

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.

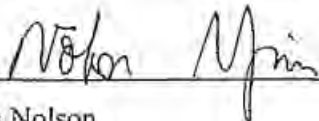
Phnom Penh, March 13, 2007



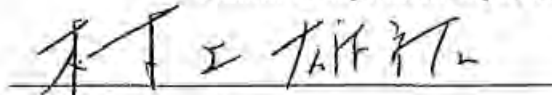
Dr. Ith Praing
Secretary of State,
Ministry of Industry, Mines and Energy
Royal Government of Cambodia



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 "PDM¹⁻¹" and "PDM¹⁻²"). Plans of Operations (hereinafter referred to as "PO¹⁻¹" and "PO¹⁻²") 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. Atau 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). $(3.769 \times 10^{-3}$ in 2003, 2.311×10^{-3} 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) 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). $(3.769 \times 10^{-3}$ in 2003, 2.311×10^{-3} 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 PDM¹⁻¹ 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 PDM¹⁻² 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. ¹ | 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.

¹ 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 PDM¹⁻¹, 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, PDM¹⁻¹ 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 PDM¹⁻², 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 26th, which will surely contribute to maintain the positive effects of the Project.

At the Output level, PDM¹⁻² 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 PDM¹⁻¹ "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 |
|--|---|---|---|
| Overall Goal 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 | |
| Project Purpose 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. |
| Outputs 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. |
| Activities 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 | Input to the Project | | - Counterparts remain in each organization. |
| | Cambodian Side | | |
| | 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 | Japanese Side | |
| | | 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 | |
| | | Precondition | |
| | | | - 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 |
|---|---|--|--|
| Overall Goal Electric power in Cambodia is supplied stably and safely. | The number of power outage times per customer decreases. | Power outage data of EDC | |
| Project Purpose 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. |
| Outputs 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. |
| Activities 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 | Input to the Project | | |
| | Cambodia Side | Japanese Side | |
| | 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 | Precondition |
| | | | - 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 |
| 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.

Plan of Operations

(Project for EDC under "Capacity and installation building of the electric power")

ANNEX 2-2

March 13, 2003

| Master Plan for EDC | Japanese Fiscal year | | | | | | | | | | | | Remarks (Change) |
|---|---|--|--|--------|---|---|--------|---|---|--------|----|----|--|
| | 2002FY | | | 2003FY | | | 2004FY | | | 2005FY | | | |
| | Year | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
| <p>Overall Goal Electric power in Cambodia is expanded stably and safely.</p> <p>Project purpose Distribution system is managed effectively and projects by EDC</p> | Input | <p>Long term expert</p> <p>Short term experts EXP-6 of Entry EXP-6 of Repair EXP-6 of Planning</p> <p>Comprehensive TRAINING in Japan Ltd. JED</p> <p>Provision of Equipments Fault locating system Database of Operation system (SCADA system) GIS (geographic information system) Standby for on-site realization</p> | | | | | | | | | | | <p>EXP-4 Long term expert</p> <p>EXP-6 Short term expert</p> |
| <p>Output (These activities are concerned in all years)</p> | <p>Project initiated</p> <p>0-1 Make the strategy of GIS in EDC</p> <p>0-2 Train COP and related members</p> <p>0-3 Install GIS and make GIS map of Phnom Penh</p> <p>0-4 Hold a seminar of GIS</p> <p>0-5 Make GIS map of other provinces</p> <p>0-6 Link GIS to other systems (PSSAD/EPT, SCADA system)</p> <p>0-7 Make the rule and the work flow of facility management and use it into practice</p> | <p>Detailed activities</p> <p>0-1-1 Check the present situation of basic construction</p> <p>0-1-2 Make the strategy of GIS</p> <p>0-2-1 Train COP and related members in the use of software</p> <p>0-2-2 Train COP in Bangkok</p> <p>0-2-3 Train related members by COP</p> <p>0-3-1 Survey in the field</p> <p>0-3-2 Make GIS map of Phnom Penh</p> <p>0-3-3 Install GIS software to EDC</p> <p>0-4-1 Hold a seminar of GIS for EDC</p> <p>0-4-2 Hold a seminar of GIS for related organizations</p> <p>0-5-1 Survey in the field</p> <p>0-5-2 Make GIS map of other provinces</p> <p>0-6-1 Link to PSSAD/EPT</p> <p>0-6-2 Link to SCADA system</p> <p>0-7-1 Make the work flow of facility management and use it into practice</p> <p>0-7-2 Make the rule and the manual of facility management</p> <p>0-7-3 Put it into practice</p> | <p>EXP-1-1</p> <p>EXP-1-2</p> <p>EXP-1-3</p> <p>EXP-1-4</p> <p>EXP-1-5</p> <p>EXP-1-6</p> <p>EXP-1-7</p> <p>EXP-1-8</p> <p>EXP-1-9</p> <p>EXP-1-10</p> <p>EXP-1-11</p> <p>EXP-1-12</p> <p>EXP-1-13</p> <p>EXP-1-14</p> <p>EXP-1-15</p> <p>EXP-1-16</p> <p>EXP-1-17</p> <p>EXP-1-18</p> <p>EXP-1-19</p> <p>EXP-1-20</p> | | | | | | | | | | |
| <p>1. Knowledge and skills to maintain the distribution system are developed.</p> | <p>1-1 Check and remove the problem and difficulties on maintenance work</p> <p>1-2 Obtain knowledge and skills to repair distribution facilities</p> <p>1-3 Make manuals for repair work (including translation into Khmer)</p> <p>1-4 Hold seminar for EDC</p> <p>1-5 Conduct on-the-job training</p> | <p>1-1-1 Check the present work and schedule of maintenance and repair</p> <p>1-1-2 Collect the diagnosis of maintenance and repair</p> <p>1-2-1 Pick up some feeders and check cables</p> <p>1-2-2 Collect data and make index parameter for cable maintenance</p> <p>1-3-1 Training at Hoshihara Electric Power College</p> <p>1-3-2 Make manual for cable maintenance</p> <p>1-3-3 Translate manual into Khmer</p> <p>1-4-1 Hold seminar for EDC</p> <p>1-5 Conduct on-the-job training</p> | <p>EXP-1-1</p> <p>EXP-1-2</p> <p>EXP-1-EXP-3</p> <p>EXP-1-EXP-4</p> <p>EXP-1-5</p> <p>EXP-1-EXP-6</p> <p>EXP-1-7</p> <p>EXP-1-EXP-8</p> <p>EXP-1-EXP-9</p> | | | | | | | | | | |
| <p>2. Knowledge and skills to recover the distribution system are developed.</p> | <p>2-1 Collect and analyze existing distribution fault data</p> <p>2-2 Study skills to locate fault points quickly and to avoid re-occurring faults</p> <p>2-3 Create the impedance map of Phnom Penh system.</p> <p>2-4 Make manuals for recovering fault (including translation into Khmer)</p> <p>2-5 Hold seminar for EDC</p> <p>2-6 Conduct on-the-job training</p> | <p>2-1-1 Collect existing distribution data (ex. diagram, facility, downloaded data, etc)</p> <p>2-1-2 Collect fault data and reasons</p> <p>2-1-3 Draw system diagram for simulation (simulator operation)</p> <p>2-2-1 Study present operation system</p> <p>2-2-2 Make improvement plans</p> <p>2-2-3 Implement measures to prevent operation</p> <p>2-2-4 Review installation and develop knowledge about operation</p> <p>2-2-5 Training in PSSAD/EPT at MEA in Bangkok</p> <p>2-2-6 Training at Hoshihara Electric Power College (Osaka)</p> <p>2-2-7 Analyze present relay setting and make improvement plans</p> <p>2-3-1 Pick up some feeders in order to test and prepare measure</p> <p>2-3-2 Implement the measures to these feeders</p> <p>2-3-3 Review and modify the measures</p> <p>2-4-1 Implement implemented measures to other feeders</p> <p>2-4-2 Technology Exchange with MEA</p> <p>2-4-3 Training at Hoshihara Electric Power College</p> <p>2-4-4 Create the impedance map of Phnom Penh system</p> <p>2-4-5 Make manuals for operation of recovering fault</p> <p>2-4-6 Make manuals for relay setting</p> <p>2-4-7 Translate manual into Khmer</p> <p>2-5 Hold seminar for EDC</p> <p>2-6 Conduct on-the-job training</p> | <p>EXP-1-1</p> <p>EXP-1-2</p> <p>EXP-1-3</p> <p>EXP-1-4</p> <p>EXP-1-5</p> <p>EXP-1-6</p> <p>EXP-1-7</p> <p>EXP-1-8</p> <p>EXP-1-9</p> <p>EXP-1-10</p> <p>EXP-1-11</p> <p>EXP-1-12</p> <p>EXP-1-13</p> <p>EXP-1-14</p> <p>EXP-1-15</p> <p>EXP-1-16</p> <p>EXP-1-17</p> <p>EXP-1-18</p> <p>EXP-1-19</p> <p>EXP-1-20</p> | | | | | | | | | | |
| <p>3. Capacity to design and enhance the distribution system is developed.</p> | <p>3-1 Obtain knowledge to plan the distribution system and to improve the reliability</p> <p>3-2 Review EDC's design standard in order to reduce the cost and adjust it to PSSAD/EPT</p> <p>3-3 Analyze the existing system, take some measures to improve the reliability and compare cost between the measures</p> <p>3-4 Consider expanding the distribution system and analyze the cost</p> <p>3-5 Train COP through on-the-job training</p> | <p>3-1-1 Collect the document of planning and construction in distribution</p> <p>3-1-2 Collect the schedule of construction</p> <p>3-2-1 Check and review the present system</p> <p>3-2-2 Review and publish EDC's design standard</p> <p>3-2-3 Training at Hoshihara Electric Power College</p> <p>3-2-4 Technology Exchange with MEA</p> <p>3-3-1 Hold seminar to publish revised design standard by EDC</p> <p>3-3-2 Pick up some feeders and work out cost/return measures</p> <p>3-3-3 Compare the cost between the measures</p> <p>3-3-4 Implement the measures and review the result</p> <p>3-4-1 Make manuals and establish workflow for expanding the distribution system</p> <p>3-4-2 Translate manual into Khmer</p> <p>3-4-3 Apply manual to expand the distribution system and review the cost</p> <p>3-5 Train COP through on-the-job training</p> | <p>EXP-1-1</p> <p>EXP-1-2</p> <p>EXP-1-EXP-3</p> <p>EXP-1-4</p> <p>EXP-1-EXP-5</p> <p>EXP-1-6</p> <p>EXP-1-EXP-7</p> <p>EXP-1-8</p> <p>EXP-1-9</p> <p>EXP-1-10</p> <p>EXP-1-11</p> <p>EXP-1-12</p> <p>EXP-1-13</p> <p>EXP-1-14</p> <p>EXP-1-15</p> <p>EXP-1-16</p> <p>EXP-1-17</p> <p>EXP-1-18</p> <p>EXP-1-19</p> <p>EXP-1-20</p> | | | | | | | | | | |

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 | | |
| | Mr. Eang Khon | 128 L | 1 | 1 | | | | | 1 | 1 | | |
| | Electricity of Kratie | 059 L | | | | | | | 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 | | | | | | | | | | | |
| | Sujing 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

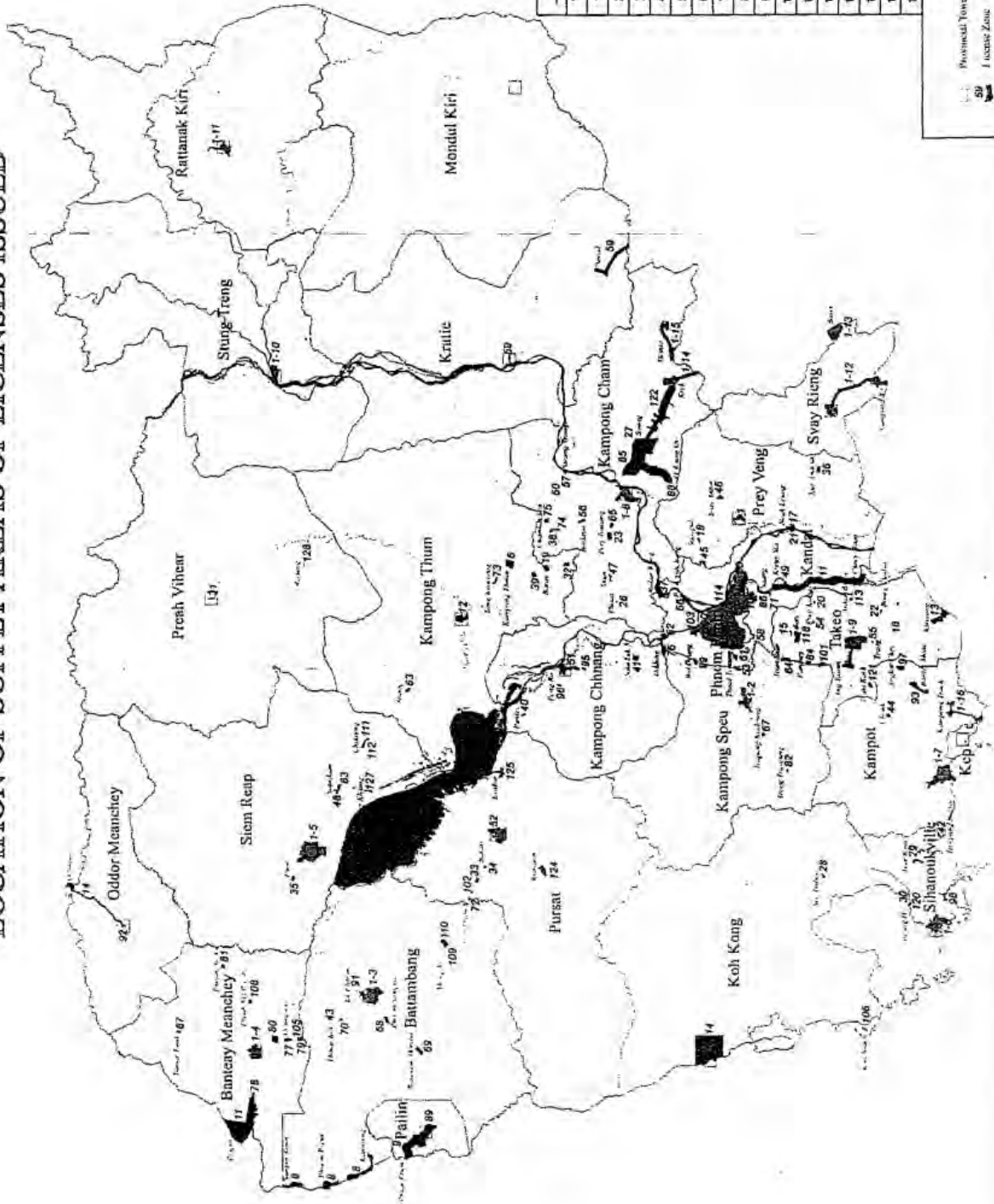
CHAPTER 7

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



LOCATION OF SUPPLY AREAS OF LICENSES ISSUED



| No. | Province | Sub-province |
|-----|----------|-------------------|
| 1 | 1-1 | Phnom Penh, Kamal |
| 2 | 1-2 | Kampong Speu |
| 3 | 1-3 | Battambang |
| 4 | 1-4 | Banteay Meanchey |
| 5 | 1-5 | Siem Reap |
| 6 | 1-6 | Stannahville |
| 7 | 1-7 | Kampot |
| 8 | 1-8 | Kampong Cham |
| 9 | 1-9 | Takeo, Angkor |
| 10 | 1-10 | Songkha |
| 11 | 1-11 | Stannahville |
| 12 | 1-12 | Svay Rieng |
| 13 | 1-13 | Prey Veng |
| 14 | 1-14 | Kratie |
| 15 | 1-15 | Stannahville |
| 16 | 1-16 | Kampong Speu |

LEGEND

- ▭ Provincial Town or City
- ▭ License Zone

Prepared and Drawn by Sam Veng

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

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 Sar, 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 Beungkar Town, Beungkar, 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, Chumkaeou, 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 Pouley Town, Pouley, 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, Chheung 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, Chamkaeur, 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 |

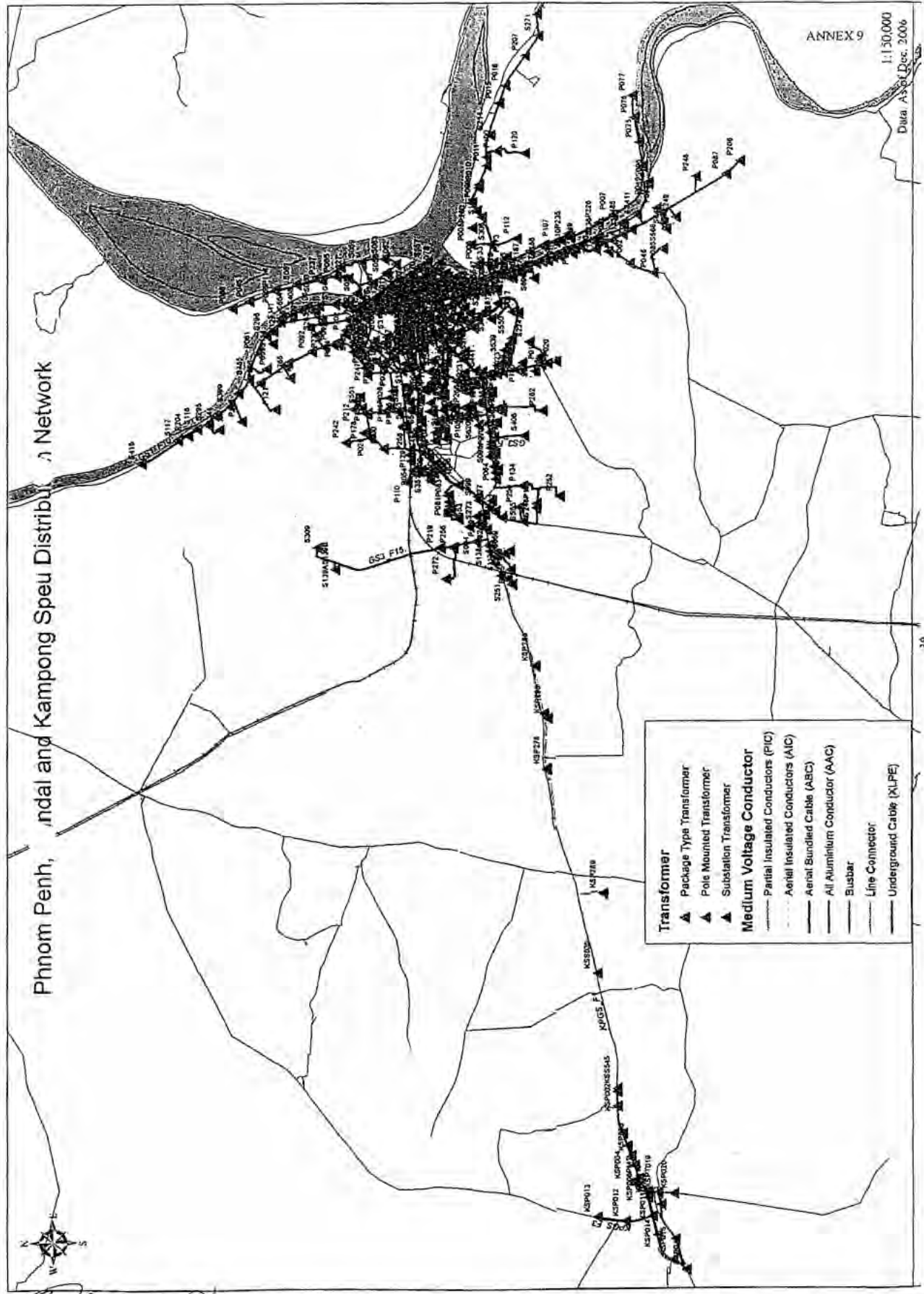
| No | Licensee | License | Issued | Term | Renewed | Term | Business Location | Type of Service | Installed Capacity kVA |
|-----|-------------------------------|---------|------------|-----------|------------|-------|--|-----------------|---------------------------|
| | | No. | Licenses | Years | Licenses | 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 | | | Slong 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&Trapeangreh, 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 Anhchang, 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 Mondha | 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, Svaydaunkeo, Baksan, 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. Vorn 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 Phnomtouch Town, Phnomtouch, 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, Phnomruch | Gen. & Dist | 110 |
| 83 | Mr. Toung Yeun | 083 L | 29-12-2003 | 2 | 29-12-2005 | 4 | Phsar Thalechek 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, Tbongkhmum, 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 | | | Psalin 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 Sivany | 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 Sovannareu | 102 L | 06-10-2004 | 2 | | | O-Tapong, Baksan, 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. Timng 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 Knuy | 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 | | | Banonn, Battambang | Gen. & Dist | 16KVA |
| 117 | Ms. Sok Kheng | 118 L | 18-07-2005 | 3 | | | Khum Chumbaruk, Bary District, Takeo | Gen. & Dist | 50 |
| 118 | Mr. Un Sopha | 119 L | 19-10-2005 | 2 | | | Toeuk Phos District Town, Kg. Chhuang | Gen. & Dist | 115 |
| 119 | Mr. Chan Keat | 120 L | 19-10-2005 | 2 | | | O-Tre, Khan Suong Hao, Sihanouk Ville | Gen. & Dist | 105 |
| 120 | Mrs. Kaling Gech 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 | | | Suang, 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 Rominh, Srok Koh Andeth, Takeo | Gen. & Dist | 110 |
| 134 | Mr. Dik Rin | 135 L | 28-06-2006 | 2 | | | Phsar Deumrokar 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 Samroung 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 Channareun | 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 | | | Krangchik, 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 ² 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, > 100A | 117 out of 847 feeders | 13.80% |

| Date | Location | Capacity (KVA) | Time | Feeder# | 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 | 228 | 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 | 228 | 228 | 228 |
| | | | | 2 | 20 | 29 | 29 | 11 | 20 | 29 | 27 | 13 | 0 | 0 | 2 | -2 | 228 | 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 | 338 | 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 | √ ₂₅ | √ ₁₆ | | √ ₂₄ | | √ ₁₇ | √ ₃₀ | | | √ ₂₃ | | | | | √ ₂₈ | | |
| Thermal | √ ₆₂ | | | √ ₃₁ | | √ ₃₀ | √ ₃₀ | | | √ ₃₀ | | | | | | √ ₃₄ | |
| Trans-mission | √ ₆₂ | | | √ ₃₁ | | √ ₃₀ | √ ₃₀ | | | √ ₃₀ | | | | | | √ ₂₈ | |

| Field | 2006 | | | | 2007 | | |
|---------------|------|----|----|----|-----------------|---|---|
| | 9 | 10 | 11 | 12 | 1 | 2 | 3 |
| Distribution | | | | | √ ₂₄ | | |
| Thermal | | | | | √ ₂₄ | | |
| Trans-mission | | | | | √ ₂₄ | | |

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)

Dispatch of Experts (EDC)

1.1 Long-term Expert

Mr. Junya SHINOHARA (February 7, 2005 – at present)

1.2 Short-term Experts

Three short-term experts were dispatched to instruct counterparts in cooperation with the long-term expert.

(1) Short-term expert for relay protection (three times)

Mr. Akihiro SEO, from August 15, 2005 to November 11, 2005 and from October 1, 2006 to December 23, 2006

Mr. Hitoshi KANETSUKI, from March 25, 2007 to April 7, 2007

(2) Short-term expert for repair (twice)

Mr. Keiji HIGASHINAKA, from October 10, 2005 to December 23, 2005 and from September 3, 2006 to November 25, 2006

(3) Short-term expert for planning (three times)

Mr. Koichi HATTA, from February 27, 2006 to June 2, 2006, from November 26, 2006 to December 23, 2006 and from February 11, 2007 to April 14, 2007

Table 1 Dispatch period of short-term experts

| No | Short-term Expert | Start | Finish | Duration | *** Present position | | | | | | | | | | | | | | | | | | | | | | | |
|----|-----------------------------|------------|------------|----------|----------------------|-----|-----|-----|-----|------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|-----|-----|-----|-----|-----|-----|
| | | | | | 2005 | | | | | 2006 | | | | | | | | | | | | 2007 | | | | | | |
| | | | | | Aug | Sep | Oct | Nov | Dec | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | Jan | Feb | Mar | Apr | May | Jun | Jul |
| 1 | Repair (First) | 10/10/2005 | 12/23/2005 | 75d | | | | | | | | | | | | | | | | | | | | | | | | |
| 2 | Repair (Second) | 9/4/2006 | 11/25/2006 | 83d | | | | | | | | | | | | | | | | | | | | | | | | |
| 3 | Relay Protection (First) | 8/15/2005 | 11/11/2005 | 89d | | | | | | | | | | | | | | | | | | | | | | | | |
| 4 | Relay Protection (Second) | 10/1/2006 | 12/23/2006 | 84d | | | | | | | | | | | | | | | | | | | | | | | | |
| 5 | Relay Protection (Third) | 3/25/2007 | 4/7/2007 | 14d | | | | | | | | | | | | | | | | | | | | | | | | |
| 6 | Planning (First) | 2/27/2006 | 6/2/2006 | 96d | | | | | | | | | | | | | | | | | | | | | | | | |
| 7 | Planning (Second) | 11/26/2006 | 12/23/2006 | 28d | | | | | | | | | | | | | | | | | | | | | | | | |
| 8 | Planning (Third) | 2/11/2007 | 4/14/2007 | 63d | | | | | | | | | | | | | | | | | | | | | | | | |

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 |
|---------------------------------------|-------------------------------|---------------------|-----------------|--------------|---------------|
| (for experts and their office) | | | | | |
| 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 |
| (for work to guide licensees) | | | | | |
| 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 |
| (for the GIS project) | | | | | |
| 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 |
|---------------------------------------|---|---------------------------|-----|-----------|---------------|
| (For experts and their office) | | | | | |
| 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 |
| (For GIS project) | | | | | |
| 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 |
| (For repair works) | | | | | |
| 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 |

| | | | | | |
|--|--|--------------------|---|------------|-------------|
| | 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 |
| (For relay protection and operation works (SCADA system)) | | | | | |
| 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 | sub total | 5,256.37 | 616.18 | 5,872.55 |
| | 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 | sub total | 24,924.01 | 32,029.06 | 56,953.07 |
| | 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 | sub total | 60,417.07 | 84,274.24 | 144,691.31 |
| | 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



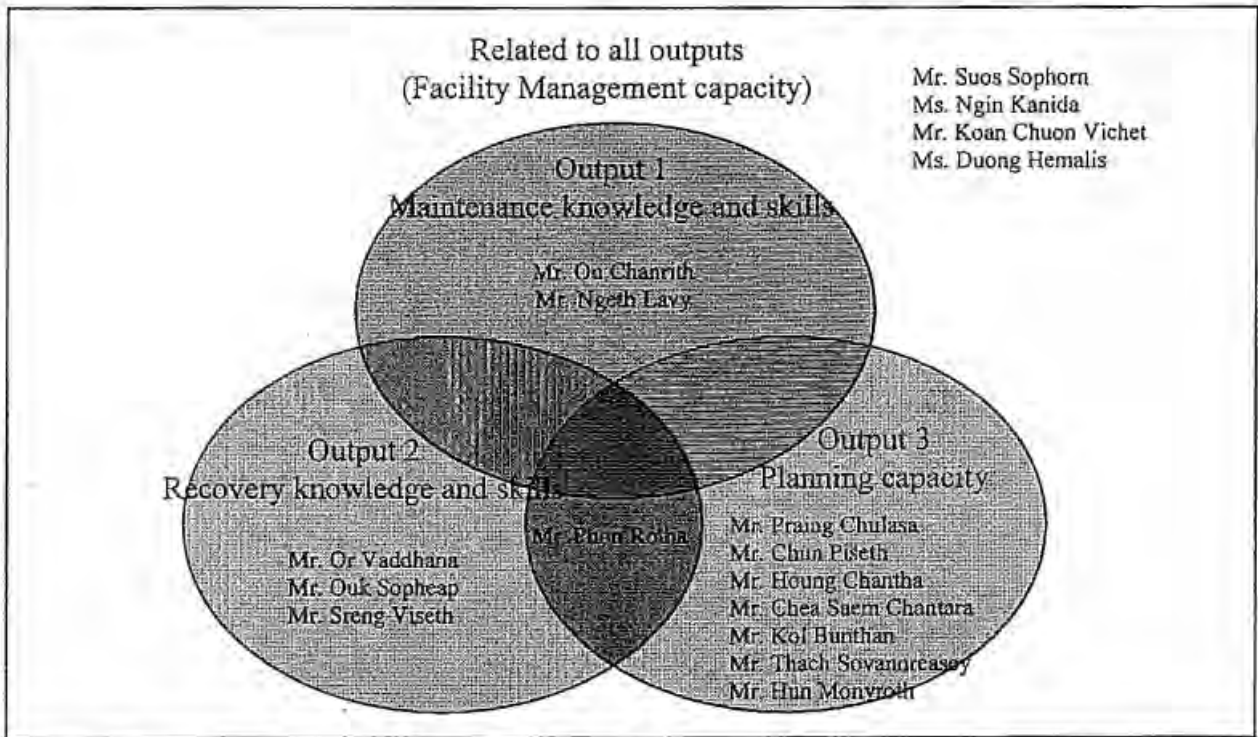



Figure 1 Diagram of counterparts

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 | | | | | | |
| Total | | | | | | 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 ³ 回/戸・年(2003年から2311 × 10 ³ 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. 認可電気事業者による細則の存在が100%認識される。 | ・計画と実績の比較 | ・EACの認識状況(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 | プロジェクトが導入したGISにより、供給エリアデータを管理している。従来のペーパーによる管理に比べれば利便性等は確実に向上している。 |
| 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 | ・実施計画(PO) ・実施計画(PO) ・実施計画(PO) ・準備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、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 ・作成中の資料、テキスト確認 ・計画と実績の対照表確認 ・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>投入の実績</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 | 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 | ・必要に応じて意見交換を実施している。 ・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。 |
| 3. ガ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 | ・C/P人数、活動への参加度合い、能力および経験の適切性 | ・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、C/P | ・インタビュー、質問表 | ・EACのO/Pは参加度合いが低い。しかし、MIMEのO/Pは参加度合いが低い。 |
| | 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 | ・英語能力 | ・長期専門家、O/P | ・インタビュー、質問表 | ・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。 |
| | 3-3. ガウンターパートの主観性 | 3-3. 配置されたO/Pはプロジェクト活動に主体的に関与しているか否か | ・主体的関与の度合い | ・ガ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は主体性を有してプロジェクト活動に参加しているが、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度合い | ・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。 ・セミナー開催等に必要な空気があれば提供しているほか、必要なる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 | ・予算の手当てと支出実績 | ・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)。 |

2. 評価グリッド: 評価5項目 (EAC)

| 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 | | | | |
| 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 | | 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) | 橋本個別専門家 | 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ないため、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は高い。 停電、事故の少ない安定した電力を供給することがニーズであり、合致している。 |
| | 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 | 橋本個別専門家 | 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・社会基盤整備に含まれる。 |
| 2. 有効性 (予測) | 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 | EACは、MIME公布の電力技術基準に基づき電気事業者の許認可業務や技術指導を行うことになってきたが、技術基準内容の理解熟度の低さから十分な成果が上がっていない。このため今後の電力の急激な需要増に対処する電力行政指導の滞りや、電力の供給信頼度と安定性の低下が危惧され、早急な対応が求められていたことから、課題解決に対して整合性がある。 |
| | 1-4. プロジェクトの手段としての適切性 | 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 | 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 | 橋本個別専門家 | EACは、電気事業の規制監督庁として、電気事業者への許認可発行ならびに是正指導等を行っており、業務において電力技術基準を実際使用する組織である。また、MIMEと異なりEACは優秀な人材を有しており、EACを主体組織として選定したことは適切である。 |
| 2. 有効性 (予測) | 2-1. プロジェクト目標の達成度合い | 1-4-2. EACを主体組織として選定した妥当性 | EAC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EACの機能・役割 | 長期専門家、MIME、EAC | EACは、電気事業の規制監督庁として、電気事業者への許認可発行ならびに是正指導等を行っており、業務において電力技術基準を実際使用する組織である。また、MIMEと異なりEACは優秀な人材を有しており、EACを主体組織として選定したことは適切である。 |
| | 2-2. プロジェクト目標達成の阻害要因 | 2-2-1. EACの人材確保の確実性 | 実績の「プロジェクト目標の達成見込み」参照 C/Pに意志があるか 否か EACの人事異動方針(プロジェクト終了後のC/Pの処遇方針) EACの人材確保の確実性 EACの人事異動方針(プロジェクト終了後のC/Pの処遇方針) EACの人事異動方針(プロジェクト終了後のC/Pの処遇方針) EACの人事異動方針(プロジェクト終了後のC/Pの処遇方針) | 実績の「プロジェクト目標の達成見込み」参照 2-2-1. C/Pの意志、EACの人事異動方針(プロジェクト終了後のC/Pの処遇方針) 2-2-2. 電力セクターにおける他ドナー援助計画 | 橋本個別専門家、MIME、EAC | EACの給与水準は他の省庁より非常に高いことから、EACに留まる意思は高い。 EACの事務所はただひとつであり、C/Pが異動することはなし。 実績グリッド参照。 |
| 2. 有効性 (予測) | 2-3. 成果1「電力技術基準遵守のためのルールが明確になる」の有効性 | 2-3-1. 成果1「電力技術基準遵守のためのルールが明確になる」の有効性 | プロジェクト開始前と現在の効果有無の比較 プロジェクト開始前と現在の効果有無の比較 プロジェクト開始前と現在の効果有無の比較 | プロジェクト開始前後におけるEACならびに電気事業者の電力設備技術基準の理解度改善状況(インタビュー、質問表) プロジェクト開始前後におけるEACの許認可業務の改善状況(インタビュー、質問表) プロジェクト開始前後におけるEACの指導能力改善状況(インタビュー、質問表) | 長期専門家、EAC 長期専門家、EAC 長期専門家、EAC | 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。 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。 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。 外部条件は適正である。 |
| | 2-4. 外部条件の適性度 | 2-4-1. 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。」、「4. C/Pがそれぞれの組織に留まる。」の有効性 | 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) 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 長期専門家、MIME、EAC、EDC | 外部条件2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に提出することになっており、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關しても指導を行うなどの努力が必要である。 |

| 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」参照 | ・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」参照 | ・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」参照 | ・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。 | |
| 3-3. 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 | ・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 | ・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。 | | |
| 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 | ・プロジェクト活動に支障なく投入されているか否か | ・カウンターパートの配置(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 | ・MIMEのC/Pの参加割合が非常に低く、この点が適正ではない。 | |
| | | 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 | ・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 | ・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 ⁻³ 回/戸・年(2003年)から2,311 x 10 ⁻³ 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。 | |
| | | 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) | ・要因の有無 | ・要因の有無 | ・阻害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 | ・電力の供給不足により輪着停電が行われるなど電気の運用できない不便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。 |
| | | 4-2. 上位目標とプロジェクト目標の因果関係 | ・因果の有無 | ・因果の有無 | ・因果の有無(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. 上位目標以外のプログラムの効果、影響の有無 | 4-2-1. 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 | ・外にについては、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、案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。 | | |
| 4-3. 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 | | |
| 4-4. 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)ならびにその中の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 | 5-2-1. 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、EAC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 | ・オーナージップの有無およびオーナージップの具体例(インタビュ、質問表) | ・オーナージップの有無およびオーナージップの具体例(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。 |
| | | 5-2-2. EACの本プロジェクトに対するオーナージップは十分か否か | ・オーナージップの有無 | ・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 | 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の有無 | ・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 | | 1 顧客あたりの停電回数が減少する。 かつ安全に供給される。 | 指標の達成・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 | ・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 | | 1. 配電系統がEDCによって効率的および適切に運営される。 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(何をもって判断するの?) ・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 ・インタビュー、実施リスト他確認 | 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キュメントの改定は正式には来年年3月予定である(すでにドキュメントは関係者に配布済み)。 |
| 成果の達成見込み | | 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. 停電復旧時間が短縮される。(目標は現在の20%減) | ・設備の進捗度合い(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 | ・長期専門家、C/P ・長期専門家、C/P ・マニュアルリスト | ・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. インピンディング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) | ・インピンディング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 ・アクセス記録 ・マニユアルリスト | ・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 ・アクセス記録 ・マニユアルリスト | ・長期専門家、C/P ・データベース ・長期専門家、C/P、地域住民 ・アクセス記録 ・インタビュー、質問票 ・マニユアルリスト | ・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 ・データベース ・アクセス記録 ・インタビュー、質問票 ・マニユアルリスト | 2005年度の短期専門家派遣計画にインピンディングマップが作成された。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ピンディング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作業に携わるスタッフへ配布する予定である。 |
| | | 3-1. 計画のために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 ・インタビュー、質問票 | ・マニユアルリスト ・インタビュー、質問票 ・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 | リレー整定マニュアルはドキュメントの作成が終わった段階である。修正後、4月までに承認を要する予定である。 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)を地図上にすばやく落とせるようにしている。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。 |

| | | | | | |
|--|---|----------------------------|---------------------------------------|---|--|
| <p>3-3. 将来の拡張計画が作成される。</p> | <p>・拡張計画の策定状況</p> | <p>・拡張計画の存在およびコストおよび内容</p> | <p>・長期専門家、C/P ・拡張計画にかかるとのコメント</p> | <p>・インタビュー、質問票 ・拡張計画の整備状況の確認</p> | <p>GISを用いて各所の配電線拡張計画を作成している。</p> <ul style="list-style-type: none"> ・ Kampong Chhnang配電網拡張計画 ・ Siemreap配電網拡張計画 ・ Siemreap アプサラ機構への設備引渡計画 ・ Shanouk Ville配電網拡張計画 ・ Phnom Penh—Kampong Speu配電網拡張計画 ・ Kandal—Takeo配電網拡張計画 ・ Kampong Chhnang地区配電網拡張計画 ・ Battambang配電網拡張計画 ・ Banteay Meanchey配電網拡張計画 |
| <p>投入の実績</p> <p>1. カンボジア側投入実績</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>・計画と実績の比較</p> | <p>・各年度投入実績</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>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>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>・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 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 | 議決法廷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。 実績「プロジェクト目標の達成見込み」参照 |
| | | 2-2-1. EDCの人材確保の確実性 | 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ず人事・組織の編成を要する必要がある。 なし。 |
| | | 2-3-1. 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。 |
| | | 2-3-2. 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。 |
| 2-4. 外部条件の適性 | 2-4-1. 外部条件「IEDCが必要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 | 2-4-1. 外部条件「IEDCが必要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 | 現時点における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性度(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。 |
| | | 2-4-2. 外部条件「IEDCが必要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. 給与条件が省庁よりよく、特にカウンタート・ハ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 | 実績参照 | ・計画と実績の対照表確認 | 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 | 実績参照 | ・計画と実績の対照表確認 | 実績グリッド参照 |
| 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「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「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 | 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 | ・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) EDC | ・長期専門家、MIME、EAC、EDC | ・インタビュー、質問表 | 特になし。 |
| | | 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 | ・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 | |
| | | 4-1-3. 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 | ・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) EDC | ・長期専門家、MIME、EAC、EDC | ・インタビュー、質問表 | 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「配電系統がEDCによって効率的および適切に運営される」に乖離はないか | 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」に乖離はないか | ・乖離の有無 | ・乖離の有無(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。 |
| | | 4-2-2. 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。 | ・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。 |
| | | 4-2-3. 上位目標以外のプロジェクトの効果、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 | 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。 |
| 4-3. 予想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 | 4-3-1. 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。 |
| | | 4-3-2. マイナスの効果、影響があつた場合の軽減対策 | ・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. 異なるプロジェクトのプラス、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 ・組織の有無ならびにその中での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) | ・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)の組織の有無ならびにその中での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) | ・長期専門家、EDC | ・インタビュー、質問表 | 個人の人材、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。 |
| | 5-2. 組織能力の有無 | 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) | ・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) | ・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。 |
| 5-3. 供与機材の維持管理 | 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 | ・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。 | |
| 5-4. 自立発展性を妨げる要因 | 5-4. 自立発展性を妨げる要因 | 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 | ・EDC職員の技術能力、指導能力 | ・EDC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 | ・要因の有無 | ・要因の有無(インタビュー、質問表) | ・要因の有無(インタビュー、質問表) | ・長期専門家、MIME、EDC | ・インタビュー、質問表 | 特になし。 |