstream projects (Don Sahong, Pakbeng, Phou Ngoy and Sanakham), and moreover GOL has already cancelled some PDAs. As a result, active projects with PDA concluded are summarized in the following table, which should be subject to approval by DEM on basic design examination pursuant to LEPTS. As of January 2013, DEM conducted the basic design examination of Nam Ngiep 1.

Table 6-7: List of IPP projects with PDA concluded

No.	Name of Project	Location Province	Installed Capacity (MW)	COD	Planned Market	Remarks
1	Nam Beng	Oudomxay	34	2015	Laos	PDA Completed
2	Nam Lik 1	Vientiane	60	2015	Laos	CA/PPA Negotiation
3	Nam Mang 1	Bolikhamxay	57	2015	Laos	CA/PPA Negotiation
4	Nam Mo	Xiengkhouang	120	2015	Vietnam	CA/PPA Negotiation
5	Nam Ngiep 1	Bolikhamxay	262.9	2018	Laos/Thailand	CA Negotiation
6	Nam Ngum 3	Vientiane/ XiengKhouang	460	2018	Thailand	CA/PPA Negotiation
7	Nam Ou #2, 5, 6	Phongsaly/ Luangprabang		2016	Thailand or China and Laos	CA Negotiation
8	Nam Pha	Luangnamtha/ Bokeo	130	2016	Laos	PDA Completed
9	Nam Seuang 1	Luangprabang	63	2017	Laos/Thailand	PDA Completed
10	Nam Seuang 2	Luangprabang	141	2017	Laos/Thailand	PDA Completed
11	Xenamnoy 1	Champasak/ Attapeu	148	2013		CA/PPA Negotiation
12	Xepian - Xenamnoy ⁶	Attapeu and Champasak	390	2018	Thailand/Laos	CA Negotiation
13	Nam Kong 2	Attapeu	66	2015		PDA completed
14	Nam Phai	Vientiane	60			PDA completed

(4) Revision of LEPTS and the Guideline

Even though the amendment of LEPTS and its Guideline is not an expected output in the project, some ambiguities included in LEPTS and the Guideline are preventing appropriate enforcement of LEPTS, and DEM should manage them properly according to its mandate.

⁶ CA was reportedly concluded in November, 2012.

In the second JCC held in November 2011, Lao side stressed that LEPTS Guidelines and relevant manuals should be updated and modified to match the organizational and administrative changes in MEM since the establishment of LEPTS. Both sides agreed that these documents should be updated and modified by the Lao side with the Experts' assistance.

The following issues are discussed among the Experts and C/Ps as matters in question.

i) Common issues

(a) Legal structure for power sector regulation and the state of violation

The Electricity Law⁷ is the supreme law governing the electricity sector enacted by the National Assembly, which prescribes LEPTS in the articles 21, 22 and 23. In addition, the article 25 refers to the appointment of Chief Engineers, and the article 35 requests electricity business entities to submit the Safety Rules for Operation and Maintenance.

LEPTS was issued as a ministerial decree of MEM in 2004, consisting of general provisions and technical standards in the respective specific fields such as hydro civil engineering, transmission, distribution etc. The general provisions composed of seven articles prescribe the necessary procedures to enforce the Electricity Law such as "Nomination of Chief Engineers (Article 4)", "Examination and Inspection (Article 5)" and "Obligation for Reporting (Article 7)" as well as "Purpose of Technical Standards (Article 1)", "Scope of Technical Standards (Article 2)" and "Conformity of Technical Standards (Article 3)". Technical aspects on LEPTS are described below.

The Guideline on Operating and Managing Lao Electric Power Technical Standards (Guideline) were issued also as a ministerial decree of MEM in 2006 together with the Safety Rules for Operation and Maintenance (Safety Rules). The Guideline details administrative procedures to enforce the technical part of the Electricity Law and LEPTS, having no technical provisions.

To be stated above, the Electricity Law, LEPTS and its Guideline have been issued as a ministerial decree. Summarizing these decrees, the responsibilities of developers are:

- Notification of Chief Engineers,
- Undertaken examination and inspection prescribed in LEPTS by the Government of Laos, and
- Submission of operational reports.

The lack of the understanding to the decrees leads non-compliant condition by the developer. For this reason, it is necessary to disseminate activities of LEPTS to the developer. Revision of TOR among DEB, DEPP and DEM and related decree are also promoted.

⁷ Amended on December 20, 2011.

(b) Non-exclusive nature of technical standards

The latter part of the article 3 in the Chapter 1 “General Provision” of LEPTS stipulates as :“The technical contents contained in Section 2-3 to Section 2-7 and Section 3-3 to Section 3-7 may not cover all the technical contents that should satisfy the fundamental requirements set forth in Section 2-2 and Section 3-2, and if proposed alternative should have sufficient technical basis to fulfill the fundamental requirements, such alternative shall be judged to conform to the fundamental requirements.”

This provision seems to be have added considering the actual situation of Laotian power sector where many foreign business entities from various countries were playing crucial roles as investors, contractors etc., which implies two linked difficulties. It will require abundant knowledge and experience to judge whether an alternative has sufficient technical basis to fulfill the fundamental requirements. On the contrary, any technical standards other than LEPTS would be acceptable if such standards are actually adopted in other organizations or countries such as EDL, PRC, Vietnam etc. In other words, LEPTS can be maliciously interpreted as but non-binding targets, not strict regulations.

(c) Amendment for jurisdiction of DEM and PDEM and definition of T/L, S/S and D/L

As described in 2.2(1), the demarcation of regulatory authorities, such as DEM and PDEM, is not explicitly defined in the areas of distribution.

In case of small hydro power project, the current Guideline says that facilities, such as dam and power house, are under the jurisdiction of PDEM, while S/S and T/L built by the same project are under the jurisdiction of DEM. This complexity may confuse the developer because two authorities, such as DEM and PDEM, administrate a single development project.

For example, the middle voltage lines unconnected to the user site are defined as T/L facilities and application approval are not required in this case. On the other hand, the middle voltage lines connected to the user site are defined as D/L facilities and application approval are required in the case of big and middle project.

To improve this situation, it would be desirable to amend the article 55 “Definitions” of LEPTS. Furthermore, it would be required to amend the Guideline article described about jurisdiction of both authorities, and to unify and control each jurisdiction. Key issues for amendments are as follows.

- To define all middle voltage lines as D/L facilities
- To amend the demarcation and application approval for T/L facilities and to require permission
- To amend the application approval for D/L facilities and to require permission

Table 6-8 and Table 6-9 shows proposed definition related to LEPTS and proposed demarcation

related to the Guideline respectively.

Table 6-8 : Proposed Definition related to LEPTS article 55

Facilities	Current definition	Proposed definition
High Voltage	T/L	T/L
Middle Voltage (Unconnected to user's site)	T/L	D/L
Middle Voltage (Connected to user's site)	D/L	D/L
Low Voltage	D/L	D/L

Table 6-9 : Proposed Demarcation related to the Guideline

Facilities	Current status		Proposed status	
	Demarcation	Application approval	Demarcation	Application approval
Transmission line Substation	100kV or more	DEM	35kV or more	DEM
	Less than 100kV	DEM (Report)	Less than 35kV	PDEM
Distribution line	Big and Middle	DEM/PDEM	Big and Middle	PDEM
	Small	DEM/PDEM (for O&M stage)	Small	PDEM

(d) Complexity of outlines of the Guideline

The chapters of the Guideline are outlined based on the classification of machinery and equipment used and installed in power facilities. As some chapters, however, do not always follow such format, it is not convenient to use the chapters of the Guideline. For example, a chapter for hydropower facilities includes the Form requiring information on T/L and S/S facilities. So, the outlines of the Guideline shall be re-structured based on types of project (e.g. hydropower, T/L, S/S and/or D/L project). It is further recommended that a chapter on S/S shall include T/L because S/S facilities are generally built together with T/L ones.

(e) Ease of article conditions of LEPTS

Taking D/L facilities as an example, there are several LEPTS article conditions which almost all installed facilities such as minimum height of pole-mounted transformers, crossarm earthing and positional relation to communication lines do not comply with actually. These article conditions are needed in case of higher safety level request, but considering the social and economical situation of the nation, it might be doubtful whether these article conditions should apply as in Japan. Therefore, it is requested to revise some articles in LEPTS in order to let them to be respected, by considering ease of conditions including separating conditions in each installation place, after the statistical survey in electrical accidents and outages due to non-compliance with these article conditions and the survey of the article conditions of the foreign countries similar in social and economic situations

and national character.

(f) Correspondence to the expansion and renovation works

The most contents of the current the Guideline are aimed at new construction projects. They do not cover renovation projects due to degradation over time and expansion projects due to increased power demand. These items regarding renovation projects and expansion projects shall be included in the future guideline because the power demand in Lao PDR is increasing.

ii) Distribution lines

(a) Adjustment of the Guideline about PDEM budget project

In a rural electrification project of PDEM budget, its owner is PDEM until constructed facilities are handed over to EDL. Therefore, both those who regulate and those who are regulated are PDEM, if those in charge of examination, inspection, etc referred in the Guideline are supposed to be PDEM. Although current situation is that a few contractors started to notify electrical chief engineers to the PDEMs and the PDEMs try to examine and inspect and the partial regulation started to work, this procedure does not comply with the current Guideline. In this issue of the case that PDEM is a owner in a rural electrification project, the most appropriate operational procedure should be reflected to the Guideline after appropriate operational procedures are debated so that a owner may not be a regulator. For instance project budget would be transferred from PDEM to EDL after completion of planning by PDEM and before commencing of detail designing by EDL instead of transferring facilities from PDEM to EDL after construction by PDEM, and the regulatory roll would be transferred from PDEM to DEM according not to actual current procedure but to the Guideline article.

(b) Revision of demarcation in examination and inspection

The demarcation of the project size, Small, Medium, Large is not applied in actual procedures, although it is stipulated in the Guideline that an electrical chief engineer notification, examination and inspection, etc. are not requested in a small project. Meanwhile, the notification, examination and inspection, etc. stipulated in the Guideline are not applied to EDL due to its national organ in fact. Examination and inspection, etc. are needed in a small project as well as in big or medium projects to keep the equal level of construction, and the constructed facilities by EDL have a certain quality level. Therefore, it would be preferable that the demarcation of the project size would be deleted according to actual procedure, and the procedure in case of EDL projects would take the place of the procedure in a small project in the Guideline.

iii) Others

- Although new types of power generation facilities such as thermal power and solar power have been installed in Laos, there is no regulation on them in LEPTS. As a result, regulatory function is not able to work properly in the new field.

- Regarding accident report regulated in the Guideline, it seems unrealistic for the Owner to submit a flash accident report to DEM within forty-eight (48) hours after knowing any serious accident(s), considering its limited time. We propose to allow the Owner to report by telephone within forty-eight (48) hours, instead of submitting the FORM stipulated in the LEPTS Guideline.
- A lot of typos in the LEPTS and the Guideline should be also modified.

6.5. Strengthening of capacity for examination and inspection process

(1) Competency Analysis

Competency analysis was conducted in the initial phase (Oct. – Dec. 2010) of the project by organizing small workshop internally. The immediate training needs and analysis of work necessary for administering LEPTS were carried out. Table 6-10 shows the summary of the analysis.

Table 6-10: Summary of Training Needs and Description

Priority	No.	Category	Description of Training Needs (Examples)
1 st Priority	1	Setting up design concepts	<ul style="list-style-type: none"> • To ensure wide range of understanding on laws and regulations regarding to LEPTS, • To provide prospective IPP investors adequate guidance and information on design concepts in all technical areas (i.e. CE, HE, SS, TL and SS) to comply with LEPTS
	2	Calculating facility	<ul style="list-style-type: none"> • To review the compliance with LEPTS to ensure public safety, • To check the conformity with LEPTS to ensure stable distribution of electricity (Knowledge and skills in calculating all facilities, etc.
	3	Implementing inspections and examinations	<ul style="list-style-type: none"> • To undertake examination and inspection on time using manuals and checklist, • To prepare comments and directions attached to the letter of approval submitted to the developer based on the results of inspections and examinations.
2 nd Priority	4	Planning of inspection	<ul style="list-style-type: none"> • To schedule the inspection based on the size and construction schedule. Arrangement of logistics and financial resources, etc.
	5	Promote, plan and develop the basic policies related to LEPTS	<ul style="list-style-type: none"> • To oversee the administrative issues on enforcing LEPTS • To collect comments and feedback on administration of LEPTS from various stakeholders (e.g. other concerned departments of MEM, investor/developers, local

Priority	No.	Category	Description of Training Needs (Examples)
			government (local admin & PDEM), etc.) <ul style="list-style-type: none"> • To revise, if necessary, articles of LEPTS • 【knowledge】 Procedures of revising regulations, etc. • 【skills】 dialogue with various stakeholders, negotiation, etc.
	6	Teaching and training	<ul style="list-style-type: none"> • To train officers of PDEM on technical matters of LEPTS • To teach articles of LEPTS to faculty of universities, technical schools and vocational schools
Least important	7	Revising manuals	<ul style="list-style-type: none"> • To revise manuals and guidelines of LEPTS

According to the analysis 1) setting up design concepts, 2) calculating facility, and 3) implementing inspections and examinations are among the immediate top priorities of work for administering the LEPTS procedures.

(2) Strengthening inspection capacity

The project undertook field based on-the-job training (OJT) aiming at strengthening inspection capacity. This training was carried out along with development and preparation of instruction and casebook. As shown in Table 6-3, it was taken place mostly during the first phase of the project. The OJT was to check DEM's routine examination approaches and collect them if necessary to follow proper inspection methodologies and procedures to enforce LEPTS. Other than logistics, typical topics covered include: 1) preliminary review (Review basic data of facilities, etc.), 2) define the inspection objectives, 3) identify sources of information, 4) obtain information from the reviewing and evaluating available data for identifying specific inspection items to investigate at the site, 5) use of checklist (amend, if necessary), 6) prepare an inspection plan, 7) identify features that need to have specific arrangements made for the team's visit (including data, transportation arrangement, etc.), 8) arrange personal and general equipment needed for proper inspection, 9) conduct inspection, and 10) compile and draft minutes of meeting.

In addition, uses of protection gears, issues on ensuring public safety and attitude necessary for inspector are among other areas being covered. By the end of the first phase, most C/Ps are able to perform inspection by themselves.

(3) Strengthening examination capacity

i) Setting examination levels based on technical difficulties and details

DEM is subject to examine application documents attached to Basic Design (B/D) and to notify the developer the results within 60 business days. DEM must identify and perform effective and efficient methods for completing the examination within given timeframe. The project proposes DEM a simplified check list for examination and instructs the C/Ps for use of it in examinations.

All application documents, once submitted to DEM, are reviewed according to the check list for the Guideline. The examination process begins from general items (e.g. table of contents and outlines are consistent with LEPTS articles, etc.) to complex and detailed items incrementally (e.g. such issues as safety factors, applicable loads to structure, accuracy of calculation, technical relevance of referring to other technical standards for items not stipulating LEPTS, etc.). Considering the time limitation and technical requirements for understanding whole contents of LEPTS, four (4) specific levels of examination are defined based on the complexity and technical and technological requirements of examination. The description of each level is explained briefly in Table 6-11.

Table 6-11: Defining the Four Levels of LEPTS examination

Levels	Examples of Typical Examination Items and Requirements
Level 1: Formality Examination	All necessary documents, attachment (drawing, etc) are submitted, Payment of examination fee, etc.
Level 2: Preliminary Examination	Whether or not the technical design adopts the technical criteria set forth in LEPTS (e. g., analysis and its calculation complied with the safety factors defined in LEPTS, the analytical results fulfills the safety factors, etc.)
Level 3: Technical Examination (1)	Load factors to the structure are adequate. The calculation and analysis is accurate and adequate.
Level 4: Technical Examination (2)	Important items for the purpose of LEPTS and not covered in the Level 3. Important items not defined in the LEPTS articles but necessary to review and analyze.

As the objective of attainment for the capacity for examination, DEM as a whole must master fully the Level 1 and 2 examinations by the completion of the project. Depending on one's interest and mastery⁸, some technical contents necessary for Level 3 may be covered toward the end of the project.

ii) Strengthening examination capacity and its progress

Activities for Strengthening of examination capacity were carried out by focusing on technical subjects with highest priority. The Experts of each technical field (HC, HE, TL, SS and DL) consulted with the C/Ps to identify the priority areas and provide appropriate instruction to them by OJT. The selected subject and learning objective by the end of the project were defined and taught incrementally based on the four levels discussed in the Table 6-11. Methodology and approaches of OJT were carefully selected based on the technical difficulty and complexity, and the C/P's personal interests. In many cases, a real application documents including drawings and technical documents were used. Combined with occasional site visits, examination items and point of review were integrated to the check points of field inspection. The C/Ps were able to

⁸While each C/P's interest and its attainment are closely monitored, the overall achievement to each learning objectives is aimed at demonstrating behavioral change collectively as a group (DEM, mostly IPP division). Expert emphasized to make sure that examination shall be carried out collectively to accomplish the requirement.

understand calculation on the technical documents and actual built in the power facilities. Through the OJT, the C/Ps were able to increase their practical skills to examine application documents. Table 6-12 shows summary of the status of the activities.

Table 6-12: Status of Strengthening Examination Capacity

Area	Objective	Status (as of March 2013)
Hydro Civil Engineering (HC)	Identification of the priority items in the technical applications and plans	Can understand and check important points on examinations and inspections, and can instruct these items in the seminar to PDEM. Can develop original check list and has a positive attitude toward examinations and inspections
	Analysis (calculation) of stability of dam	Can understand the combination of external load factors, and methods for assessing dam stability. Has a positive attitude to check the validity of the result of the calculation by himself
	Planning (and design) of other structures (e.g. spillways, power house, etc.)	Can understand the basic concept of the stability of other civil structures because it is almost the same as that of dam body. Has a positive attitude to study the contents of LEPTS Guideline Explanation by himself.
	Design of Maximum Flood Discharge and freeboard	Can develop the capacity by himself because the C/P has knowledge of hydrology from the beginning.
Hydro Electric Engineering (HE)	Understanding of significant items on the examination of technical documents	Can understand outlines of technical documents that are submitted together with application form of examination. Can instruct subordinates and new staff. Can understand significant technical issues by OJT using actual BD.
	Understanding of how to review and confirm basic specifications of hydro turbines and generators	Can understand general estimation of turbine type and output of power station from basic data. Can instruct subordinates and new staff.
	Understanding of major auxiliary equipment for hydro turbines and generators (emergency water interception devices, protective devices, pressure oil supply system and water drainage system)	Can mostly understand outline of emergency water interception devices, protective devices, pressure oil supply system and water drainage system that work for operating and stopping hydro turbine and generator safely.
	Understanding of important equipment which causes outage in case of destruction (main transformer, switchgear and lightning arrester)	Can mostly understand outline of main transformer, switchgear and lightning arrester which cause outage in case of destruction.
Transmission Lines (TL)	Understanding of safety factors	Can calculate safety factors and can judge the conformity to LEPTS.
	Understanding of assumed loads for supporting	Can compare the combination of loads (vertical and horizontal loads, etc.) and the loads table in LEPTS.

Area	Objective	Status (as of March 2013)
	structures	
	Understanding of safety clearance between supporting structure and power conductors.	Can judge the conformity of wind pressure and safe distance by LEPTS article.
	Understanding of safety clearance between power conductors and other objects	Can understand the necessary documents and can judge the adequacy of the documents from the information provided in the technical documents.
Substation (SS)	Understanding of three phase short circuit current calculation and capacity of the circuit breakers	Can understand the determinant for capacity of the circuit breakers and can conduct mostly the calculation in the technical documents.
	Understanding of earthing design	Understand overall concept of earthing design. Can conduct mostly examination and inspection using instruction and checklist
	Understanding of basic Insulation design (e.g. protection design of lightning)	Can understand fundamental of insulation design (protection design of lightning) Can conduct mostly examination and inspection using instruction and checklist
	Understanding of functions of equipment protection systems.	Understand fundamentals of the function of equipment protection system Can conduct mostly examination and inspection using instruction and checklist
	Understanding on voltage control system	Understands fundamental of voltage control system Can explain mostly the contents and its meaning of application document
Distribution Lines (DL)	Understanding on important examination items.	The C/Ps have achieved the expected level in understanding on how to conduct examination and is able to instruct PDEM.
	Safety distance between the power lines and other objects (building, trees, etc.)	From the viewpoint of public safety, the C/Ps understand important items for E&I on selecting distribution route.
	Demand projection and load distribution, voltage drop calculation, adequacy of equipment and material selection (e.g. capacity of transformer, cable, guy, etc.)	The C/Ps understand information necessary for conducting examination. He can judge validity of voltage drop calculation.
	Earthing design	The C/Ps can estimate the validity of a test result at a high level by not only checking the value itself but also checking a calibration record of the meter, etc.

(4) Behavioral change (improvement of E&I capacity)

i) Hydro Civil Engineering

In addition to the related activities on strengthening inspection, those of inspection were developed. The objectives of examination strengthening on HC area includes (i) Identification of the priority items in the technical applications and plans, (2) Analysis (calculation) of stability of dam, (3) Planning (and design) of other structures (e.g. spillways, power house, etc.), and (4) Design of Maximum Flood Discharge and freeboard. Except the item (4), which he may be able to learn himself because of his significant technical background in the subject.

As a result, some behavioral changes, in knowledge, skill and attitude as an inspector were observed.

For example, at the initial phase of the project, the C/Ps tend to insist on improvement of knowledge for personal interests. They now understand the articles of LEPTS and other guidelines based on the importance of E&I. In the occasion of site inspection the C/Ps conduct, the C/Ps are able to direct and request the developer for submission of required paper works, etc. It was observed that many improvements of comprehension on examination items through accumulating experience of E&I over the period. In particularly, the C/Ps now understand the LEPTS procedures and its workflow making it able to issue official documents (letters approvals, etc.) for notifying the developer the result of E&I in a proper manner. Finally the C/Ps prepares a draft of minute of discussion in advance in order for them to issue proper direction and request on pending issues during a site inspection.

ii) Hydro Electric Engineering

In addition to the related activities on strengthening the capacity of inspection of HE, that of examination was strengthened by focusing on (i) Understanding of significant items on the examination of technical documents, (ii) Understanding of how to review and confirm basic specifications of hydro turbines and generators, (iii) Understanding of major auxiliary equipment for hydro turbines and generators (emergency water interception devices, protective devices, pressure oil supply system and water drainage system) that work for operating and stopping them safely and (iv) Understanding of important equipment which causes outage in case of destruction (main transformer, switchgear and lightning arrester).

The C/Ps enhanced his knowledge of hydropower electrical facilities, and he understood important check points of examination and inspection regarding human life (emergency water interception devices, necessary clearance to live parts, etc.).

When we started this project, the C/Ps hardly understood his responsibility because he was a newcomer. The C/Ps learned his work from experienced the C/Ps, and he has improved his attitude toward his work every time he experienced OJT. The C/Ps understood outline of LEPTS and the Guideline, and he understood his responsibility, examiner and inspector of hydropower

electrical facilities, in DEM.

Regarding local seminar on the promotion of LEPTS understanding, the C/Ps had a forward-looking attitude that the C/Ps practiced presentation before the seminar. In his presentation and OJT in the actual seminar, he had a forward-looking attitude that he tried to enhance PDEM staffs' knowledge. The C/P's presentation attracted the interest of participants, and his OJT was conducted by using instructions. After the seminar, the C/Ps had a forward-looking attitude that they had a wrap-up meeting for next seminar.

iii) Transmission Line

T/L area's focus on examination are: (i) Understanding of safety factors, (ii) Understanding of assumed loads for supporting structures, (iii) Understanding of safety clearance between supporting structure and power conductors and (iv) Understanding of safety clearance between power conductors and other objects.

Furthermore, following are main issues to be confirmed for inspection: (i) Tower foundation, (ii) Tower members, (iii) Clearances between conductors and objects, and (iv) Installation of fitting hardwares.

As above mentioned items, the C/Ps understood the purpose and necessity of the LEPTS and improved their own skills and knowledge.

Regarding examination, the C/Ps required submission of the document yet to submit and re-submission of uncompleted document. This shows that the C/Ps have had skills as a regulator.

Furthermore, at the T/L site inspection (executed together with the first impounding inspection at Nam Ngum 5), the C/Ps pointed out inadequacy of conductor clearance, inappropriateness of backfilling around tower foundations, and lack of tower members. As it is enough to point out malfunctions of facilities from the Expert's view, the Experts conclude the C/Ps can inspect and examine facilities by themselves to use check sheet and instructions.

While the C/Ps would like to enhance their skill more and more, the ability to instruct their own skill should be enhanced. Their documentation ability should be also enhanced in order to write down their pointed items to M/M.

iv) Substation

In S/S area, on top of activities to develop capacity on inspection, strengthening of examination focused on (i) Understanding of three phase short circuit current calculation and capacity of the circuit breakers, (ii) Understanding of earthing design, (iii) Understanding of basic Insulation design (e.g. protection design of lightning), (iv) Understanding of functions of equipment protection systems, and (v) Understanding on voltage control system. As a result, the C/Ps understood the purpose of examination and inspection and has improved their own skills,

knowledge as a regulator.

For example, the C/Ps had not understand the facilities to be examined and inspected, but instruction by the Experts related to insulation design, for example, made them strengthened for understanding of the purpose and necessity of such facilities. The improved skills lead them to judge for Level 2 by themselves at site inspection and examination. At the seminar in province, the C/Ps explained LEPTS and related regulation polity to the audience, so they have already had skills as an inspector/examiner.

v) Distribution Line

D/L has worked on such subjects as (i) Understanding on important examination items, (ii) Safety distance between the power lines and other objects (building, trees, etc.) , (iii) Demand projection and load distribution, voltage drop calculation, adequacy of equipment and material selection (e.g. capacity of transformer, cable, guy, etc.) and (iv) Earthing design.

As the result of the capacity strengthening, the following behavioral changes were observed:

First, the understanding toward complying LEPTS was improved. Initially, the C/Ps did not show their attitude toward complying LEPTS. As the project progresses, they understand the importance of compliance to LEPTS and its meaning. They actively involve teaching and instructing LEPTS to PDEM.

Second, the C/Ps now understands importance of examination items well. Initially, examination was partially carried out by focusing on economic analysis. The technical examination by pausing questions to developer side was not initiated. The Expert observed that the C/Ps made technically accurate instruction to developer in June 2012 and requested them to revise the technical document. Following the incident, the C/Ps ordered the developer to fine the application and technical document revised for approval to the amendment.

Third, previously the level of understanding on the procedures and paper works related to examination, such as receipt of Forms and issuing correspondence was limited. Presently, the C/Ps are able explain these procedures properly. The C/Ps developed by themselves an identification (ID) card for registered chief engineers which may be recognizable by others (with a neck hanging ID card case). The ID card was introduced during the provincial seminars in Xieng Khouang in October 2012 and Savannakhet in January 2013. The nomination of chef engineers is properly carried out in two provinces.

Fourth, translation to Lao language has progressed in the course of technical cooperation project. It helps understand technical documents in mother language.

Finally, skills for instructor have been improved. The C/Ps in D/L area have relatively high level of skills from the beginning. He did not show his strong will to promote and disseminate LEPTS. In the course of the project, he expresses his interest in doing so and involves to his duties positively. In particular, he produces a variety of presentation materials in his initiatives for the

provincial seminars. He organizes a post-seminar review sessions with the Experts regularly to draw lessons from the seminars. They prepared an “in-basket training” for LEPTS training for D/L. It was found quite effective and practical because it simulates actual examination procedures by reviewing some made-up technical documents.

(5) Utilization of Resources of EDL Training Center

One of the elements of resources utilization of EDL Training center was to see if the equipment provided during the past technical cooperation is still in a good shape. The some equipment provided to EDL Training Center for inspection was checked by the Expert. The equipment provided includes safety and protection goods and measuring devises. Except some consumables, they are properly stored in the lockers provided. Safety boots looks still new. The Experts, however, concluded that most equipment may not be able to use since the current framework of the technical cooperation is not fully matched to the prospect of using these equipment already past six years since the installation.

The first and foremost, examinations conducted for IPP do not intend to bring this equipment for examination during actual field inspection. If measuring is necessary for the purpose of the examination by some reasons, regulator (or inspector) may instruct the IPP developer to provide necessary data measured by IPP’s own equipment. Data should be presented by the inspector’s direction and shall be double-checked by the regulator (inspector) using the equipment installed and prepared for the inspection. Second, most devises are in need of calibration and/or withstand voltage test regularly. The equipment, however, has never done such testing since transferring to EDL. Measuring devises are required to calibrate at least once a year. Safety (protection) gears are also been checked annually from the view point of occupational safety. In particular withstand voltage test is essential for protecting any persons working in the power sector.

(6) Review of Needs for LEPTS Training Curriculums and Training Materials

LEPTS training for EDL employees has been carried out at the center energy year even though the number of the training courses are reduced by three (3) times in 2012 from seven (7) times in FY 2011. In 2012, only 3 beginner’s course on D/L, T/L and indoor wiring were offered. Only two (2) LEPTS training in D/L and T/L totaling 35 participants are offered in 2013.

The center has a plan to expand its facility at the current location and to rename as the Power Institute in order to extend the training program. The construction of the proposed institute will begin as early as March 2013. Some training facilities at the EDL-TC, such as the towers and the transmission lines will be relocated to Naxaithong District of Vientiane Province near Vientiane Capitol (a land owned by EDL). The current program was developed during STEP II. It has no major changes since that time. The center has an ambition to upgrade the training program based on the output from IPSM to reach out to a variety of EDL employees and their training needs.

EDL acknowledges LEPTS as a regulation of the power sector in Lao PDR while its development

projects are carried out based on technical standards of elsewhere chosen by external consultants funded by financiers and donors supporting the projects. Currently EDL does not have technical standards across the financial sector except DL field. The training program aiming at introducing and implementation of unified technical standard is challenging. In addition, difference in the training and practice may create false message to less experienced EDL employees that compliance of external standards is more significant over the laws and regulations of Lao PDR. Creating such business environment may communicate newly hired employees a false message.

(7) Issues on HRD at MEM for Enforcement of LEPTS

i) Target of human resources development and their existing capacity

For MEM to disseminate and enforce LEPTS throughout the power sector in Lao PDR more effectively, emphasis on further human resources development (HRD) shall be given not only officers within MEM (including PDEM) but also those in the power sector as a whole. The actual situation of MEM, however, is different. EDL assumes the burden of most of the expense required for implementation of the LEPTS training at the training center. This is not desirable as viewed from the standpoint of the division of roles between the DEM and the EDL and the autonomous extensibility of the HRD training. The current situation does not reflect DEM's roles to direct HRD policy on LEPTS, coordinate implementation and that of EDL to carry out the training with clarity.

ii) Needs in basic math and science education for long-term professional development

By reviewing the previous experiences working with the C/Ps as well as Laotian engineers (i.e. PDEM, EDL, MCI, etc.), it is identified that additional field experience is needed. In addition, the Experts have observed some incidents that require strengthening of basic math and science as well as some basic engineering education. These weaknesses may be avoided when the jobs are routine and predictable. The engineers may be able to accomplish jobs if they accumulate knowledge and experiences. New knowledge-creation and further technical analysis are, however, required when more complex or specific conditions kicks in. In such cases, basic math and science, as well as mathematical understanding helps us understand such challenges. Capacity development to tackle such problems shall be taken place in educational setting, not suitable for training program. The proposed technical cooperation explained in this section, which is also a training program, is not suitable for that purpose. The most effective approach to strengthen the professional capacity is promoting long-term self-development by emphasizing its needs and importance in one's career.

iii) Need of effective training program and delivery

The existing LEPTS training program is designed for acquiring most knowledge through classroom lecture. It is effective for LEPTS introductory course for novice learners. Its approaches may have a room to improve to provide opportunity to learn practical skills and knowledge for building and overseeing power facilities complying LEPTS. The current training

is not fully tailored to meet the future needs of improving EDL's quality control practice through enforcing self-inspection while complying with LEPTS.

EDL-TC has an expectation to extend the current LEPTS training and revise the teaching materials based on the output of IPSM. The center has a will to collaborate IPSM seeking such collaboration in the course of the project. Described in 6.5(6), compliance of external standards shall be no narrower or harmonized because, from the view point of training activities, what you are teaching in training shall be matched what you practice once he/she is assigned from the training. This is particularly important for newly employed employees. This negatively harms one's behavior by sending false message that an everyday practice can be different from what the one learned at the training. Compliance of external standards is not only technical issue but also challenge to HRD activity of the power sector.

iv) Diversity of the target of HRD and their capacity

The primary targets of HRD for enforcement of LEPTS include engineers in of MEM headquarters and those of PDEM. Some of the former may have past experience in technical cooperation projects including STEP I, II, IPSM and others. Others have limited experience since they are young and newly employed by MEM. Engineers in PDEM, in the other hand, are more diversity in terms of experience because they have had taken different type of works. PDEM engineers works closely with local community and administration and has a variety of work experiences. They have, however, limited experience in practical activities in development of power projects because their primary job is administrator of the government. In the other hand, training to PDM tends to include technologically highly sophisticated subjects. Such subjects may not be fully matched the requirement for dealing with day to day activities of officers of provincial government. The contents of training shall be based on the real needs derived from analysis of participants' work requirement and condition.

Further measures to be taken to improve the current LEPTS training program is discussed in 9.1(3)iv).

6.6. Seminars on promotion of LEPTS understanding in pilot provinces

(1) Pre-seminar on promotion of LEPTS understanding for IPSM (February 25, 2011)

The pre-seminar on the promotion of LEPTS understanding for IPSM was held at International Cooperation and Training Center (ICTC) on February 25, 2011. The Pre-seminar started with remarks by Mr. Hatsady SYSOULATH, Deputy Director General of DOE, and Mr. Yoshiharu YONEYAMA, Senior Representative of JICA Laos Office. The Experts, DOE, PDEMs and EDL made presentations.

The Pre-seminar was held as the preparation for the promotion of LEPTS understanding which would be held in three provinces such as Xieng Khouang, Savannakhet and Champasak. The purposes of the Pre-seminar were to exchange and collect information on the issues regarding

LEPTS in provinces, and to understand how IPSM would be implemented. Attachment IV(5)a shows the agenda of the seminar.

The issues, comments and expectations from the three provinces are shown in below:

- The number of engineers in PDEM is very small as less than 10. These engineers should take care of the wide technical areas such as mines and electric power, so that their knowledge is not specialized as civil engineering and so on.
- The procedure and inspection forms of LEPTS are difficult for PDEMs to utilize.
- Inspections are conducted by EDL or in collaboration with PDEM and EDL.
- Practical inspection method is helpful for PDEM.
- The knowledge of mini-hydro and distribution field is very necessary for PDEM.

(2) Improvement of seminars and development of a set of teaching materials

The Experts have assisted the C/Ps to improve plan, prepare and implement provincial seminars. In the first phase, the Experts worked closely with the C/Ps to improve planning, preparing and implementing the pre-seminar (discussed in the previous section) and the first seminar in Champasak (discussed in the next section). In the second phase, the project carried out two seminars and gradually decreased the Experts' involvement for the process. The following are major improvement of the seminar:

- Prior to the project, procedures of organizing seminars were not clear and not recorded. The project reviewed the whole process (including budgeting, preparation of handouts, teaching materials, and work allocation) and prepared a checklist for implementation,
- The Experts suggested the C/Ps form a committee to work together by allocating tasks and responsibilities instead of some associates take whole responsibilities,
- Recommended a briefing (post-training review) based on the evaluation results from the participants,
- During the preparation, handouts such as slides, teaching materials, etc shall be reviewed. If necessary tryout for presentation is strongly recommended,
- Based on the above items, a manual for preparation of provincial seminar is prepared. The manual is prepared as a teaching material for newly hired officers of MEM.

Presently, seminar is wholly planned, prepared and implemented by the C/Ps.

(3) Seminars on the promotion of LEPTS understanding in pilot provinces

i) First seminar in Champasak (June 6 – 9, 2011)

DOE held a pilot seminar in the Champasak Province from June 6 to 9, 2011 in order to promote the understanding of LEPTS on the provincial level. The participants of the seminar included: engineers from Champasak PDEM, EDL with technical fields of hydropower civil, electrical engineering, and distribution lines (substations and transmission lines as supplemental

fields). The list of the participants is shown below:

- DOE: Mr. Bouthep (Director), Mr. Veingsay (HE and S/S), Dr. Phoukhong (HC), Mr. Thammanoune (D/L), Ms. Santisouk (T/L), Mr. Phouxay (D/L), Mr. Va (HE and S/S), Mr. Lair (HC and D/L)
- 8 from Champasak PDEM, 14 from EDL , 2 from JICA Laos Office
- The Experts: Mr. Kawakami (Deputy Chief, HC), Mr. Fujita (HE), Mr. Maruoka (T/L), Mr. Fukunaga (D/L)

All the textbooks and the presentation materials were prepared by the C/Ps. The lectures and field trainings were planned and initiated by the C/Ps. Japanese experts assisted DOE's preparation at the seminar and answering technical advises when the C/Ps needed help. The Lao language was officially used throughout the seminar, and translation from English to Lao was made by the C/Ps when the Experts explained to the participants.

DOE delivered lectures on the first day, site trainings for hydropower civil and electrical engineering, substations and transmission lines on the second day, and field trainings for distribution lines on the third day. On the final day, the certificates of participation signed by the DG and Chief Advisor were awarded to the participants after the Q&A session.

The program and participant lists are shown in the Attachment IV(5)b).

(a) Issues observed

- The seminar was basically prepared and executed by the C/Ps. It is believed that the C/Ps realized the difficulties and differences between to learn (acquire the knowledge) and to teach (practice). Actually there were more than 10 questions from the participants and the C/Ps had to respond to them. Even through the discussions with the Experts to prepare the answers, they have improved their capabilities.
- After the seminar on the afternoon of the final day, the C/Ps and the Experts held a wrap-up meeting with JICA Laos Office officers as observers and the issues to be revised for the next seminar were discussed and clarified.

(b) Outline of the wrap-up meeting

- Lecture time was too short. Ideally 2-days lecture was appropriate including detailed explanation of relevant LEPTS articles. More Q&A time should be added. Field training could be designated only one day divided into respective teams with each technical field based on the participant's request in the application, etc.
- The seminar was a good educational experience for DOE staff because unexpected questions from the participants were good occasions for them to think deeper.
- Engineers from EDL training centers would be invited again because high level of questions/ comments from them could be useful not only for the participants from the

provinces but also for the DOE staff.

- All the Q&As were expected to be translated into English with the Experts' comments and be used for the next seminar.

ii) Second seminar in Xieng Khouang (October 22 – 25, 2012)

The second seminar on the promotion of LEPTS understanding was conducted in the Xieng Khouang Province from October 22 to 25. In light of lessons learned from the previous seminar in the Champasak province, the C/Ps and the Experts reviewed the program. In this seminar, each field OJT was conducted one by one so that all participants could get knowledge of all fields, because all PDEM engineers were dealing with D/L, (small) HE and HC under the present conditions. And also, Q&A session time was intentionally programmed at the end of each lecture to avoid unexpected extension of lecture time. This seminar went smoothly because of the revised program and the C/Ps' active involvement. The program is shown in the Attachment IV(5)c).

The lectures (including Q&A session) and field OJTs were recorded with the HD video camera provided in the Project in order to utilize as instructional tools for the future seminar and training for the other PDEMs.

After the seminar on the afternoon of the final day, the C/Ps and the Experts held a wrap-up meeting, and discussed and clarified issues to be revised for the next seminar.

(a) Participants

- DEM: Mr. Bounsy (Deputy Director General),
(PEPMD) Mr. Houmphanh (Chief), Dr. Phoukhong (Deputy Chief, HC),
Mr. Phouxay (T/L), Mr. Va (HE), Mr. Kila(S/S)
(SOEMD) Mr. Lair (HC), Mr. Southaphone(T/L), Mr. Sonephuang(S/S)
(EEMD) Mr. Thammanoune (Chief), Mr. Sengpheth (D/L)
- 15 from XiengKhouang PDEM, 7 from EDL, 15 from Provincial Division and Private Companies
- JICA Laos Office: Mr. Yuzurio (Sr. Representative)
- The Experts: Mr. Kawakami (Deputy Chief Advisor, HC), Mr. Kinoshita (HE),
Mr. Wada (D/L), Mr. Onozawa (DT)

(b) Outline of activities

- Lectures on the Electricity Law and hydropower civil engineering were delivered on October 22. The Chief of PDEM having participated in the counterpart training in Japan made a presentation for sharing his knowledge and experience obtained in the training.
- Lectures on hydropower electrical engineering, substation, distribution lines and transmission lines were delivered on October 23.

- Field training was conducted at Nam Ka Hydropower Station and Phonsavanh substation on October 24.
- On October 25, the C/Ps answered questions that were asked during the seminar. And an additional lecture for distribution lines was held by using pictures of facilities taken during the field training.
- The certificate of participation was given to participants who took part in all lectures and field training on October 25.

(c) Outline of wrap-up meeting (including issues observed)

- The C/Ps made a presentation and conducted field training confidently. During the field OJT, all the C/Ps used instruction properly and actively instructed it to participants.
- All C/Ps, especially newly hired ones to DEM actively involved themselves in a variety of logistic and preparation for the seminar. During the seminar, they helped each other to conduct the seminar smoothly.
- Totally, the seminar went smoothly compared to the previous seminar in the Champasak province. On the other hand, some C/Ps said the lecture time was too short for some fields like distribution lines. The program of next seminar should be discussed more.
- The eligibility of the participating to the next seminar should be reviewed prior to the next seminar. The majority of the participants lacked a basic knowledge of small hydro which is substantive part of the seminar. The number of participants to the field trip should be limited depending on the facility and expertise, because there was difficulty for the C/Ps to instruct the participants and to maintain the safety.

iii) Third seminar in Savannakhet (January 22 – 24, 2013)

The third seminar, which is the final one in the course of IPSM, was carried out in the Savannakhet province from January 22 to 24. The seminar was carried out employing the past experiences of the previous two seminars. It was planned and implemented mostly by the C/Ps with a minimal support and assistance from the Experts. Because of physical location of on-going construction site of a small hydro project, the field trip and field OJT was omitted. The main method of training this time was limited to lecture, but it emphasized D/L and small hydro development. This is because of the result of the past review of the work responsibilities of PDEM. It was identified that the most work responsibilities of PDEM are related to these two areas. In addition, the contents of the presentation was reviewed and more practical information (e.g. examination of application and technical documents, inspection based on the results of the examination, etc.) which was relatively modified for ease of understanding was delivered.

A time for a Q&A was set aside upon completion of each presentation to exchange the view and receive brief comments from PDEM. The agenda of the seminar is shown in Attachment IV(5)d).

(a) Participants

- DEM: Mr. Bounsy (Deputy Director General),
(PEPDM) Mr. Houmphanh (Chief), Dr. Phoukhong (Deputy Chief, HC),
Mr. Phouxay (T/L), Mr. Va (HE)
(SOEMD) Mr. Veingsay (Chief), Mr. Lair (HC),
(EEMD) Mr. Thammanoune (Chief), Mr. Sengpheth (D/L)
- 9 from Savannakhet PDEM, 2 from EDL, 1 from ECI, 13 from Provincial Division and Private Companies
- The Experts: Mr. Nakanishi (Chief Advisor, HC), Mr. Takahashi (S/S),
Mr. Onozawa (D/T), Mr. Oda (Assist. HC)

(b) Outline of activities

- Lectures on the Electricity Law and hydropower civil engineering were given on January 22. The Chief Engineer of PDEM having participated in the counterpart training in Japan made a presentation for sharing his knowledge and experience obtained in the training.
- Lectures on hydropower electrical engineering, substation, distribution lines and transmission lines were delivered on January 23.
- On January 25, a Q&A session was carried out. The C/Ps answered PDEM's questions and further discussed a variety of issues related to LEPTS and its Guideline.
- Two sets of LEPTS and related documents were presented to PDEM. And the certificate of attendance was given to participants who fulfilled the requirements during the closing seminar.

(c) Outline of wrap-up meeting (including issues observed)

- Due to physical location of the prospective small hydro development, the seminar did not include a field trip and OJT during this seminar. Participants made a couple of comments on the needs of field OJT. During the field OJT.
- Young MEM engineers who hired recently took responsibility in logistic and routing tasks for preparation for the seminar. They kept eyes on carrying out a variety of tasks necessary for the seminar.
- Overall, PDEM asked some non-technical questions regarding the Electricity Law and other regulations related to small hydro development projects. For example, PDEM requested clarification of the procedures of development of small hydro project which provincial government assumes authority and jurisdiction. Such procedures, the template format and the step by step procedures of executing MOU, need to be clarified and explained by the responsible department (i.e. DEB).
- Another point of discussion was how to review and examine F/S reports for small hydro development projects submitted by developers. The Electricity Law only stipulates transfer of authority for approving small hydro power projects to provincial administration. The procedures and criteria for examining and approving such application including technical

documents, etc, however, were not clarified. DEM was not able to give a clear answer to the participants because the issue is under the jurisdiction of DEPP.

- Further topics include cross-ministerial issues such as coordination of water usage in a water basin, implication of rights of way and power facilities, clearing in the protected land, etc were discussed. It was difficult for DEM to give clear answers at this seminar because these topics were complex and in need of coordination among various ministries concerned.

6.7. Counterpart trainings in Japan

(1) First counterpart training in Japan (September 1 to 13, 2011)

The first counterpart (C/P) training in Japan was conducted from September 1 to 13, 2011. As a result of discussion with JICA and the C/Ps, four participants from DOE and two from Champasak PDEM were selected for the training. The program and itinerary of the training is shown in Attachment IV (6) a).

(a) Outline of contents

To acquire skill and knowledge effectively, the training course was separated in each technical field. The contents of training included not only lecture but also site visit to construction site or actual electrical facilities. The contents of site visit are shown below:

(Chubu Electric Power Co., Inc.)

- Human Resource Development Center (HC and D/L);
- Tokuyama hydropower construction site (HC and D/L);
- Koshido Dam (HC); and
- Toyota Customer Service Station (D/L)

(The Kansai Electric Power Co., Inc.)

- Sakurai line construction site (T/L);
- Kitakatsuragi substation (S/S and T/L);
- Uji hydropower station (HE);
- Kisenyama pumped storage power station (HE); and
- Amagase hydropower station (HE and S/S)

Q&A session and intensive discussion session were conducted after completion of all site visits to fix their understanding of the training contents.

(b) Issues observed

- The major opinion from the C/Ps was that they could expand their understandings through training such as site visit of actual construction site and electrical facilities, so that they can use their experience to capacity development of examination and inspection in Laos.
- The C/Ps appreciated the attendance of PDEM, because PDEM participants could spread their experience of the training to their regional staff. For this reason, PDEM engineers

should be invited to the next C/P training course as well.

(2) Second counterpart training in Japan (September 6 to 19, 2012)

The second C/P training in Japan was conducted from September 6 to 19, 2012. Eight officers (four from DEM, two from Xieng Khouang PDEM and the other two from Savannakhet PDEM) attended the training. The program on the training is shown in Attachment IV(6)b).

(a) Outline of contents

To acquire skill and knowledge effectively, the participants were divided into two groups; one is for CE and D/L, the other is for HE, S/S and T/L. Training program included not only lectures but also site visit to actual facilities and construction sites. The contents of site visit are shown below:

(Chubu Electric Power Co., Inc.)

- Nishidaira Dam (HC and D/L);
- Koshido Dam (HC);
- Asahimeito Customer Service Station (D/L); and
- Human Resource Development Center (HC and D/L) ;

(The Kansai Electric Power Co., Inc.)

- Minami-Himeji substation (S/S and T/L) ;
- Ebisugawa and Keage hydropower station (HE) ;
- Yokooji - Ogura line construction site (T/L) ;and
- Uji hydropower station (HE, S/S and T/L).

Q&A session and intensive discussion session were conducted after completion of all site visits to establish their understanding of the training contents. The major opinion from the C/Ps was that they were able to expand their understandings through training such as site visit of construction sites and electrical facilities, so that they can use their experience for capacity development of examination and inspection in Laos.

(b) Issues observed

At the end of the training, the C/Ps and the Experts had a series of discussion on the mutual confirmation of the needs for capacity development with way forward and strategies of the provincial seminar. Major issues are as follows:

- PDEM has mainly three roles: “Provincial Administration”, “Project Promotion” and “Regulation”, although the number of PDEM staff is limited;
- In the construction work of distribution lines, a construction company submits an “Application form for Chief engineer” and PDEM approve it, although PDEM order the work. This work does not match the procedure in LEPTS Guideline in that Owner (PDEM) does not apply a “Chief Engineer”. And the construction companies use their own forms, not the ones stipulated in the Guideline.

7. Records of Joint Coordinating Committee

JCC meetings were held four times in total. The principal purposes of the meetings are:

- i) To share the information on the design and the progress of the project;
- ii) To discuss issues on how to implement the project; and
- iii) To reach a consensus on the above matters.

The Committee was co-chaired by the project director (DG of DOE/ Vice-minister of MEM) and the Chief Representative of JICA, and the representatives from MEM, EDL, JICA and other relevant agencies were invited.

7.1. First JCC meeting

The first JCC was held in the DOE conference room on November 4, 2010. About 30 participants attended the meeting. After opening remarks by Mr. Viraphonh VIRABVONG, Director General of Department of Electricity, Ministry of Energy and Mines, and Mr. Masato TOGAWA, Chief Representative, Laos Office, Japan International Cooperation Agency, the Experts explained the contents of the Activity Plan. Attachment V(1) shows the presentation materials by the Experts and minutes of meeting (M/M). The relevant discussions are shown below.

- Mr. Viraphonh stated that the framework of DOE's examination and inspection was not yet well organized for IPP projects even if the facilities constructed and operated by IPPs would be handed over to GOL's facilities after concession period (30 years), and he expected that electric power facilities conforming with LEPTS would be increased through the IPSM project concerning the efficient and useful framework of examination and inspection.
- LEPTS trainings are implemented in the Training Center and the Technical Department in EDL.

7.2. Second JCC meeting

The second JCC was held at the DOE conference room on November 14, 2011. Mr. Viraphonh VIRAVONG (Vice Minister of Energy and Mines) and Dr. Masato TOGAWA co-chaired the meeting, and 24 representatives from JICA and DOE and the concerned agencies participated.

In the opening remarks, Mr. Viravong explained the background of the project and the purpose of the JCC. He also mentioned much progress observed in the project activity. Dr. Togawa stressed the importance of the Ministry's roles as the electric power regulator, and mentioned "Upholding balance between power promotion and regulation will not be easy. However, I believe the Ministry has will and power to over come this challenge."

The work progress so far was explained by the JICA experts and the achievement of the project was acknowledged. Furthermore, actions to be taken in the second phase starting from the next year were proposed by the Experts.

The minutes of meeting signed by DOE and JICA is attached as Attachment V(2), and the following items were mainly discussed and agreed among the participants.

i) Revision of The Guideline and relevant manuals

The Lao side stressed that the Guideline and relevant manuals should be updated and modified to match the organizational and administrative changes in MEM since the establishment of LEPTS. Both sides agreed that these documents shall be updated and modified by Lao side with JICA experts' assistance.

ii) Development of Annex to be attached to MOU, PDA and/or CA

The Experts asserted that LEPTS must be adopted by all stakeholders of the electric power sector in Lao PDR. In order to promote LEPTS more effectively, GOL must clarify the procedures of approval process as well as LEPTS. The Experts further proposed GOL that Annex (or excerpt) of LEPTS should be developed and provided to IPP to clarify the procedures. Such documents should be attached to MOU, PDA and/or CA, depending on the current status of on-going IPP project. DEPD should invite all stakeholders of IPP projects to organize a meeting for clarifying approval procedures and LEPTS requirements.

iii) Practical Instructions and Casebooks

The Lao side emphasized that the practical instruction should be used for not only for inspection but also examination, and requested Japanese side that more technical contents that suite to examination should be updated toward the end of the project. Both sides agreed that the practical instructions should be translated into Lao language by Lao side.

iv) Activity Plan for second phase

Both sides agreed to work closely to take into consideration the above requests from the Lao side to complete the activity plan for the second phase of the project which would be submitted by January 2012.

7.3. Third JCC meeting

The third JCC was held at the meeting room on the sixth floor of MEM building on December 4, 2012. Mr. Khammany INTHIRATH (Vice Minister of Energy and Mines) and Dr. Masato TOGAWA co-chaired the meeting, and 22 representatives from JICA, DEM, EDL and the concerned agencies participated.

After the opening remarks from Mr. Khammany and Dr. Togawa, the Experts made presentations on the work progress, principles of draft roadmap for future activities.

The main issues discussed in the JCC were described in the minutes of meeting signed by MEM and JICA as shown in Attachment V(3), and the following items were mainly discussed and agreed among the participants.

i) Recognition of Proposal on Future Activities (Presentation of the Draft Roadmap)

The Experts proposed a draft of post-Project roadmap showing future activities with timeframes of three, six, and ten year periods. The Japanese side explained the proposed roadmap needed to be taken into consideration for developing an effective regulatory framework of the Government. The draft roadmap was acknowledged by the attendees for further consideration.

ii) Continuous Support by JICA

The Lao side requested the Japanese side to support the DEM to enhance the capacity of the PDEM by continuing the provincial seminars developed during the Project. JICA acknowledged the necessity of extending the capacity development aiming at the PDEM. At the same time, JICA expressed a concern on possible duplication of on-going seminar-type activities for capacity development of the PDEM funded by the World Bank. It was suggested that these seminars with similar purposes should be reviewed and clarify the demarcation to improve effectiveness of scarce resources.

iii) Watershed Management

The Lao side pointed out necessity of watershed management in place in the Lao PDR. JICA explained that the World Bank and ADB were carrying out a pilot project on river basing management by setting up regular coordination meeting by stakeholders such as hydropower and irrigation. JICA explained that the World Bank (IFC) is currently undertaking an activity for revising the River Law. It also emphasized that the importance of clarifying the roles in watershed management between the MEM and the Ministry of Natural Resources and Environment.

7.4. Fourth JCC meeting

The fourth JCC was held at the meeting room on the sixth floor of MEM building on March 11, 2013. Mr. Khammany INTHIRATH (Vice Minister, Ministry of Energy and Mines) and Mr. Koichi TAKEI co-chaired the meeting, and 25 representatives from JICA, DEM, EDL and the concerned agencies participated. After the opening remarks from Mr. Khammany and Mr. Takei, The Experts presented the achievement of the Project along with the major outputs in the STEP 1 and STEP 2 projects.

The M/M signed by MEM and JICA is attached as Attachment V(4), and main issues discussed among the participants are described as follows.

i) Recommendations to future activities for power sector management

The Experts also presented recommendations for power sector management, which included dissemination for developers and contractors, focusing on the most critical issues, and review and revising the LEPTS and the Guideline. Such recommendations were acknowledged by the attendees for further activities.

ii) Interim evaluation of JICA Evaluation Team

The JICA Evaluation Team raised a question about why some indicators of the project purpose in the project design matrix (PDM) with regard to PDEM and EDL have not been achieved. The Lao side explained the actual situation of PDEM and EDL, including the technical and personnel capacity of PDEM and procurement procedures of EDL.

iii) Continuous support from JICA

The Lao side requested the Japanese side to deliver continuous support for the DEM to enhance the capacity of the MEM and PDEM. JICA acknowledged the necessity of cooperation for development aiming at DEM/PDEM. At the same time, JICA proposed that further discussion should be required before the formulation of future projects.

8. Other activities

8.1. Participation in World Bank seminar in Bolikhamxay Province

(a) Date: October 3 to 5, 2011.

(b) Participants

- DOE: Mr. Veingsay (HE and S/S), Dr. Phoukhong (HC), Mr. Tammanoune (D/L), Dr. Xayphone (T/L)
- JICA Laos Office: Mr. Yuzurio (Sr. Representative) [on Oct. 4]
- The Experts: Mr. Nakanishi (CA), Mr. Maruoka (T/L)

(c) Activities:

- World Bank held a workshop entitled “Training Workshop on Capacity Building for the Hydropower Sector” in Pakxan, Bolikhamxay Province, and representative from five provinces (Vientiane, Bolikhamxai, Xiengkhouang, Khammouane, and Savannakhet) were invited. The main themes of the workshop were environmental assessment, planning, and dissemination of LEPTS focusing on small hydropower development. All the lectures were delivered in Lao language.
- DOE explained the application flow of IPP development in accordance with LEPTS, and introduced the summary and the method of examination and inspection of LEPTS in the field of hydropower civil engineering, hydropower electrical engineering, distribution and transmission, respectively, using presentation materials which they appropriately modified the materials having used in the seminar in Champasak. The application flows provided by the Experts were also translated into Lao language.
- PDEM officers conducted a site visit to Nam Phao HPP (1.8 MW) located in the vicinity of Laksao town which were expected to start operation in the coming October, in order to understand actual hydropower facilities.

(d) Remarks:

- The contents of PDEM seminar need to be improved considering opinions from participants, and we should make presentations paying special attention to the role of PDEM. Though DOE officers made presentations with large hydro development in the workshop, it would have been better to focus on small hydropower development. DOE also should have considered what DOE expected the role of PDEM in the field of transmission lines while they expected the examination and inspection of transmission facilities by themselves even though the role demarcation between DOE and PDEMs are not prescribed anywhere.
- Bolikhamxay PDEM should have conducted examination and inspection on Nam Phao project because of its installed capacity according to the Electricity Law. However, it

seemed quite difficult for the PDEM to do it, and PDEM requires technical support from DOE just as the case of Nam Nhone project.

8.2. Seminar on JICA Group Training & IPSM

The second seminar on JICA Group Training & IPSM Project was held on November 23, 24 and 25 2011, co-hosted by DOE and JICA, according to the lead of Mr. Hashimoto, JICA expert to DOE. The purpose of the seminar was to share the knowledge and experience acquired in the JICA Group Training widely among the participants. Not only the participants for JICA Group Training but a JICA senior representative and JICA experts made presentations. Three panel discussions were also held focused on energy policy, hydropower development, and LEPTS. The summary is shown below:

(a) Date: November 23, 24, and 25, 2011

(b) Venue: International Cooperation and Training Center, (ICTC) Vientiane Capital

(c) Remarks:

As pointed out in the remarks for the World Bank seminar aforementioned, the C/Ps should have made presentations considering the role of PDEM while they have done using the materials delivered in the previous seminars mostly just translating into Lao language without making any modification according to the target. DOE has the dual roles in power sector regulation that they are a regulator themselves and they are in a position to lead and support PDEMs to regulate small IPP projects in the technical aspects. Though it was expected that the C/Ps could invent their own materials suitable for PDEMs acknowledging their roles, the Experts planned and prepared the contents and the teaching materials of the counterpart training in Japan next year considering the regulation of PDEMs.

8.3. Accompanying field trip to PDEMs in Bolikhamxay and Luang Prabang

Assessment of the situation in rural area and exchange of opinions at PDEM were planned as part of a seminar on small hydropower development in another JICA project. The Experts joined the survey of the management situation based on technical standard and the manpower in charge of examination and inspection and so on.

(1) Interview to Bolikhamxai PDEM

(a) Date: March 5, 2012

(b) Participants:

- DEPP: Mr. Hashimoto (JICA expert), Mr. Akhomdeth
- EPDC/J-Power: Dr. Tani, Mr. Wada
- The Experts: Mr. Nakanishi (Chief Advisor), Mr. Kinoshita (HE)

(c) Activities:

- The Experts confirmed the personnel structure in energy sector in charge of examination and inspection of electric power facilities at Bolikhamxai PDEM. They grasped the current situations in rural area; there were some problems that almost staff were electrical engineers and had low English abilities; the staff felt uncomfortable even in the present management area of PDEM although the management area was getting wider.

(2) Interview to Luang Prabang PDEM and site survey to small hydropower plant

(a) Date: March 6-7, 2012

(b) Participants:

- DEPP: Mr. Hashimoto (JICA expert), Mr. Akhomdeth
- EPDC/J-Power: Dr. Tani, Mr. Wada
- The Experts: Mr. Kinoshita (HE), Dr. Shikimachi (DL)

(c) Activities:

- The Experts interviewed the PDEM to recognize the current situations of power sector management in Luang Prabang, and exchanged the opinions. The Experts with PDEM officers visited a hydropower plant and distribution facilities in rural area. Notable issues are:
 - i) lack of staff number, staff technical knowledge, vehicles and instruments for site surveys disturbs work, and
 - ii) all the seven staff in energy sector have electrical academic background (no civil engineer) and the staff's English ability is so low that the staff need support from another division staff to understand submitted English documents.

8.4. Participation in the seminar on the dissemination of the LEPTS procedure

(a) Date: February 13 to 14, 2013

(b) Participants

- The Experts: Mr. Kawakami (Deputy Chief Advisor, HC), Mr. Onozawa (DT)

(c) Activities:

- DEM held a seminar entitled "the seminar on the dissemination of the LEPTS procedure" funded by the World Bank to explain mainly the procedure of the examination and inspection for each technical field inviting all PDEMs and IPP developers with the presence of Mr. Kammny, the Vice Minister, MEM.
- Not only DEM but also DEB and DEPP made presentation on the contractual procedure and development procedure, respectively.
- Most of the presentations from DEM were not technical matters but concentrating on the

procedures from examination to inspection although the technical checklists with explanation were attached in the materials.

(d) Remarks:

- The seminar had been planned by the DEM to explain all the process on the E&I to PDEMs and concerned developers comprehensively. Seminar materials and presentations were translated into Lao language and prepared by the DEM staff based on the products of the projects to adjust the purpose of the seminar.
- This seminar was the first opportunity to explain mainly the procedure of the examination and inspection for each technical field inviting all PDEMs and IPP developers.

9. Recommendations

9.1. Overall management of electric facilities

The project purpose of the IPSM is “Regulatory function of the electric power sector is strengthened”, but regulation is only a part of overall management of electric facilities and only the strengthening of regulatory function is not sufficient to achieve the overall goal: “The number of electric power facilities that suit LEPTS increases and the electric power is stably supplied”. In this context, overall management measures of electric power facilities are recommended in this section, considering experience of IPSM activities and the actual situation of Laotian power sector.

(1) Review of overall activities on LEPTS

i) STEP 1

The project purpose of STEP 1 is to establish and maintain LEPTS, and LEPTS was successfully drafted in the project. LEPTS, which was later legislated as a ministerial decree of the then Ministry of Industry and Handicraft (MIH), consists of two different components: electric power technical standards and regulatory procedures. The former is the technical standards which all the electric facilities in Laos should satisfy, and the latter is the administrative procedures with which the Government regulates whether electric power facilities satisfy the standards. Among the total of 184 provisions of LEPTS, Articles 3 to 7 stipulate the regulatory procedures, and the other Articles correspond to the technical standards.

ii) STEP 2

The project purpose of STEP 2 is that LEPTS should be enforced within public and private sector, and the project was implemented in order for DOE and EDL to improve operational capacity of LEPTS, not technical capacity, as specially emphasized in the Joint Terminal Evaluation Report. The principal output in the project was formulation of the Guidelines⁹ and Safety Rules¹⁰. The Guideline clarifies the responsibilities of RAEPD¹¹ and owners (developers) on the regulatory procedures stipulated in LEPTS, and provides the forms and documents to be submitted by developers. The Safety Rules stipulates necessary items in safety regulations to be submitted by owners, ruled by the Article 31 of the Guidelines. With regard to the technical aspect, STEP 2 developed Explanation¹², Glossary of technical terms, and Examination & Inspection manual (E&I manual). Examination prescribes technical contents which meet the requirements stipulated in the LEPTS, as specifically as possible, and E&I manual summarizes

⁹ The Guidelines on Operating and Managing Lao Electric Power Technical Standards

¹⁰ The Safety Rules for Operation and Maintenance.

¹¹ Responsible Agency for Electric Power Development

¹² Explanation of the Lao Electric Power Technical Standards.

checkpoints and considerations when regulator actually conduct examination and inspection.

this...
 prepare... by the end of STEP 2, but the actual examination and inspection pursuant to LEPTS
 and the... relevant documents had never been realized before the IPSM project.

) IPSM (STEP 3)

success... the achievements and results of STEP 1 and STEP 2, IPSM focused on the actual
 examination and inspection consistent with the procedures stipulated in the LEPTS and the
 guidelines... as described in Chapter 6, and the project purpose: “Regulatory function of the
 electric power sector is strengthened” was achieved almost as per the project design matrix
 (PDM).

Overall activities in STEP 1, STEP 2 and IPSM are illustrated as Figure 9-1.

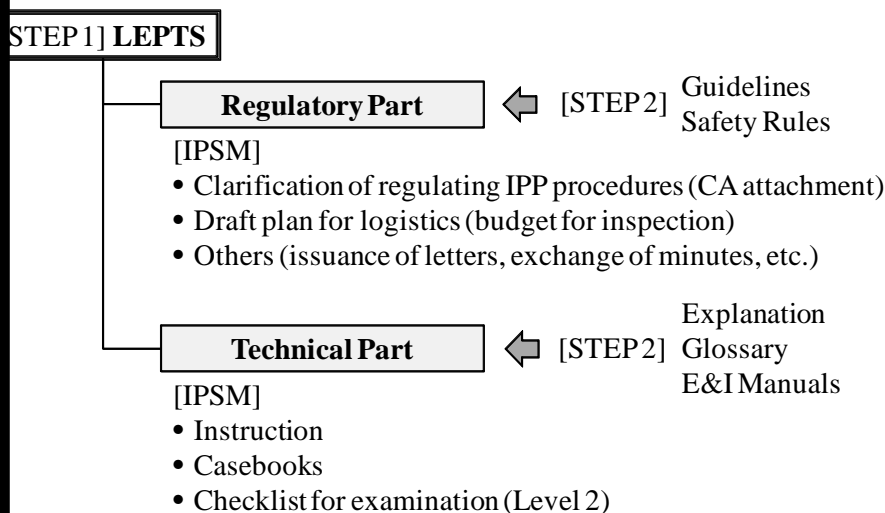


Figure 9-1: Overall activities in STEPs

However, the overall goal of the project: “The number of electric power facilities that suit
 LEPTS increases and the electric power is stably supplies” seems a long way off even after the
 IPSM project completed. Overall procedures stipulated in LEPTS and the relevant documents
 were summarized as Table 9-1, but no project has so far suited LEPTS. All the items in Table
 9-1 are mandatory stipulated in the Electricity Law, LEPTS and the Guidelines, and the owner
 and the regulator should observe all of them. Otherwise, such electric facilities must be
 recognized as illegitimate in a strict sense.

Table 9-1: Overall procedures pursuant to LEPTS

Item	Owner (Developer)	Regulatory Authority (DEM/PDEM)
[Design Stage]		
Chief Engineers	Notification	(Qualification)
Field Investigation Plan	Application	Approval
Design Criteria	Application	Examination (Approval/Remedy Order)
Detailed Design (before commencement of construction)	Application	Examination (Approval/Remedy Order)
[Construction Stage]		
Commencement of Construction	Notification	Receipt
Construction Commencement Report	Submission	Receipt
Chief Engineers	Notification	(Qualification)
Inspection of dam foundation	Application	Inspection (Approval/Remedy Order)
Flood management rules	Notification	Receipt
Inspection prior to first impounding	Application	Inspection (Approval/Remedy Order)
Examination and Inspection before commencement of commercial operation	Application	Examination and Inspection (Approve/Remedy Order)
[Operation Stage]		
Report for commencement of operation	Submission	Receipt
Chief Engineers	Notification	(Qualification)
Safety Rules	Submission	Receipt
Regular Report	Submission (annually/monthly)	Receipt
Accident report	Submission (each case)	Receipt

Although the roadmap for power sector regulation was formulated and proposed within a framework of LEPTS as described in Chapter 6, it is high time to review the regulatory design pursuant to LEPTS itself and try different approaches to achieve the overall goal, considering that 10 years have already passed since the formulation of LEPTS.

(2) Analysis and evaluation

i) Comparison with Japan

LEPTS and the other relevant documents were formulated by Japanese engineers from Japan's electric power utilities substantially modeling after the technical standards and regulatory system of Japan, even considering the conditions of Laos.

This IPSM project aims to strengthen the regulatory function of the electric power sector in Laos, but the following obstacles were often pointed out by the counterparts in the course of technical transfer, such that it was quite difficult to follow the procedures stipulated in LEPTS since the electric power business was differently operated from Japan; e.g.,

- EPC/ full turn-key¹³ contract is most common in Laos, and the developer (EDL) does not necessarily manage the contents of (detailed) design and the progress of construction work in detail, so that EDL could not undergo examination and inspection timely and properly.
- A lot of foreign investors design and construct electric facilities in Laos, sometimes on a temporary basis, hiring less quality contractors while trustworthy Japanese business entities are continually engaged in the electric power business in Japan. In addition, such IPP facilities are supposed to be transferred to the Government of Laos after a concession period, so that more strict regulation will be required in Laos.

For these reasons, power situation was re-evaluated comparatively in Laos and Japan.

Firstly, the scale of electric power industry was compared as shown in Table 9-2. Comparing the scale of electric power business with Japan, Laos has no more than a ninetieth part of installed capacity including capacity for export, one-third of transmission lines and a half of distribution lines. Among the annual generation of 13 TWh, one-sixth was sold for domestic use, which is less than four-hundredth of that of Japan, and the per capita sales is less than one-twentieth. However, the number of projects to be examined and inspected is considerably large in Laos compared to the size of existing facilities along with the active demand increase both domestically and abroad, while new investment for electric facilities is limited due to stagnant demand growth in Japan.

Table 9-2: Comparison of scale of electric power industry (as of 2010)

	Japan (A)	Laos (B)	(A)/(B)
Population (million)	127.1	6.4	19.9
Land area (km ²)	377.9	236.8	1.60
Number of employee (electric power enterprises)	134,767	3,491	38.6
Installed capacity (MW)	228,479	2,581	88.5
Annual generation (GWh)	918,236	12,821	71.6
Electricity sales (GWh)	906,417	2,228	406.8
Sales per capita (kWh)	7,133	346	20.6
Performance index ¹⁴ (MWh per capita)	6,726	638	10.5
Transmission lines (km)	101,478	3,076	33.0
Distribution lines (km)	1,298,657	29,158	44.5

(Source) JEPIC Statistics 2010.

In the meantime, the structures of electric power industries are quite different each other as shown in Table 9-3.

¹³ Contract where a single contractor or provider undertakes collectively design, procurement of equipment, materials and workforce, construction through completion and commissioning, owing responsibilities of delivery, guarantee and performance. The [client](#) or [customer](#) only has to turn the proverbial key to make everything [function](#) as it should.

¹⁴ Sales per employee

Table 9-3: Comparison of (regulatory) structure of electric power industry

	Japan	Laos
Regulatory authorities	METI & NRA (ex NISA) (160 & 500 approximately)	DEM & PDEMs (24 in DEM & part-timers in PDEMs)
Developer (Owner)	Mostly Japanese 10 power utilities (private) 2 wholesalers (EPDC, JAPC) Local governments (hydro) Other IPPs	EDL (state owned) Foreign investors Domestic investors MEM (distribution lines) PDEM (small hydro, distribution)
Design & construction management	In-house engineers of developer	(Full turn-key contract) EPC contractors appointed consultants
Contractors	Mostly domestic Manufacturers (Toshiba, Hitachi, MHI etc.) General contractors Subsidiaries of power utilities	Foreign contractors from various countries according to developers and financiers

Major electricity business entities in Japan are 10 General Electricity Utilities responsible for supply monopolistically to their region in the form of a vertical integration from generation, transmission to distribution; two Wholesale Electricity Utilities supplying General Electricity Utilities; and Wholesale Suppliers such as IPPs and local authorities, most of which are principally domestic private enterprises¹⁵ or local governments. Generally most of Japan's electricity business entities have their own in-house engineers on a permanent basis, and they conduct design, construction management and operation & maintenance by themselves. Construction works are usually conducted by also Japanese private companies such as manufacturers including Toshiba, Hitachi and MHI, general contractors and subsidiaries of Electric Utilities. In this way, most of electricity business players are Japanese, which are naturally familiar with Japan's technical standards. In addition, owners acknowledge and manage their business to technical details including the progress and quality of projects. The business structure that limited number of business players are engaged in electricity business on a continuous basis can be regarded as an environment bringing positive incentive to observe rules and regulations.

On the contrary, major electricity suppliers in Laos are a state-owned enterprise: EDL and domestic IPPs supplying to EDL for domestic supply; and export IPPs. Most of IPPs are owned by foreign capitals, and the electricity of export IPPs are directly sold to EGAT in Thailand and EVN in Vietnam by their own transmission lines without connecting EDL system, which is complicating the electricity business situation in Laos. In addition, the design and construction (management) of projects are generally conducted through EPC/ full turn-key contracts regardless of owners (EDL/IPP), and the owner doesn't necessarily manage the progress and quality in detail. (In other words, owners without such managing abilities may prefer EPC/

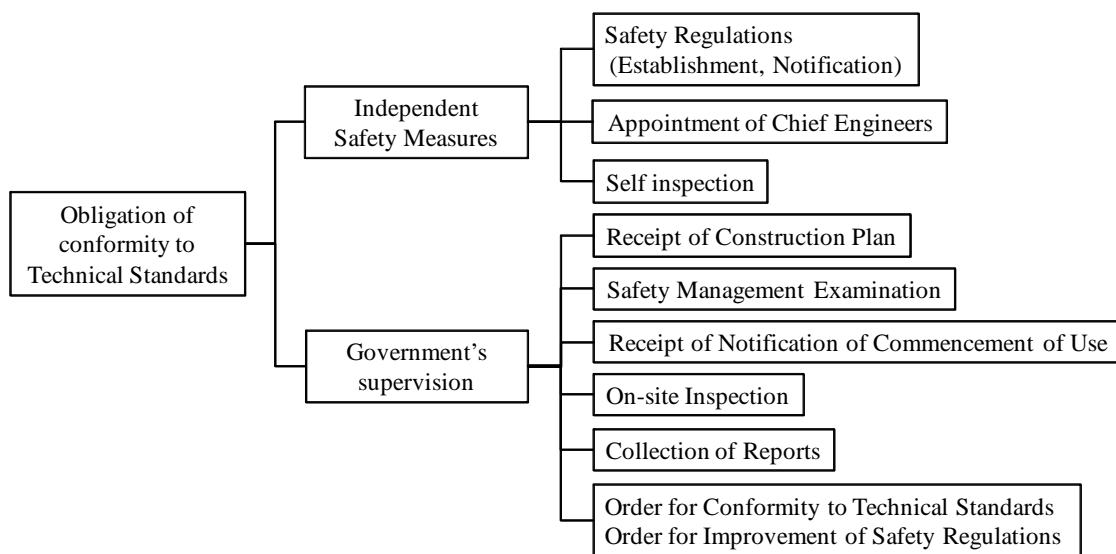
¹⁵ The acquisition of more than 10% of listed companies has been the subject of prior notification stipulated in the Foreign Exchange and Foreign Trade Law.

turn-key contract.) It is not also uncommon that Many IPPs are outsourcing even operation and maintenance works.

Although owners should have primary responsibilities on design, construction, and operation and maintenance in LEPTS, modeling after Japan’s regulation, strict application of LEPTS doesn’t necessarily seem easy considering the difference of business environment between Japan and Laos.

ii) Regulatory procedures and technical standards in Japan

LEPTS consists of technical standards and regulatory procedures as mentioned above. Technical standards naturally do not differ from country to country, and should be observed voluntarily to secure a certain quality of facilities regardless of regulatory examination and inspections. On the contrary, regulatory system and procedures should be individually determined by a regulator from a viewpoint of public safety etc. as necessary, and naturally vary widely according to the business situation. In the case of Japan, safety ensuring system for electric facilities for business use are established under independent safety measures based on the principle of self-responsibility of an owner, in relation to the safety of electric facilities for business use, as shown in Figure 9-2.



(Source) Japan Electric Engineers' Association.

Figure 9-2: Safety Ensuring System

Although LEPTS stipulates regulatory procedures modeling after the regulatory system of Japan, comprehensive concept of safety ensuring system are not completely understood. The counterparts sometimes insisted the necessity of more strong supervision of the Government from their mistrust of foreign developers, and if so, other regulatory system should be referred instead of Japan’s system.

It should be noted that the administrative procedures in LEPTS are similarly stipulated in the Electricity Law amended in 2011, as shown in Table 9-5, and should be unified in the Law to avoid misunderstanding, which is considered desirable from the viewpoint of legal system.

iii) Regulation for electric power facilities

By the game theory, regulations can be generally classified into two types: ‘zero-sum game’ type and ‘cooperative game’ type. In case of public pollution, business entities will be likely to discharge polluted matter such as exhausted gas and waste water as they like for the sake of cost saving, without regulation. This situation is likened to a zero-sum game. On the contrary, one of the most critical objectives of power sector regulation is to secure a good quality of facilities to supply electricity stably and prevent bad influences for environment, and stable power supply with a good quality of facilities will be not only benefit for consumers but for suppliers such as as-planned electricity sales income and reduction of unplanned maintenance cost. Standardized specification may bring benefit into also contractors and manufacturers for saving production costs. In addition, conformance to regulations and standards can be alibi for developers’ and contractors’ errors and/or negligence in case of trouble or accident. In this sense, regulation for electric power facilities is likened to a cooperative game, and has a built-in incentive for developers and contractors to conform to the regulation even though there are some zero-sum game type items to be strictly regulated.

iv) Observation of actual examination and inspections

Actual examination and inspection was emphasized as one of the major purposes of the IPSM project. As described in Chapter 6, regulatory inspections were conducted for actual ongoing projects, and necessary support was provided to responsibly conduct mandatory procedures stipulated in LEPTS such as issuance of ‘correction order’ or ‘certification’. In the meantime, most of the issued orders were relating to forms and documents to be submitted by developers, and little technical correction was observed, which indicates that LEPTS is not disseminated at all among developers.

Obviously well-functioned regulation requires cooperation among all the concerned parties assuming primarily owners’ (developers’) proactive and faithful fulfillment of their responsibilities with totally knowing the regulation and complementary inspection by the regulator on particularly important items, and will never be realized by unilateral efforts to enhance the regulatory capacity of the regulator.

LEPTS and the Guidelines have been legislated as ministerial decrees, and all the parties concerned with power sector should observe them. It is thereby natural to think that educational activities for developers should be unnecessary. However, strong commitment of the high government officials for compliance will be required, considering the current law-violated situation that quite a few projects have commenced commercial operation without undergoing regulatory inspections stipulated in LEPTS and the Guidelines. Otherwise, disseminating

activities for developers seem indispensable.

(3) Recommendations

Considering the above reviews and analyses on the past regulatory activities and the related issues, the following issues are recommended for sound and rational power sector regulation in the future.

i) Designation of purpose and necessity of technical standards and regulation

LEPTS is a facility standard applicable to design, construction and operation, and all the principles are referring to the requirements of power facilities as follows:

- Power facilities shall not harm the human body and damage any object;
- The power facilities shall be installed so as not to cause any electrical and magnetic interference that may affect other electrical facilities;
- There shall be of no significant effect on power supply despite of the power facilities being broken down or damaged; and
- Installation of the power facilities shall not have an adverse effect on the surrounding environment.

Hence LEPTS is not almighty, but effective as long as in accordance with the principles and the scope. In other words, other standards will be required to meet other objectives. For example, LEPTS cannot be applied to the examination of feasibility studies, and only LEPTS is not sufficient for achievement of stable power supply without operation standards such as grid codes. When caring for the handover of IPP's electric facilities after the concession period, another standard should be established.

ii) Review and revision of LEPTS

As declared in the preface of LEPTS, technical standards should not be considered rigid and inflexible. Rather, it should be updated timely and appropriately according to technological progress as well as the conformity to actual situations and the change of circumstances.

The following items are considerable viewpoints when reviewing and revising of LEPTS in the future.

(a) Review of standards actually applied to electric facilities in Laos

Before revising the LEPTS, all the technical standards applied to electric facilities in Laos should be reviewed at first. LEPTS accepts other alternative standards when it has sufficient technical basis, but what standards are acceptable or not acceptable is not clearly defined. All of the countries running electricity business in Laos are the member countries of WTO including China and Vietnam, and their standards should not be thereby very different from the international standards. In any case, comparison among standards should be studied including the difference between international standards and LEPTS itself.

(b) Changes in circumstances

- Participation in WTO: WTO-TBT Agreement¹⁶ requires the member countries to follow international standards such as ISO and IEC in principle, and strong local rules and regulations are sometimes considered as non-tariff barriers preventing free trade.
- Future regional network among GMS and ASEAN: Technical standards should be discussed and ultimately unified in advance along with other rules such as market structure and tariffs.

(c) Actual situation of electric facilities in Laos

As described in Chapter 6, some provisions in LEPTS were found difficult to comply with in actual inspections particularly in the field of distribution, and such provisions should be reconsidered along with the actual situations.

iii) Optimization of electric power development management

After the enactment of LEPTS, regulatory activities have been enhanced to realize the overall goals: “Power sector’s activities and power facilities’ safety are improved” in STEP 2 and “The number of electric power facilities that suit LEPTS increases and the electric power is stable supplied” in IPSM. However, only the enhancement of regulation is not sufficient to realize the above overall goals, but the cooperation with promotion side such as the government agency (DEB), developers and contractors is indispensable, and optimization of electric power development management should be considered including regulation.

(a) Dissemination of LEPTS for developers and contractors

As mentioned in the previous section, sound regulation requires the cooperation of developers and contractors. As the Electricity Law orders all the electrical facilities installed in Laos to conform to LEPTS, any developers must conduct self examination and inspection to verify if their facilities satisfy the requirements of LEPTS, regardless of whether or not the regulator conducts E&I. However, most developers and contractors are not familiar with the provisions of LEPTS from the results of on-site inspections. The technical contents of LEPTS are not so different from international standards and others that developers and contractors can possibly understand without any instruction, and the first step is to inform them of the provisions of the Electricity Law and the LEPTS. In this sense, the role of the DEB’s official concerned with contract and agreement, and EDL’s procurement division is critical, who should instruct the obligation to conform to LEPTS, include it in the contract, agreement or procurement specification, and check their fulfillment with support from regulatory authority as necessary.

¹⁶ Agreement on Technical Barriers to Trade

(b) Optimization of management combining with contract and agreement¹⁷

Although quality electric facilities essentially bring benefit also into developers as mentioned earlier, contractual obligations such as performance guarantee are also effective to keep the facilities quality. While the regulations on electric facilities are a bottom-up approach, contractual obligations are a top-down approach. Comprehensive measures of electric facilities should be considered to optimally manage electric facilities in Laos.

(c) Rationalization of examination and inspection

There are four different types of examination & inspection (E&I) in the Lao power sector, as shown in Table 9-4. The first one is the regulatory E&I, which has been promoted in the IPSM project, and the government (regulator) conducts examination and inspection on the developer of a project. The contents of regulation are detailed in the Guidelines and summarized as Table 9-1. The second one is the self E&I to be conducted by a developer as mentioned above. The first and second E&I's should be conducted strictly according to LEPTS.

In the meantime, the third one, receiving E&I is what a developer conduct for the contractor of a project whether or not the facilities are designed and constructed as per the procurement specification. Without regulations and technical standards, receiving E&I is naturally conducted before the developer pay the contract fee. The last one is exceptional E&I and applied to the handover of distribution facilities from MEM/PDEM to EDL at the completion of projects. If EDL applies LEPTS to their facilities — in other words, procurement specifications of EDL contain LEPTS or the internal standard conforms to LEPTS —, the third and the last E&I's are equivalent to self E&I. Considering that EDL is a state-owned enterprise and enough trustworthy, self E&I of EDL can substitute regulatory E&I, and the responsibility of the regulator will be to audit the results of self E&I in such cases.

Table 9-4: Different types of examination and inspection

	Type of E&I	Governing standard	Examiner & Inspector	Examinee & Inspectee
1.	Regulatory E&I	LEPTS	Regulator (DEM/PDEM)	Developer (EDL, IPP, DEM, PDEM)
2.	Self E&I	LEPTS	Developer	Developer (Contractor)
3.	Receiving E&I	Procurement specification	Developer	Contractor
4.	Handover E&I	EDL's internal standard	EDL	PDEM IPP (in future)

¹⁷ This is currently studied and discussed in more depth in another JICA Project for Improvement of Power Sector Governance.

Table 9-5: Provisions in LEPTS and Electricity Law on Technical Standards

LEPTS (Ministerial Decree No: 052/MIH), 2004	Electricity Law 2011
<p>Article 3 Conformity to the Technical Standards</p> <p>An owner intending to newly install, rehabilitate, and operate a power facility shall design, construct, operate, and maintain/administer such facility so as to conform to the requirements as prescribed in the Technical Standards.</p> <p>The Technical Standards provide for the fundamental requirements concerning the power facilities and such technical contents that should satisfy the fundamental requirements. The technical contents contained in Section 2-3 to Section 2-7 and Section 3-3 to Section 3-7 may not cover all the technical contents that should satisfy the fundamental requirements set forth in Section 2-2 and Section 3-2, and if proposed alternative should have sufficient technical basis to fulfill the fundamental requirements, such alternative shall be judged to conform to the fundamental requirements.</p> <p>The "owner" used in this Article shall mean any organization, the Government and provincial administrative organs, Electricite du Laos, enterprises or persons that are authorized to engage in the electricity business in accordance with Article 11 and Article 40 of the Electricity Law¹⁸.</p> <p>With respect to any power facility that is already being operated, power facility under construction and power facility of which design has been completed at the time of enforcement of the Technical Standards, the owner shall try to do his utmost so that such power facilities conform to the fundamental requirements within the limits of possibility.</p>	<p>Article 14 Construction and Installation of electricity</p> <p>Construction and installation of electricity shall ensure the safety, restriction and reduction of harmful effects to the nature and people's property.</p> <p>Construction and installation of electricity shall be conducted in accordance with the Lao Electric Power Technical Standards.</p> <p>Article 21 Installation of Electrical Facilities</p> <p>Individuals, legal entities or organizations undertaking the construction, installation, expansion, repair and maintenance of the electrical facilities shall strictly comply with the Lao Electric Power Technical Standards.</p> <p>Article 22 Establishment and Compliance with Electricity Technical Standards</p> <p>The Ministry of Energy and Mines is responsible to establish the Electricity Technical Standards in order to standardize the electrical tools, equipment, transmission lines and electrical appliances; and to ensure the safety and economization and to form of unanimous standards throughout the country to be able to control the quality of all electrical appliances domestically produced and imported from abroad.</p> <p>Any new installation, expansion, repair, design, construction, operation and maintenance or management of electrical facilities shall be complied with the Lao Electric Power Technical Standards.</p> <p>Article 35 Safety of Operation and Maintenance</p> <p>Individuals, legal entities organizations that operated the electricity business shall ensure the safety in operation and maintenance of the power facilities of engineering of power plant construction, such as: dam, reservoir, spillway, power hours, transmission line, substation, distribution lines and electrical facilities, including the user's site.</p> <p>To ensure the above mentioned safety, individuals, legal entities organizations that operated the electricity business shall establish the Safety Rules for Operation and Maintenance in accordance with the Lao Electric Power Technical Standards and then, submit them to the Energy and Mines sector¹⁹ for consideration.</p>

¹⁸ Electricity Law 1997.

¹⁹ MEM, PDEM, DDEM according to its authority.

LEPTS (Ministerial Decree No: 052/MIH), 2004	Electricity Law 2011
<p>Article 4 Nomination of Chief Engineers The owner shall nominate chief engineers responsible for the technical matters in the fields of design, construction and operation concerning the power facilities respectively, and submit a notice of such nomination to the Minister of Industry and Handicrafts.</p>	<p>Article 25 Appointment of Chief Engineers Individuals, legal entities or organizations operating the electricity business shall nominate Chief Engineers to be responsible for the technical matter in the field of design, construction, installation and operation concerning the power facilities respectively and submit a notice of such nomination to the Energy and Mines sector.</p> <p>The Energy and Mines sector is responsible for the determination of conditions and standards of the Chief Engineers.</p>
<p>Article 5 Examination and Inspection The owner shall, in conducting design, construction and operation of any power facility, undergo examination and inspection as prescribed in the following paragraph be conducted by the Minister of Industry and Handicrafts and pass such examination and inspection.</p> <p>The owner and the registered engineers nominated under Article 4 hereof shall cooperate with the Minister of Industry and Handicrafts in conducting the examination and inspection.</p>	<p>Article 69 Technical Inspection Committee The technical inspection committee is comprised of the Energy and Mines sector and other concerned sectors and is appointed by the Minister of Energy and Mines in order to ensure that the construction, installation, and operations of an electricity business are technically sound, ensure safety, and protect the environment, society and nature.</p> <p>The technical inspection committee shall be automatically terminated after having completed its duties as assigned.</p> <p>Article 72 Forms of Inspection The inspection of electricity activities has three forms as follows:</p> <ol style="list-style-type: none"> 1. Regular inspection; 2. Inspection with prior notification; 3. Emergency inspection. <p>Regular inspection is an inspection carried out in regular manner in accordance with the fixed time.</p> <p>Inspection with prior notification is an inspection conducted out the plans when deemed necessary and with an advance notice to the targets to be inspected.</p> <p>Emergency inspection is an urgent inspection without any prior notification to the targets to be inspected.</p> <p>In the course of inspection of medicines and medical products, the inspection authorities shall be duly and strictly complied with the laws and regulations.</p>
<p>Article 6 Order of Remedy for Conformance to Technical Standards Whenever the Minister of Industry and Handicrafts confirms that the power facility does not conform with the Technical Standards, he/she shall have the authority to order the owner to repair or rehabilitate the power facility so as to conform thereto, suspend the use of such power facility, or restrict the operation of such power facility.</p>	<p>Article 23 Remedy for conformance to Technical Standards In the case that it is found that any electrical installation, expansion, repair, design, construction, electrical facilities has no quality, the Energy and Mines sector or assigned sector has the right to order the electricity business operators to remedy, repair or rehabilitate to be in conformity with the Lao Electric Power Technical Standards; or to order to suspend the use of such power facilities.</p>

LEPTS (Ministerial Decree No: 052/MIH), 2004	Electricity Law 2011
<p>Article 7 Obligation for Reporting The owner shall, in designing, constructing and operating the power facilities, report those matters as prescribed in the following paragraph to the Minister of Industry and Handicrafts.</p>	<p>Article 43 Report Individuals, legal entities or organizations operating the electricity business shall regularly submit their report on the design, construction, operation and safety relating to electricity to the Energy and Mines sector and relevant local administrations.</p>

iv) Strengthening of human resources capacity of the power sector

(a) Basic Strategy for HR Capacity Development

Considering the current situation of HRD in the power sector in Lao PDR (see section 6.5), the measures shall be developed and implemented based on the following strategy:

- | |
|--|
| <ul style="list-style-type: none"> • Utilize existing resources available in the power sector in Lao PDR (e. g. entrust EDL Training Center for implementation), • Tailored training to match the needs of diverse targets (PDEM, newly employed engineers at MEM and EDL), • Continuous expert support to LEPTS • Emphasis on practicality for undertaking E&I, small hydro and/or distribution projects, • Combination of theory (technical and regulatory), procedures and field practice (Examination and Inspection: E&I). |
|--|

In order for MEM to carry out effective HRD policy without exhausting already scarce resources of MEM, it will need to utilize existing resources across the power sector in Lao PDR. One realistic approach the Experts recommend is to entrust EDL Training Center for implementing sector-wide training courses. The target group for strengthening the HR of the power sector as a whole include newly hired employee of MEM and PDEM, and possibly EDL staff who practice internal examination and inspection. The training courses shall be tailored carefully to specific needs of these target groups. The current training programs taught at the center are far from practical with a heavy emphasis on theories. Most training programs are instructed by classroom lecture even though most LEPTS subjects are best learned if they teaching programs are delivered in a field-based environment. Advanced LEPTS training beyond the current training at the center as well as the OJT at MEM headquarters do not exist domestically. The current training programs are designed to emphasize machinery and equipment rather lacking focus on tasks and process management. The current training programs at EDL Training Center does not cover civil engineering, only operation and maintenance of hydro power facilities are covered in the LEPTS training. Even small hydro power development projects are promoted; no training programs matching the target groups are available. While the DL area is one of core competencies for PDEM, the LEPTS training does not focus on examination and inspection.

(b) Basic Design for Capacity Development Activities

1 Selection of target groups

Based on the strategy above, the following training design is proposed:

The target group of the proposed training includes three (3) classes of trainees, namely (i) PDEM, (ii)

MEM officers with less-experienced, and (iii) EDL engineers.

The Experts' analysis (see section 6.3(5)) indicates officers at PDEM are highly in need of strengthening E&I capacity. PDEM will continue to play a vital role in promoting and regulating electric power development in provincial level. Given the required work of PDEM, E&I capacity with specific focus on DL is significantly important. In addition, recent decentralization of authority over small hydro power development requires capacity development on basics of planning of small hydro power development.

MEM officer with relatively less experienced are also one of the target groups. MEM recently hired many young officers in DEM alone, 10 officers are hired and assigned in three divisions. Responsibility of providing appropriate training to them seems to be given solely respective departments and divisions. It is, however still a big burden for senior officers through OJT. More systematic approach to supplement OJT is desired.

EDL officers are in need of improving E&I capacity to alien the roadmap proposed. As discussed, improvement of E&I capacity at EDL may benefit particularly in the area of quality control. Table 9-6 explains the prospective target groups and the proposed training courses.

The training courses will be divided in two categories, core courses and elective courses. Core courses are fundamental (or common) subjects that everyone must learn. Elective courses are specifically tailored to the target group base on the respective work requirements. Core course shall be a prerequisite for taking elective courses.

Based on the judgment by the Experts, E&I by LEPTS on DL is considered as high priority and is elective course for PDEM. E&I by LEPTS in the HC field is another importance for PDEM. It should be integrated into a long-term training program on small hydro power development proposed by Japanese Long-term expert. Elective course for MEM officers with relatively low experiences shall be F/S course (advance). Again, elective courses shall be taken by those who completed the core courses. Finally associates from EDL shall be taking the training program by different structure. They shall focus on LEPTS Training as it is already implemented. Newly developed training contents focusing on the LEPTS procedures and E&I shall be provided to EDL-TC for revising and updating the existing LEPTS training program.

In general, trainee groupings should correspond to the roles and functions within organizations that have a bearing on the problem that the training is attempting to address. Usually, this involves trainees from multiple units. Where there are important points of similarity, a mix of organizations and/or levels within an organization offers productive cross-fertilization of ideas, promotes innovation, and enhances the training climate.

Table 9-6: Prospective Target Groups and the Training Courses

Target Group	Objective	Prospective Courses	
		Core	Elective
PDEM	Improvement of E&I for DL projects undertaken by PDEM.	Ethics in Public Sector Employees Laws & Regulation (The Electricity Law, LEPTS (procedures), etc)	E&I by LEPTS (DL) (E&I by LEPTS (HC)) ²⁰
MEM	Acquiring basic knowledge on laws and regulations on power sector development.	Contractual Management Negotiation F/S & Budgeting	F/S (advanced)
EDL	Improvement of the quality of provincial DL projects.	Laws & Regulation (The Electricity Law, LEPTS (procedures), etc), Operation and Maintenance of Power Facilities	E&I (HC, HE, SS, TL, DL)

2 Utilization of EDL-TC (Delivery of the Training)

The training shall be taken place at the EDL-TC because of the following reasons:

EDL-TC is a professional division under the Human Resources Department of EDL with its mission is to provide employees of EDL group technical and managerial training. They have expanded the clientele to IPP employees (or engineers of the power sector in Lao PDR). The current LEPTS training focuses on EDL and some IPP engineers but they are capable for teaching PDEM and MEM officers. The center is fully capable to plan, teach and administer training for the power sector employees. EDL-TC is capable of providing training to these new target groups if the training contents are available.

3 Contents of the proposed training

The current LEPTS training program is subject to full updated based on the output from IPSM. Currently, the main focus of the existing LEPTS training at the EDL-TC is on facility design and regulation. Following revisions to the existing LEPTS training program shall be considered.

First, the current LEPTS training does not explain the Electricity Law because the law was enacted after LEPTS training was established. A training module on the new law shall be included. Second, enhancement of the LEPTS procedures is necessary. The clarity of the LEPTS procedures for power facilities were much improved because of IPSM activities. The procedures for small hydro power facilities (equal or less than 15MW) is developed and clarified. Paper work as well as E&I requirements shall be added to the new training module. Third, use of instruction and casebook shall be added to the LEPTS training. They are also output from IPSM activity. The instruction explains LEPTS requirements and related articles graphically. Casebook shows example of good and bad practices of the power facilities. They are helpful to understand the requirement of the technical standard. Fourth, the training program shall include practical examination training focusing on technical documents. The practical instruction prepared during IPSM shall be taught at the training

²⁰Examination and inspection of civil facilities under 15MW may be carried out by MEM. Only basic E&I methods may be taught as an advanced level. The needs depend on the number of participants.

course for enhancement of examination capacity. Fifth and finally, field trip to exercise inspection using the instruction shall be carried out.

Training for EDL employees may be modified according to the similar concept above. Only difference it may have will be EDL's positioning. EDL employees will bore more responsibility for carrying out E&I for internal quality control. Such role difference may need some modification from the contents of the training for PDEM and MEM.

Additionally, some new courses are proposed as indicated in Table 9-6. According to the analysis of PDEM, courses such as "ethics in public sector employees", "contractual management", "negotiation", and "F/S & budgeting" may be important because these are a foundation of the capacity for PDEM and MEM officers. These courses shall be developed from the scratch.

Each course shall have two levels and grades of (i) basic course and (ii) intermediate course. Basic course is prerequisite for taking intermediate course. The basic courses are designed for "novice" learners. Typical novice employees are employees with less than 5 years of experience. They are able to perform a given tasks (mainly routine tasks) with accurate procedures as directed by senior employees; and evaluate the outcomes from his/her outcomes. Intermediate courses are designed for those who took an exam on the basic training course²¹. Intermediate learners are able to comprehend the reasons why he/she is choosing a specific tasks or procedures. He/she can perform regular work accurately without significant direction from his/her supervisors. Course duration may be varied depending on the topics and training design.

(c) Measures to be taken by MEM

Followings are the measures to be taken by MEM to carry out the proposed training.

Internal authorization with HR department of MEM for providing training to PDEM and young MEM officers entrusting to EDL-TC is necessary. Official request and agreement with the Human Resources Department of EDL for implementation frameworks including cost sharing is needed. Under the senior leadership from MEM and EDL, MEM should establish a steering committee to discuss and coordinate cross-cutting issues related to LEPTS Training.

(d) Need of technical assistance by external consultants

In order for MEM to meet the urgency of starting the training program, MEM may request donors to support hiring external consultants. The consultant's assistance shall include the following activities:

- Detailed review of the current training program at EDL/TC,
- Followed by above, curriculum development and identification of topics (consensus-building between MEM & EDL/TC on topics to be covered),
- Assist EDL/TC for preparation of teaching plan,

²¹Minimum prerequisites for taking intermediate courses include taking the previous courses, to pass the final exam of the previous course, or to demonstrate (without taking the course) the capacity (knowledge, skills and attitude) comparable to those who passed the final examination.

- Procurement of training equipment, if any,
- Assist EDL/TC for preparation of teaching materials,
- Carry out Training of Trainers (TOT) to Trainers (i.e. EDL-TC, MEM, EDL senior members who will act as instructor) ,
- Supplemental OJT to senior MEM engineers on LEPTS²²

²²External consultants may be able to provide supplemental assistance to a variety of issues related to LEPTS enforcement to DEM when necessary. As a result of IPSM, DEM is able to perform E&I following LEPTS. It is advisable that the external consultant may provide support and advice on technically advanced issues when it is needed.

10. Provision of equipment

Electronic office equipment such as personal computers, printers, scanners, photocopier and projectors were procured and handed over to DEM (DOE) to prepare the materials and make presentations for seminars and trainings. An HD video camera was also provided to record the lectures in DVDs, which would be utilized as a training material especially for PDEMs other than those in pilot provinces.

Measuring instruments for distance and position such as a handy GPS receiver and laser range finder were also provided for field inspections.

The equipment was kept in the project office of the C/Ps.

Table 10-1: List of equipment

No.	Item	Name of product/ Manufacturer	Quantity	Date	Country of procurement
1	Printer	MP648 / Canon	1	October 27, 2010	Laos
2	Scanner	ScanSnap S1500 / Fujitsu	1	January 31, 2011	Japan
3	Laptop PC	Satellite M645 / Toshiba	2	May 27, 2011	Laos
4	Projector	VPL-EX100 / Sony	1	May 27, 2011	Laos
5	Desktop PC	Pavilion P7-1060L / HP	1	October 10, 2011	Laos
6	Printer	Pixma ip100 / Canon	1	October 10, 2011	Laos
7	Portable GPS receiver	eTrex30 / Garmin	1	March 30, 2012	Japan
8	Laser Range Finder	L550AS / Nikon	1	March 30, 2012	Japan
9	Video Camera	iVIS HF R21 / Canon	1	March 30, 2012	Japan
10	Photocopier	iR2530 / Canon	1	May 31, 2012	Laos

11. Local expenses report

Local expenses for car rental, petrol, copy papers and other consumables were provided for the Project by JICA. The table below shows the summary of local expenses.

Table 11-1Table: List of local expenses

(Japanese Yen)

Local Expenses	1st Year (Oct. 2010 – Dec. 2011)	2nd Year (Jan. 2012 – Mar. 2013)	Total
Interpretation and Translation Cost	61,620	21,083	82,703
Repair and Maintenance Cost	0	0	0
Material/Equipment Purchase Expenses	420,455	408,550	829,005
Expendable Supplies	234,525	438,668	673,193
Travel Expenses	0	77,300	77,300
Communication Expenses	0	0	0
Printing and Binding Cost	163,988	105,206	269,194
Rental Cost	2,044,669	1,805,949	3,850,618
Training Fee	213,662	229,895	443,557
Conference Cost	125,166	337,420	462,586
Others	0	0	0
Total	3,264,085	3,424,071	6,688,156

12. Ingenuity for implementation of the Project and lessons learnt

12.1. Procedure on the examination and inspection (E&I) in the Project

The approximate procedure for the E&I must be: to confirm the conformity to LEPTS on the design of power facilities (examination of the design documents) before the commencement of construction; and, then to confirm whether the facilities are being constructed in line with the design based on examination by the LEPTS or not (field inspection). There are 2 major duties for the regulatory authority as shown below and the 2 duties should be necessary for the “perfect” E&I:

- (1) Administrative procedure following the LEPTS article 3 to 7 and the Guidelines.
- (2) Technical confirmation in line with LEPTS articles apart from the administrative procedure above.

It was informed that the C/Ps had carried out several E&Is before the commencement of the IPSM Project (before October 2010). However, from the design stage to inspection stage, official evidence was not found out following the administrative procedure from the receipt of application forms from developers, implementation on E&Is based on the applications with design documents and issuance of the official letter of completion (or certificate) to the developers. Only the FS examination official letters were issued as “the Interim Letter” or “Certificate for FS”. From the technical viewpoints, the F/S cannot be examined under the framework of the LEPTS because it is prepared to evaluate the project feasibility (viability). For the FS, examination was carried out by checking the table of contents stipulated in the MOU and a few points of technical matters such as flood discharge and basic dam shape (most likely no electrical checking points)²³.

The Project commenced under the background mentioned above. There were not concrete and clear policy and methodology for the C/Ps to conduct the coming examination of design documents (B/D) and field inspections in near future. At that time, most of the C/Ps personnel thought that deeper individual technical knowledge with more sophisticated language skills could achieve the Project goal “Regulatory function in the power sector is enhanced” overcoming the foreign developers. The technical matters (No. (2) above) was the first priority rather than the administrative procedure (No.(1) above) even if the necessity of the information sharing, receipt of the forms and E&I within the stipulated period were realized. Results of the brainstorming meeting prior to the preparation of the Review Report showed that activities categorized under No. (2) above became the 1st and 2nd priorities and activities categorized under No.(1) above became the 3rd priority.

The Experts had a series of discussion with the Director General (DG) of the DOE on the future institutional framework. It was mentioned by the DG that the first priority was to implement the E&I with the administrative procedure (No. (1) above) and it would be possible even to hire a technical

²³ Duty of the examination of FS was transferred to the DEPP in charge of planning and development from DEM for the regulation. The Guidelines should be revised.

consultant to conduct technical part of the E&I. The Experts, under such circumstances, started the preparation of the Instructions (check sheets) and Casebooks easily used for the inspections and conducted the field OJTs to set up a preparatory framework even if there was not the full consensus with all the C/Ps on such framework. Then the first inspection (Inspection Prior to First Impounding) with the official process for the C/Ps (from receiving the application form, conducting field inspection, exchanging the minutes of the meeting (M/M) at the site office and issuing the official letter to the developer) was conducted in June 2011 with cooperation from the developer. This was a small success for the C/Ps, and similar inspections were conducted afterwards. As described above, one of the major activities was the setup of the inspection.

Before the commencement of the second phase in November 2011, the C/Ps requested the Experts to assist the examination for the design documents. The Experts prepared the check sheets to confirm the necessity contents of the application form, table of contents (necessity documents attached) with necessary design forces (up to level 2) for the C/Ps to conduct the administrative examination as the minimum requirement. The Experts also tried to improve technical understanding of the C/Ps in each field with mutually setting up an individual target. However the improvement was not remarkable because of shortage of time and some other reasons.

As mentioned above after 2 and half year Project period, the C/Ps understood their role as the administrative officer with actual experiences of E&Is and now teach the know-how to the newly recruited officers. However, there are some issues that were not resolved as way-forward as follows:

1. Strictly organized E&I framework

The C/Ps has not organized a strict organizational and institutional framework to cover all E&Is due to the lack of human resources in DEM and lack of developers' understanding even if they have experienced E&Is throughout the project period. In most cases, developers do not submit the necessary application forms with design documents prior to the inspection as stipulated in the Guidelines, and as a result, the C/Ps have to conduct the inspection receiving the documents on the same day as the inspection at the site. In the sense, the level of understanding on the LEPTS has not reach sufficient one yet for all the developers.

2. Balance between examination and inspection

Inspections in the field had to be carried out without sufficient level examination to the B/D (design documents) because the Project appreciated the formal set-up of inspection methodology as the first priority. One serious example was the Inspection of Rock Foundation. The evaluated rock conditions such as their petro genetic features, strength, water-tightness, treatment methodologies to the weak parts, etc. should be confirmed by the design documents in advance and then the visible parts of the rock foundation should be confirmed directory in the field. Unfortunately, the process mentioned was not taken properly and for the reason, the E&I could not be conducted under the ideal (perfect) conditions.

3. Understanding on the direction of the Project in the C/Ps organization

Basically, the Project was implemented under the consensus with the C/Ps organization to prioritize the formal (administrative) procedure on the E&I. The C/Ps, on the other hand, have another duty to diffuse the appropriate technical knowledge based on the LEPTS throughout the country. In the sense, it is realized that some C/Ps are not satisfied with results of the Project due to the shortage of the deeper technical inputs from the Experts.

13. List of outputs of Project

(1) Reports

Project phase	Title of report	Time of submission
First phase (Oct. 2010 to Dec. 2011)	Activity Plan	November 2010
	Project Progress Report (No. 1)	March 2011
	Project Progress Report (No. 2)	September 2011
	Project Progress Report (No. 3)	December 2011
Second phase (Jan. 2012 to Mar. 2013)	Activity Plan (second phase)	March 2012
	Project Progress Report (No. 4)	March 2012
	Project Progress Report (No. 5)	July 2012
	Project Progress Report (No. 6)	December 2012
	Project Completion Report	March 2013 (planned)

(2) Outputs for technical cooperation

No.	Title of document	Time of submission
1	Review Report (first draft)	December 2010
2	Review Report (Final)	March 2011
3	Instructions (first draft)	March 2011
4	Casebooks (first draft)	March 2011
5	Instructions	July 2011
6	Casebooks	July 2011
7	Checklist for examination and inspection with revised Instructions and Casebooks	July 2012
8	Manual on Provincial Seminar for Promoting LEPTS	February 2013
9	10 Tips for More Effective PowerPoint Presentation (incl. DVD)	February 2013
10	Guidance to Roadmap for Power Sector Regulation (Draft)	March 2013

14. Attachment

Attachment I R/D and M/M Work schedule

- (1) Record of Discussions (R/D)
- (2) Minutes of Meeting (M/M)

Attachment II Work schedule

Attachment III Organization chart of counterpart organization (DEM)

Attachment IV Documents for results of activities

- (1) Pictures of activities
- (2) Field inspection and OJT
- (3) Discussion material with DEB and DEPP
- (4) Project List
- (5) Seminars on the promotion of LEPTS understanding
 - a) Pre seminar in Vientiane
 - b) 1st seminar in Champasak
 - c) 2nd seminar in Xieng Khouang
 - d) 3rd seminar in Savannakhet
- (6) Counterpart trainings in Japan
 - a) 1st counterpart training
 - b) 2nd counterpart training

Attachment V Documents for the Joint Coordinating Committee (JCC)

- (1) First JCC
- (2) Second JCC
- (3) Third JCC
- (4) Fourth JCC

Attachment I

Record of Discussion (R/D) and
Minutes of Meeting (M/M)

(1) Record of Discussions (R/D)

**RECORD OF DISCUSSIONS BETWEEN
JAPAN INTERNATIONAL COOPERATION AGENCY AND
AUTHORITIES CONCERNED OF THE GOVERNMENT OF
THE LAO PEOPLE'S DEMOCRATIC REPUBLIC
ON JAPANESE TECHNICAL COOPERATION
FOR THE PROJECT FOR IMPROVEMENT OF POWER SECTOR MANAGEMENT**

With regard to the Minutes of Meeting of the Japanese Detail Planning Study Team dated 19 November 2009, Japan International Cooperation Agency (hereinafter referred to as "JICA") had a series of discussions through JICA Laos Office with the Department of Electricity (hereinafter referred to as "DOE") and other authorities concerned on desirable measures to be taken by JICA and the Government of Lao People's Democratic Republic for the successful implementation of the Project for Improvement of Power Sector Management in the Lao People's Democratic Republic (hereinafter referred to as "Lao P.D.R.").

As a result of the discussions, and in accordance with the provisions of the Agreement on Technical Cooperation between the Government of Japan and the Government of The Lao People's Democratic Republic, signed in Tokyo on 12th December, 2003 (hereinafter referred to as "the Agreement"), the Team and Lao authorities concerned agreed on the matters referred to in the document attached hereto.

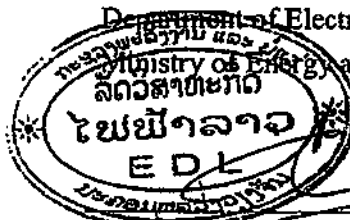


Mr. Masato FOGAWA
Chief Representative
Laos Office
Japan International Cooperation Agency



Vientiane, July 16, 2010

Mr. Viraphonh VIRAVONG
Director General
Department of Electricity
Ministry of Energy and Mines



Mr. Khammany INTHIRATH
General Manager
Electricite du Laos

THE ATTACHED DOCUMENT

I. COOPERATION BETWEEN JICA AND THE GOVERNMENT OF THE LAO PEOPLE'S DEMOCRATIC REPUBLIC

1. The Government of the Lao P.D.R. will implement the Project for Improvement of the Power Sector Management (hereinafter referred to as "the Project") in cooperation with JICA.
2. The Project will be implemented in accordance with the Master Plan which is given in ANNEX I.

II. MEASURES TO BE TAKEN BY JICA

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

1. DISPATCH OF JAPANESE EXPERTS

JICA will provide the services of the Japanese experts as listed in ANNEX II. The provision of Article V of the Agreement will be applied to the above-mentioned experts.

2. PROVISION OF MACHINERY AND EQUIPMENT

JICA will provide such machinery, equipment and other materials (hereinafter referred to as "the Equipment") necessary for the implementation of the Project as listed in ANNEX III. The provision of Article VII of the Agreement will be applied to the Equipment.

3. TRAINING OF LAO PERSONNEL IN JAPAN

JICA will receive the Lao personnel connected with the Project for technical training in Japan.

III. MEASURES TO BE TAKEN BY THE GOVERNMENT OF THE LAO PEOPLE'S DEMOCRATIC REPUBLIC

1. The Government of the Lao P.D.R. will take necessary measures to ensure that the self-reliant operation of the Project will be sustained during and after the period of Japanese

M.J. W t

technical cooperation, through full and active involvement in the Project by all related authorities, beneficiary groups and institutions.

2. The Government of the Lao P.D.R. will ensure that the technologies and knowledge acquired by the Lao nationals as a result of the Japanese technical cooperation will contribute to the economic and social development of the Lao P.D.R.
3. In accordance with the provisions of Article V of the Agreement, the Government of the Lao P.D.R. will grant in the Lao privileges, exemptions and benefits to the Japanese experts referred to in II-1 above and their families.
4. In accordance with the provisions of Article VII of the Agreement, the Government of the Lao P.D.R. will take the measures necessary to receive and use the Equipment provided by JICA under II-2 above and equipment, machinery and materials carried in by the Japanese experts referred to in II-1 above.
5. The Government of the Lao P.D.R. will take necessary measures to ensure that the knowledge and experience acquired by the Lao personnel from technical training in Japan will be utilized effectively in the implementation of the Project.
6. In accordance with the provision of Article V of the Agreement, the Government of the Lao P.D.R. will provide the services of Lao counterpart personnel and administrative personnel as listed in ANNEX IV.
7. In accordance with the provision of Article V of the Agreement, the Government of the Lao P.D.R. will provide the buildings and facilities as listed in ANNEX V.
8. In accordance with the laws and regulations in force in the Lao P.D.R., the Government of the Lao P.D.R. will take necessary measures to supply or replace at its own expense machinery, equipment, instruments, vehicles, tools, spare parts and any other materials necessary for the implementation of the Project other than the Equipment provided by JICA under II-2 above.
9. In accordance with the laws and regulations in force in the Lao P.D.R., the Government of the Lao P.D.R. will take necessary measures to meet the running expenses necessary for the implementation of the Project.

IV. ADMINISTRATION OF THE PROJECT

M.T. W A

1. Director General of the Department of Electricity (DOE), as the Project Director, will bear overall responsibility for the administration and implementation of the Project.
2. Deputy Director of Electricity Power Management Division, DOE, as the Project Manager, will be responsible for the managerial and technical matters of the Project.
3. The Japanese Chief Advisor will provide necessary recommendations and advice to the Project Director and the Project Manager on any matters pertaining to the implementation of the Project.
4. The Japanese experts will give necessary technical guidance and advice to Lao counterpart personnel on technical matters pertaining to the implementation of the Project.
5. For the effective and successful implementation of technical cooperation for the Project, a Joint Coordinating Committee will be established whose functions and composition are described in ANNEX VI.

V. JOINT EVALUATION

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

VI. CLAIMS AGAINST JAPANESE EXPERTS

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

VII. MUTUAL CONSULTATION

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

M.S. W.A.

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

For the purpose of promoting support for the Project among the people of the Lao P.D.R., the Government of the Lao P.D.R. will take appropriate measures to make the Project widely known to the people of the Lao P.D.R..

IX. TERM OF COOPERATION

The duration of the technical cooperation for the Project under this Attached Document will be two (2) years and half from September, 2010.

ANNEX I	MASTER PLAN
ANNEX II	LIST OF JAPANESE EXPERTS
ANNEX III	LIST OF MACHINERY AND EQUIPMENT
ANNEX IV	LIST OF LAO COUNTERPART AND ADMINISTRATIVE PERSONNEL
ANNEX V	LIST OF BUILDINGS AND FACILITIES
ANNEX VI	JOINT COORDINATING COMMITTEE

M.S. W.A.

MASTER PLAN

1. Project title
The Project for Improvement of Power Sector Management

2. Project framework
 - (1) Objectives
 - a. Overall Goal
The number of electric power facilities that suits Lao Electric Power Technical Standards (hereinafter referred to as "LEPTS") increase and the electric power is stably supplied.
 - b. Project Purpose
Regulatory function of the electric power sector is strengthened.

 - (2) Outputs of the project
 - 1 DOE's examination and inspection capacities are enhanced.
 - 2 The capacity of DOE for supervising Provincial Department of Energy and Mines (hereinafter referred to as "PDEM") is enhanced.
 - 3 Understanding on LEPTS in target provinces is improved.

 - (3) Activities of the project
 - 1-1. DOE reviews and analyzes issues and problems of the present examination and inspection process with assistance of Japanese experts.
 - 1-2. DOE conducts sample examination of documents (F/S, D/D, etc.) and on-site inspection with assistance of Japanese experts.
 - 1-3. DOE lists up points to be noted in the process of examination and inspection (including how to instruct enterprises who submitted documents) and formulates the practical examination and inspection instructions with assistance of Japanese experts.
 - 1-4. DOE revises the examination and inspection instructions properly.
 - 1-5. DOE formulates a plan of institutional arrangement for enhancing regulator function of DOE.

 - 2-1. DOE lists up points to be noted in the process of inspection and formulates the practical

M. J. W. A

inspection instructions (including how to instruct enterprises) with assistance of Japanese Experts.

2-2. PDEM conducts on-site inspection with assistance of LEPTS trainers. Japanese Experts assist LEPTS trainers for on-site inspection.

2-3. DOE formulates case books based on actual cases with assistance of Japanese experts.

2-4. DOE revises the case books continuously.

2-5. DOE revises the inspection recording form for PDEM.

3-1. DOE reviews and analyzes issues and problems of the implementation of LEPTS by using actual cases with assistance of Japanese experts.

3-2. DOE formulates case books on how to implement LEPTS at provincial level with assistance of Japanese experts.

3-3. LEPTS trainers conduct seminars on LEPTS in target provinces with assistance of Japanese experts.

3. Target areas

Vientiane Capital and Pilot project sites to be selected

In case in which the Master Plan should be changed due to the situation of the Project, JICA and the Government of Lao People's Democratic Republic will agree to and confirm the changes by exchanging Minutes of Meetings.

M.S. W t

ANNEX II

LIST OF JAPANESE EXPERTS

Experts will be dispatched as needed.

The fields of experts will be described as needed and including the following fields;

1. Hydropower Civil Engineering/ Chief Advisor
2. Hydropower Electrical Engineering
3. Distribution lines
4. Transmission lines/ Substations
5. Development of Training

M.J. W A

ANNEX III

LIST OF MACHINERY AND EQUIPMENT

Part of machinery and equipment necessary for the effective implementation of the Project will be provided by the Japanese side within the budget allocated for technical cooperation. Necessary equipment for the project implementation will be decided upon mutual agreement.

M.J. W.A

ANNEX IV

LIST OF LAO COUNTERPART AND ADMINISTRATIVE PERSONNEL

1. Counterpart personnel
 - (1) Project Director
Director General of the Department of Electricity (DOE)
 - (2) Project Manager
Deputy Director of Electricity Power Management Division, DOE
 - (3) Technical staff from Electric Power Management Division, DOE
 - (4) Technical staff from Rural Electrification Division, DOE
 - (5) Technical staff from Power Sector Planning Division, DOE
 - (6) Technical staff from EDL
 - (7) Other personnel mutually agreed upon as necessary

2. Administrative personnel
 - (1) Administrative and clerical staff
 - (2) Other supporting staff necessary for the project implementation

M.S. 11/17

LIST OF LAND, BUILDINGS AND FACILITIES

The following will be prepared by the Government of the Lao People's Democratic Republic for the project implementation.

1. Office buildings and facilities in Vientiane Capital and some selected province(s) for the implementation of the project;
2. Electricity, air conditioning, water supply and
3. Other facilities agreed upon as necessary.

M.J. W t

JOINT COORDINATING COMMITTEE

1. Function

The Joint Coordinating Committee (JCC) will meet at least once a year or whenever necessity arises. The main functions of JCC are:

- (1) To approve the Annual Plan of Operation formulated by the Project in accordance with Record of Discussions.
- (2) To review the overall progress of the Project and activities carried out under the above-mentioned Annual Plan of Operation in particular
- (3) To review and exchange views on major issues arising from or concerning the Project
- (4) To facilitate coordination with other relevant authorities

2. Membership

- (1) Chairperson: Director General, Department of Electricity, MEM
- (2) Co chairperson: Chief Representative, JICA Laos Office
- (3) Vice Chairperson:
 - a. Deputy Director General, DOE, MEM
 - b. Managing Director, EDL
 - c. Deputy Director General, Department of Energy Promotion and Development (DEPD), MEM
- (4) Lao side:
 - a. Members of Regulatory Unit, DOE
 - b. Representative, Electric Power Management Division, DOE
 - c. Representative, Rural Electrification Division, DOE
 - d. Representative, Power Sector Planning Division, DOE
 - e. Representative, PDEM in Provinces
 - f. Representative, EDL and EDL Training Centre
 - g. Representative, DEPD, MEM
 - h. Other officials mutually agreed upon
- (5) Japanese side:
 - a. Representative of JICA Laos Office
 - b. Japanese Experts of the Project
 - c. Other relevant personnel mutually agreed upon
- (6) Observer: Representative, Department of International Cooperation, Ministry of Planning and Investment

Note: Official(s) of Embassy of Japan may attend the JCC as observer(s)

M.F. W A

(2) Minutes of Meeting (M/M)

**MINUTES OF MEETING BETWEEN
JAPAN INTERNATIONAL COOPERATION AGENCY AND
AUTHORITIES CONCERNED OF THE GOVERNMENT OF
THE LAO PEOPLE'S DEMOCRATIC REPUBLIC
ON JAPANESE TECHNICAL COOPERATION
FOR THE PROJECT FOR IMPROVEMENT OF POWER SECTOR
MANAGEMENT**

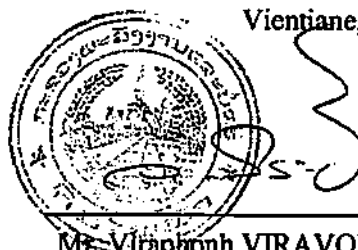
The authorities concerned of the Government of the Lao People's Democratic Republic (hereinafter referred to as "Lao P.D.R.") and the Japan International Cooperation Agency (hereinafter referred to as "JICA") had a series of discussion with respect to desirable measures to be taken by the Government of the Lao P.D.R. and JICA for successful implementation of the Project for Improvement of Power Sector Management (hereinafter referred to as "the Project").

As a result of the discussion, JICA and Lao side (hereinafter referred to as "both sides") agreed upon the matters referred to in the document attached hereto.

Vientiane, July 16, 2010

The image shows a circular seal of the Japan International Cooperation Agency (JICA) with the text "JAPAN INTERNATIONAL COOPERATION AGENCY" and "JICA" in the center. A signature is written over the seal.

Mr. Masato ITO
Chief Representative
Laos Office
Japan International Cooperation Agency

The image shows a circular seal of the Ministry of Energy and Mines of the Lao P.D.R. with the text "THE PEOPLE'S DEMOCRATIC REPUBLIC OF LAO" and "MINISTRY OF ENERGY AND MINES" around the perimeter. A signature is written over the seal.

Mr. Viraphonh VIRAVONG
Director General
Department of Electricity
Ministry of Energy and Mines

ATTACHED DOCUMENT

1. Project Design Matrix

The Project Design Matrix (hereinafter referred to as "PDM") is shown in Annex I. The PDM is subject to change within the framework of the R/D when necessity arises in the course of implementation of the Project by mutual consent.

2. Plan of Operation

The Plan of Operation (hereinafter referred to as "PO") is shown in Annex II. The PO is subject to change within the framework of the R/D when necessity arises in the course of implementation of the Project by mutual consent.

3. Pilot project Sites

Both sides confirmed that the candidate sites of pilot project sites are (1) Vientiane Province, (2) Luangprabang Province and (3) Savannakhet Province. The sites will be fixed in the course of implementation of the Project by mutual consent.

4. Necessary Expense

JICA requested Lao side to consider for sharing a part of project implementation cost for local activities such as travel allowances for Lao personnel in conducting local seminars in order outputs of the Project to be sustainable in the future.

Lao side understood the above request and promised to take necessary measures on budget request to the Ministry of Finance in the Government of the Lao P.D.R.

5. Revision of documents on Lao Electric Power Technical Standards

(1) Guideline of Lao Electric Power Technical Standards

A part of the Guideline of Lao Electric Power Technical Standards (hereinafter referred to as "LEPTS") does not suit the current situation because of the revision of the electricity law and other practical reasons. Both sides agreed that DoE will modify the Guideline and Japanese experts will give advice for modification if necessary.

(2) Commentary Report of the LEPTS

Commentary Report of the LEPTS has been translated into Lao and planned to be proofread by DoE staff. When any needs of modification because of practical reasons are found in the course of implementation of the Project, DoE will modify the contents and Japanese experts will give advice if necessary.

Annex I PDM-0

Annex II PO-0



Project Design Matrix (Ver.0)

Project Title : The Project for Improvement of the Power Sector Management (IPSM) Duration : 2 years and half (September 2010 to March 2013)
Implementing Agencies: (Laos) Department of Electricity (DoE), Ministry of Energy and Mines (MEM), Provincial Department of Energy and Mines (PDEM) (Japan) Japan International Cooperation Agency (JICA)

Project Site : Vientiane Capital, Lao P.D.R. and Pilot Project Sites

Target Group : (Primary) Department of Electricity (DoE), Selected Provincial Department of Energy and Mines, (Secondary) EDL
 First created on July 16, 2010

Narrative Summary	Objectively Verifiable Indicators	Means of Verification	Important Assumption
<p>Overall Goal The number of electric power facilities that suit LEPTS increases and the electric power is stably supplied.</p>	<ul style="list-style-type: none"> • The total number of DoE-approved electric power facilities • The total number of unplanned power cuts 	Letters of approval Operational records of EDL	
<p>Project Purpose Regulatory function of the electric power sector is strengthened.</p>	<ul style="list-style-type: none"> • The number of reviewed project documents (F/S, D/D, etc.) by DoE based on the practical examination instructions • The number of inspection activities by DoE based on the practical inspection instructions • The number of reviewed project documents (F/S, D/D, etc.) by PDEM based on the practical examination instructions • The number of electric power facilities reports from PDEM to DoE • The number of internal inspection activities by EDL based on the practical inspection instructions • Electric power facilities reports from EDL to DoE include the matter related to LEPTS. 	<ul style="list-style-type: none"> • Letters of Approval by DoE • DoE's examination and inspection records • Letters of Approval by PDEM • PDEM's examination and inspection records • Electric power facilities reports from PDEM to DoE • EDL internal inspection records • Electric power facilities reports from EDL to DoE 	<ul style="list-style-type: none"> • There is no drastic change in development policy (including electric power sector policy) of Laos. • DoE and EDL continue operating properly in accordance with the electricity laws. • Necessary budget for DoE and EDL for their operation is continuously allocated. • All electric power facility projects accept the examination and inspection of DoE.
<p>Output I. DoE's examination and inspection capacities are enhanced.</p>	<ul style="list-style-type: none"> • The practical examination and inspection instructions for DoE are formulated. • Examination of documents and on-site inspections are conducted properly based on LEPTS. • Improvement of institutional arrangement for regulatory function of DoE 	<ul style="list-style-type: none"> • The practical examination and inspection instructions for DoE • Report of Japanese Experts • Plan of institutional arrangement for enhancing regulatory function of DoE 	<ul style="list-style-type: none"> • There is no drastic change in electric power sector policy of Laos. • Lao counterpart personnel keep working for the implementation of the LEPTS.

Narrative Summary	Objectively Verifiable Indicators	Means of Verification	Important Assumption
<p>2. The capacity of DoE for supervising PDEM is enhanced.</p>	<ul style="list-style-type: none"> LEPTS trainers' ability as trainer is improved. The practical examination and inspection instructions are formulated. Inspection recording forms for PDEM are revised. Case books are continuously revised. 	<ul style="list-style-type: none"> Report of Japanese Experts The practical examination and inspection instructions Revised inspection recording forms for PDEM Case books 	<ul style="list-style-type: none"> Line ministries support the project continuously. Necessary budget for DoE and EDL for their operations is continuously allocated.
<p>3. Understanding on LEPTS in target provinces is improved.</p>	<ul style="list-style-type: none"> Seminars on LEPTS are conducted in target provinces Participants' understanding on LEPTS is improved. User-friendly case books are formulated. Case books are continuously revised. 	<ul style="list-style-type: none"> Records of seminars (the number of seminars, participants, etc.) Results of post-seminar questionnaires and examinations Report of Japanese experts Case books 	
<p>Activities (Output 1: DoE's examination and inspection capacities are enhanced.) 1-1. Review and analyze issues and problems of the present examination and inspection process with assistance of Japanese experts. 1-2. Conduct sample examination of documents (F/S, D/D, etc.) and on-site inspection with assistance of Japanese experts. 1-3. List up points to be noted in the process of examination and inspection (including how to instruct enterprises who submitted documents) and formulate the practical examination and inspection instructions with assistance of Japanese experts. 1-4. Revise the examination and inspection instructions properly. 1-5. Formulate a plan of institutional arrangement for enhancing regulatory function of DoE.</p>	<p>Input from Japan</p> <ul style="list-style-type: none"> Dispatch of experts on: Hydropower Civil Engineering/ Chief advisor Hydropower Electrical Engineering Distribution Lines Transmission Lines/ Substations Development of Training Training of counterpart personnel of DoE in Japan, and Expenses necessary for the implementation of the Project 	<p>Input from Laos</p> <ul style="list-style-type: none"> Assignment of project director, project manager and counterpart personnel Assignment of administrative personnel and driver Buildings, office space, and facilities necessary for the Project, and Allocation of the budget necessary for the Project 	

M.P. W

M.S. W

Narrative Summary	Objectively Verifiable Indicators	Means of Verification	Important Assumption
<p>(Output 2: The capacity of DoE for supervising PDEM is enhanced.)</p> <p>2-1. List up points to be noted in the process of inspection and formulate the practical inspection instructions (including how to instruct enterprises) with assistance of Japanese Experts.</p> <p>2-2. PDEM conducts on-site inspection with assistance of LEPTS trainers.</p> <p>2-3. DoE formulates case books based on actual cases with assistance of Japanese experts.</p> <p>2-4. Revise the case books continuously.</p> <p>2-5. Revise the inspection recording form for PDEM.</p>			
<p>(Output 3: Understanding on LEPTS in target provinces is improved.)</p> <p>3-1. Review and analyze issues and problems of the implementation of LEPTS by using actual cases with assistance of Japanese experts.</p> <p>3-2. Formulate case books on how to implement LEPTS at provincial level with assistance of Japanese experts.</p> <p>3-3. LEPTS trainers conduct seminars on LEPTS in target provinces with assistance of Japanese experts.</p>			<p><u>Prerequisites</u></p> <ul style="list-style-type: none"> • EDL is not privatized.

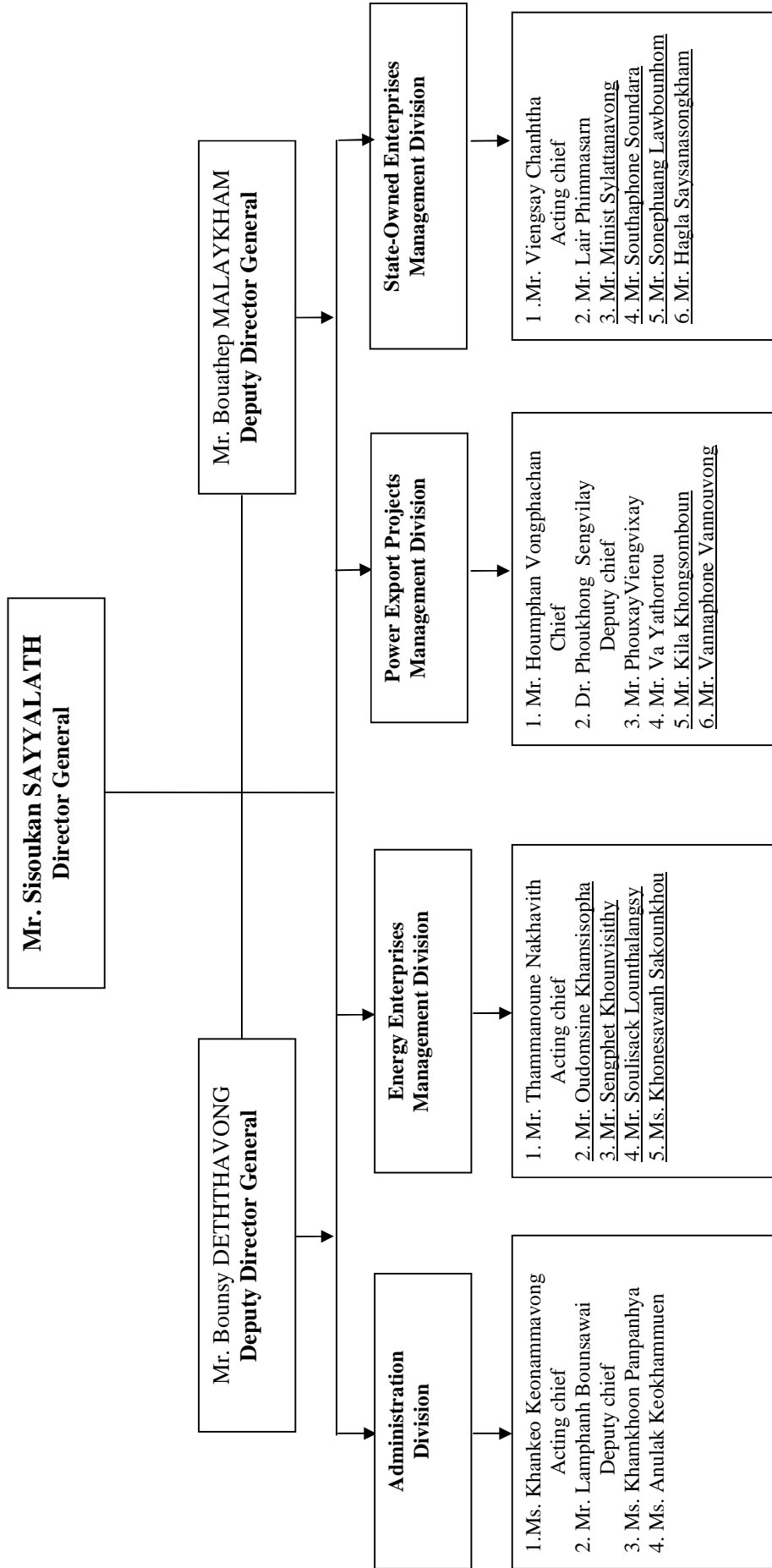
Attachment II

Work schedule

Attachment III

Organization chart of counterpart organization (DEM)

Organization Chart of Department of Energy Management



Note) Newly joined engineers after the establishment of DEM are underlined.