

## 付 属 資 料

1. ミニッツ及び付属書
2. 評価グリッド



1. ミニッツ及び付属書

MINUTES OF MEETING BETWEEN  
THE JAPANESE FINAL EVALUATION TEAM  
AND THE AUTHORITIES CONCERNED OF THE GOVERNMENT OF  
THE KINGDOM OF CAMBODIA  
ON THE JAPANESE TECHNICAL COOPERATION  
FOR THE PROJECT OF CAPACITY AND INSTITUTIONAL BUILDING  
OF THE ELECTRIC SECTOR

The Japan International Cooperation Agency (hereinafter referred to as "JICA") dispatched the Final Evaluation Team, headed by Mr. Yusuke MURAKAMI, to the Kingdom of Cambodia from 5 to 14 March 2007, for the purpose of conducting the final evaluation of the Project on Capacity and Institutional Building of the Electric Sector (hereinafter referred to as "the Project").

The Joint Evaluation Team (hereinafter referred to as "the Team"), which consists of members from JICA and members from the Government of the Kingdom of Cambodia, was jointly organized for the purpose of conducting the final evaluation and preparation of necessary recommendations to the respective governments.

After intensive study and analysis of the activities and achievements of the Project, the Team prepared the Joint Final Evaluation Report (hereinafter referred to as "the Report"), which was presented to the Joint Coordinating Committee.

The Joint Coordinating Committee discussed the major issues pointed out in the Report, and agreed to recommend to the respective governments the matters attached hereto.

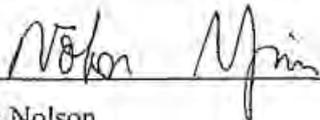
Phnom Penh, March 13, 2007



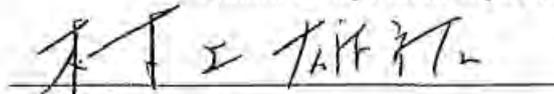
Dr. Ith Praing  
Secretary of State,  
Ministry of Industry, Mines and Energy  
Royal Government of Cambodia



Dr. Ty Norin  
Chairman of Electricity Authority of Cambodia



Mr. Yim Nolson  
Deputy Managing Director of Electricité du Cambodge



Mr. Yusuke Murakami  
Leader  
Japanese Final Evaluation Team  
Japan International Cooperation Agency  
Japan

## ATTACHED DOCUMENT

### 1. Final Evaluation of the Project

Final evaluation of the Project was done by the Team composed of five Japanese members and three Cambodian members. The Team prepared the Joint Final Evaluation Report as shown in Annex I. The report was explained at the meeting of the Joint Coordinating Committee (JCC) held on March 13, 2007 and JCC approved the report. Accordingly, both sides confirmed the acceptance of the result of final evaluation stated in the report.

### 2. Recommendations

The Joint Coordinating Committee has taken notes of the recommendations aimed at successfully sustaining and extending the achievement of the Project.

JOINT FINAL EVALUATION REPORT  
ON  
THE PROJECT OF CAPACITY AND INSTITUTIONAL BUILDING  
OF THE ELECTRIC SECTOR  
IN  
THE KINGDOM OF CAMBODIA

Phnom Penh, March 13, 2007

CAMBODIAN-JAPANESE  
JOINT FINAL EVALUATION TEAM



---

Dr. Ith Praing  
Leader  
The Cambodian Final Evaluation Team  
Ministry of Industry, Mines and Energy  
Royal Government of Cambodia



---

Mr. Yusuke Murakami  
Leader  
The Japanese Final Evaluation Team  
Japan International Cooperation Agency  
Japan



## Table of Contents

1. Introduction	1
1-1 Objective of the Evaluation Study	1
1-2 Methodology of Evaluation	1
1-3 Members of the Evaluation Team	2
1-4 Schedule of the Study	2
2. Outline of the Project	3
2-1 Background of the Project	3
2-2 Summary of the Project	4
3. Project Performance	5
3-1 Overall Goal	5
3-2 Project Purpose	5
3-3 Outputs	6
4. Results of Evaluation	9
4-1 Relevance	9
4-2 Effectiveness	10
4-3 Efficiency	11
4-4 Impact	13
4-5 Sustainability	14
5. Conclusion	15
6. Recommendations	16
7. Lessons Learned	16



ANNEX 1	PDMs
ANNEX 2	POs
ANNEX 3	Fault Records for Year 2006
ANNEX 4	Participants List of Seminars
ANNEX 5	Contents of SREPTS
ANNEX 6	Supply area data of existing licensees
ANNEX 7	List of issued licenses
ANNEX 8	Technical materials and textbooks
ANNEX 9	The database of distribution system
ANNEX 10	Results of Measuring Low Voltage Underground Cables
ANNEX 11	Dispatch of Experts
ANNEX 12	Acceptance of Cambodian Trainees in Japan
ANNEX 13	Provision of Machinery, Equipment and Materials
ANNEX 14	Local Cost by the Japanese Side
ANNEX 15	Assignment of Counterpart Personnel
ANNEX 16	Local Cost by the Cambodian Side

 PDA



## **I. Introduction**

### **1-1 Objective of the Evaluation Study**

The evaluation was conducted with the following objectives.

(1) To review the degree of achievement of Inputs, Outputs, and Project Purposes based on the Project Design Matrixes of both Electricity Authority of Cambodia (hereinafter referred to as "EAC") and Electricité du Cambodge (hereinafter referred to as "EDC") attached as ANNEX 1-1 and 1-2 respectively, which were modified in May 2006 (hereinafter referred to as "PDM<sup>1-1</sup>" and "PDM<sup>1-2</sup>"). Plans of Operations (hereinafter referred to as "PO<sup>1-1</sup>" and "PO<sup>1-2</sup>") are also attached as ANNEX 2-1 and 2-2.

(2) To evaluate the Project in terms of five evaluation criteria (Relevance, Effectiveness, Efficiency, Impact and Sustainability).

(3) To make recommendations regarding measures to be taken for the improvement of the Project as well as to draw lessons for the improvement in planning and implementation of similar Technical Cooperation Projects.

### **1-2 Methodology of Evaluation**

The Project was evaluated by the Japanese and Cambodian Joint Evaluation Team (hereinafter referred to as "the Team"). The Team was composed of five members from the Japanese side and three members from the Cambodian side respectively. The Team visited the Ministry of Industry, Mines and Energy (hereinafter referred to as "MIME"), EAC and EDC, and carried out a series of interviews and discussions with Japanese long-term experts and Cambodian counterpart personnel. Evaluation analysis was made on the five evaluation criteria described below:

#### **(1) Relevance**

Relevance refers to the validity of the Project Purpose and the Overall Goal in connection with the development policy of Cambodia as well as the needs of beneficiaries.

#### **(2) Effectiveness**

Effectiveness refers to the extent to which the expected benefit was brought about as a result of the Project (not of the Important Assumptions specified in PDM).

#### **(3) Efficiency**

Efficiency refers to the productivity of the implementation process, examining if the

input of the Project was efficiently converted into the output.

(4) Impact

Impact refers to direct and indirect, positive and negative impacts caused by implementing the Project, including the extent to which the Overall Goal has been attained.

(5) Sustainability

Sustainability refers to the extent to which Cambodia can further develop the Project, and the benefits generated by the Project can be sustained under the Cambodian policies, technology, systems and financial state.

**1-3 Members of the Evaluation Team**

**1-3-1. Japanese Side**

Name	Field	Position
Mr. Yusuke Murakami	Team Leader	Deputy Resident Representative, JICA Cambodia Office
Mr. Hideki Narumi	Improvement of Capacity to Authorize and Approve Licenses for the Electric Sector	Deputy Assistant Manager, Administration Department, Japan Electric Power Information Center, Inc. International Cooperation Center
Mr. Satoshi Kobayashi	C/P Training	Program Officer, Natural Resources and Energy Conservation Team Group II, Economic Development Department, JICA
Mr. Atsu Kishinami	Evaluation Analysis	Permanent Expert, International Development Associates, Ltd.
Mr. Shigeki Miyake	Operation and Management	Assistant Resident Representative, JICA Cambodia Office

**1-3-2. Cambodian Side**

Name	Role of JCC	Position
Dr. Ith Praing	Chairperson	Secretary of State, MIME
Dr. Ty Norin	Member	Chairman, EAC
Mr. Yim Nolson	Member	Deputy Managing Director, EDC

**1-4 Schedule of the Study**

No.	Date	Schedule
	Feb.26	Deliver the Questionnaire to MIME, EDC, EAC
I	Mar. 4 SUN	Dep. Narita 10:55→BKK→P. Penh 19:30 (JL717, TG698)

2	Mar. 5	MON	AM: Meeting at JICA Office/ Courtesy Call on EOJ MIME: 14:30: Courtesy Call, Collect the Questionnaires, Questionnaire Survey for Counterpart Personnel of MIME
3	Mar. 6	TUE	EDC: 8:30: Courtesy Call, Collect the Questionnaires, Questionnaire Survey for Counterpart Personnel 14:00 Meeting with Exp. Mr. Shinohara. Collect the Additional Documents
4	Mar. 7	WED	EAC: 8:30: Courtesy Call, Collect the Questionnaires, Questionnaire Survey for Counterpart Personnel 14:00: Meeting with Exp. Mr. Tsuji. Collect the Additional Documents
5	Mar. 8	THU	National Holiday Internal Meeting, Draft the Report
6	Mar. 9	FRI	8:30: Discussion about the Minutes of Meetings (M/M) among the Participants of MIME, EAC, EDC at MIME
7	Mar. 10	SAT	Internal Meeting, Draft the Report
8	Mar. 11	SUN	Internal Meeting, Draft the Report
9	Mar. 12	MON	Draft the Minutes of Meetings (M/M)
10	Mar. 13	TUE	9:30 Joint Coordination Committee by the Participants of MIME, EAC, EDC at MIME. Signature of M/M at MIME
11	Mar. 14	WED	8:30 Report the Result of Study at JICA 11:00 Report the Result of Study at EOJ Dep. P. Penh 20:40→BKK 21:45 (TG699) BKK 23:30→
12	Mar. 15	THU	Arr. Narita 7:15 (JL704)

## 2. Outline of the Project

### 2-1 Background of the Project

Cambodia has one of the lowest per capita consumption rates of electricity in Asia. In recent years, however, demand for electricity has rapidly been increasing and therefore, enhancement of energy supply capacity and improvement of maintenance/management technologies are expected in accordance with enlarging demand in the future.

The Electricity Law was promulgated on February 2, 2001. EAC was established, as per the Electricity Law, to regulate the electricity power services in September 2001.

In 2002, JICA conducted "The Development Study for Power Sector in Cambodia". The development study was implemented from June 2002 to February 2004, and the study team produced "The General Requirements of Electric Power Technical Standards". According to this result, MIME issued the Standards in July 2004. As EAC

2) Knowledge and skills to recover the distribution system are developed.

3) Capacity to design and enhance the distribution system is developed.

### 3. Project Performance

#### 3-1 Overall Goal

The Overall Goal is "Electric power in Cambodia is supplied stably and safely". One indicator is set up in order to assess the degree of achievement. Table 1 shows the indicator of the Overall Goal and the degree of achievement.

Table 1: Indicators and Degree of Achievement

Indicator	Degree of Achievement
The number of power outage times per customer decreases.	<p>The number of power outage times per one thousand customers decreased from 3.769 in 2003 to 2.311 in 2006. "Fault Records for Year 2006" is attached as a reference (refer to ANNEX 3).</p> <p>#This index is (A)/(B).  <math>(3.769 \times 10^{-3}</math> in 2003, <math>2.311 \times 10^{-3}</math> in 2006)            (A) the number of fault            (530 times in 2003, 433 times in 2006)            (B) customer number            (140,611 in 2003, 187,346 in 2006)</p> <p>This index is not SAIFI (System Average Interruption Frequency Index, SAIFI = Total number of customer interruptions per Total number of customers served).</p>

#### 3-2 Project Purpose

##### 3-2-1 EAC

The Project Purpose for EAC is "Electric Power Technical Standards are managed effectively and properly by EAC". Two indicators are set up in order to assess the degree of achievement. Table 2 shows the indicators of the Project Purpose and the degree of achievement. The Project Purpose will be achieved after Specific Requirements of Electric Power Technical Standards (hereinafter referred to as "SREPTS") are promulgated by MIME.

Table 2: Indicators and Degree of Achievement

Indicators	Degree of Achievement
1 Specific Requirements of Electric Power Technical Standards	The final seminar on SREPTS was held in January 2007 as planned and the final version of SREPTS, with the consideration of comments at the seminar, will be

2) Knowledge and skills to recover the distribution system are developed.

3) Capacity to design and enhance the distribution system is developed.

### 3. Project Performance

#### 3-1 Overall Goal

The Overall Goal is “Electric power in Cambodia is supplied stably and safely”. One indicator is set up in order to assess the degree of achievement. Table 1 shows the indicator of the Overall Goal and the degree of achievement.

Table 1: Indicators and Degree of Achievement

Indicator	Degree of Achievement
The number of power outage times per customer decreases.	<p>The number of power outage times per one thousand customers decreased from 3.769 in 2003 to 2.311 in 2006. “Fault Records for Year 2006” is attached as a reference (refer to ANNEX 3).</p> <p>#This index is (A)/(B).  <math>(3.769 \times 10^{-3}</math> in 2003, <math>2.311 \times 10^{-3}</math> in 2006)</p> <p>(A) the number of fault            (530 times in 2003, 433 times in 2006)</p> <p>(B) customer number            (140,611 in 2003, 187,346 in 2006)</p> <p>This index is not SAIFI (System Average Interruption Frequency Index, SAIFI = Total number of customer interruptions per Total number of customers served).</p>

#### 3-2 Project Purpose

##### 3-2-1 EAC

The Project Purpose for EAC is “Electric Power Technical Standards are managed effectively and properly by EAC”. Two indicators are set up in order to assess the degree of achievement. Table 2 shows the indicators of the Project Purpose and the degree of achievement. The Project Purpose will be achieved after Specific Requirements of Electric Power Technical Standards (hereinafter referred to as “SREPTS”) are promulgated by MIME.

Table 2: Indicators and Degree of Achievement

Indicators	Degree of Achievement
1 Specific Requirements of Electric Power Technical Standards	The final seminar on SREPTS was held in January 2007 as planned and the final version of SREPTS, with the consideration of comments at the seminar, will be

(SREPTS) are submitted to MIME.	finalized by the end of April 2007.
2 The number of guidance to licensees concerning technical matters.	Technical guidance has already been conducted when necessary. Technical guidance specifically on SREPTS were also carried out after the preparation of the first draft of SREPTS in August 2006 and the second seminars for local licensees will be conducted in July and August 2007 "Participants List of Seminars" is attached as a reference (refer to ANNEX 4).

### 3-2-2 EDC

The Project Purpose for EDC is "Distribution system is managed effectively and properly by EDC". Two indicators are set up in order to assess the degree of achievement. Table 3 shows the indicators of the Project Purpose and the degree of achievement. The Project Purpose has almost been achieved.

Table 3: Indicators and Degree of Achievement

Indicators	Degree of Achievement
1 Facility database is managed and analysed properly.	A facility database for MV distribution system of Phnom Penh and those of other provincial towns under EDC control have been established as of March 2007.
2 Planning works of EDC are executed properly.	Geographic Information System (GIS) data, which is required to prepare the planning works, has been arranged and part of works has been executed in Phnom Penh and provincial towns under EDC control. Standards showing basic methodologies of the extension plan implementation will be modified in March 2007.

### 3-3 Outputs

#### 3-3-1 EAC

There are three Outputs, i) Rules with respect to General Requirements of Electric Power Technical Standards become clear, ii) Work to authorize and approve licenses is performed smoothly, and iii) Knowledge and skills to guide licensees are upgraded. A total of 10 indicators are set up for three Outputs in order to assess the degree of achievement. Table 4 shows the indicators of Outputs within PDM<sup>1-1</sup> and the degree of achievement. Outputs have almost been achieved.

Table 4: Indicators and Degree of Achievement

Indicators	Degree of Achievement
1-1 The SREPTS of three major fields are prepared.	The final draft of SREPTS was presented in the final seminar held in January 2007 in Phnom Penh. SREPTS are currently being reviewed and revised and will be

	submitted to MIME in April 2007. Contents of SREPTS are attached as ANNEX 5.
1-2 Officials/staff of Electricity Regulation Department in EAC can understand the contents of the SREPTS. (Target level of the understanding: 80%)	Counterpart personnel have well understanding of SREPTS through making presentation at six seminars and also through translation. The questionnaire on the level of understanding will be carried out before the Project completion.
1-3 Awareness of the SREPTS by licensees (Target level: 100%)	A total of 112 licensees out of 132 (85%) participated in the first seminar on SREPTS held in July 2006. A total of 110 licensees out of 132 (83%) participated in the rural seminar in four places in August 2006. In addition, the final seminar was held with 114 licensees out of 137 (83%) in January 2007. Other licensees, who did not participate in neither seminar, have been provided with the SREPTS including explanation-sheet.
2-1 Licensees' supply areas can be accessed in a short time and with ease.	Supply area data of existing licensees have already been collected. It can already be accessed with ease through intranet, which is more effective compared to the conventional management system in written documents (refer to ANNEX 6).
2-2 Licensees' facilities data are managed in EAC.	The data has already been collected and are currently managed by GIS. "List of issued licenses" is attached as a reference (refer to ANNEX 7).
2-3 Data on faults and accidents are collected.	EAC is currently revising "Overall Performance Standards" in order to appropriately collect data from licensees. Report of data on faults and accidents from licensees will be stipulated as obligatory in the standards. After the Standards are issued, the data will be collected.
2-4 Data of electrified areas are opened to the public on the Website	A trial was made by the intranet within EAC. It is expected to be public by the end of March 2007.
3-1 Technical materials and textbooks are prepared.	Some materials, such as "Explanation Sheet for Specific Requirements of Electric Power Technical Standards", "Voltage Management" and a DVD on "Safety Work" have been prepared (refer to ANNEX 8).
3-2 Officials/staff of Electricity Regulation Department in EAC can use instruments provided in this project.	Instruments Operation Manual has been prepared. A meeting and practical training on the operations were carried out within EAC. Major personnel have obtained a high level of understanding.
3-3 Guidance and training are given to all licensees.	Guidance are given to licensees when a problem takes place as well as when a licensee is visited. Technical guidance and training sessions were carried out in July and August 2006 at SREPTS seminars and also will be conducted at local seminars to be held in July and

**3-3-2 EDC**

There are three Outputs, i) Knowledge and skills to maintain the distribution system are developed, ii) Knowledge and skills to recover the distribution system are developed, and iii) Capacity to design and enhance the distribution system is developed. A total of 11 indicators are set up for three Outputs in order to assess the degree of achievement. Table 5 shows the indicators of Outputs within PDM<sup>1-2</sup> and the degree of achievement. Outputs have almost been achieved.

Table 5: Indicators and Degree of Achievement

Indicators	Degree of Achievement
1-1 The database for maintenance is prepared.	The database for maintenance has been completed as of March 2007 (refer to ANNEX9).
1-2 Manuals for repair work are prepared.	"Manual for repairing underground cable" and "Manual for patrol, inspection and measuring (underground cable)" were completed in November 2006, with an assistance of a short-term expert dispatched in September 2006.
1-3 Periodic checks are conducted for preventive maintenance.	It is recognized that the measurement of an electric current of a LV underground cable is effective for preventive maintenance. The periodic checks have properly been conducted according to maintenance manuals since the beginning of 2007. "Results of Measuring Low Voltage Underground Cables" is attached as a reference (refer to ANNEX 10).
1-4 The time fault recovery is shortened. (Target level: to reduce 20% of present time)	The time for fault recovery in case of cable accidents decreased from 1,004 minutes per case in 2005 to 654 minutes per case in 2006. The Project started collecting other data in January 2006.
2-1 Impedance map is prepared.	The impedance map was updated in December 2006.
2-2 The area and the number of household affected by the fault can be found out in a short time and with ease.	Training courses related to GIS started in February 2007 for system operators. The area and the number of household affected by the fault can be found out in a short time and with ease after the completion of the training courses in April 2007. Booklets showing map information will be distributed to the relevant personnel in March 2007 (refer to ANNEX9).
2-3 Manuals for relay setting are prepared.	"Manual for relay protection works" was prepared together with a short-term expert dispatched in October 2006. It will be officially approved in April 2007.
2-4 The time fault recovery is shortened. (Target level: to reduce 20% of present time)	A time for fault recovery in case of cable accidents decreased from 1,004 minutes per case in 2005 to 654 minutes per case in 2006. The Project already started collecting other data in January 2006.

3-1 The database for planning is prepared.	The database has been prepared with the information regarding facilities and villages (e.g. the number of houses) as of March 2007 (refer to ANNEX9).
3-2 The revised EDC technical standard is prepared. <sup>1</sup>	The first draft was prepared in January 2007. It is currently being modified/revised according to relevant personnel's opinions and will be approved by EDC Managing Director by the end of March 2007.
3-3 The future plans for extension are prepared.	The future plan for extension has been prepared for the following areas and sections by using GIS. -Kampong Cham -Siemreap -Sihanouk Ville -Phnom Penh - Kampong Speu -Kandal - Takeo -Takeo - Kampot -Battambang -Banteay Meanchay

#### 4. Results of the Evaluation

##### 4-1 Relevance

Relevance of the Project is considered high for the following reasons.

##### (1) Relevance to National/Sector Development Policies

There are a few national and sector development policies and plans in Cambodia. The "National Poverty Reduction Strategy" approved in 2002 emphasizes the reform and strengthening of the electric sector in order to enhance the electrification rate. The "Energy Sector Development Policy" aims to i) supply electricity nationwide with appropriate tariff, ii) provide stable electricity, and iii) promote effective use of energy. The "Cambodia Power Sector Strategy" also stresses i) promotion of the electric sector, ii) establishment of a framework of electric management administration, iii) promotion of sound management of EDC, iv) promotion of private investment, and v) electrification of local areas (provinces). In accordance with these policies and plans, the Royal Government of Cambodia has been developing the laws/regulations as well as developing human resources in the electric sector. The Project has been designed to make technical supports to personnel dealing with the preparations and operations of laws and regulations in this sector and is clearly suited to the current governmental policy framework.

<sup>1</sup> The Cambodian Evaluation Team pointed out that "EDC technical standard" is not a correct term and that it must be changed to "EDC technical guideline"

## (2) Relevance to Interest of Beneficiaries

EAC is a supervising agency which issues licenses and makes proper instructions for licensees in accordance with Electric Power Technical Standards and is considered to be appropriate as an implementing agency.

EDC did not have sufficient capacities of dealing with issues on planning, designing, construction and maintenance and has a pressing need of enhancing its capacities in this regard. The Project aims to support human resource development at EDC and, therefore, is obviously suited to the needs of beneficiaries.

## 4-2 Effectiveness

Effectiveness of the Project is considered high for the following reasons.

### (1) Fulfillment of Indicators at the Project Purpose Level

#### 1-1) EAC

As mentioned above, the draft of SREPTS was already prepared and is expected to be submitted to MIME in April 2007 and to become effective a few weeks thereafter. Technical instructions have been carried out according to necessities after the Project started. For instance, technical guidance specifically on SREPTS were carried out after the preparation of the first draft of SREPTS in July and August 2006 and the second seminars for local licensees will be conducted in July and August 2007. Two indicators at the Project Purpose level have almost been fulfilled and it is expected that the Project Purpose will be achieved by the completion of the Project.

#### 1-2) EDC

Both indicators at the Project Purpose level have almost been fulfilled with the establishment of a facility database for MV distribution system of Phnom Penh and those of other provincial towns under EDC control as well as the introduction of GIS data in order to prepare and conduct the planning works. The Project Purpose will be achieved with the establishment of the Office of System Analysis and GIS as well as the completion of EDC technical standard (EDC technical guideline) modification.

### (2) Important Assumptions that affected Effectiveness

#### 2-1) EAC

There are three important assumptions at the Project Purpose level in PDM<sup>1-1</sup>, i) Electric power utilities secure the necessary budget for managing facilities, ii) Necessary power sources are developed, and iii) MIME issues the Specific Requirements. Assumption ii) and iii) are fulfilled, since there are several plans to enhance electricity supply, for instance, by constructing hydropower plants and international transmission lines between Cambodia and Thailand/Vietnam and MIME

will promulgate the SREPTS in May 2007. Regarding assumption i), there are many small-sized suppliers which usually do not have sufficient finance, however, the situation is gradually improving.

At the Output level, PDM<sup>1-1</sup> mentions "Counterparts remain in each organization". Although one of the counterpart personnel was replaced, the assumption is considered to be almost fulfilled.

#### 2-2) EDC

There is one important assumption at the Project Purpose level in PDM<sup>1-2</sup>, which is "EDC secures the necessary budget". This assumption is considered to be fulfilled since there have been no problems concerning EDC budget by the final evaluation. EDC will establish a GIS related office, within the new Transmission Department already approved by the Board of Directors of EDC at the meeting held on February 26<sup>th</sup>, which will surely contribute to maintain the positive effects of the Project.

At the Output level, PDM<sup>1-2</sup> mentions "Counterparts remain". All the counterpart personnel are part-time. Therefore, there was a concern, at the time of the mid-term evaluation, about keeping the positive effects generated by the Project after September 2007. The concern was largely disappeared because of the above-mentioned EDC's plan to establish a GIS related office. Therefore the assumption is considered to be fulfilled.

#### 4-3 Efficiency

Efficiency of the Project is considered relatively high for the following reasons.

##### 4-3-1 Inputs from the Japanese Side

Inputs from the Japanese side have generally been carried out as planned in terms of timing, quantity and quality for both EAC and EDC. Dispatch of Japanese experts, training of Cambodian counterpart personnel in Japan as well as in the third countries, and provision of machinery, equipment and materials have been carried out almost as planned.

##### (1) Dispatch of Japanese Experts

###### 1-1) EAC

A total of one long-term expert and 23 short-term experts have been dispatched in accordance with the original plan as shown in ANNEX 11-1.

###### 1-2) EDC

A total of one long-term expert and seven short-term experts have been dispatched in accordance with the original plan as shown in ANNEX 11-2.

(2) Acceptance of Cambodian Counterpart Personnel in Japan

2-1) EAC

A total of six counterpart personnel, including one from MIME and one from EDC, have been trained in Japan in accordance with the original plan as shown in ANNEX 12-1.

2-2) EDC

A total of four counterpart personnel have been trained in Japan in accordance with the original plan as shown in ANNEX 12-2.

(3) Training and Business Trip in the Third Countries

A total of 22 EDC counterpart personnel took training courses on ArcFM, ArcFM configuration, ArcSDE, PSS/ADEPT in Thailand. In October 2005, a total of three counterpart personnel (two from EAC and one from EDC) were sent to Laos in order to exchange information and opinions with personnel of JICA similar project and a total of eight counterpart personnel (five from EAC, two from EDC and one from MIME) visited Thailand for training in thermal technologies. In addition, a total of 48 EDC counterpart personnel took training courses on "Power Network Planning and Design", "Power Network Operation", "Power Network Maintenance and Repair" and "Relay Protection" in Vietnam.

(4) Provision of Machinery, Equipment and Materials

4-1) EAC

Equipment and materials (including equipment for experts) has been provided in accordance with the original plan as shown in ANNEX 13-1.

4-2) EDC

Machinery, equipment and materials (including equipment for experts) has been provided in accordance with the original plan as shown in ANNEX 13-2.

(5) Local Cost

5-1) EAC

Local cost of USD 90,597 has been provided to support the Project as shown in ANNEX 14.

5-2) EDC

Local cost of USD 116,919 has been provided to support the Project as shown in ANNEX 14.

**4-3-2 Inputs from the Cambodian Side**

Inputs from the Cambodian side have generally been appropriate. Facilities and local

cost have been appropriately provided by the Cambodian side.

(1) Assignment of Counterpart Personnel

1-1) EAC

A total of five counterpart personnel have been assigned as shown in ANNEX 15-1.

1-2) EDC

A total of 18 counterpart personnel have been assigned as shown in ANNEX 15-2.

(2) Facilities

2-1) EAC

Main project office in Phnom Penh has been provided for the Project.

2-2) EDC

Main project office in Phnom Penh has been provided for the Project.

(3) Local Cost

3-1) EAC

Local cost of USD2,280 and 8,150,509 Riels has been provided as shown in ANNEX 16-1.

3-2) EDC

Local cost of USD3,691 has been provided as shown in ANNEX 16-2.

**4-3-3 Efficiency of Inputs**

As mentioned, indicators at the Output level have almost been fulfilled, and on the whole, inputs from each side were effectively put into the Project, although there are a few prolonged activities and there was a fault locating system with a four-wheel-drive vehicle (laboratory car) provided behind schedule.

It should be noted that some counterpart personnel stated that the training courses in Cambodia's neighboring countries such as Thailand and Vietnam have contributed to the enhancement of their skills and knowledge based on regional/local conditions, since the conditions of these countries are similar to those of Cambodia. This approach can be effective in order to generate knowledge rooting the regional/local conditions.

**4-4 Impact**

Some positive Impacts are observed as follows.

(1) Overall Goal

Overall Goal is “Electric power in Cambodia is supplied stably and safely” and its indicator is “the number of power outage times per customer decreases”. As mentioned in Chapter 3, the number of power outage times decreased from 3.769 per one thousand customers in 2003 to 2.311 per one thousand customers in 2006 and it can be said that an improvement was observed partly thanks to the preparation of proper relay setting and that part of Overall Goal has been achieved.

#### (2) Enhanced Activities by GIS

A seminar on the introduction of GIS was held for the relevant organizations. As a consequence, several organizations have introduced GIS and shared satellite pictures.

### 4-5 Sustainability

Overall sustainability is considered high for the following reasons.

#### 4-5-1 Institutional Aspect

##### (1) Development Policies

As mentioned, there are several national and sector development policies and plans and it is obvious that the electric sector continues to be important in Cambodia.

##### (2) EAC

MIME, EAC, EDC and JICA held a seminar in order to discuss the draft of SREPTS in January 2007, inviting the concerned personnel from provinces, international donors (e.g. World Bank, Asian Development Bank) and so forth. Through the seminar, SREPTS are commonly understood among these relevant organizations. After final submission of SREPTS to MIME from EAC in April, it is expected that they are promulgated accordingly. After promulgation, EAC will have a firm regulation to instruct licensees.

##### (3) EDC

EDC has established a division in charge of relay setting and fault analysis under the Dispatching Control Center, as suggested by a long-term expert and a short-term expert. It is expected that the establishment contributes to more efficient implementation of the relevant activities.

As recommended at the mid-term evaluation, it is essential to continue GIS related activities in order to enhance institutional capacity of EDC. According to the recommendation, the establishment of an office for GIS activities has already been approved by the Board of Directors. Budget for the office is expected to officially be secured from the beginning of year 2008. With the establishment, counterpart personnel are able to continue to apply their skills and knowledge obtained through the Project.

Institutional sustainability, therefore, is considered high.

#### **4-5-2 Technical Aspect**

##### **(1) EAC**

Top personnel have been actively involved into the preparation of SREPTS and technical knowledge of counterpart personnel at EAC have been enhanced and improved. Their skills to instruct licensees have also been enhanced with provision of essential equipment and materials.

##### **(2) EDC**

EDC counterpart personnel have a sufficient level of understanding on the technologies regarding distribution system, including GIS. They hold seminars and OJT in order to transfer their knowledge and skills to other staff at EDC. In addition, machinery and equipment provided by the Project have been well operated, maintained and managed.

Overall, technical sustainability is considered high.

#### **4-5-3 Financial Aspect**

##### **(1) EAC**

EAC has sufficient budget and it is possible to secure financial resources, such as maintenance and revision of equipment and materials, even after the Project completion.

##### **(2) EDC**

There have been no problems concerning EDC budget by the time of the final evaluation. EDC's budget is limited, however, it has been making a good effort in order to secure necessary budget for maintaining the positive effects of the Project. It is expected this effort continue even after the Project completion.

Financial sustainability, therefore, is considered relatively high.

#### **5. Conclusion**

According to the indicators, the Outputs and the Project Purposes are expected to be fulfilled by the completion of the Project. In addition, a positive effect, which is a decrease in the number of power outage times per customer, is observed regarding the Overall Goal. Moreover, the implementation of the Project has been satisfactory from the viewpoint of five evaluation criteria (relevance, effectiveness, efficiency, impact, and sustainability). Therefore, the Project is to be completed in September 2007 as

originally planned. Nevertheless, to guarantee the sustainability of the Project in the future, it is necessary to take any possible measures concerning allocation of the human and financial resources both at EAC and EDC.

## **6. Recommendations**

### **(1) Approval of Establishment of GIS Office and Security of its Budget**

As mentioned, the establishment of an office for GIS activities has already been proposed with an effort of EDC and is currently in the process of approval by the Board of Directors. It is also essential in terms of effective utilization of experienced personnel and the Team once again recommends accelerating the process of establishing the office particularly with capable and experienced personnel as well as finance sufficient to operate and manage the office.

### **(2) Establishment of Overall Performance Standards**

The indicator 2-3 specified in PDM<sup>1-1</sup> "Data on faults and accidents are collected" is important. The Project already submitted a draft regarding collecting data on faults and accidents which will be incorporated into the "Overall Performance Standards". It is expected that the Standards are reviewed, revised and issued promptly.

### **(3) Training Using SREPTS**

Although SREPTS has not been promulgated, it is recommended that counterpart personnel have training concerning inspection by applying SREPTS with Japanese experts' assistance. The training is important in order for counterpart personnel to smoothly carry out inspections after the promulgation.

## **7. Lessons Learned**

### **(1) Training Courses Rooting Regional Conditions**

As mentioned, some counterpart personnel stated that the training courses in Cambodia's neighboring countries have greatly contributed to the enhancement of their skills and knowledge because the conditions of these countries are similar to those of Cambodia. This perspective should be taken into account when training courses are prepared.

### **(2) Preparation of Baseline Survey**

Several indicators require quantitative data, however, some data were not available at the time of mid-term evaluation. A baseline survey should be conducted according to PDM in order to quantitatively measure and clarify the degree of achievement of

effectiveness, efficiency and impact.

### **(3) Utilization of Existing Personnel, Institutional Organization and Infrastructure**

The Project has been carried out by effectively utilizing the existing institutional organization and infrastructure, without establishing a new facility and employing new personnel. In many cases, a facility is newly constructed when a new project starts and frequently such facility is not self-sufficient after the project completion, as a result of the change of government and national policy, financial difficulty or attrition of newly employed counterpart personnel. In the case of the Project, sustainability is expected to be high and in this sense, the Project can be a good example for other projects. It is highlighted that the approach of capacity development assistance based on the existing counterpart capacity can contribute to the success of the Project in an effective manner.

### **(4) Necessary Factors for Project Implementing Organization**

The Project has been successfully implemented. One of the major reasons of this is that implementing organizations have the following features.

- Strong commitment to the project activities by top personnel
- Devotion into the project activities by counterpart personnel
- Sufficient budget for local cost
- Sufficient budget for counterpart personnel salary so that they can devote themselves into the project activities
- High similarity of project activities to daily works
- Existence of personnel of high technical level
- Existence of a good ICT environment

The above factors should be taken into consideration when future projects are planned.

**Project Design Matrix (PDM)**  
(1) Capacity and Institutional Building of the Electric Sector -PDM for EAC-

Ver. 1.0 ANNEX 1-1  
May 9, 2006

Duration: Sep. 20, 2004 – Sep 18, 2007, Target area: The whole country, Target group: EAC

Narrative Summary	Objectively Verifiable Indicators	Means of Verification	Important Assumption
<b>Overall Goal</b> Electric power in Cambodia is supplied stably and safely.	1. The number of power outage times per customer decreases.	1. Power outage data of EDC	
<b>Project Purpose</b> Electric Power Technical Standards are managed effectively and properly by EAC.	1. Specific Requirements of Electric Power Technical Standards (SREPTS) are submitted to MIME. 2. The number of guidance to licensees concerning technical matters	1. Confirmation to the Coordinating Committee 2. The list of Implementing guidance	- Electric power utilities secure the necessary budget for managing facilities. - Necessary power sources are developed. - MIME issues the Specific Requirements.
<b>Outputs</b> 1. Rules with respect to General Requirements of Electric Power Technical Standards become clear.  2. Work to authorize and approve licenses is performed smoothly.  3. Knowledge and skills to guide licensees are upgraded.	1-1 The SREPTS of three major fields are prepared. 1-2 Officials/staff of Electricity Regulation Department in EAC can understand the contents of the SREPTS. (Target level of the understanding: 80%) 1-3 Awareness of the SREPTS by licensees (Target level: 100%)  2-1 Licensees' supply areas can be accessed in a short time and with ease. 2-2 Licensees' facilities data are managed in EAC. 2-3 Data on faults and accidents are collected. 2-4 Data of electrified areas are opened to the public on the Website  3-1 Technical materials and textbooks are prepared. 3-2 Officials/staff of Electricity Regulation Department in EAC can use instruments provided in this project. 3-3 Guidance and training are given to all licensees.	1-1 The list of the SREPTS 1-2 Evaluation test and questionnaires to the officials/staff  1-3 Questionnaires to licensees taken at seminars or workshops  2-1 Data of Licensees' supply areas  2-2 Database of licensees' facilities data 2-3 The list of data submitted to EAC by licensees 2-4 EAC's Website  3-1 The list of the technical materials and textbooks 3-2 Interviews and questionnaires to the officials/staff  3-3 The list of the guidance and training conducted	- Counterparts remain in each organization.
<b>Activities</b> 1-1 Check and review the present situation of three major fields*. *Distribution, Thermal power plant and Transmission 1-2 Pick out the items and make sample forms 1-3 Make out the detailed plan and schedule for preparing the Specific Requirements 1-4 Make the Specific Requirements for three major fields 1-5 Translate the Specific Requirements into Khmer by C/P 1-6 Conduct seminars and workshops to disseminate the Specific Requirements 1-7 Review and revise the Specific Requirements 1-8 Guide licensees according to the Specific Requirements  2-1 Check and review the problems and difficulties on authorization and approval work 2-2 Have a meeting with licensees to collect information 2-3 Pick out the needs to improve the authorization and approval work 2-4 Implement the measures 2-5 Review and revise the measures  3-1 Check and review the present problems and collect data on accidents and trouble 3-2 Pick out the needs of materials, textbooks and instruments 3-3 Make materials and textbooks and purchase instruments 3-4 Train C/P through on-the-job training 3-5 Guide licensees with the materials, textbooks and instruments 3-6 Review and revise the materials and textbooks	<b>Input to the Project</b>		- Counterparts remain in each organization.
	<b>Cambodian Side</b>		
	1. Local cost Necessary budget for the implementation of the project  2. Allocation of necessary personnel (1) Counterpart personnel (2) Administrative personnel  3. Preparation of office spaces and facilities	<b>Japanese Side</b>	
		1. Dispatch of Experts (1) One Long-term expert (2) Short-term experts Short-term experts necessary for technical transfer  2. Counterparts training in Japan or third countries  3. Provision of Equipment	
		<b>Precondition</b>	
			- Full-time counterparts are assigned by each organization.

Project Design Matrix (PDM) (Ver. 1.0)

ANNEX I-2  
Apr. 18, 2006

Capacity and Institutional Building of the Electric Sector – PDM for EDC-

Duration: Feb.7 2005 – Sep. 18, 2007, Target area: The whole country, Target group: EDC

Narrative Summary	Objectively Verifiable Indicators	Means of Verification	Important Assumption
<b>Overall Goal</b> Electric power in Cambodia is supplied stably and safely.	The number of power outage times per customer decreases.	Power outage data of EDC	
<b>Project Purpose</b> Distribution system is managed effectively and properly by EDC.	1. Facility database is managed and analysed properly. 2. Planning works of EDC are executed properly.	Confirmation to EDC	- EDC secures the necessary budget.
<b>Outputs</b> 1. Knowledge and skills to maintain the distribution system are developed.  2. Knowledge and skills to recover the distribution system are developed.  3. Capacity to design and enhance the distribution system is developed.	1-1 The database for maintenance is prepared. 1-2 Manuals for repair work are prepared. 1-3 Periodic checks are conducted for preventive maintenance. 1-4 The time fault recovery is shortened. (Target level: to reduce 20% of present time)  2-1 Impedance map is prepared. 2-2 The area and the number of household affected by the fault can be found out in a short time and with ease. 2-3 Manuals for relay setting are prepared. 2-4 The time fault recovery is shortened. (Target level: to reduce 20% of present time)  3-1 The database for planning is prepared. 3-2 The revised EDC technical standard is prepared. 3-3 The future plans for extension are prepared.	1-1 Database of facilities data  1-2 The list of manuals 1-3 The list of maintenance reports  1-4 The list of fault reports  2-1 Data of impedance map 2-2 Database of customer and facilities data  2-3 The list of manuals 2-4 The list of fault reports  3-1 Database of facilities data 3-2 The list of reports of considering expanding the distribution system 3-3 The list of extension plan	- Counterparts remain.
<b>Activities</b> 0-1 Make the strategy of GIS in EDC 0-2 Train C/P and related staffs 0-3 Install GIS and make GIS map of Phnom Penh 0-4 Hold a seminar of GIS 0-5 Make GIS map of other provinces 0-6 Link GIS to other systems(PSS/ADEPT,SCADA system) 0-7 Make the rule and the work flow of facility management and put it into practice  1-1 Check and review the problem and difficulties on maintenance work 1-2 Obtain knowledge and skills to repair distribution facilities 1-3 Make manuals for repair work (including translation into Khmer) 1-4 Hold seminars for EDC 1-5 Conduct on-the-job training  2-1 Collect and analyze existing distribution fault data 2-2 Study skills to locate fault points quickly and to avoid spreading faults 2-3 Make manuals for recovering faults (including translation into Khmer) 2-4 Hold seminars for EDC 2-5 Conduct on-the-job training  3-1 Obtain knowledge to plan the distribution system and to improve the reliability 3-2 Revise EDC's technical standard in order to reduce the cost and adjust it to SREPTS 3-3 Analyze the existing system, take some measures to improve the reliability and compare cost between the measures 3-4 Consider expanding the distribution system and analyze the cost 3-5 Train C/P through on-the-job training	<b>Input to the Project</b>		
	<b>Cambodia Side</b>	<b>Japanese Side</b>	
	1. Local cost Necessary budget for the implementation of the project  2. Allocation of necessary personnel (1) Counterpart personnel (2) Administrative personnel  3. Preparation of office spaces and facilities	1. Dispatch of Experts (1) One Long-term expert (2) Short-term experts Short-term experts necessary for technical transfer  2. Counterpart training in Japan or third countries  3. Provision of Equipment	<b>Precondition</b>
			- Full time counterparts are assigned by EDC. - Organizations concerned cooperate in the Project.

Plan of Operations (Project for EAC under "Capacity and institutional building of the electric sector")

Master Plan for EAC	Year	2004				2005					2006					2007													
		Month				9	O	N	D	1	2	3	4	5	6	7	8	9	O	N	D	1	2	3	4	5	6	7	8
Overall Goal Electric power in Cambodia is supplied stably and safely.	Inputs																												
	1. Long-term expert	_____																											
	2. Short-term expert																												
	- Distribution (for SREPTS)	_____																											
- Thermal (for SREPTS)	_____																												
- Transmission (for SREPTS)	_____																												
Project Purpose Electric Power Technical Standards are managed effectively and properly by EAC.	- Substation (for training)	_____																											
	3. Training																												
	- For output 2 & 3 (in Japan)	_____																											
	- For output 1 (in Japan)	_____																											
	- Thermal (in Thailand)	_____																											
- Transmission (under consideration)	_____																												
Outputs 1. Rules with respect to General Requirements of Electric Power Technical Standards become clear.	Activities																												
	1-1 Check and review the present situation of three major fields (including collecting information from other countries)	_____																											
	1-2 Pick out the items and make sample forms	_____																											
	- Pick out the items	_____																											
	- Make sample forms	_____																											
	- Ask opinions and advices to MIME, EAC, EDC and Japanese side	_____																											
	- Site visits	_____																											
	- Revise the items and the sample forms with Short-term experts	_____																											
	1-3 Make out the detailed plan and schedule for preparing the Specific Requirements	_____																											
	1-4 Make the Specific Requirements for three major fields	_____																											
	- Make Specific Requirements with Short-term experts	_____																											
	1-5 Translate the Specific Requirements into Khmer by C/P	_____																											
	- Translate them into Khmer	_____																											
	- Ask opinions and advices to MIME, EAC, EDC and Japanese side	_____																											
	- Revise the Specific Requirements	_____																											
	1-6 Conduct seminars and workshops to disseminate the Specific Requirements	_____																											
	- Conduct the first seminar	_____																											
	- Revise the Specific Requirements	_____																											
	- Conduct seminars in rural areas	_____																											
	- Conduct the second seminar	_____																											
	1-7 Review and revise the Specific Requirements	_____																											
	- Revise the Specific Requirements and guide licensees	_____																											
	- Ask opinions and advices to MIME, EAC and EDC	_____																											
- Revise the Specific Requirements and guide licensees	_____																												
1-8 Guide licensees according to the Specific Requirements	_____																												
2. Work to authorize and approve licenses is performed smoothly.	2-1 Check and review the problems and difficulties on authorization and approval work	_____																											
	2-2 Have a meeting with licensees to collect information	_____																											
	2-3 Pick out the needs to improve the authorization and approval work	_____																											
	2-4 Implement the measures	_____																											
	2-5 Review and revise the measures	_____																											
3. Knowledge and skills to guide licensees are upgraded.	3-1 Check and review the present problems and collect data on accidents and trouble	_____																											
	3-2 Pick out the needs of materials, textbooks and instruments	_____																											
	3-3 Make materials and textbooks and purchase instruments	_____																											
	3-4 Train C/P through on-the-job training	_____																											
	3-5 Guide licensees with the materials, textbooks and instruments	_____																											
	- Visit and guide licensees	_____																											
- Conduct seminars in rural areas	_____																												
3-6 Review and revise the materials and textbooks	_____																												

Handwritten initials and marks at the bottom left of the page.



ELECTRICITE DU CAMBODGE  
Dispatching Control Center

## FAULT RECORDS FOR YEAR 2006

N°	Feeders	Voit. (kV)	Reason of faults														BO	Total	
			Trip1	Trip2	Trip3	Trip4	Trip5.1	Trip5.2	Trip5.3	Trip5.4	Trip5.5	Trip5.6	Trip5.7	Trip5.8	Trip5.9	Trip5.10			
1	All feeder																	5	5
2	CU-F1	22	6							6				2		1			15
3	CU-F3		4				3			1				4					12
4	CU-F4		4				1	1						1					7
5	GS1-F2		2																2
6	GS1-F3	4					1			3								8	
7	GS1-F4	2				1												3	
8	GS1-F5	2																2	
9	GS1-F7	2								2	1							5	
10	GS1-F9	3																3	
11	GS1-F10	9	1	1						7								18	
12	GS1-F11	2																2	
13	GS1-F14	7	1				2	1		24					3	1		39	
14	GS1-F15	2																2	
15	GS1-F17	1																1	
16	GS2-F2	5					2	2		28				2		5	1		45
17	GS2-F3	2								6				1					9
18	GS2-F4	3					1			28				5		1			38
19	GS2-F6	2												2					4
20	GS2-F7	2												1					3
21	GS2-F8	2					1							2					5
22	GS2-F9	2					1					1		2					6
23	GS2-F10	2					1	1						1					5
24	GS2-F11	2					1							1					4
25	GS2-F13	2							1	1				2					6
26	GS2-F14	2					1							2					5
27	GS2-F15	2					1	3		5				3		1			15
28	GS2-F16						1												1
29	GS3-F2	2																	2
30	GS3-F4	3					1			14						1			19
31	GS3-F5	2							1										3
32	GS3-F7	2																	2
33	GS3-F9								1										1
34	GS3-F10	5					1	2	1	32	1				2				44
35	GS3-F13	30	1	2	1					31					3	1		69	
36	GS3-F14	4								1									5
37	GS3-F15	5								10	1				1	1		18	
Total			131	3	3	4	22	9	0	199	4	0	31	0	18	4	5	433	

## Note:

- BO Black out
- Trip1 Machine Triped
- Trip2 Unstable frequency
- Trip3 Power lack
- Trip4 Over Load
- Trip5.1 Overhead Line - Underground cable fault ( Trip by Over-current Relay )
- Trip5.2 Electrical equipment fault
- Trip5.3 Cause by other feeder have a fault
- Trip5.4 Unknown ( Trip by Earth Fault Relay )
- Trip5.5 Excavating
- Trip5.6 Animal
- Trip5.7 Grounding fault ( Tree and something )
- Trip5.8 Lightning
- Trip5.9 Rain and wind
- Trip5.10 Others Accident

## Participants list of seminars

## ANNEX 4

Province	Licensee	License No.	SREPTS seminar				Technical seminars in rural areas					
			Phnom Penh(CJCC)		Phnom Penh		Sihanoukville		Kampong Cham		Battambang	
			Jul. 24, 2006	Jan. 25, 2007	Aug. 7	Aug. 8	Aug. 10	Aug. 11	Aug. 14	Aug. 15	Aug. 17	Aug. 18
Phnom Penh	Mr. Ven Veasna	090 L	2	1	1	1						
	Mr. Nhem Phanny	103 L	1	1	1	1						
	Mr. Chea Sophear	138 L		1								
Takeo	Mr. Mak Thorr	013 L	2	1	3	3						
	Mr. Srey Sokhom	015 L	1	1	2	2						
	Mr. Ke Kuy Houy	016 L	1	1	2	2						
	Mr. Chhuor Lay	020 L	1	1	2	2						
	Mr. Kong Phat	022 L	2	2	2	2						
	Ms. Ouch Per	054 L	1	1	1	1						
	Mr. Pak Hean	055 L	1	1	1	1						
	Mr. Chhin Seng	064 L	2	1	1	1						
	Mr. Mok Chin	084 L	2	1	2	2						
	Mr. Chhin Song	101 L	1	1	1	1						
	Mr. Nou Kruy	113 L	1		2	2						
	Ms. Sok Kheng	118 L	1	1	2	2						
	Ms. Kaing Gech Seam	121 L	1	2	1	1						
	Mr. Hak Ly Seng	133 L	1	1	1	1						
	Mr. Zhiang Kun	141 L		1								
	Mr. Ty Khlaok	134 L	1	1	2	2						
Kandal	Mr. Ang Senghe	037 L	1	1	1	1						
	Ms. Khev Nareth	049 L	1	1	2	2						
	Mr. Long Nget	053 L	1	1	1	1						
	Mr. Chay Neng	058 L	1	1	1	1						
	Mr. Khoun Sambath	061 L	1	1	1	1						
	Mr. Keb Borey	062 L	1	1	2	2						
	Mr. Pean Sokhalay	066 L	1	1	2	2						
	Mr. Heng Tray	071 L	1	1	1	1						
	Mr. Quach Edward	076 L	0		2	1						
	Mr. Koesung Rithy	086 L	1	1	2	2						
	Mr. Suon Sany	104 L	1	1	2	2						
	Ms. Leang Chhunry	143 L		1								
	Mr. Duk Liv	144 L		1								
	Ms. Chear Taing	114 L	1	1	2	2						
Sihanoukville	Mr. Sok Thy	029 L	1				1	1				
	Mr. Ly Bunthy	030 L	1	1			1	1				
	Ms. Kun Sivanny	088 L	1				1	1				
	Mr. Chan Keat	120 L	1				1	1				
Koh Kong	Mr. Samnith Sothy	028 L	1	1			1	1				
	Ms. An Samlan	108 L	0				1	0				
Kg. Speu	Mr. Sok Hoy	067 L	1	1			1	1				
	Mr. Ly Sokry	082 L	1	1			1	1				
	Mr. Leng Mov	099 L	1	1			2	2				
	Mr. Dik Rin	135 L	0	1			1	1				
	Mr. Men Kunthea	136 L	1	1			1	1				
	Mr. Tim Som	137 L	1	1			1	1				
Kampot	Mr. Kong Sophal	042 L	1	1			2	2				
	Mr. Kong Puthy	044 L	2	1			2	2				
	Mr. Khut Chinda	093 L	0	1			0	0				
	Mr. Yin Each	097 L	1	1			2	1				
	Mr. Khun Sambo	023 L	2	1					2	2		
Kg. Cham	Mr. Chhang Bunnareith	026 L	1	1					1	1		
	Mr. Kuy Sour	027 L	1	1					2	2		
	Mr. Ngen Kong	032 L	1	1					1	2		
	Mr. Sieng Seng	038 L	0	1					2	2		
	Mr. Kim Chantara	039 L	1	1					1	1		
	Mr. Mom Dara	047 L	1	2					2	2		
	Mr. Nhek Theary	056 L	2	1					2	2		
	Mr. Chin Sohin	057 L	1	1					2	2		
	Ms. Eam Sreng	060 L	1	1					2	2		
	Mr. Chou Sroan	065 L	1	1					2	2		
	Mr. Mean Vanna	074 L	1	1					1	1		
	Mr. Chhay Kimhour	075 L	1						2	2		
	Kg. Cham City Power	085 L	1						1	1		
	Mr. Khun Sophal	088 L	1	1					2	2		
	Mr. Um Hont	130 L	1	1					2	2		
	Ms. Nhek Sokun	131 L	1	1					2	2		
	Mr. Chea Channarooun	140 L	1	1					0	0		
	Mr. Mok Heat	040 L	1	1					0	1		
	Kg. Chhnang	Mr. Ty Sokun	041 L	1	1					2	2	
Sovanny Co., Ltd		051 L	1	1					2	2		
Ms. Chan Simoly		095 L	1	1					1	1		
Mr. Chear Sareth		096 L	1	1					1	1		
Mr. Un Sophal		119 L	1	1					1	1		
Mr. Huor Pheng		006 L	1	1					2	2		
Kg. Thom	Chilbo Industrial	012 L	1						1	1		
	Mr. Te Kok Eng	019 L	1	1					1	1		
	Mr. Ong Hoksia	063 L	1	1					1	1		
	Mr. Treng San	073 L	1	1					0	0		
	Ms. Bun Liv	017 L	1	1					1	1		
Prey Veng	Mr. Ky Sophear	018 L	1	2					2	2		
	Mr. Nov Sokha	021 L	1	1					1	1		
	Ms. Pauch Kim	036 L	1	2					2	2		
	Mr. Keo Dara	045 L	1	1								
	Mr. Seng Sokun	046 L	1	1					2	2		
Preah Vihear	Mr. Chan Thon	031 L	1	1					1	1		
	Electricity of Kratie	059 L		1					1	1		

Province	Licensee	License No.	SREPTS seminar		Technical seminars in rural areas								
			Phnom Penh(CJCC)		Phnom Penh		Sihanoukville		Kampong Cham		Battambang		
			Jul. 24, 2008	Jan. 25, 2007	Aug. 7	Aug. 8	Aug. 10	Aug. 11	Aug. 14	Aug. 15	Aug. 17	Aug. 18	
Kratie	Mr. Lay Se	043 L	1	1								2	2
Baiternbang	Ms. Touch Montha	068 L	1	1								2	2
	Mr. Neb Bin	069 L	1	1								2	2
	Mr. Sun Pov	091 L	1	1								2	2
	Ms. Tieng Chinda	109 L	1	1								1	1
	Ms. Sier Gech	110 L	1	1								1	1
	Mr. Dung Ly	117 L	1	1								2	2
Siem Reap	Ms. Chhouy Pheut	035 L	0	1								2	2
	Mr. Chhoam Sophay	048 L	0	1								1	1
	Mr. Tun Yoeun	083 L	1	1								1	1
	Mr. Kung Vun	111 L	1	1								1	1
	Mr. Ly Kung	112 L	1	1								2	2
	Mr. Te Hong Cheng	127 L	0	1								1	1
	Ms. Chhun Lieng Sour	129 L	0	1								2	2
	Mr. Doung Narin	139 L	1	2								2	2
	Ms. Chav Noy	077 L	1	1								1	1
	Mr. Vom Yeang	078 L	1	1								2	2
Banteay Meanchey	Mr. Thun Thooun	079 L	1	1								2	2
	Mr. Sok Vitth	080 L	1	1								2	2
	Mr. Moun Han	081 L	1	1								2	2
	Mr. Sok Konkea	087 L	1	1								2	2
	Mr. Soeung Sovanna	105 L	1	1								2	2
	Ms. Sin Savour	108 L	1	1								2	2
	Mr. Chhour Ngoun	033 L	1	1								2	2
	Mr. Tœum Touch	034 L	1	1								2	2
Pursat	Nareth Electricity	052 L	1	1								2	2
	Mr. Ya Sambath	072 L	0									1	1
	Mr. Preab Vannareth	102 L	1	1								1	1
	Mr. Yeab Lav	124 L	1	1								1	1
	Mr. York Savong	125 L	1	1								2	2
Oddor Meanchay	Vannak Peak Company	089 L	1	1							2	2	
Pailin Company	EDC	001 L	39	36									
	CUPL	002 L	1	2									
	GTS	004 L	0	1									
	CETIC	007 L	1	1									
	FRANASIE	008 L	0										
	MSP	009 L	0										
	ANCO	011 L	1										
	Duly Free Shop	014 L	0										
	Recco Company	050 L	1	1									
	Edward Energy power Supply Co.	094 L	0	1									
	Union Victory Asia Co.	107 L	1	1									
	KEP	115 L	0										
	City Power Co.	116 L	0	1									
	E.D. Con.	122 L	1	1									
	Colben Co.	123 L	2	2									
	S.H.C. Ptd	126 L	0										
	CEP	132 L	1	2									
	Kompot Power Plant Co.	142 L											
	Suling Electronic Co.	145 L											
	S.L. Gamand Co.	146 L											
	Han Seng Land En Co.	148 L											
	Sen Kern Co.	149 L											
	Kien Svay Electric Co.	150 L											
	Khmer Electricity Service Co.	151 L											
	Power Transmission Line Co.	152 L											
	Ms. Ngum Socheaty	153 L											
	Mr. Uy Sophat	154 L											
	Mr. Samrith Kiry	155 L											
	Mr. Mean Sambath	156 L											
	Total			159	160	46	45	19	17	52	54	52	52

*[Handwritten signature]*

*[Handwritten mark]*

## Electric Power Technical Standards

### Specific Requirements for Transmission and Distribution Facilities

#### CONTENTS

#### CHAPTER 1

#### INTRODUCTION

Article 1 : Definitions

Article 2 : Purpose

Article 3 : Area of Application

Article 4 : Applicable Standards

Article 5 : Types of Power Transmission and Distribution Facilities

Article 6 : Voltage

#### CHAPTER 2

#### GENERALS FOR TRANSMISSION AND DISTRIBUTION

#### PART 1

#### General Provisions

Article 7 : Prevention of Electric Power Disasters

Article 8 : Prevention of Accidents Caused by Electric Power Facilities

Article 9 : Safety of Third Persons

Article 10 : Prevention of Failures of Electric Power Facilities from Natural Disasters

Article 11 : Prevention of Electric Power Outage

Article 12 : Protection against Over-current

Article 13 : Protection against Ground Faults

Article 14 : Environmental Protection

Article 15 : Life of Electric Power Facilities

Article 16 : Requirements related to the Design of Electric Power Facilities

Article 17 : Technical Documents of Electric Power Facilities

Article 18 : Communication System

Article 19 : Accuracy of Power Meters

#### PART 2

#### Grounding

Article 20 : General Requirements for Grounding

Article 21 : Classification of Grounding

Article 22 : Grounding for Electrical Lines

Final Draft, 28-Feb.-2007

Article 23 : Grounding for Power Stations, Substations, Switching Stations and High-voltage and Medium-voltage Users' Sites

Article 24 : Grounding for Distribution Lines and Low-Voltage Users' Sites

### **PART 3**

#### **Conductor**

Article 25 : Conductors for Transmission and Distribution Facilities

Article 26 : Connection of Conductors

Article 27 : Safety Factor of Bare Conductors and Ground Wires of Overhead Electrical Lines

Article 28 : Side-by-Side Use and Joint Use of Electrical Lines or Communication Lines

Article 29 : Underground Lines

### **CHAPTER 3**

#### **HIGH-VOLTAGE TRANSMISSION FACILITIES**

Article 30 : Protective Devices for Electrical Equipment

Article 31 : Design of Supporting Structures of Overhead High-voltage Lines

Article 32 : Design of Fittings for Conductors and/or Ground Wires of Overhead High-voltage Lines

Article 33 : Protection against Lightning for Overhead High-voltage Lines

Article 34 : Bare Conductors of Overhead High-voltage Lines

Article 35 : Clearance between Bare Conductors and Supporting Structures of Overhead High-voltage Lines

Article 36 : Height of Overhead High-voltage Lines

Article 37 : Clearance between Overhead High-voltage Lines and Other Facilities or Trees

Article 38 : Prevention of Danger and Interference due to Electrostatic Induction and Electromagnetic Induction

Article 39 : Surge Arresters

### **CHAPTER 4**

#### **MEDIUM AND LOW-VOLTAGE DISTRIBUTION FACILITIES**

Article 40 : Supporting Structures

Article 41 : Overhead Medium-voltage and Low-voltage Lines

Article 42 : Mechanical Strength of Insulators

Article 43 : Medium-voltage/Low-voltage (MV/LV) Transformers

Article 44 : Installation of Distribution Transformers for Single Wire Earth Return (SWER) Systems

Article 45 : Protective Devices

Article 46 : Height of Overhead Medium-voltage and Low-voltage Lines

Article 47 : Clearance between Overhead Medium-voltage and Low-voltage Lines and Other Objects

Article 48 : Proximity and Crossing of Overhead Medium-voltage and Low voltage Lines

Attachment : Explanation Sheet for Transmission and Distribution Facilities

Final Draft, 28-Feb.-2007

# Specific Requirements for Thermal Power Generating Facilities

## CONTENTS

### CHAPTER 1 INTRODUCTION

- Article 1 : Definitions
- Article 2 : Purpose
- Article 3 : Area of Application
- Article 4 : Applicable Standards
- Article 5 : Facilities regulated in this Specific Requirements

### CHAPTER 2

#### Requirements for all types of Thermal Generating Facility

- Article 6 : Prevention of Electric Power Disasters from the Facility
- Article 7 : Safety of Third Persons
- Article 8 : Requirements related to the Fuel
- Article 9 : Requirements related to the Handling of Chemical Materials
- Article 10 : Requirements related to the Natural Disasters
- Article 11 : Requirements related to the Operation of Generating Facility with Power System
- Article 12 : Requirements related to the Environment
- Article 13 : The Life of Electric Power Facilities
- Article 14 : Requirements related to the design of Electric Power Facilities
- Article 15 : Requirements related to the Technical Document of Electric Power Facilities
- Article 16 : Requirements related to the Grounding

### CHAPTER 3

#### Requirements for Steam Turbine Generating Facility

- Article 17 : Steam Turbine Generating Facility

#### PART 1

##### Boiler

- Article 18 : Requirements for Materials of Boiler and its Accessories
- Article 19 : Requirements for Structure of Boiler and its Accessories
- Article 20 : Safety Valve for Vessels and Tubes of the Boiler
- Article 21 : Feed Water System of Boiler
- Article 22 : Water Feeding and Steam Outpouring of Boiler

Final Draft, 28-Feb.-2007

Article 23 : Monitoring the Running Condition of Boiler and Safety and Alarm System

## **PART 2**

### **Steam Turbine**

Article 24 : Requirements for Materials of Steam Turbine and its Accessories

Article 25 : Mechanical Strength of Structure of Steam Turbine and its Accessories

Article 26 : Bearings of Steam Turbine

Article 27 : Governance of Turbine Speed

Article 28 : Requirements to Alarm and to Stop the Turbine in Emergency Case

Article 29 : Monitoring the Condition of Turbine Operation

Article 30 : Reviewing the Safety of Steam Turbine and its Accessories

## **CHAPTER 4**

### **Requirements for Gas Turbine Generating Facility**

Article 31 : Gas Turbine Generating Facility

Article 32 : Requirements for Materials of Gas Turbine and its Accessories

Article 33 : Mechanical Strength of Structure of Gas Turbine and its Accessories

Article 34 : Bearings of Gas Turbine

Article 35 : Governance of Turbine Speed

Article 36 : Emergency Alarm and Stop Devices

Article 37 : Monitoring and Alarm Systems

Article 38 : Reviewing the Safety of Gas Turbine

Article 39 : Requirements for Gas-Turbine Combined Cycle and its Accessories

## **CHAPTER 5**

### **Requirements for Internal Combustion Engine**

Article 40 : Internal Combustion Engine

Article 41 : Requirements for Materials of Internal Combustion Engine

Article 42 : Mechanical Strength of Structure of Internal Combustion Engine

Article 43 : Bearings of Internal Combustion Engine

Article 44 : Governance of Internal Combustion Engine Speed

Article 45 : Emergency Stop and Alarm Devices

Article 46 : Overpressure Protection Devices

Article 47 : Monitoring and Alarm Systems

Final Draft, 28-Feb.-2007

## CHAPTER 6

### Requirements for Generators

- Article 48 : Protection of Generators
- Article 49 : Electrical Equipment
- Article 50 : Cables in Thermal Power Plants
- Article 51 : Installation of Hydrogen Cooling Type Generators
- Article 52 : Control Systems

## CHAPTER 7

### Transitional Provisions

- Article 53 : Transitional Provisions for Small and Medium Licensees
- Article 54 : Prevention of Electric Power Disasters
- Article 55 : Safety of Third Persons
- Article 56 : Safety Measures for Fuel and Chemical Materials
- Article 57 : Environmental Protection
- Article 58 : Requirements for Operation
- Article 59 : Safety and Technical Training
- Attachment : Explanation Sheet for Thermal Power Generation Facilities





As of February 28, 2007

## List of issued licenses

No	Licensee	License	Issued	Term	Renewed	Term	Business Location	Type of Service	Installed Capacity
		No.	Licenses	Years	Licenses	Years			kVA
1	EDC	001 L	01-02-2002	No Limit			Phnom Penh	Gen., Tran. & Dist.	
2	CUPL	002 L	01-02-2002	PPA			Phnom Penh	Generation	37100
3	JUPITER	003 L	29-03-2002	PPA			Phnom Penh, Pursat, Kg. Chhnang Provincial Town	Generation	21000, 750, 1000
4	GTS	004 L	29-03-2002	PPA			Kg Cham Provincial Town	Generation	2200
5	Mr. Hoor Pheng	006 L	01-4-2002	5			Khum Kampong Thmar, Santuk, Kompong Thom	Gen. & Dist	525
7	CETIC	007 L	05-4-2002	PPA			Kirirom ( Kg Speu )	Generation	12000
8	Franasie Ins & Exp	008 L	09-4-2002	10			Komzieng, Phnom Prack, Sampsou Loum (Battambang)	Distribution	3000
9	MSP	009 L	27-5-2002	5			Phsar Prom (Pailin)	Distribution	2500
11	Anco Brothers Co.,Ltd	011 L	9-8-2002	5			Poi Pet (Banteay Meanchey)	Distribution	5000
12	Chitbo Industrial	012 L	9-8-2002	5			Provincial Town of Kompong Thom	Gen. & Dist	1900
13	Mr. Mak Thom	013 L	6-9-2002	3	06-09-2005	10	Phsar Tonlab Town, Preahbaitchanchum, Kiriwong, Takeo	Gen. & Dist	510
14	Duty Free Shop	014 L	22-11-2002				Koh Kong & Osmach Town, Samrong Odder Meanchey	Distribution	2000, 2000
15	Mr. Srey Sokham	015 L	22-11-2002	2	22-11-2004	7	Phsar Samrong Yong Town, Trapeang Sab, Bati, Takeo	Gen. & Dist	100
16	Mr. Ke Kuyhuay	016 L	22-11-2002	2	22-11-2004	2	Phsar Preyvea Town, Preyvea, Trang, Takeo	Gen. & Dist	80
17	Mrs. Bun Liv	017 L	29-11-2002	5			Estern Neakleung, Peamro, Prey Veng	Gen. & Dist	2385
18	Mr. Ky Sophea	018 L	29-11-2002	2	29-11-2004	3	Phsar Snay Pol, Roka, Pesarang, Prey Veng	Gen. & Dist	135
19	Mr. Te Kok Eng	019 L	12-12-2002	3	12-12-2004	2	Khum Tral Town, Baray, Kompong Thom	Gen. & Dist	175
20	Mr. Chhior Lay	020 L	30-12-2002	2	30-12-2004	3	Phsar Preyvea Town, Preyvea, Prey Kabas Takeo	Gen. & Dist	70
21	Mr. Nov Sokha	021 L	30-12-2002	2	30-12-2004	3	Western Neakleung Town, Loek Dek, Kandal	Gen. & Dist	650
22	Mr. Kong Phat	022 L	11-02-2003	2	11-02-2005	2	Phum Thmor Sor, Korkpor, Boreycheulaa, Takeo	Gen. & Dist	52
23	Mr. Khun Sambo	023 L	11-02-2003	3			Phsar Prey Toteung Town, Prey Chhor, Kompong Cham	Gen. & Dist	484
24	Global Power System	024 L	11-02-2003	PPA			Prey Veng Provincial Town	Generation	1200
26	Mr. Chang Bunaret	026 L	12-03-2003	2	12-03-2005	4	Phsar Phaav Town, Paav, Baitheay, Kompong Cham	Gen. & Dist	110
27	Mr. Kuy Sour	027 L	12-03-2003	2	12-03-2005	10	Phsar Suong Town, Suong, Thong Khnom, Kompong Cham	Gen. & Dist	740
28	Mr. Samnith Sothy	028 L	12-03-2003	2	12-03-2005	3	Sre Ambil Dist. Town, Koh Kong	Gen. & Dist	850
29	Mr. Sok Thy	029 L	12-03-2003	2	12-03-2005	5	Phsar Veal Rinh Town, Preyob, Sihanoukville	Gen. & Dist	860
30	Mr. Ly Bunthy	030 L	13-03-2003	2	13-03-2005	3	Sangkai Tomnobrelok and Kompenh, Stoeng Hav Sihanoukville	Gen. & Dist	470
31	Mr. Chan Thon	031 L	13-03-2003	5			Preah Vihear Provincial Town	Gen. & Dist	575
32	Mr. Ngen Kang	032 L	13-03-2003	2	13-03-2005	2	Phsar Tang Kok, Baray, Kompong Thom	Gen. & Dist	237.5
33	Mr. Chhuor Nguon	033 L	9-4-2003	2	9-4-2005	2	Phsar Beungknar Town, Beungknar, Bakan, Pursat	Gen. & Dist	125
34	Mr. Toem Touch	034 L	9-4-2003	2	9-4-2005	2	Khum Trapeang Chhnhng, Bakan, Pursat	Gen. & Dist	115
35	Mrs. Chhuoy Pout	035 L	9-4-2003	2	9-4-2005	4	Puork Dist. Town, Siem Reap	Gen. & Dist	110
36	Mrs. Pauch Kim	036 L	9-4-2003	2	9-4-2005	7	Kar-Anloek, Prasad, Kampong Trabek, Prey Veng	Gen. & Dist	215
37	Mr. Ang Senghy	037 L	20-05-03	2	20-05-05	2	Rokakong, Mukkampung, Kandal	Gen. & Dist	120
38	Mr. Khut Bunpich	038 L	20-05-03	2	20-05-05	2	Phum Thnal Bek, Svayteab, Chumkaleu, Kompong Cham	Gen. & Dist	120
39	Mr. Kim Chantara	039 L	20-05-03	2	20-05-05	2	Phsar Baray Town, Baray, Baray, Kompong Thom	Gen. & Dist	70
40	Mrs. Mok Heat	040 L	26-05-03	2	26-05-05	2	Phar Ponley Town, Ponley, Borbor, Kompong Chuang	Gen. & Dist	636
41	Mr. Ty Sokhan	041 L	26-05-03	2	26-05-05	3	Kompong Triseth Dist. Town, Kompong Chuang	Gen. & Dist	636
42	Mrs. Muy Kuan	042 L	26-05-03	2	26-05-05	2	Trapeang Ropao, Prekhnat, Kampot, Kampot		240
43	Mr. Lay Se	043 L	01-07-03	2	01-07-05	2	Thmor Kol Town, ThmorKol Dist., Battambang	Gen. & Dist	200, 160, 80
44	Mr. Kong Puhhy	044 L	01-07-03	2	01-07-05	5	Phsar Chhouk Town, Chhouk Dist. kampot	Gen. & Dist	120x1
45	Mr. Keo Dara	045 L	18-08-2003	2	18-08-2005	2	Phsar Kampong Popel, Kam_pel, Pearsang, Prey Veng	Gen. & Dist.	85
46	Mr. Seng Sokun	046 L	18-08-2003	2	18-08-2005	2	Phsar Svay Antor Town, Svay-ator, Prey Veng, Prey Veng	Gen. & Dist	113
47	Mr. Mon Yaza	047 L	18-08-2003	2	18-08-2005	4	Phsar Skun Town, Soteb, Chbeung Prey, Kompong Chhn	Gen. & Dist	100
48	Mr. Chhom Sophay	048 L	18-08-2003	2	18-08-2005	4	Phsar Domdek Town, Domdek Phsar, Sonikom, Siem Reap	Gen. & Dist	280
49	Mrs. Khiev Narut	049 L	18-08-2003	2	18-08-2005	4	Tambon Treuy Sin, Sa Ang, Kandal	Gen. & Dist	413
50	Reeco Company	050 L	09-09-2003	15			Prekthmey and Chheu Teal, Kean Svay, Kandal	Dist	400
51	Sovanny Elec. Devl. Co., Ltd	051 L	09-09-2003	10			Kampong Chuang Provincial Town	Dist	750
52	Nareth Elec. Devl. Co., Ltd	052 L	09-09-2003	3			Pursat Provincial Town	Dist	1000
53	Mr. Long Nget	053 L	09-09-2003	2	09-09-2005	2	Phsar Thnal Toteung, Ang Snuol-Samrongong K-dal/RK-Speu	Gen. & Dist	75, 40
54	Mrs. Ouch Por	054 L	09-09-2003	2	09-09-2005	3	Phsar Sayva Town, Preykasab Dist., Takeo	Gen. & Dist	50, 20
55	Mr. Fark Hean	055 L	07-10-2003	2	07-10-2005	3	Phsar Preysindek Town, Preysiek, Trang, Takeo	Gen. & Dist	35
56	Mrs. Nitek Theary	056 L	07-10-2003	2	07-10-2005	3	Phsar Bokhnor Town, Bokhnor, Chamkaleu, K- Chhn	Gen. & Dist	115
57	Mrs. Chin Sohin	057 L	07-10-2003	2	07-10-2005	2	Phsar Steungtrang Town, Prekak, Steung Trang, K- Chhn	Gen. & Dist	50
58	Mr. Chhay Neng	058 L	07-10-2003	2	07-10-2005	1	Phsar Kampongkotoirt Town, Bakou, Kandalstung, Kandal	Gen. & Dist	50
59	Electricity of Kratie Province	059 L	07-10-2003				Kratie Provincial Town	Dist	200
60	Mrs. Eam Sreng	060 L	20-11-2003	2			Khum Mesorehrey, Steung Trang, Kompong Cham	Gen. & Dist	90
61	Mr. Khoeun Sambath	061 L	20-11-2003	2	20-11-2005	5	Phsar Ang Snuol, Peuk, Ang Snuol, Kandal	Gen. & Dist	95

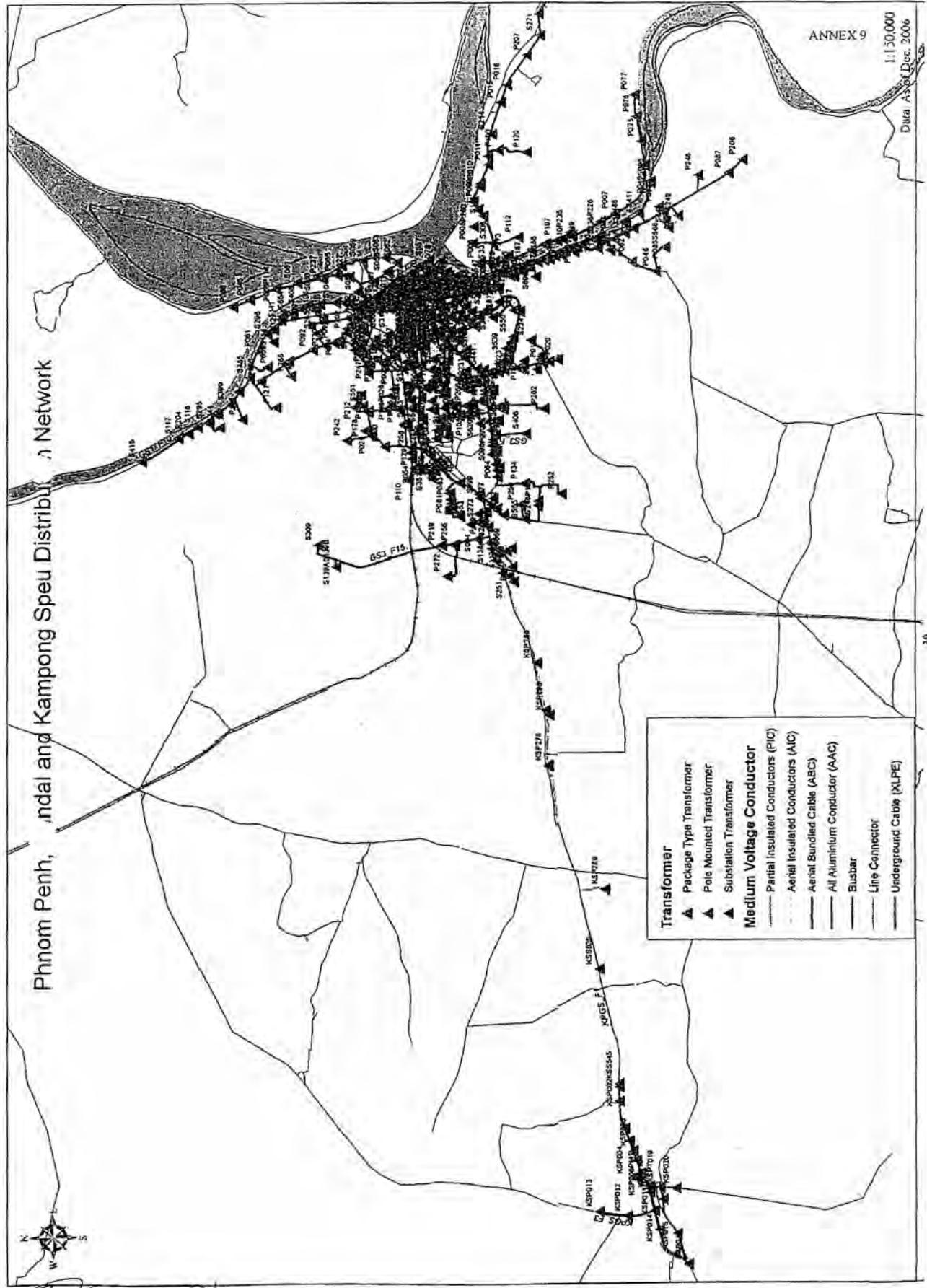
No	Licensee	License	Issued	Term	Renewed	Term	Business Location	Type of Service	Installed Capacity kVA
		No.	Licenses	Years	Licenses	Years			
62	Mr. Kab Borey	062 L	20-11-2003	2	20-11-2005	2	Eastern Phsar Prek Kdam Town, Koh Chin, Ponhealeu, Kandal	Gen. & Dist	120
63	Mr. Ong Hokin	063 L	20-11-2003	7			Sieng Dist. Town, Kampong Thom	Gen. & Dist	375
64	Mr. Chhin Seng (Ut Thy)	064 L	20-11-2003	2	20-11-2005	4	Phsar Trm Khna Town, Chungkruk&Sophty, Kg-Takeo	Gen. & Dist	160
65	Mr. Chao Soan	065 L	20-11-2003	2	20-11-2003	3	Phsar Mean Town, Mean&Trapeangpreh, Preyhor, Kg-Ch	Gen. & Dist	95
66	Mr. Pean Sokhalay	066 L	20-11-2003	2	20-11-2005	2	Phsar Prek Anhchang Town, Prek Anhchanh, Mokampoul, K-D	Gen. & Dist	112.5
67	Mr. Sok Hoy	067 L	20-11-2003	2	20-11-2005	2	Phsar Trapeang Kraleung, Kirivom, Phnom Srooch, Kg-S	Gen. & Dist	75
68	Mrs. Tusch Monha	068 L	16-12-2003	2	16-12-2005	2	Khum Sampaoloun, Banan, Battambang		112.5
69	Mr. Nob Ben	069 L	16-12-2003	3			Rattanakmondul Dist Town, Battambang	Gen. & Dist	120
71	Mr. Heng Tray	071 L	16-12-2003	2	16-12-2005	4	Phsar Saangkhanthong Town, Preakloy, Saing, Kandal	Gen. & Dist	120
72	Mr. Ya Sambath	072 L	16-12-2003	2	16-12-2005	2	Phsar Svaydaunkeo Town, Svaytounkeo, Bakan, Pursat	Gen. & Dist	110
73	Mr. Treung San	073 L	16-12-2003	3			Phsar Tangkrosang Town, Tangkrosang, Santuk, K-gbom	Gen. & Dist	75
74	Mr. Mean Vanna	074 L	16-12-2003	2	16-12-2005	5	Phsar Svayteap Town, Svayteap, Chamkaleu, K-gcham	Gen. & Dist	185
75	Mr. Chhay Kimhuor	075 L	16-12-2003	2	16-12-2005	2	Phsar Seu Town, Svay&Chayro, Chamkaleu, K-gcham	Gen. & Dist	100
76	Mr. Quach Edward	076 L	17-12-2003	2	17-12-2005	10	Phsar Otdong Town, Viangchas-Vihearloun, Otdong-poungear	Gen. & Dist	370
77	Ms. Chav Moy (Loch Hing)	077 L	17-12-2003	2	17-12-2005	3	Phsar Otsuot Town, Oprasat, Monkulborey, Bantaymeanchey	Gen. & Dist	75
78	Mr. Vom Yeang	078 L	17-12-2003	2	17-12-2005	3	Phsar Kusat Town, Nimit and kob, Ochrov	Gen. & Dist	50
79	Mr. Thon Thuang	079 L	17-12-2003	2	17-12-2005	5	Phar Phnomouch Town, Phnomouch, Monkulborey	Gen. & Dist	112
80	Mr. Sok Vithi	080 L	17-12-2003	2	17-12-2005	4	Phsar Bantaymeanchey Town, Monkulborey, Bantaymeanchey	Gen. & Dist	70
81	Mr. Moua Han	081 L	17-12-2003	2	17-12-2005	3	Phnomrok town, Bantaymeanchey	Gen. & Dist	112
82	Mr. Ly Sokry	082 L	29-12-2003	2	29-12-2005	4	Phsar Trengira Yeung Town, Trengira Yeung, Phnomouch	Gen. & Dist	110
83	Mr. Toung Yeun	083 L	29-12-2003	2	29-12-2005	4	Phsar Thalek Town, Keangseake and Damdeak, Sotnikum	Gen. & Dist	35
84	Mr. Mok Chen	084 L	29-12-2003	2	29-12-2005	3	Phsar Pansey Town, Kyao and Toul Ampil, Samrong and	Gen. & Dist	20
85	Kg. Cluan City Power	085 L	29-12-2003	2	29-12-2005		Phsar Thaleteung Town, Chob, Tbongkhmom, K-gcham	Gen. & Dist	90
86	Mr. Koeung Rithy	086 L	09-02-2004	7			Phsar Saang Khangcheung Town, Sa Ang, Kandal	Gen. & Dist	400
87	Mrs. Sok Koonka	087 L	09-02-2004	3			Thmor Puok Dist. Town, Bantay Meanchay	Gen. & Dist	93
88	Mr. Khun Sopha	088 L	09-02-2004	10			Oreang Oy Dist. Town, Kampong Cham	Gen. & Dist	112
89	Vannak Peap Company	089 L	09-02-2004	5			Psailin City	Distribution	
90	Mr. Van Vexana	090 L	16-03-2004	5			Khum Bakeng and Phum Klor, Sang Kai Prek Leap, Russey Keo, P-P	Gen. & Dist	100
91	Mr. Sun Pov	091 L	16-03-2004	2			Khum Prek Khjeb and Khum Prek Luong, Ek Phnom Dist., B-B	Gen. & Dist	100
92	Mr. Som Visal	092 L	16-03-2004	2			Phsar Chouk and Sam Rong, Khum Samrong, Samrong Dist., Oddormoanchay	Gen. & Dist	115
93	Mr. Khut Chenda	093 L	16-03-2004	7			Bantaymeanchey District Town, Kampot Province	Gen. & Dist	30
94	Edward Energy Supply Co., Ltd	094 L	06-05-2004	PPA			Pursat Provincial Town	Gen.	4350
95	Mrs. Chan Sunoly	095 L	30-07-2004	2			Phsar Prey Khmer Town, Khum Andong Snay and Rolea	Gen. & Dist	85
96	Mr. Chear Sareth	096 L	30-07-2004	2			Phsar Pong Ro Town, Khum Pong Ro and Svay Chrum	Gen. & Dist	40
97	Mr. Yin Each	097 L	30-07-2004	2			Angkor Chey District town, Kampot Province	Gen. & Dist	75
98	Ms. Kun Sivanyy	098 L	15-09-2004	3			Snuachdeng, Ream, Sihanouk Ville	Gen. & Dist	85
99	Mr. Leng Mov	099 L	15-09-2004	4			Bardeung, O-Dong, Kg. Speu	Gen. & Dist	100 MW
100	Ms. So Rinda	101 L	15-09-2004	2			Thnolbat, Samrong, Kg. Speu	Gen. & Dist	75
101	Mr. Preah Sovannareul	102 L	06-10-2004	2			O-Tapong, Bakan, Pursat	Gen. & Dist	70 MW
102	Mr. Nhem So Phany	103 L	06-10-2004	2			Bak Kheng, Prek Leap, Russey Keo, Phnom Penh	Gen. & Dist	100
103	Mr. Soun Sany	104 L	19-11-2004	2			Phum 2, 3, 4, Svay Rolom, Saang, Kandal	Gen. & Dist	100
104	Mr. Soeung Sovanna	105 L	19-11-2004	2			Phum Phnom Thom Tbong, O-Prasat, M. Borey, B.M	Gen. & Dist	70
105	Ms. Ana Samlan	106 L	19-11-2004	3			Koh Sdech, Koh Sdech, Kirisarak, koh Kong	Gen. & Dist	120
106	Union Victory Asia Co., Ltd	107 L	30-11-2004	PPA			Battambang Provincial Town	Generation	4000 KVA
107	Ms. Sin Savoun	108 L	16-02-2005	2			Preah Net Preah, Bantay Meanchey	Gen. & Dist	112.5
108	Ms. Tieng Cherita	109 L	16-02-2005	2			Mong Russey, Battambang (From PP at Left hand)	Gen. & Dist	300
109	Ms. Sear Kech	110 L	16-02-2005	2			Mong Russey, Battambang (From PP at Right hand)	Gen. & Dist	275
110	Mr. Kong Yun	111 L	16-02-2005	2			Chekreng, Siem Reap	Gen. & Dist	120
111	Mr. Ly Kung	112 L	16-02-2005	2			Chekreng, Siem Reap	Gen. & Dist	110
112	Mr. Nou Kny	113 L	16-02-2005	2			Angkor Baré, Takeo	Gen. & Dist	75
113	Ms. Chear Taing	114 L	16-02-2005	2			Khsach Kandal, Kandal	Gen. & Dist	80
114	Khmer Electric Power (KEP)	115 L	15-03-2005	PPA			Suang Mean Chey, Phnom Penh	Generation	30,000
116	City Power Co.	116 L	15-03-2005	PPA			Kakab, Dong Ker, Phnom Penh	Generation	5,000
116	Mr. Dung Ly	117 L	08-04-2005	S-Biomass			Banorn, Battambang	Gen. & Dist	16KVA
117	Ms. Sok Kheng	118 L	18-07-2005	3			Khum Chumbar, Bary District, Takeo	Gen. & Dist	50
118	Mr. Un Sopha	119 L	19-10-2005	2			Teouk Phot District Town, Kg. Chhvaung	Gen. & Dist	115
119	Mr. Chan Keat	120 L	19-10-2005	2			O-Tre, Khan Svung Hao, Sihanouk Ville	Gen. & Dist	105
120	Mrs. Kaling Oech Seam	121 L	28-12-2005	2			Khum Trapeang Kok, Tram Kok, Takeo	Gen. & Dist	110
121	E.D.Con.	122 L	28-12-2005	5			Stung, Ponhea Krek, Kg. Cham	Distribution	
122	COLBEN Co., Ltd	123 L	28-12-2005	10			Russey Keo, Phnom Penh	Generation	10,000
123	Mr. Yeab Lav	124 L	02-02-2006	2			Kralanh District Town, Pursat	Gen. & Dist	96
124	Mr. York Savong	125 L	07-02-2006	2			Krakor District Town, Pursat	Gen. & Dist	120
125	S.H.C., Pnt	126 L	08-02-2006	1			Siem Reap Provincial Town	Generation	8,130
126	Mr. Te Hong Cheng	127 L	16-02-2006	2			Phsar Khlaing, Kg. Khlaing, Sotnikom, S.R	Gen. & Dist	50
127	Mr. Eang Khon	128 L	28-02-2006	2			Roaveang District Town, Preah Vhear	Gen. & Dist	65
128	Ms. Chhun Leang Sour	129 L	31-05-2006	2			Phum Chak, Khum Sangveuy, Chikreng District, S.R	Gen. & Dist	40
129	Mr. Um Haut	130 L	31-05-2006	2			Phum Cheung Chhnok, Khum Taingkrang, Baiheay	Gen. & Dist	40
130	Ms. Nhek Kumhear	131 L	31-05-2006	2			Treung, Srok Prey Chhor, Kg. Cham	Gen. & Dist	101
131	Cambodia Electricity Private	132 L	31-05-2006	PPA			Suang Mean Chey, Phnom Penh	Generation	45,000
132	Mr. Hak Ly Seng	133 L	28-06-2006	2			Khum Prey Remdeng & Prey Ampok, Srok Kirivong, Takeo	Gen. & Dist	80
133	Mr. Try Khlasuk	134 L	28-06-2006	2			Phsar Rominh Town, Khum Romuth, Srok Koh Andeth, Takeo	Gen. & Dist	110
134	Mr. Dik Rin	135 L	28-06-2006	2			Phsar Deumrokrao Town, Khum Veal, Srok Kongpisey, Kg. Speu	Gen. & Dist	45
135	Mr. Men Kumhear	136 L	28-06-2006	2			Phsar Talat, Khum Or, Srok Phnom Srooch, Kg. Speu	Gen. & Dist	100
136	Mr. Toem Sam	137 L	28-06-2006	2			Phsar Prey Phday, Khum Trapeang Kog, Srok Samraung tong, Kg. Speu	Gen. & Dist	112.5
137	Mr. Chea Sophear	138 L	05-07-2007	5			Phsar O-Russey, P-P	Distribution	
138	Mr. Doung Narin	139 L	05-07-2007	2			Phsar Daeo Sva, Khum Char Chhouk, Srok Angkor Chum, S.R	Gen. & Dist	97.5
139	Mr. Chea Channareoun	140 L	05-07-2007	3			Phum Ta-ong, Khum Ta-ong, Srok Chamkar Leu, Kg. Cham	Gen. & Dist	100
140	Mr. Ching Kuu	141 L	01-09-2006	2			Phsar Yiew Trop, Khum Roaveang, Srok Samrong, Takeo	Gen. & Dist	60
141	Kompot Power Plan Co.Ltd	142 L	01-09-2006	2			Kompot Province	Generation	23000

No	Licensee	License	Issued	Term	Renewed	Term	Business Location	Type of Service	Installed Capacity
		No.	Licenses	Years	Licenses	Years			kVA
142	Ms. Leang Chhunry	143L	25-10-2006	2			Kandal Province	Gen & Dist	20
143	Mr. Duk Liv	144L	25-10-2006	3			Kandal Province	Gen & Dist	75
144	Su Jing Co.Ltd	145L	28-11-2006	20			Siem Reap Provincial Town	Distribution	
145	S.I. Co.Ltd	146L	29-11-2006	PPA			Phnom Penh	Generation	56250
146	O.M.O Co.Ltd	147L	29-11-2006	MOU			Kampong Cham Province	Generation	312.5
147	Hsu Senlen Co.Ltd	148L	21-12-2006	PPA			Porsat Province	Generation	2750
148	Mr. Sen Kim	149L	21-12-2006	15			Mally, Bantaymeanchey	Distribution	
149	Kean Svay Electric Co.Ltd	150L	21-12-2006	15			Kandal Province	Distribution	
150	Khmer Electricity Co.Ltd	151L	21-12-2006	15			Kandal Province	Distribution	
151	Power Transmission Line Co.Ltd	152L	17-02-2007	PPA			Bat dambang, Bantaymeanchey	Transmission	
152	Ms. Ngung Socheay	153L	07-02-2007	3			Kadal Steng, Kadal Province	Gen & Dist	50
153	Mr. Uy Sophad	154L	07-02-2007	2			Kangpisey, K.Spe	Gen & Dist	40
154	Mr. Samrith Kiri	155L	07-02-2007	2			Krangchhik, K.Spe	Gen & Dist	45
155	Mr. Mean Sambath	156L	07-02-2007	2			Samrongtong, K.Spe	Gen & Dist	30

**The List of Technical Materials and Textbooks**

1. Voltage Management (Text Book)
2. Safety Work (Text Book & Video)
3. Maintenance manual for diesel power plant (Text Book)
4. Improving line losses and voltage drops by power capacitors (Text Book)
5. Calculation method for line parameters, conductor thermal ratings and short-circuit current (Text Book)
6. Line sag calculation program (Text Book)
7. Explanation Sheet (Text Book)

 for 



RESULT OF MEASURING CURRENT FEEDERS UNDERGROUND CABLE LOW VOLTAGE

	Overload 240mm <sup>2</sup> AL XLPE Allowable max current = 295A at 40C	24 out of 847 feeders	2.80%
	Leaking current (in - out) > 30%, > 50A	14 out of 847 feeders	1.70%
	Unbalanced current Max>Min <sup>2</sup> , > 100A	117 out of 847 feeders	13.80%

Date	Location	Capacity (KVA)	Time	Feeders	Current in substation (A)				Current outside substation (B)				Current (A - B)				Voltage(V)		
					PhaseA	PhaseB	PhaseC	N	PhaseA	PhaseB	PhaseC	N	PhaseA	PhaseB	PhaseC	N	PhaseA	PhaseB	PhaseC
15/02/06	001	630	8h00	1	300	203	190	75	289	200	170	72	11	3	20	3	226	227	227
				2	141	156	180	40	139	150	158	42	2	6	2	-2	228	227	227
16/02/06	048	630	9h00	1	115	94	141	65	122	94	81	59	-7	0	50	6	225	226	227
				2	174	193	180	42	169	191	190	42	5	2	-10	0	225	226	227
				3	212	173	150	38	207	160	149	40	5	13	1	-2	225	226	227
				4	90	50	27	18	88	45	25	19	2	1	2	-1	225	226	227
				5	71	100	86	58	64	148	85	70	7	2	1	-2	225	226	227
17/02/06	015	630	08h30	1	35	46	99	48	34	45	98	50	1	1	1	-2	228	229	229
				2	98	74	103	35	96	72	102	33	2	2	1	2	228	229	229
				3	100	83	65	39	99	81	64	37	1	2	1	2	228	229	229
				4	277	194	196	75	275	190	195	13	2	4	1	82	228	229	229
				5	168	132	197	59	165	130	195	58	3	2	2	1	228	229	229
21/02/06	010	636	08h30	1	102	130	160	23	99	104	182	32	3	26	-22	-9	226	227	227
				2	103	80	87	28	95	80	58	26	8	0	9	2	226	227	227
				3	85	120	182	68	70	100	158	33	16	20	6	-25	226	227	227
				4	102	69	89	36	92	84	75	33	10	5	14	3	226	227	227
21/02/06	014	480	10h30	1	95	95	69	33	95	95	69	51	0	0	0	-18	226	228	228
				2	20	29	29	11	20	29	27	13	0	0	2	-2	226	228	228
				3	57	45	80	26	60	46	80	28	-3	-1	0	-2	228	228	228
				4	75	65	45	38	73	64	44	38	2	1	1	0	228	228	228
22/02/06	027	630	9h00	1	20	78	100	35	16	17	90	18	2	2	10	-4	227	228	229
				2	130	109	134	30	129	109	130	31	1	0	4	-1	227	228	229
23/02/06	026	400	9h30	1	27	30	41	17	25	27	38	15	2	3	3	2	231	231	231
23/02/06	016	1000	9h00	1	70	51	93	25	70	54	98	28	0	-3	-5	-3	227	228	227
				2	65	36	80	27	69	40	60	27	-4	-4	0	0	227	228	227
23/02/06	038	400	11h00	1	239	213	250	26	239	213	250	26	0	0	0	0	232	232	232
24/02/06	005	400	9h37	1	82	43	37	32	82	39	32	30	0	4	5	2	227	228	229
				2	146	34	27	113	140	33	27	114	5	1	0	-1	227	228	229
24/02/06	029	1000	08h00	1	240	270	178	54	210	270	170	55	30	0	8	-1	225	224	226
				3	33	29	26	16	22	27	24	17	11	2	2	-2	225	224	226
				4	16	65	32	31	12	63	30	29	4	2	2	2	225	224	226
				5	123	125	150	21	119	121	148	19	4	4	2	2	225	224	226
				24/02/06	067	630	10h33	2	101	69	125	33	99	87	120	32	2	2	5
27/02/06	034	1000	08h30	1	183	232	157	85	178	229	146	87	5	3	11	-2	223	222	224
				2	89	86	49	16	87	85	43	20	2	3	6	-4	223	222	224
				3	203	245	149	75	198	240	143	78	5	5	6	-3	223	222	224
27/02/06	031	1000	10h30	4	102	108	214	79	100	103	210	82	2	3	4	-3	223	222	224
				5	147	144	135	44	140	140	135	47	7	4	0	-3	223	222	224
				6	23	24	34	9	23	24	34	9	0	0	0	0	223	222	224
				7	12	26	25	7	12	24	25	12	0	2	0	-5	223	222	224
				8	344	332	345	44	340	328	347	50	4	4	-2	-6	221	220	223
				27/02/06	031	1000	10h30	1	148	152	134	31	146	149	130	40	2	4	4
28/02/06	040	1000	08h30	2	213	230	147	47	208	210	150	38	5	20	-3	8	226	225	226
				3	99	48	79	17	83	43	70	28	16	5	9	-12	226	225	226
				4	118	150	125	14	110	151	125	23	8	-1	0	-8	226	225	226
28/02/06	040	1000	08h30	1	46	75	73	37	43	80	72	36	3	-5	1	2	222	222	222
				2	130	170	117	43	129	165	120	42	1	5	-3	1	222	222	222
				3	156	90	140	36	153	97	138	40	2	2	2	-4	222	222	222
				4	126	97	126	31	123	95	121	45	3	2	5	-14	222	222	222

*[Handwritten signature]*

*[Handwritten mark]*

## Dispatch of Experts (EAC)

## 1 Long-term Expert

Mr. Hitoshi KANETSUKI (September, 2004 – September, 2006)

Mr. Naokazu TSUJI (September, 2006 – at present)

## 2 Short-term Experts

## 2.1 Short-term experts on preparing SREPTS

Short-term experts were dispatched to prepare Specific Requirements of Electric Power Technical Standards (SREPTS) and Explanation sheet (Ex. Sheet) with the long-term expert and counterparts.

- (1) Short-term experts on preparing SREPTS for distribution  
4 experts, total 8 times
- (2) Short-term expert on preparing SREPTS for thermal power  
1 expert, total 7 times
- (3) Short-term expert on preparing SREPTS for transmission  
2 expert, total 7 times

Table 1 Dispatch of short-term experts on preparing SREPTS

Field	2005									2006							
	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	
Distribution	√ <sup>25</sup>	√ <sup>16</sup>		√ <sup>24</sup>		√ <sup>17</sup>	√ <sup>30</sup>			√ <sup>23</sup>					√ <sup>28</sup>		
Thermal	√ <sup>62</sup>			√ <sup>31</sup>		√ <sup>30</sup>	√ <sup>30</sup>			√ <sup>30</sup>						√ <sup>34</sup>	
Trans-mission	√ <sup>62</sup>			√ <sup>31</sup>		√ <sup>30</sup>	√ <sup>30</sup>			√ <sup>30</sup>						√ <sup>28</sup>	

Field	2006				2007		
	9	10	11	12	1	2	3
Distribution					√ <sup>24</sup>		
Thermal					√ <sup>24</sup>		
Trans-mission					√ <sup>24</sup>		

## 2.2 Short-term expert on substation technology course

A short-term expert was dispatched to have basic substation technology course. He had three-day lecture and one-day on-site training. (1 expert, 1 time)



## Acceptance of Cambodian Trainees in Japan (EAC)

### 1 Training

#### 1.1 Electric Power Administration and Technology in Japan

This training was planned to provide counterparts with an opportunity to:

- study and understand authorization and approval work and law systems in the Japanese electric power sector, and holding technical skills and electric facilities in Japanese electric power companies
- make use of the above understanding in managing work in EAC and planning the project activities

##### (1) Trainees

Mr. Hul Kunnak Vuth    Executive Director, EAC  
 Mr. Loeung Keosela    Manager, Generation Regulation Office, EAC

##### (2) Place

JICA Headquarters in Tokyo  
 Japan Electric Power Information Center in Tokyo  
 Ministry of Economy, Trade and Industry in Tokyo  
 Electric Power Development Co., Ltd. in Tokyo  
 Chubu Electric Power Co., Inc. in Nagoya  
 Chugoku Electric Power Co., Inc. in Hiroshima and Chugoku District

##### (3) Period

March 12, 2005 to April 11, 2005 (31days)

#### 1.2 Electric Power Technical Standards and Electric Power Technology in Japan

This training was planned to provide counterparts with an opportunity to:

- study and understand the Japanese Electric Power Technical Standard and its application situation (This training will contribute to preparing Specific Requirements of Cambodian Electric Power Technical Standards.)
- study Japanese law systems for stable electric power supply and public safety, holding technical skills and electric power facilities in Japanese electric power companies (This training will be useful and helpful to consider planning the future development plan and reforming the sector strategy.)

##### (1) Trainees

Mr. Yim Viseth                      Manager, Transmission and Distribution Regulation Office, EAC  
 Mr. Teng Saroeun                  Chief, Generation Regulation Office, EAC  
 Mr. Chea Saem Chantara          Deputy Head, Technical Office, EDC  
 Mr. Heang Bora                      Head, Energy Efficiency and Standard, MIME

##### (2) Place

JICA Headquarters  
Japan Electric Power Information Center in Tokyo  
Ministry of Economy, Trade and Industry in Tokyo  
Electric Power Development Co., Ltd. in Tokyo and Okinawa  
Chubu Electric Power Co., Inc. in Nagoya  
Chugoku Electric Power Co., Inc. in Hiroshima and Chugoku District

(3) Period  
September 4, 2005 to October 1, 2005 (28 days)



## Acceptance of Cambodian Trainees in Japan (EDC)

### 1 Training

#### 1.1 Training in Relay Protection and Operation in Japan

This training was planned to provide counterparts with an opportunity to:

- study and understand relay protection and coordination of EDC system
- study and understand control of distribution system
- make use of above understanding to relay setting of extension and control in EDC

##### (1) Trainees

Mr. Or Vaddhana	Deputy Chief of Load Dispatching Center, T&D Dep.
Mr. Ouk Sopheap	Deputy Chief of Section, Load Dispatching Center, T&D Dep.

##### (2) Place

JICA Headquarters in Tokyo  
 Japan Electric Power Information Center in Tokyo  
 Chugoku Electric Power Co., Inc. in Hiroshima

##### (3) Period

February 8, 2006 to February 26, 2006 (19days)

#### 1.2 Training in Maintenance & Repair work on Distribution System in Japan

This training was planned to provide counterparts with an opportunity to:

- study and understand maintenance work flow from installation until life
- study and understand PDCA cycle for maintenance work
- make use of above understanding to maintenance work in EDC

##### (1) Trainees

Mr. Ou Chanrith	Chief of Distribution Network Unit, T&D Dep.
Mr. Ngeth Lavy	Deputy Chief of Laboratory car, DNU, T&D Dep.

##### (2) Place

JICA Headquarters in Tokyo  
 Japan Electric Power Information Center in Tokyo  
 Shikoku Electric Power Co., Inc. in Takamatsu  
 Yondenko Co., Inc. in Takamatsu  
 Chugoku Electric Power Co., Inc. in Hiroshima

##### (3) Period

June 14, 2006 to July 9, 2006 (26days)




## Provision of Machinery, Equipment and Materials

No	Items	Manufacturer	Type	Price (US\$)	Purchase date
<b>(for experts and their office)</b>					
1	Laptop PC	TOSHIBA	Satellite M30	1,920	22-Oct-2004
2	Digital Camera	FUJIFILM	F710	480	21-Oct-2004
3	Digital Projector	HP	SB21	1,720	8-Oct-2004
4	Scanner, Fax, Copy, Printer	HP	OJ6110	293	8-Oct-2004
5	Mobile Printer	HP	450CBi	250	17-Jan-2005
6	PC	ANANA	P4, 2.4GHz	689	17-Feb-2005
7	Laser Printer	HP	5550dn	3,500	7-May-2005
<b>(for work to guide licensees)</b>					
8	Clamp-on Power Meter	YOKOGAWA	CW240	5,135	21-Mar-2005
	Clamp-on Power Meter	YOKOGAWA	CW240	4,947	27-Mar-2006
9	Earth Tester	YOKOGAWA	323511	324	21-Mar-2005
10	Insulation Poly-tester	YOKOGAWA	320731	737	21-Mar-2005
11	Insulation Tester	YOKOGAWA	321344	227	21-Mar-2005
12	Software for CW240	YOKOGAWA	AP240	602	21-Mar-2005
13	Digital Sound Level Meter	BAMR	8925	122	26-Dec-2005
14	Measuring Pole	SENSHIN INDUSTRY	FS12-12m	750	23-Jan-2006
15	Plastic Insulation Helmet (7)	YOTSUGI	YS125-02-01	378	22-Feb-2006
16	Rubber Insulation Gloves (10)	YOTSUGI	YS102-11-1	670	22-Feb-2006
17	Voltage Detector	HASEGAWA	HST-30	201	22-Feb-2007
18	Voltage Detector Checker	HASEGAWA	CL-1-06	281	22-Feb-2007
<b>(for the GIS project)</b>					
17	Software for GIS	ESRI	Arc View 9.0	4,292	31-Mar-2005
18	Software for GIS	ESRI	Spatial Analyst	3,621	31-Mar-2005
19	GPS Receiver(inc. software)	GARMIN	GPSMAP76	638	30-Apr-2005
	GPS Receiver	GARMIN	GPSMAP76	480	3-Dec-2005
20	Antenna for GPS receiver	GARMIN	for a car	122	25-Jul-2005
	Antenna for GPS receiver	GARMIN	for a car	122	22-Feb-2006
21	Server	ANANA	3GHz	2,169	5-Oct-2005
22	Software for GIS	ESRI	Arc Publisher	3,552	21-Mar-2006

### Provision of Machinery, Equipment and Materials

Necessary equipments and software packages for the project shown in Table 1 were provided. The equipment and software are divided into four categories as follows:

- (1) For experts and their office
- (2) For GIS project
- (3) For repair works
- (4) For relay protection and operation works (SCADA system)

**Table 1 List of Equipment and Software**

No	Items	Manufacturer	Qty	Price	Purchase date
<b>(For experts and their office)</b>					
1	Laptop PC Satellite M30	TOSHIBA	1	\$1,950	2-Mar-2005
2	Digital Projector XB31	HP	1	\$2,140	2-Mar-2005
3	Scanner, Fax, Copy, Printer OfficeJet6110	HP	1	\$290	2-Mar-2005
<b>(For GIS project)</b>					
4	ArcFM 9.1 & Designer including Arc Editor 9.1 (concurrent)	ESRI and Miner & Miner	3	\$54,000	15-Mar-2006
5	ArcFM Viewer 9.1 including Arc View 9.1 (concurrent)	ESRI and Miner & Miner	1	\$2,210	15-Mar-2006
6	ArcFM Viewer 9.1 including Arc View 9.1 (single)	ESRI and Miner & Miner	15	\$35,870	18-Jan-2007
7	Arc Schematic 9.1 (concurrent)	ESRI	1	\$2,860	15-Mar-2006
8	Arc SDE	ESRI	1	\$11,430	15-Mar-2006
9	Windows SQL Server 2005	Microsoft	1	\$2,000	15-Mar-2006
10	PSS/Engine	Siemens PTI	1	\$9,550	15-Mar-2006
11	Windows server 2003 standard edition with 10 clients license	Microsoft	1	\$987	21-Dec-2005
12	ArcPad 6	ESRI	2	\$400	25-Nov-2005
13	Satellite Image (SPOTS, 2.5m natural color, Level 3)	SPOT ASIA	15	\$240,240	30-Mar-2006
14	Server ML150	HP	1	\$1,400	14-Oct-2005
15	RAID system for server with 4 SATA HD (total 1TB)	HP	1	\$1,485	27-Jan-2007
16	Desktop PC dc7600SFF with	HP	4	\$3,600	11-Nov-2005

	graphic card				
17	Desktop PC Optiplex 745DT	Dell	15	\$15,000	24-Jan-2007
18	Laptop PC M5200NP	ASUS	1	\$1,520	13-Sep-2005
19	LCD Monitor 20inch HP2035	HP	1	\$840	14-Oct-2005
20	LCD Monitor 17inch HPL1706	HP	4	\$1,196	11-Nov-2005
21	LCD Monitor 17inch FP71G+	BENQ	2	\$464	10-Mar-2006
22	LCD Monitor 19inch E196FP	Dell	15	\$3,405	24-Jan-2007
23	Laser Printer LBP-2000 with Ethernet card	Canon	1	\$1,230	14-Oct-2005
24	Plotter DesignJet500 with network unit	HP	1	\$2,880	14-Oct-2005
25	Scanner ScanExpressA3USB	Mustex	1	\$365	20-Feb-2006
26	UPS	Power Tree	5	\$145	11-Nov-2005
27	UPS	Power Tree	15	\$435	30-Jan-2007
28	Network Equipment Switching Hub	D-Link	3	\$288	19-Oct-2005
29	Digital Camera PhotoSmart M407	HP	4	\$580	25-Aug-2005
30	Digital Camera IXY	Canon	1	\$480	24-Mar-2006
31	Digital Camera IXUS	Canon	2	\$725	28-Dec-2006
32	GPS receiver iQueM3	GARMIN	2	\$1,573	28-Oct-2005
33	GPS receiver GPS72	GARMIN	2	\$572	30-Sep-2005
34	GPS receiver GPS76	GARMIN	1	\$260	10-Mar-2006
35	GPS receiver GPS76	GARMIN	15	\$4,650	16-Feb-2007
36	GPS Antenna for PC	GARMIN	2	\$125	28-Sep-2005
37	Laser Distance Meter Yard Pro 450	Bushnell	4	\$760	13-Oct-2005
<b>(For repair works)</b>					
38	Medium Voltage Insulation Tester 3123	KYORITSU	2	\$1,260	17-Mar-2006
39	Low voltage Insulation Tester 3007A	KYORITSU	2	\$600	17-Mar-2006
40	Digital Clamp Meter 2002PA	KYORITSU	4	\$600	17-Mar-2006
41	Plastic Insulation Helmet YS125-02-01	YOTSUGI	5	\$270	22-Feb-2006
42	Clamp-on Power Meter CW121 with clamp (500A, 1000A,	YOKOGAWA	4	¥799,987	12-Sep-2006

*Handwritten signature/initials*

*Handwritten mark*

	3000A)				
43	Clamp-on Power Meter CW121 with clamp (1000A)	YOKOGAWA	6	¥1,224,300	Mar-2007
44	UPS	Power Tree	4	\$116	12-Sep-2006
45	UPS	Power Tree	6	\$174	30-Jan-2007
46	mΩ HiTESTER 3540	HIOKI	1	¥90,608	12-Sep-2006
47	Fault Locating System Syscompact 2000	BAUR	1	€50,820	22-Nov-2006
48	High Voltage Test set PGK80E	BAUR	1	€8,451	22-Nov-2006
49	Audio Frequency Receiver UL30 with ground micro phone BM30	BAUR	1	€13,088	22-Nov-2006
50	Locator Set Audio Frequency System	BAUR	1	€3,456	22-Nov-2006
51	Laptop PC VGN-SZ23GP/B	SONY	1	\$1,880	17-Oct-2006
52	4WD Car Land Cruiser PRADO 2001	TOYOTA	1	-	22-Nov-2006
53	Radio Receiver GP68	Motorola	2	\$540	19-Dec-2006
<b>(For relay protection and operation works (SCADA system))</b>					
54	Multi digital Meter 2001	KYORITSU	1	\$65	15-Dec-2006
55	Multi analog Meter 1109	KYORITSU	1	\$140	15-Dec-2006
56	Digital Clamp Meter 2002PA	KYORITSU	1	\$150	15-Dec-2006
57	Primary Current Injection Test Set LET-2000RD	EURO SMC	1	\$15,820	5-Mar-2007
58	Memory HiCORDER 8861 set	HIOKI	1	¥2,049,348	Mar-2007
59	Desktop PC ML110	HP	1	\$1,702	17-Oct-2006
60	SCADA driver for UNI1000 and windows software package for Gateway PC	SEVME Informatique	1	€27,010	8-Dec-2006

## Local Cost by the Japanese Side

2004

	expenses	EAC	EDC	Total
Activities	<b>sub total</b>	<b>5,256.37</b>	<b>616.18</b>	<b>5,872.55</b>
	Local activity cost (except training/management)	5,155.87	616.18	5,772.05
	reward	95.00	0.00	95.00
	Meeting/conference	5.50	0.00	5.50
	Travel expenses	0.00	0.00	0.00
	Construction	0.00	0.00	0.00
	Contract with local consultants	0.00	0.00	0.00
	Contract with local NGOs	0.00	0.00	0.00

2005

	expenses	EAC	EDC	Total
Activities	<b>sub total</b>	<b>24,924.01</b>	<b>32,029.06</b>	<b>56,953.07</b>
	Local activity cost (except training/management)	18,664.74	22,294.75	40,959.49
	reward	3,504.00	687.00	4,191.00
	Meeting/conference	472.71	0.00	472.71
	Travel expenses	2,282.56	4,847.31	7,129.87
	Construction	0.00	0.00	0.00
	Contract with local consultants	0.00	4,200.00	4,200.00
	Contract with local NGOs	0.00	0.00	0.00

2006 (as of the end of Feb 2007)

	expenses	EAC	EDC	Total
Activities	<b>sub total</b>	<b>60,417.07</b>	<b>84,274.24</b>	<b>144,691.31</b>
	Local activity cost (except equipment below)	16,941.10	9,352.22	26,293.32
	equipment (from JPY20,000 to less than JPY200,000)	0.00	6,560.06	6,560.06
	Communication	822.01	1,662.96	2,484.97
	Preparation of reports	0.00	0.00	0.00
	rent	1,377.50	585.00	1,962.50
	lightening, heating, water	0.00	0.00	0.00
	Air transportation	1,426.00	1,966.00	3,392.00
	Travel expenses (except Air)	9,883.79	16,396.30	26,280.09
	reward (except staff)	3,041.72	4,076.00	7,117.72
	Meeting/conference	7,924.95	1,921.10	9,846.05
	Contract with local consultants	0.00	7,500.00	7,500.00
	Contract with local NGOs	0.00	0.00	0.00
	Contract (including third country training)	19,000.00	34,254.60	53,254.60
	Other contracts	0.00	0.00	0.00

### Assignment of Counterpart Personnel (EAC)

#### 1. EAC Project

##### (1) Project Manager

Mr. Hul Kunnak Vuth Executive Director, EAC

##### (2) Counterpart personnel

Mr. Ou Long Manager, Generation Regulation Office, EAC  
 Mr. Yim Viseth Manager, Transmission and Distribution Regulation Office, EAC  
 Mr. Nong Rithya Chief, Transmission and Distribution Regulation Office, EAC  
 Mr. Teng Saroeun Chief, Generation Regulation Office, EAC

#### 2. Members of Working Group to prepare SREPTS

Mr. Heang Bora Head, Energy Efficiency and Standard, MIME  
 Mr. Thach Kieng Mony Deputy Chief, Rural & Provincial Electric Office, Energy Development  
 Department, MIME  
 Mr. Lor Sathya Chief, Secretariat Office, General Department of Energy,  
 MIME  
 Mr. Houn Chantha Head, Technical Office, EDC  
 Mr. Chea Saem Chantara Deputy Head, Technical Office, EDC  
 Mr. Aun Hemrith Deputy Director, Power Plant Department, EDC  
 Mr. Ou Long Manager, Generation Regulation Office, EAC  
 Mr. Yim Viseth Manager, Transmission and Distribution Regulation Office, EAC  
 Mr. Nong Rithya Chief, Transmission and Distribution Regulation Office, EAC  
 Mr. Teng Saroeun Chief, Generation Regulation Office, EAC

**Member List of Each Group****1. Distribution Group**

Role	Name	Organization	Remarks
Coordinator	Yim Viseth	EAC	
Member	Heang Bora	MIME	
Member	Houng Chantha	EDC	
Observer	Nong Rithya	EAC	
Observer	Junya Shinohara	EDC	

**2. Thermal Power Group**

Role	Name	Organization	Remarks
Coordinator	Ou Long	EAC	Appointed on Aug. 1, 2006
Member	Thach Kieng Mony	MIME	Appointed on June 13, 2006
Member	Aun Hemrith	EDC	
Member	Teng Saroeun	EAC	
Observer	Suon Ponnarith	EAC	
Observer	Nobuo Hashimoto	MIME	

**3. Transmission Group**

Role	Name	Organization	Remarks
Coordinator	Cheasaem Chantara	EDC	
Member	Lor Sathya	MIME	Appointed in Nov. 2006
Member	Nong Rithya	EAC	
Observer	Hul Kunnak Vuth	EAC	
Observer	Yim Viseth	EAC	

### Assignment of Counterpart Personnel (EDC)

1. Project Manager  
Mr. Chea Sin Hel      Director of Transmission and Distribution Department, EDC
2. Counterparts personnel
  - Mr. Chea Saem Chantara      Deputy Head of Technical Office, CP&P Dep.
  - Mr. Ngeth Lavy      Deputy Chief of Laboratory Car, Distribution Network Unit, T&D Dep.
  - Mr. Sreng Viseth      Chief of Relay Section, Electrical Equipment Unit, T&D Dep.
  - Mr. Kol Bunthan      Project Chief of Technical & Electrical Energy Loss Management Office, T&D Dep.
  - Mr. Or Vaddhana      Deputy Chief of Load Dispatching Center, T&D Dep.
  - Mr. Ouk Sopheap      Deputy Chief of Section, Load Dispatching Center, T&D Dep.
  - Mr. Praing Chulasa      Deputy Director of CP&P Dep.
  - Mr. Chun Piseth      Chief of Planning Management Information System and Tariff Office, CP&P Dep.
  - Mr. Houg Chantha      Chief of Technical Office, CP&P Dep.
  - Mr. Ou Chanrith      Chief of Distribution Network Unit, T&D Dep.
  - Mr. Thach Sovannreasey      Staff of Technical Office, CP&P Dep.
  - Mr. Phon Rotha      Staff of Technical Office, CP&P Dep.
  - Mr. Suos Sophorn      Staff of Planning Management Information System and Tariff Office, CP&P Dep.
  - Ms. Ngin Kanida      Staff of Planning Management Information System and Tariff Office, CP&P Dep.
  - Mr. Hun Monyroth      Deputy Chief of Electrical Equipment Unit, T&D Dep.
  - Mr. Koan Chuon Vichet      Staff of Data Processing Office
  - Ms. Duong Hemalis      Staff of Data Processing Office

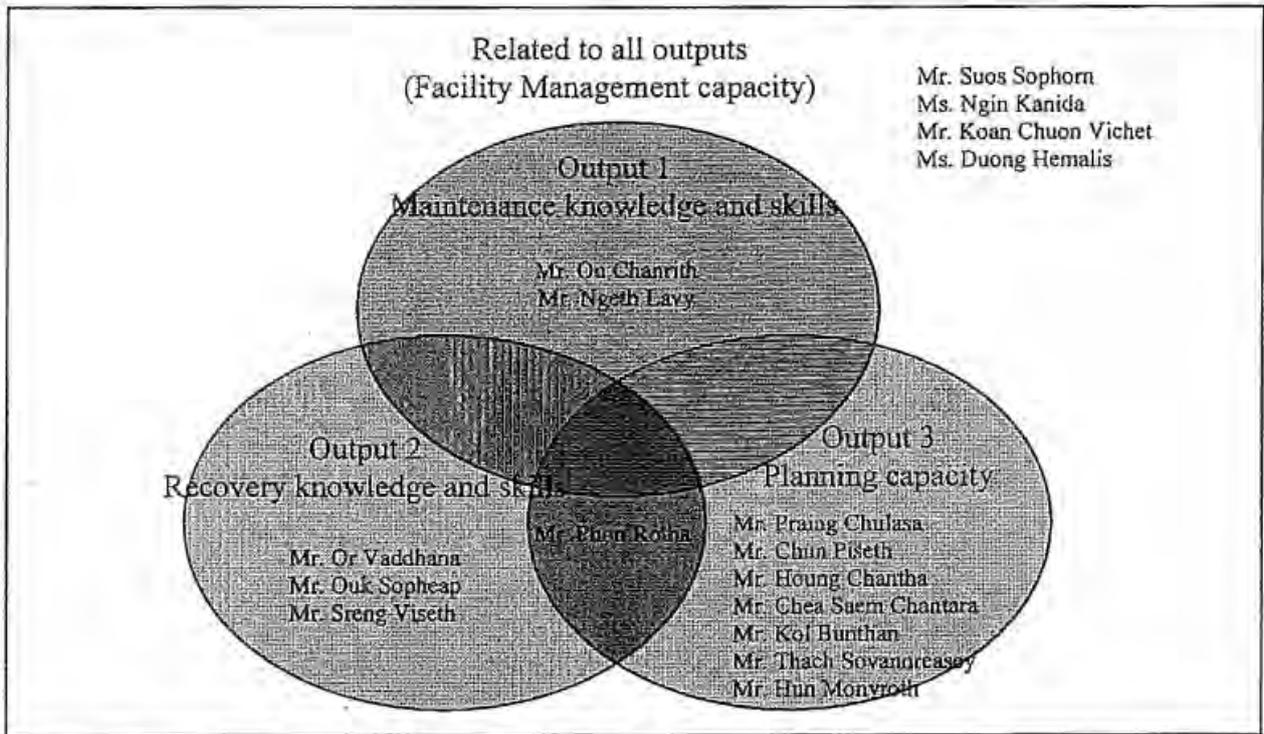


Figure 1 Diagram of counterparts

*[Handwritten signature]*

*[Handwritten mark]*

Local Cost by the Cambodian Side (EAC)

## INVENTORY OF JICA OFFICE

No	Date	Type	Code	Quantity	Unit Price(\$)	Total(\$)	Note
1	9/1/2004	Table	TFO2012-13	2	150	300	
2	11/10/2004	Table	TFO2018	1	150	150	
3	25/2/2005	Table	TFO2024-2025	2	150	300	
4	19/8/2004	Oval Table	TFM1010	1	380	380	
5	10/11/2004	Table	TFC1018	1	80	80	
6	15/9/2004	Steel shelf	BSH2009-2010	2	135	270	
7	10/11/2004	Café Shelf	CUB1003	1	60	60	
8	29/7/2004	Chair	CHA1020-1022	2	125	250	
9	8/11/2004	Chair	CHA2066-2075	10	46	460	
10	23/7/2004	Telephone desk	TEL1030-1031	2	15	30	
Total						2280	Dolars US

## ELECTRICITY ENERGY USE FOR JICA OFFICE

No	Date	Consumption(kWh)	Use for Jica %	Cons for Jica(kWh)	Unit Price( R )	Amount( R )	Note
1	Sep-04	8130	1.66	134.958	650	87722.7	From 20 Sep
2	Oct-04	6591	5	329.55	650	214207.5	
3	Nov-04	6448	5	322.4	650	209560	
4	Dec-04	6270	5	313.5	650	203775	
5	Jan-05	6659	5	332.95	650	216417.5	
6	Feb-05	6943	5	347.15	650	225647.5	
7	Mar-05	7451	5	372.55	650	242157.5	
8	Apr-05	8073	5	403.65	650	262372.5	
9	May-05	8365	5	418.25	650	271862.5	
10	Jun-05	9104	5	455.2	650	295880	
11	Jul-05	8181	5	409.05	650	265882.5	
12	Aug-05	8902	5	445.1	650	289315	
13	Sep-05	7977	5	398.85	650	259252.5	
14	Oct-05	6355	5	317.75	650	206537.5	
15	Nov-05	7212	5	360.6	740	266844	
16	Dec-05	6706	5	335.3	755	253151.5	
17	Jan-06	7201	5	360.05	736	264996.8	
18	Feb-06	7889	5	394.45	732	288737.4	
19	Mar-06	8176	5	408.8	747	305373.6	
20	Apr-06	9345	5	467.25	770	359782.5	
21	May-06	8659	5	432.95	797	345061.15	
22	Jun-06	10020	5	501	799	400299	
23	Jul-06	9246	5	462.3	821	379548.3	
24	Aug-06	9298	5	464.9	739	343561.1	
25	Sep-06	8949	5	447.45	726	324848.7	
26	Oct-06	7021	5	351.05	712	249947.8	
27	Nov-06	7852	5	392.6	691	271286.6	
28	Dec-06	9438	5	471.9	671	316644.9	
28	Jan-07	7742	5	387.1	688	266324.8	
28	Feb-07	7638	5	381.9	690	263511	
28	Mar-07						
28	Apr-07						
28	May-07						
28	Jun-07						
28	Jul-07						
28	Aug-07						
28	Sep-07						
8150509.2						Riels	

Riels US\$  
1,399,487.70 348.87

Riels US\$  
3,230,205.80 807.55

Riels US\$  
3,520,815.65 880.20

## Local Cost by the Cambodian side (EDC)

	US\$	remark
2004		
electricity (estimated)	156	1kWh=700riel, 1\$=4,000riel
telephone machine	100	
book shelf	155	
sub total	411	
2005		
electricity (estimated)	1,661	1kWh=700riel(-2005.10), 1kWh=780riel, 1\$=4,000riel
sub total	1,661	
2006		
		as of Feb.28
electricity (estimated)	1,619	1kWh=780riel, 1\$=4,000riel
sub total	1,619	
total	3,691	

## 2. 評価グリッド

### 2. 評価グリッド: 実績 (EAC)

#### 1. 実績

評価期間	調査項目		判断基準	必要な情報・データ(質問紙等)	情報源	データ収集方法	調査結果
	目標	指標					
上位目標の達成 見込み	カンボジアの電力が安定的かつ安全に供給される	1 顧客あたりの停電回数が減少する。	・目標(指標)達成の見込み	(※近年数か年の)EDCの停電データ	・EDC	・EDCからの情報収集	・顧客あたりの停電回数がプロジェクト開始前の3,769 × 10 <sup>3</sup> 回/戸・年(2003年から2311 × 10 <sup>3</sup> 回/戸・年(2006年))に改善されており、一部上位目標が実現している。 SREPTSの作成は終了し、2007年1月にFinal Seminarを予定通り実施した。現在最後の修正中であり、2007年4月に最終版が完成する予定である。
プロジェクト目標 達成見込み	電力技術基準(EAC)によって効果的および適切に運営される	1. 電力技術基準(細則)がMIMEに提出される。 2. 技術的指導の回数。	・目標(指標)達成の見込み ・技術指導が全電気事業者に行われる達成見込み	・電力技術基準(細則)の作成状況 ・MIMEの法制化スケジュール ・実施計画(PO)	・長期専門家、MIME(Dr. Ith Prang), EAC(Dr. Ty Norm) ・長期専門家、EAC	・作成中の電力技術基準(細則)に関するインタビューおよび質問 ・インタビュー、質問表	プロジェクト開始以来、必要の頻度、技術指導を実施しており、SREPTS第一次完成後の2006年7月8日には地方電気事業者に対するセミナーが開催された。また、2007年7月8日にも第2回地方電気事業者に対するセミナーも開催される予定である。
成果の達成見込み	1. 電力技術基準(総則)を遵守するためのルールが明確になる。	1-1. 3分野(配電、送電、火力発電)の細則が作成される。 1-2. EACの電力規制部門の職員が細則の内容を80%以上理解できる。	・整備される見込み ・作成の進捗度合い(計画と実績の比較) ・C/Pの理解度(80%以上達成)	・EACにおける電力技術基準運用のための部署ならびに人員の配置状況 ・電力技術基準(細則)の作成状況 ・計画と実績の対照表(PO) ・実施計画(PO)	・長期専門家、EAC(Dr. Ty Norm) ・長期専門家、C/P ・長期専門家、EAC、理解度テスト結果	・インタビュー、質問表 ・インタビュー、質問表	・電力技術基準運用を司る部署は「Electricity Regulation Department」であり、人員は1名おり、整備済み。 SREPTSの最終案に基づき、2007年1月にFinal Seminarを実施した。現在、SREPTSの改訂作業を行なっている。4月に完了予定である。 ・現在電力技術基準(細則)は作成途中であり、最終案が完成していないため、現時点において理解度テストは行っていないが、今後実施予定。 ・ただし、同基準の英語-クエスチョンへの翻訳を通して理解度は向上している。
2. 電気事業者の許認可業務が円滑に行われる。	2-1. 認可電気事業者供給エリアのデータに容易にアクセスが可能となる。	2-1. 認可電気事業者供給エリアのデータにより広く公表される。	・計画と実績の比較	・EACの認可業務状況(技術基準セミナーおよび地方セミナーへの参加度合い) ・計画と実績の対照表	・長期専門家、EAC	・インタビュー、質問表	2006年7月のSREPTSセミナーには132業者中112業者が参加、また同年8月のSREPTSセミナーには110業者、2007年1月には137業者中114業者(2007年1月)が参加している。セミナー不参加の業者には郵送にて、SREPTSのExplanation-Sheetを送っており、SREPTSの認識度は非常に高い。
3. 電気事業者への指導能力が向上する。	2-2. 認可電気事業者の設備データがEACにより管理される。 2-3. 電気設備事故ならびに感電事故等のデータが収集される。 2-4. 電化エリアのデータがウェブサイトににより広く公表される。 3-1. 技術資料ならびにマニュアルが準備される。 3-2. EAC電力規制部門の職員が導入された測定器類を使用できる。	2-2. 認可電気事業者の設備データがEACにより管理される。 2-3. 電気設備事故ならびに感電事故等のデータが収集される。 2-4. 電化エリアのデータがウェブサイトににより広く公表される。 3-1. 技術資料ならびにマニュアルが準備される。 3-2. EAC電力規制部門の職員が導入された測定器類を使用できる。	・計画と実績の比較 ・計画と実績の比較 ・計画と実績の比較 ・EACの機器操作に関する理解度	・実施計画(PO) ・実施された技術資料ならびにマニュアルの作成状況 ・計画と実績の対照表 ・機器操作マニュアルの有無 ・機器操作講習会実施の実績	・長期専門家、EAC ・長期専門家、EAC ・長期専門家、C/P、EAC	・インタビュー、質問表 ・インタビュー、質問表 ・インタビュー、質問表 ・マニュアルの有無確認、講習会実績の確認	・設備更新中の事業者を除き、設備データは取得済であり、取得設備データはGISにより管理している。 ・電気設備事故ならびに感電事故データの収集は未実施であるが、今後収集予定。また、Overall Performance Standardsの一部修正により修正することになり、真正業は完了しているが、WBコンサルタントが実施している修正とともに盛り込み、12月に実施される予定である。 ・EAC内のイントラネットにより試行実績があり、今後ウェブサイトに公表予定。 ・電力技術基準の解説書「Explanation Sheet of Electric Power Technical Standards」、技術資料として電圧管理マニュアル、「安全作業ルール」を作成。その他に安全作業に関するDVDも作成。 ・機器操作マニュアルを作成。 ・EAC内の担当指導者の説明会の実施のほか、機器操作の現地指導も実施。 ・コアとなる人材は既に機器操作を理解しており、理解度は非常に高い。 ・後継者(2007年9月21日納入)については、今後説明書を作成し、使用方法の指導をする予定である。
	3-3. 技術指導とトレーニングが全認可電気事業者に行われる。	3-3. 技術指導とトレーニングが全認可電気事業者に行われる。	・計画と実績の比較	・実施計画(PO)	・長期専門家、EAC	・実施計画(PO)	・2006.07の第一回技術基準セミナー、同年8月の地方セミナーにて技術指導を実施。実施、電気事業者に対する技術指導を行う予定(POあり)。 ・2007年7月、8月の地方セミナーでも実施する予定である。

<p><b>投入の実績</b></p>	<p>1. カンボジア側投入実績</p>	<p>1-1. C/Pおよびその他の必要な人員の配置 1-2. 施設・建物・設備 1-3. ローカルコスト</p>	<p>・計画と実績の比較</p>	<p>・各年度投入実績</p>	<p>・EAC</p>	<p>・C/Pおよびその他の人員リスト、ローカルコスト他確認</p>	<p>1. C/P配置 合計 18名配置 2. プロジェクト事務所・施設 3. ローカルコスト 単位:US\$ 2004年度 \$5256 2005年度 \$24,294 2006年度 \$60,417 合計\$90,997</p>
<p>2. 日本側投入実績</p>	<p>2-1. 専門家派遣(長期・短期) 2-2. C/P研修受入 2-3. 供与機材</p>	<p>・計画と実績の比較</p>	<p>・各年度投入実績</p>	<p>・長期専門家</p>	<p>・専門家活動(派遣)実績リスト、C/P研修実績リスト、供与機材リスト確認</p>	<p>1. 専門家 1-1. 長期専門家 合計 2名 1-2. 短期専門家 合計 23名 2. 機材供与 単位:US\$ JERの別添13へ参照 3. 日本におけるC/P研修 2005年度 2名、2006年度 4名 合計 6名 4. 現地業務員 単位:US\$ 2004年度 \$616,118、2005年度 \$32,092.06、2006年度 \$25,392.60 合計 \$98,100.84</p>	

2. 実施プロセス

大項目	評価期間		判断基準	必要な情報・データ(質問概要)	情報源	データ収集方法	1. 活動の進捗状況
	中項目	小項目					
2. プロジェクトの本質・モニタリング体制	2-1. モニタリングの仕組み	2-1. モニタリングの頻度、方法が適切であるか否か	・計画と実績の比較 ・モニタリングにおける問題の有無	1-1. プロジェクト活動の計画と実績の対照表 (もしあれば計画と乖離した理由) 1-2. プロジェクトの運営実施上の阻害要因 (もしあれば) モニタリングの方法、頻度の適切性	・長期専門家、O/P、EAC、JICA 事務所 ・長期専門家、O/P、EAC、JICA 事務所	・計画と実績の対照表確認 ・インタビュー、質問表	・プロジェクト活動全般を通して、計画と実績の大きな乖離はなく、順調に推移している。 ・JICA事務所へは長期ならびに短期専門家等の活動報告を計2回実施しているほか、JICAならびに政府セミナー開催を通してJICA、MIME、EAC等の関係者に広く活動内容を報告しており、適切な頻度でモニタリングが行われている。
	2-2. 意思決定過程	2-2. プロジェクト活動遂行における意思決定過程が適切であるか(所定の意思決定者が意思決定を行っているか否か)	・意思決定上の問題有無	課題発生時ならびに活動遂行時における意思決定過程の適切性	・長期専門家、O/P、EAC、JICA 事務所	・インタビュー、質問表	・プロジェクト活動の遂行において、長期専門家等はプロジェクトマネージャー、EAC長官、JICA事務所と連絡を密に活動を実施しており、適切な意思決定過程を経て活動が行われている。 ・必要に応じて意見交換を実施している。
	2-3. JICAカンボジア事務所の機能	2-3. プロジェクト活動に対する適切なタイミングでの助言、対応ならびにプロジェクトチームとの意思疎通は十分に図られているか否か	・JICAカンボジア事務所とプロジェクトチームとの関係と度合い ・C/P人数、活動への参加度合い、能力および経験の適切性 ・英語能力	プロジェクト活動における主管事務所の関わり方ならびにその適切性	・長期専門家、O/P、EAC、JICA 事務所	・インタビュー、質問表	・EACのO/Pは参加度合いならびに能力経験を有している。しかし、MIMEのO/Pは参加度合いが低い。 ・ほぼ全員が専門家との意思疎通に支障ない語学力を有している。 ・EACのO/Pは主体性を有しているが、特にMIMEのO/Pは参加度合いが低く主体性が低い。
3. カウンターパートの配置状況	3-1. 人選・配置の適切性	3-1. プロジェクト活動に支障が無いよう適切なタイミングで、また適切な能力を有したO/Pを配置しているか否か	・主体的関与の度合い ・意思疎通の問題の有無	プロジェクト活動への相手国実施機関トップの関与度合い	・長期専門家、O/P	・インタビュー、質問表	・EACのO/Pは主体性を有しているが、特にMIMEのO/Pは参加度合いが低く主体性が低い。
	3-2. コミュニケーション能力	3-2. 配置されたO/Pは十分なコミュニケーション能力を有しているか否か	・意思疎通の問題の有無	・カウンターパートの積極性、意欲、プロジェクト活動への参加割合	・長期専門家、O/P	・インタビュー、質問表	・EACのO/Pは主体性を有しているが、特にMIMEのO/Pは参加度合いが低く主体性が低い。
4. 相手国実施機関のオーナーシップ	4-1. 相手国実施機関(MIME、EAC、EDC)の関与	4-1-1. 相手国実施機関のトップが、本プロジェクトに対して好意、意欲をもって取り組んでいるか否か 4-1-2. プロジェクト活動において必要な協力(例えばセミナー開催等)を十分にしているか否か	・相手国実施機関トップの関与度合い ・相手国実施機関の協力 ・本プロジェクト活動への協力実績	・長期専門家、MIME (Dr. Itth Prang)、EAC (Dr. Ty Norin)、EDC (Mr. Yim Nolson)	・長期専門家、MIME、EAC、EDC	・インタビュー、質問表 ・インタビュー、協力実績一覧	・MIME、EAC、EDCのトップとも、プロジェクト活動に対して好意をもって接している。 ・ミーティング、セミナー開催等の実施は空きがあれば提供しているほか、セミナー開催時等が必要に応じてO/P以外のEAC職員を動員させるなど、必要な協力を十分に行っている。
	4-2. 予算手当て	4-2. 本プロジェクト活動に対して必要な予算を充当しているか否か	・必要な予算の手当て状況	・必要となる支出実績	・長期専門家、MIME、EAC、EDC	・インタビュー、予算実績確認	・電気代、備品などの予算を負担している(基本的な現地活動費はJICAが負担している)。



評価項目	調査項目		判断基準	必要な情報・データ(質問概要)	情報源	調査結果
	大項目	小項目				
3. 効率性 (現状・実績)	3-1. 成果1～3の達成度	3-1-1. 成果1「電力技術基準遵守のためのルールが明確になる」の達成度	・計画と実績の比較(実績の「成果」の達成見込み)参照	・成果1に対する計画と実績の対照表(PO)	実績の「成果」の達成見込み	・計画と実績の対照表(PO)を参照
		3-1-2. 成果2「許認可業務が円滑に行われる」の達成度	・計画と実績の比較(実績の「成果」の達成見込み)参照	・成果2に対する計画と実績の対照表(PO)	実績の「成果」の達成見込み	・計画と実績の対照表(PO)を参照
		3-1-3. 成果3「指導能力が向上する」の達成度	・計画と実績の比較(実績の「成果」の達成見込み)参照	・成果3に対する計画と実績の対照表(PO)	実績の「成果」の達成見込み	・計画と実績の対照表(PO)を参照
	3-2. 成果1～3の達成のための各活動項目の適正度	3-2-1. 成果1「電力技術基準遵守のためのルールが明確になる」達成のための活動との整合性	・成果と活動項目に整合性があるか否か(インタビュ、質問表)	・成果と活動項目に整合性があるか否か(インタビュ、質問表)	・長期専門家、C/P	・成果1の発現は、活動の結果であり、活動項目がなければ実践されないものである。
	3-2-2. 成果2「許認可業務が円滑に行われる」達成のための活動との整合性	・成果と活動項目に整合性があるか否か	・成果と活動項目に整合性があるか否か(インタビュ、質問表)	・長期専門家、C/P	・成果2の発現は、活動の結果であり、活動項目がなければ実践されないものである。	
	3-2-3. 成果3「指導能力が向上する」達成のための活動との整合性	・成果と活動項目に整合性があるか否か	・成果と活動項目に整合性があるか否か(インタビュ、質問表)	・長期専門家、C/P	・成果3の発現は、活動の結果であり、活動項目がなければ実践されないものである。	
	3-3. 投入の適正度	3-3-1. 日本側投入の適正度	・プロジェクト活動に支障なく投入されているか否か ・プロジェクト活動に支障なく投入されているか否か	・長期専門家 ・提供された施設設備の適正度	・プロジェクト活動の進捗にあわせ、必要なる専門家、機材、研修を投入しており申し分ない。 ・MIME、EAC、EDC	
4. インパクト (予測)	4-1. 上位目標の達成の見込み	4-1-1. 上位目標「カンボジアの電力が安定的かつ安全に供給される」が達成する見込み	・停電回数の減少度合い ・停電回数の減少度合い	・至近年の1顧客あたりの停電回数のデータ資料 ・至近年の1顧客あたりの停電回数のデータ資料	・EDC資料 ・EDC資料	・顧客あたりの停電回数がプロジェクト開始前の3,769 x 10 <sup>3</sup> 回/戸・年(2003年)から2,311 x 10 <sup>3</sup> 回/戸・年(2006年)に改善されており、一部上位目標が発現している。 ・電力の供給不足により顧客停電が行われるなど電気の運用できない不都合な生活を強いられているが、上位目標達成によりこの問題も解消され十分インパクトが望まれる。
		4-1-2. 上位目標「カンボジアの電力が安定的かつ安全に供給される」の達成によりカンボジア国へのインパクトは望めるか	・要因の有無 ・乖離の有無	・重要要因の有無および具体例(インタビュ、質問表)	・長期専門家、MIME、EAC、EDC	特になし。
	4-2. 上位目標とプロジェクト目標の因果関係	4-2-1. 上位目標「カンボジアの電力が安定的かつ安全に供給される」と、プロジェクト目標「電力技術基準がEACによって効率的および適切に運営される」に乖離はないか	・乖離の有無	・乖離の有無(インタビュ、質問表)	・長期専門家、MIME、EAC、EDC	・プロジェクト目標を達成しない限り、カンボジア国の電力が安定的かつ安全に供給されるとは言いがたい。
	4-2-2. 外部条件「1. 電気事業者が設備運営に必要な予算を確保する。」「2. 必要なる電源が開発される。」「3. MIMEが細則を発行する。」が満たされる可能性は高いか。	・外部条件の満たされる可能性度合い	・外部条件が満たされる可能性度合い(インタビュ、質問表)	・長期専門家、MIME、EAC、EDC	外については、水力発電所の開発やカンボジアとベトナムおよびタイとの間に送電線を建設する計画等がある。また3についてはプロジェクトチームが2007年の4月に細則の最終版をMIMEに提出することとなり、条件は満たされたと考えられる。しかしながら1の条件を満たすためには、現状では資金が十分でない中小の電気事業者が多いため、今後EACが技術だけでなく経営についても指導を行うなどの努力が必要である。	
4-2. 上位目標以外のプログラムの効果、影響	4-2. 上位目標以外のプログラムの効果、影響の有無	・効果、影響の有無	・効果、影響の有無(インタビュ、質問表)	・長期専門家、MIME、EAC、EDC	特になし	
4-3. 予測しなかったマイナスの効果、影響	4-3-1. マイナスの効果、影響の有無	・効果、影響の有無	・効果、影響の有無(インタビュ、質問表)	・長期専門家、MIME、EAC、EDC	特になし	
	4-3-2. マイナスの効果、影響があった場合の軽減対策	・軽減対策の有無	・軽減対策の有無(インタビュ、質問表)	・長期専門家、MIME、EAC、EDC	特になし	
4-4. ジェンダー、民族、社会的階層の違いによる異なったプラス、マイナス効果の有無	4-4. 異なったプラス、マイナス効果の有無	・プラス、マイナス効果の有無	・プラス、マイナス効果の有無(インタビュ、質問表)	・長期専門家、MIME、EAC、EDC	特になし	

評価5項目	調査項目		判断基準	必要な情報・データ(質問概要)	情報源	調査結果
	大項目	小項目				
5. 自立発展性 (見込み)	5-1. 政策的支援の継続	5-1-1. プロジェクト終了後も、EACによる電力技術基準の効率的および適切な運営にあたって、カンボジア国の政策的支援が継続されるか否か	・政策支援の継続性見込み	・カンボジア国電力セクター全体の将来構想(セクター改革構想の有無)ならびにその中でEACの役割、機能に対する改革構想の有無(インタビュ、質問表)	・MIME、EAC	カンボジアには「国家貧困削減戦略」、「電力セクター開発政策」および「Cambodia Power Sector Strategy」など、電力セクターに関する国家計画や開発計画が存在しており、電力セクターの重要性は今後も続くと考えられる。
		5-2. 組織能力の有無	・組織能力(人材ならびに意思決定プロセス)の有無	・組織能力の有無および具体例(インタビュ、質問表)	・長期専門家、EAC	・EACの主要業務に密接に関連しており、また優秀な人材も多いことから十分な能力を有している。
	5-3. 供与機材の維持管理	5-2-2. EACの本プロジェクトに対するオーナーシップは十分か否か	・オーナーシップの有無	・オーナーシップの有無およびオーナーシップの具体例(インタビュ、質問表)	・長期専門家、EAC	・電力技術基準(細則)の作成にあたって、EAC長官自らが内容をチェック。 ・EACのOC/Pはプロジェクト活動への参加割合が最も高い。
		5-2-3. EACの事業運営にあたって十分な予算確保はなされているか否か	・EACの予算状況確認	・EACの予算資料(財務資料)	・MIME、EAC	・他の電力セクターと異なり、EACの予算状況は非常に潤沢であり、予算確保は十分可能である。
5-4. 自立発展性を妨げる要因	5-3-1. 供与機材の維持管理が適切に行われるか否か	・供与機材の維持管理状況	・供与機材の維持管理状況、修繕予算の確保方法等	・長期専門家、EAC	・電気事業者への指導等、測定器具類の供与機材は必要不可欠なものであり、また、修繕および更新等に当たっての予算確保も十分に行うことが可能である。	
		5-3-2. 普及のメカニズム(技術基準の更新、電気事業者への技術指導等)をプロジェクト終了後も継続できるか否か	・EAC職員の技術能力、指導能力	・EAC職員の技術能力、指導能力	・長期専門家、EAC	・EACのOC/Pはプロジェクトへの参加度合いが技術能力が向上しており、十分に継続可能である。
		5-4. 自立発展性を妨げる要因	・要因の有無	・要因の有無(インタビュ、質問表) ・有る場合はその具体例	・長期専門家、MIME、EAC	特になし。

2. 評価グリッド：実績(EDC)

1. 実績

評価段階	調査項目		判断基準	必要な情報・データ(質問紙等)	情報源	データ収集方法	調査結果
	目標	指標					
上位目標の達成 見込み	カンボジアの電力が安定的かつ安全に供給される	1 顧客あたりの停電回数が減少する。 2. EDCの設備拡張計画が適切に実施される。	指標の達成度(見込み)	・(至近年数か年の)EDCの停電データ	・C/P	・EDCからの情報収集	リレー整定などにより、一部上位目標が実現している。
プロジェクト目標達成見込み	配電系統がEDCによって効率的および適切に運営される。	1. 設備データベースが適切に運営、管理される。 2. EDCの設備拡張計画が適切に実施される。	・目標(指標)達成の見込み ・計画の実施率と現状の比較	・データベースの使用状況(何をもち判断するの?) ・計画の実施率 ・現状資料および観察	・長期専門家、C/P ・長期専門家、C/P	・インタビュー、質問票 ・データベースの整備状況の確認	設備データベースは、ファンペン系統および地方(13州)分を含めて完成した。組織(地図情報システム担当)新設はC/Pと協議しており、2007年2月26日に組織案が承認された。 整備拡張計画作成のための基礎資料である地図情報データは整備できている。拡張計画の基本的な考え方が記載されたドラフトの改定は正式には来年年3月予定である(すでにドラフトは関係者に配布済み)。
成果の達成見込み	1. 配電系統の保守能力が向上する。 2. 配電系統の事故復旧能力が向上する。	1-1. 保守のためのデータベースが作成される。 1-2. 補修作業のマニュアルが作成される。 1-3. 予防保全の観点から定期点検が導入される。 1-4. インベーターダンスマップが作成される。(目標は現在の20%減)	・整備の進捗度合い(計画と実績の比較) ・マニュアルの作成状況(作成計画と実績の比較) ・定期点検スケジュールと実績	・データベースの整備・使用状況 ・マニュアルリスト ・定期点検実績	・長期専門家、C/P ・長期専門家、C/P ・マニユアルリスト ・長期専門家、C/P ・定期点検記録	・データベース確認 ・インタビュー、質問票 ・インタビュー、質問票 ・インタビュー、質問票 ・定期点検記録	保守のためのデータベースはできあがっている。 補修作業のマニュアルは9月より派遣された重中専門家がカウンターパートで2006年11月に完成した。 低圧地中ケーブルの電流測定が有効であることがわかり2006年に中庄・低庄の地中ケーブルを点検する計画を行い、機材の購入を行って実施している。低圧ケーブルはすべて終了済みという状況で計画通りに測定を実施している。2007年から配電補修作業のマニュアルに基づいて定期点検を実施している。 2005年平均1,004分/件から2006年平均654分/件に短縮された(約35%短縮)
		2-1. インベーターダンスマップが作成される。 2-2. 事故により影響を受けるエリアならびに家庭が容易に短時間に探索が可能となる。 2-3. リレー整定マニュアルが作成される。 2-4. 停電復旧時間が短縮される。(目標は現在の20%減)	・インベーターダンスマップ整備の進捗度合い(計画と実績の比較) ・顧客・設備システムの整備・使用状況 ・事故・設備システムの整備・使用状況 ・アセス記録	・データベース(ファンペンの配電設備)の整備・使用状況 ・顧客・設備システムの整備・使用状況 ・アセス記録	・長期専門家、C/P ・データベース ・長期専門家、C/P、地球住民 ・アセス記録	・インタビュー、質問票 ・データベース ・アセス記録 ・インタビュー、質問票	2005年度の短期専門家派遣計画にインベーターダンスマップは作成された。現在、系統の更新にあわせてカウンターパートとともにインベーターダンスマップを更新している。 地図情報システムについては系統担当者向けの教育を2007年2月から行っており、訓練が修了する4月には、給電制御所にて事故の影響を受けるエリアがすぐわかる見込みである。また、3月には地図情報を印刷した冊子を配電補修業務に携わるスタッフへ配布する予定である。
		3-1. 計画のためのデータベースが作成される。 3-2. EDCの技術基準が用意される。	・マニユアルリスト ・事故復旧マニュアル、復旧記録 ・早期発見技術と事故点が広範囲に広がることを防ぐ技術に関するセミナー等の記録 ・設備データベースの整備・使用状況	・長期専門家、C/P ・マニユアルリスト ・復旧記録、セミナー記録、事故復旧マニュアル ・長期専門家、C/P ・長期専門家、C/P	・マニユアルリスト ・インタビュー、質問票 ・復旧記録、セミナー記録、事故復旧マニュアル	・データベース ・マニユアルリスト ・インタビュー、質問票	リレー整定マニュアルはドラフトの作成が終わった段階である。修正後、4月までに承認を受ける予定である。 2005年平均1,004分/件から2006年平均654分/件に短縮された(約35%短縮)。 地図情報システムを使って設備と各村落の情報(戸数等)を地図上にすでに落とし込んでいる。計画のためのデータベースはできあがっている(地図情報システムを使用)。 2007年1月に第1次案ができ、意見を聞き終えた。現在修正を行っている。3月末までにEDC総裁の承認を得る予定である。

投入の実績	3-3. 将来の拡張計画が作成される。	拡張計画の策定状況	拡張計画の存在およびコストおよび内容	長期専門家、C/P 拡張計画にかかるとのコメント	インタビュー、質問票 拡張計画の整備状況の確認	GISを用いて各所の配電網拡張計画を作成している。
<p>1. カンボジア側投入実績</p> <p>2. 日本側投入実績</p>	<p>1-1. C/Pおよびその必要な人員の配置 1-2. 施設・建物・設備 1-3. ローカルコスト</p> <p>2-1. 専門家派遣(長期・短期) 2-2. C/P研修受入 2-3. 供与機材</p>	<p>・計画と実績の比較</p> <p>・計画と実績の比較</p>	<p>・各年度投入実績</p> <p>・各年度投入実績</p>	<p>・C/P</p> <p>・長期専門家</p>	<p>・C/Pおよびその他人員リスト、ローカルコスト他確認</p> <p>・専門家活動(派遣)実績リスト、C/P研修実績リスト、供与機材リスト確認</p>	<p>1. C/P配置 合計 18名配置 2. フロンティア事務所、施設 3. ローカルコスト 単位:US\$ 合計\$3,691</p> <p>1. 専門家 合計 1名 1-1 長期専門家 合計 8名 1-2 短期専門家 合計 8名 2. 機材供与 単位:US\$ 3. 日本におけるC/P研修 Clamp-on Power Meter等(JERの別添13-2参照) 2005年度 2名、2006年度 2名 合計 4名 4. 現地業務費 単位:US\$ 2004年度 \$816.18、2005年度 \$32,092.06、2006年度 \$94,274.24 合計\$116,919</p>

2. 実施プロセス

大項目	評価期間		判断基準	必要な情報・データ(質問概要)	情報源	データ収集方法	備考
	中項目	小項目					
1.活動の進捗状況			・計画と実績の比較	1-1. プロジェクト活動の計画と実績の対照表(もしあれば計画と乖離した理由) 1-2. プロジェクトの運営実施上の阻害要因(もしあれば)	・長期専門家、C/P ・長期専門家、C/P、JICA事務所	・計画と実績の対照表確認 ・インタビュー、質問票	順調に進んでいる。2007年3月に開催されたJOCの資料参照。 JOCを開催しており、進捗状況や問題点を把握しているが、半年に1度程度の開催が望まれる。
2.プロジェクトのマネジメント体制状況	2-1. モニタリングの仕組み	2-1. モニタリングの頻度、方法が適切であるか否か	・モニタリングにおける問題の有無	モニタリングの方法、頻度の適切性	・長期専門家、C/P、JICA事務所	・インタビュー、質問票	JICAおよびEDC内で必要に応じた意志決定過程(決定者)を経ている。
	2-2. 意志決定過程	2-2. プロジェクト活動遂行における意志決定過程が適切であるか否か(所定の意志決定者が意志決定を行っているか否か)	・意思決定上の問題の有無	議決方法時ならびに活動遂行時における意志決定過程の適切性	・長期専門家、C/P、JICA事務所	・インタビュー、質問票	JICAおよびEDC内で必要に応じた意志決定過程(決定者)を経ている。
	2-3. JICAカンボジア事務所の機能	2-3. プロジェクト活動に対する適切なタイミングでの助言、対応ならびにプロジェクトチームとの意思疎通は十分に図られているか否か	・JICAカンボジア事務所とプロジェクトチームとの関与度合い	プロジェクト活動における主管事務所の関わり方ならびにその適切性	・長期専門家、C/P、JICA事務所	・インタビュー、質問票	必要に応じて意見交換を実施している。
3.カウンターパートの配置状況	3-1. 人選・配置の適切性	3-1. プロジェクト活動に支障が無いよう適切なタイミングで、また適切な能力を有したC/Pを配置しているか否か	・C/P配置上の問題の有無	・C/P人数、活動への参加度合い、能力および経験の適切性	・長期専門家	・インタビュー、質問票	当初4名であったカウンターパートを活動内容・能力にあわせて17名に追加・削除を行った。
	3-2. コミュニケーション能力	3-2. 配置されたC/Pは十分なコミュニケーション能力を有しているか否か	・意思疎通の問題の有無	・英語能力、技術用語理解能力	・長期専門家、C/P	・インタビュー、質問票	一部カウンターパートは英語能力が低い。カウンターパート同士でフォローを行っている。
	3-3. カウンターパートの主体性	3-3. 配置されたC/Pはプロジェクト活動に主体的に臨んでいるか否か	・主体的関与の度合い	・カウンターパートの積極性、意欲、プロジェクト活動への参加割合	・長期専門家、C/P	・インタビュー、質問票	概ね主体的に取り組んでいる。
4.相手国実施機関のオーナーシップ	4-1. 相手国実施機関(MIME、EAC、EDC)の関与	4-1-1. 相手国実施機関のトップが、本プロジェクト活動に対して好意、意欲をもって取り組んでいるか否か	・相手国実施機関トップの関与度合い	・本プロジェクト活動への相手国実施機関トップの関与度合い	・長期専門家、C/P (MIME、EAC、EDC)	・インタビュー、質問票	副総裁Ym Nelson氏から常にプロジェクト活動を好意的にサポート、助言がある。
	4-2. 予算手当て	4-2. 本プロジェクト活動に対して必要な予算を充当しているか否か	・相手国実施機関の協力度合い	・本プロジェクト活動への協力実績	・長期専門家、C/P (MIME、EAC、EDC)	・インタビュー、質問票	ミーティング、セミナーを開くための施設を有しており、空きがあれば提供する。
			・必要な予算の手当て状況	・予算の手当てと支出実績	・長期専門家、C/P (MIME、EAC、EDC)	・インタビュー、質問票	電気代、備品などの予算を負担している(基本的な現地活動費はJICAが負担している)。

2. 評価グリッド: 評価5項目 (EDC)

評価5項目	調査項目		判断基準	必要な情報・データ(質問概要)	情報源	情報収集方法	調査結果 (国内準備作業による)
	大項目	小項目					
1. 妥当性 (現状・実績)	1-1. カンボジア国の開発政策との整合性 1-2. ターゲットグループのニーズとの整合性 1-3. 日本の開発援助政策との整合性	1-1-1. カンボジア国の開発政策との整合性	政策と整合しているか否か	カンボジアの電力セクター開発政策(計画時) カンボジアの電力セクター開発政策(現在)	MIME	開発政策資料確認	カンボジアにおける電力セクターの状況は、プロジェクト計画時と変化が無い。上位目標およびプロジェクト目標は現在においても優先度が高い。
		1-2. ターゲットグループのニーズとの整合性	ニーズに合致しているか否か	1-2. カンボジア電力セクターのニーズ	MIME, EAC, EDC	インタビュー、質問表、各種資料	EDCにおいて送電線設備がほとんど無い現在の状況では、主な設備である配電設備の効率のおよび適切な運用は非常にニーズが高い。
		1-3. 日本の開発援助政策との整合性	援助方針と整合しているか否か	1-3. 日本の対カンボジア国別援助方針	JICA	国別援助方針資料等確認	JICAは、カンボジア国の重点課題として、i) グッド・ガバナンスの推進、ii) 経済・産業振興、iii) 農業・農村開発、iv) 社会開発セクター開発などを設定している。このうち、本プロジェクトは経済・産業振興のDevelopment Issueのひとつである経済・社会基礎整備に含まれる。
		1-4. プロジェクトの手段としての適切性	課題解決と整合しているか否か	1-4-1. カンボジア電力セクターの課題解決策としての適切性	日本人専門家、MIME、EAC、EDC	インタビュー、質問表、各種資料	EDCは電気設備の計画・設計・建設・保守にかかわる問題に対処する能力が低く組織化された技術者集団の育成が急務となっていた。本プロジェクトは係る分野の人材育成を目的としたものである。
2. 有効性 (予測)	2-1. プロジェクト目標の達成度合い 2-2. プロジェクト目標達成の阻害要因	2-1-1. EDCを主体組織として選定した妥当性	EDCの機能、役割と整合しているか否か	1-4-2. カンボジア国電力セクターにおけるEDCの機能・役割	日本人専門家、MIME、EAC、EDC	インタビュー、質問表、各種資料	EDCはプノンペンなど主要都市の電力設備(送配電)を統括している機関であり、実施機関として整合性が取れている
		2-2-1. EDCの人材確保の確実性	プロジェクト目標の達成見込み、参照	実績の「プロジェクト目標の達成見込み」参照	実績の「プロジェクト目標の達成見込み」参照	実績の「プロジェクト目標の達成見込み」参照	実績グリッド参照
		2-2-2. EDCの人的資源の確保	C/Pに意図があるか否か EDCの人事異動方針においてC/Pの処遇を確立しているか否か	2-2-1. C/Pの意志、EDCの人事異動方針(プロジェクト終了後のC/Pの処遇方針)	C/P	インタビュー、質問表	プロジェクト目標達成には人材および有効な組織が不可欠である。人材育成のためには外部からの継続的な支援は必要であるが、EDC自身が組織的に人材育成のためのプログラムや能力を身に付ける人事・組織の編成を要する必要がある。
		2-2-3. EDCの人的資源の確保	阻害を受けそうな他、参照 他、参照の有無	2-2-2. 電力セクターにおける他、参照 他、参照の有無	MIME、EDC	他、参照の有無	なし。
3. 持続性 (予測)	3-1. 成果1「配電システムの保守能力が向上する」の有効性 3-2. 成果2「配電システムの事故復旧能力が向上する」の有効性 3-3. 成果3「配電システムの計画ならびに拡張能力が向上する」の有効性	3-1. 成果1「配電システムの保守能力が向上する」の有効性	プロジェクト開始前と現在との効果有無の比較	実績(グリッド)参照	長期専門家、EDC	インタビュー、質問表	本プロジェクトの成果1はプロジェクト目標の達成に直結すべく設定されている。成果1の指標達成度は「実績グリッド」を参照。
		3-2. 成果2「配電システムの事故復旧能力が向上する」の有効性	プロジェクト開始前と現在との効果有無の比較	実績(グリッド)参照	長期専門家、EDC	インタビュー、質問表	本プロジェクトの成果2はプロジェクト目標の達成に直結すべく設定されている。成果2の指標達成度は「実績グリッド」を参照。
		3-3. 成果3「配電システムの計画ならびに拡張能力が向上する」の有効性	プロジェクト開始前と現在との効果有無の比較	実績(グリッド)参照	長期専門家、EDC	インタビュー、質問表	本プロジェクトの成果3はプロジェクト目標の達成に直結すべく設定されている。成果3の指標達成度は「実績グリッド」を参照。
		3-4. 外部条件「LEDCが必要となる予算を確保する」、「2カカウンタートが留まる」の現時点における適性	外部条件が適性であるか否か	現時点における外部条件の適正度(インタビュー、質問表)	長期専門家、MIME、EAC、EDC	インタビュー、質問表	外部条件は適正である。C/Pは変わっていないが、フィルタムのC/Pではないため自分の仕事を優先しがちである。
4. 外部条件の適性 (予測)	4-1. 外部条件「LEDCが必要となる予算を確保する」、「2カカウンタートが留まる」の現時点における適性	4-1-1. 外部条件「LEDCが必要となる予算を確保する」の現時点における適性	外部条件が満たされる可能性が高いか否か	外部条件が満たされる可能性(インタビュー、質問表)	長期専門家、MIME、EAC、EDC	インタビュー、質問表	1. 予算については2007年3月に時点で問題は生じていない。 2. 給付条件が省庁よりよく、特にカウンタートは高給なため留まる可能性が高い。
		4-1-2. 外部条件「2カカウンタートが留まる」の現時点における適性	外部条件が満たされる可能性が高いか否か	外部条件が満たされる可能性(インタビュー、質問表)	長期専門家、MIME、EAC、EDC	インタビュー、質問表	1. 予算については2007年3月に時点で問題は生じていない。 2. 給付条件が省庁よりよく、特にカウンタートは高給なため留まる可能性が高い。

評価項目	調査項目		判断基準	必要な情報・データ(質問概要)	情報源	情報収集方法	調査結果 (国内準備作業による)	
	大項目	小項目						
3. 効率性 (現状・実績)	3-1. 成果1～3の達成度	3-1-1. 成果1「配電系統の保守能力が向上する」の達成度	・計画と実績の比較 (実績の「成果の達成見込み」参照)	・成果1に対する計画と実績の対照表	実績の「成果の達成見込み」参照	・計画と実績の対照表確認	実績グリッド参照	
		3-1-2. 成果2「配電系統の事故復旧能力が向上する」の達成度	・計画と実績の比較 (実績の「成果の達成見込み」参照)	・成果2に対する計画と実績の対照表	実績の「成果の達成見込み」参照	・計画と実績の対照表確認	実績グリッド参照	実績グリッド参照
		3-1-3. 成果3「配電系統の計画ならびに拡張能力が向上する」の達成度	・計画と実績の比較 (実績の「成果の達成見込み」参照)	・成果3に対する計画と実績の対照表	実績の「成果の達成見込み」参照	・計画と実績の対照表確認	実績グリッド参照	実績グリッド参照
3-2. 成果1～3達成のための各活動項目の適正度	3-2-1. 成果1「配電系統の保守能力が向上する」達成のための活動との整合性	3-2-1. 成果1「配電系統の保守能力が向上する」達成のための活動との整合性	・成果と活動項目に整合性があるか否か (質問表)	・成果と活動項目に整合性があるか否か(インタビュー、質問表)	・長期専門家、C/P	・インタビュー、質問表	成果の発現は、投入・活動の結果であり、投入・活動がなければ、実践されないものである。	
		3-2-2. 成果2「配電系統の事故復旧能力が向上する」達成のための活動との整合性	・成果と活動項目に整合性があるか否か	・成果と活動項目に整合性があるか否か(インタビュー、質問表)	・長期専門家、C/P	・インタビュー、質問表	成果2の発現は、投入・活動の結果であり、投入・活動がなければ、実践されないものである。	
		3-2-3. 成果3「配電系統の計画ならびに拡張能力が向上する」達成のための活動との整合性	・成果と活動項目に整合性があるか否か	・成果と活動項目に整合性があるか否か(インタビュー、質問表)	・長期専門家、C/P	・インタビュー、質問表	成果3の発現は、投入・活動の結果であり、投入・活動がなければ、実践されないものである。	
3-3. 投入の適正度	3-3-1. 日本側投入の適正度	3-3-1. 日本側投入の適正度	・プロジェクト活動に支障なく投入されているか否か	・長期・短期専門家派遣(人数、タイミング、分野) ・供与機材(種類、機種、数、タイミング)の適正 ・研修員受入(タイミング、人数、研修内容)	・長期専門家	・インタビュー、質問表、プロジェクト資料確認	概ね適切であったと思われる。	
		3-3-2. カンボジア側投入の適正度	・プロジェクト活動に支障なく投入されているか否か	・カンボジアンパートナーの配置(人数、タイミング、分野) ・プロジェクト運営費 ・提供された施設設備の適正度	・MIME、EAC、EDC	・インタビュー、質問表、プロジェクト資料確認	C/Pは活動範囲の拡大に合わせて変更・追加をした。執務室が最初手狭であったが、2005年10月末に移転した。	
		3-3-3. 上位目標「カンボジアの電力が安定的かつ安全に供給される」が達成する見込み	・停電回数の減少度合い	・至近年の1顧客あたりの停電回数のデータ資料	・EDC資料	・資料確認	1顧客あたりの停電回数がプロジェクト開始前の3769×10-3回/戸・年(2003年)から2.311×10-3回/戸・年(2006年)に改善されている。	
4. インフラ (予測)	4-1. 上位目標の達成の見込み	4-1-1. 上位目標「カンボジアの電力が安定的かつ安全に供給される」が達成する見込み	・停電回数の減少度合い	・至近年の1顧客あたりの停電回数のデータ資料	・EDC資料	・資料確認		
		4-1-2. 上位目標「カンボジアの電力が安定的かつ安全に供給される」の達成によりカンボジア国へのインフラは望めるか	・要因の有無	・阻害要因の有無および具体例(インタビュー、質問表)	・長期専門家、MIME、EAC、EDC	・インタビュー、質問表	特になし。	
		4-1-3. 上位目標「カンボジアの電力が安定的かつ安全に供給される」を阻害する要因(もしあれば)	・垂離の有無	・垂離の有無(インタビュー、質問表)	・長期専門家、MIME、EAC、EDC	・インタビュー、質問表	プロジェクト目標を達成しない限り、カンボジア国の電力が安定的かつ安全に供給されるとは言いがたい。	
4-2. 上位目標とプロジェクト目標の因果関係	4-2-1. 上位目標「カンボジアの電力が安定的かつ安全に供給される」と、プロジェクト目標「配電系統がEDCによって効率的および適切に運営される」に垂離はないか	4-2-1. 上位目標「カンボジアの電力が安定的かつ安全に供給される」と、プロジェクト目標「配電系統がEDCによって効率的および適切に運営される」に垂離はないか	・外部条件の満たされる可能性度合い	・外部条件が満たされる可能性度合い(インタビュー、質問表)	・長期専門家、MIME、EAC、EDC	・インタビュー、質問表	EDGの予算状況は逼迫しているが、新組織の設立のための予算確保に努力を継続している。	
		4-2-2. 外部条件「EDCが必置なる予算を確保する」が満たされる可能性は高いか。	・効果、影響の有無	・効果、影響の有無(インタビュー、質問表) ・有る場合はその具体例	・長期専門家、MIME、EAC、EDC	・インタビュー、質問表	地図情報システム導入を紹介するセミナーを関係諸機関向けに行った。その結果、いくつかの機関において地図情報システムを導入したり、情報(衛星写真)を共有したりする反響があった。	
		4-2-3. 予想しなかったマイナスの効果、影響	・効果、影響の有無	・効果、影響の有無(インタビュー、質問表) ・有る場合はその具体例	・長期専門家、MIME、EAC、EDC	・インタビュー、質問表	特になし。	
4-3. 予想しなかったプラスの効果、影響	4-3-1. マイナスの効果、影響	4-3-1. マイナスの効果、影響	・軽減対策の有無	・軽減対策の有無(インタビュー、質問表) ・有る場合はその具体例	・長期専門家、MIME、EAC、EDC	・インタビュー、質問表	特になし。	
		4-3-2. マイナスの効果、影響	・軽減対策の有無	・軽減対策の有無(インタビュー、質問表) ・有る場合はその具体例	・長期専門家、MIME、EAC、EDC	・インタビュー、質問表	特になし。	
		4-3-3. 異なるプラスの効果、影響	・プラス、マイナス効果の有無	・プラス、マイナス効果の有無(インタビュー、質問表) ・有る場合はその具体例	・長期専門家、MIME、EAC、EDC	・インタビュー、質問表	特になし。	

評価5項目	調査項目		判断基準	必要な情報・データ(質問概要)	情報源	情報収集方法	調査結果 (国内準備作業による)
	大項目	小項目					
5. 自立発展性 (見込み)	5-1. 政策的支援の継続	5-1-1. プロジェクト終了後も、EDCIによる配電システムの効率的および適切な運営にあたって、カンボジア国の政策的支援が継続されるか否か	・政策支援の継続性見込み	・カンボジア国電力セクター全体の母体組織(セクター改革構想の有無)ならびにその中のEACの役割、機能に対する改革構想の有無(インタビュー、質問表)	・MIME、EDC	・インタビュー、質問表	カンボジアには「国家貧困削減戦略」、「電力セクター開発政策」および「Cambodia Power Sector Strategy」など、電力セクターに関する国家計画や開発計画が存在しており、電力セクターの重要性は今後も高く考えられる。
		5-2. 組織能力の有無	5-2-1. プロジェクト終了後も、EDCIによる配電システムの効率的および適切な運営にあたって、EDCIには十分な組織能力(人材ならびに意思決定プロセス)を有しているか否か	・組織能力(人材ならびに意思決定プロセス)の有無	・組織能力の有無および具体例(インタビュー、質問表)	・インタビュー、質問表	個人個人の能力、技術力はあることから活動を継続することは可能と思われる。それを発揮できる組織を整備する必要があり、GIS活動や設計基準改訂の活動をプロジェクト終了後担当組織が設立される予定である。
	5-3. 供与機材の維持管理	5-2-2. EDCの本プロジェクトに対するオーナーシップは十分か否か	・オーナーシップの有無	・オーナーシップの有無およびオーナーシップの具体例(インタビュー、質問表)	・長期専門家、EDC	・インタビュー、質問表	C/Pの配置・意欲や予算の確保など、これまで問題も無くオーナーシップは強いと言える。
		5-2-3. EDCの事業運営にあたって十分な予算確保はなされているか否か	・EDCの予算状況確認	・EDCの予算資料(財務資料)	・MIME、EDC	・資料確認	EDCの予算状況は逼迫しており、事業効果の継続は可能であっても発展(ソフトウェアライセンスの追加など)は難しいと思われる。
5-4. 自立発展性を妨げる要因	5-3-1. 供与機材の維持管理が適切に行われるか否か	・供与機材の維持管理状況	・供与機材の維持管理状況(設備台帳等による管理有無)、修繕予算の確保方法等	・長期専門家、EDC	・インタビュー、質問表	機材は、問題なく稼働しており、機材の保守管理体制が確立している。	
	5-3-2. 普及のガバナンス(配電システムの保守、事故復旧能力などの技術指導等)をプロジェクト終了後も継続できるか否か	・EDCI職員(技術能力、指導能力)	・EDCI職員の技術能力、指導能力	・長期専門家、EDC	・インタビュー、質問表	技術指導内容をカウンターパートからの他の職員へ指導する取り組み(セミナー、OJT等)を行っている。事故点検表設置については機材を供与する前から既存の装置を使って新規職員をOJTにて教育している。	
	5-4. 自立発展性を妨げる要因	5-4. 自立発展性を妨げる要因の有無	・要因の有無	・要因の有無(インタビュー、質問表) ・有る場合はその具体例	・長期専門家、MIME、EDC	・インタビュー、質問表	特になし。