

3. 合意文書 (MOU)

**MEMORANDUM OF UNDERSTANDING
BETWEEN
JAPAN INTERNATIONAL COOPERATION AGENCY
AND
ELECTRICITE DU CAMBODGE
ON
PROJECT FOR IMPROVEMENT OF
TRANSMISSION SYSTEM OPERATION AND MAINTENANCE**

DATE: September 28, 2012
PLACE: Phnom Penh,
The Kingdom of Cambodia

For
Japan International
Agency



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Chief Representative
JICA Cambodia Office

For
Electricite Du Cambodge



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RGC Delegate in charge of Managing
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I. INTRODUCTION


Japan International Cooperation Agency (hereinafter referred to as "JICA") dispatched a survey mission (hereinafter referred to as "the JICA Mission") to the Kingdom of Cambodia from June 4 to June 12, 2012 for the purpose of developing a detailed plan for the Project for Improvement of Transmission System Operation and Maintenance (hereinafter referred to as "the Project").

During its stay in the Kingdom of Cambodia, the JICA Mission exchanged views and held a series of discussions with the representatives of relevant organizations of the Kingdom of Cambodia.

As a result, the JICA Mission and Electricite Du Cambodge (hereinafter referred to as "EDC") confirmed that both parties would sincerely cooperate with each other with a view to contributing toward smooth implementation and enhancing development effect of Greater Mekong Power Network Development Project (Cambodia Growth Corridor) signed on March 26, 2007 by attaining the purposes of the Project.

The Project will be carried out within the framework of the Agreement on Technical Cooperation signed on June 17, 2003 (hereinafter referred to as "the Agreement") and the Notes Verbale between the Government of Japan (hereinafter referred to as "GOJ") and the Royal Government of Cambodia (hereinafter referred to as "RGC"), and privileges, immunities and other benefits necessary for smooth implementation of the Project will be granted to the Japanese experts, missions and their families accordingly.

Appendix 1: PROJECT DOCUMENT

Appendix 2: MAIN POINTS DISCUSSED 



PROJECT DOCUMENT

I. BACKGROUND

Cambodian electric power sector, especially transmission system has grown rapidly in recent years. Specifically, new high voltage transmission lines and substations construction projects have been completed/planned, Japan's ODA loan project "Greater Mekong Power Network Development Project (Cambodia Growth Corridor)" will be completed and the National Control Center (NCC) will be started to operate soon. EDC is expected to develop its human resources to correspond to these progresses.

This project was requested to transfer technology and train engineers for maintenance and management of transmission and transformation facilities, and to upgrade the contents of training courses of it, network operation and relay protection in EDC.

II. OUTLINE OF THE PROJECT

Details of the Project are described in the Project Design Matrix (PDM) (Annex 1) and the tentative Plan of Operation (Annex 2).

1. Project Title

JICA has explained to the Cambodia side that the Project title will change from "Capacity and Institutional Building of the Electric Power Sector (Phase2)" to "Project for Improvement of Transmission System Operation and Maintenance", to which both sides have agreed.

2. Overall Goal


Overall goal of the Project is "Electrical power is stably supplied in Phnom Penh power grid".

3. Purpose

Purpose of the Project is "Electrical power is stably supplied in Phnom Penh bulk power system".

4. Output

(1) Capacity of operation and maintenance of transmission line and substation facilities in Phnom Penh system is enhanced.

(2) Basic capacity of enhanced power system operation such as planning, 



scheduling and actual execution is strengthened.

5. Activities

Necessary activities in the Project, as shown in Annex 1(PDM)

6. Input

(1) Input by JICA

(a) Dispatch of Experts

- Chief Advisor
- Transmission Line 1 (leader)
- Transmission Line 2
- Transmission Line 3
- Substation facilities 1 (leader)
- Substation facilities 2
- Substation facilities 3
- System management (leader)
- System management (SCADA)
- System management (Relays)
- System management (Communication)
- Organizational/Training Management
- Training Management /Coordinator (long-term expert)

(b) Provision of Overseas Training of EDC personnel

- Necessary overseas trainings in neighboring countries

(c) Provision of Equipment

- Tentative equipment for activities, as shown in Annex 3

Contents of equipment will be determined through mutual consultations between JICA and EDC during the implementation of the Project.

(2) Input by EDC

EDC will take necessary measures to provide at its own expense:

- (a) Services of EDC's counterparts personnel and administrative personnel as referred to in III-1;
- (b) Suitable office space with necessary equipment;
- (c) Supply or replacement of machinery, equipment, instruments vehicles, tools, spare parts and any other materials necessary for the implementation of the Project other than equipment provided by JICA;
- (d) Credentials or Identification cards;
- (e) Available data (including maps and photographs) and information related to the Project; and, *Ch*

(f) Running expenses necessary for the implementation of the Project

7. Project Site

Phnom Penh power grid area

8. Duration

The duration of the technical cooperation for the project under this Attached Document will be two years and nine months.

9. Reports

EDC and JICA experts will work together to prepare the following reports in English.

- (1) Progress Report on semiannual basis until the project completion
- (2) Project Completion Report at the time of project completion

10. Social/Environmental Consideration

EDC agreed to abide by 'JICA Guidelines for Environmental and Social Considerations (April 2010)' in order to ensure that appropriate considerations will be made for the environmental and social impacts of the Project.

III. IMPLEMENTING ARRANGEMENTS

1. Administration of the Project

The roles and assignments of relevant organizations are as follows:

(1) EDC will assign:

- (a) Project Director (who will bear overall responsibility for the administration and implementation of the project) : Deputy Managing Director, Planning and Techniques, EDC
- (b) Project Manager (who will bear responsibility on the managerial and technical matters): Director of Transmission Department, EDC
- (c) Project Co-Manager: Director of Institute of Electrical Science, EDC
- (d) Other counterparts

(2) JICA Experts

The JICA experts will give necessary technical guidance, advice and recommendations to EDC on any matters pertaining to the implementation of the Project. *u*



(3) Joint Coordinating Committee

Joint Coordinating Committee (hereinafter referred to as "JCC") will be established in order to facilitate inter-organizational coordination. JCC will be held at least once a year and whenever deems it necessary. JCC will approve an annual work plan, review overall progress, conduct monitoring and evaluation of the Project, and exchange opinions on major issues that arise during the implementation of the Project. A list of proposed members of JCC is shown in the Annex 4.

2. Evaluation

(1) Ex-Ante Evaluation

Ex-Ante Evaluation was conducted jointly by JICA and the Cambodian authority concerned during JICA mission's stay. Summary of the Ex-Ante Evaluation is as per Annex 5.

(2) Terminal Evaluation and Ex-Post Evaluation

Evaluation of the Project will be conducted jointly by JICA and the Cambodian authority concerned, during the last six months of the Project (Terminal Evaluation) and after completion (Ex-Post Evaluation) in order to examine the level of achievement and impact of the Project. Ex-Post Evaluation will be conducted three (3) years after the Project completion, in principle.

3. Undertakings of EDC

- (1) EDC will provide counterpart personnel and suitable office space with necessary equipment and secretariat services.
- (2) EDC will take necessary measures to ensure that the self-reliant operation of the Project will be sustained during and after the period of the Project, through full and active involvement in the Project by all related authorities, beneficiary groups and institutions.
- (3) EDC will ensure that the technologies and knowledge acquired by the Cambodia nationals as a result of the Project will contribute to the economic and social development of the Kingdom of Cambodia.
- (4) EDC will ensure that the Equipment referred to in II-6 above will be utilized effectively for the implementation of the Project in consultation with the Japanese experts and properly utilized/managed even after completion of the Project.
- (5) EDC will take necessary measures to ensure that the knowledge and experience acquired by the Cambodia personnel from technical training in *ca*

neighboring countries will be utilized effectively in the implementation of the Project.

- (6) EDC will provide security-related information as well as measures to ensure the safety of the experts.
- (7) EDC will provide information as well as support in obtaining medical service.
- (8) EDC will provide credentials or identification cards.
- (9) EDC will take necessary measures to permit the experts to enter, leave and sojourn in the Kingdom of Cambodia for the duration of their assignments therein.

4. Mutual Cooperation

JICA and EDC will consult each other whenever any major issues arising in the course of Project implementation.

Annex 1 Project Design Matrix


Annex 2 Tentative Plan of Operation

Annex 3 Tentative List of Equipment

Annex 4 Joint Coordinating Committee

Annex 5 Summary of Ex-Ante Evaluation

Annex 6 Tentative Lists of Counterparts

Annex 7 Organization Chart 



MAIN POINTS DISCUSSED

1. National Control Center (NCC)

Both parties agreed that starting operation of NCC is crucially important and prerequisite for a part of JICA experts' Activities II shown in Annex 2. EDC assured that NCC will be ready for operation by the end of September 2012 by taking all means including negotiations with the original contractors, and that supporting systems for equipment and software installed to NCC will be acquired by the original manufactures. JICA reiterated that technology transfers using equipment in NCC (eg. SCADA, Training Simulator) can be conducted only after NCC starts operation. EDC agreed to that.

2. Provision of Equipment


Both parties agreed that contents, specification and quantity of equipment in Annex 3 will be finalized through mutual consultations taking into account the priority within the allocated budget of Japanese fiscal year.

EDC ensured that EDC will take responsibility to properly utilize and maintain all the equipment to be provided by the Project (including that to Institute of Electrical Science).

3. Overseas Training

Both parties agreed that number of personnel who will join overseas training will be decided through mutual consultations within the allocated budget of Japanese fiscal year.

4. Location of JICA Experts' Office

Both parties agreed that location of JICA expert's office space will be decided through mutual consultations. 

End



Project Name: Project for Improvement of Transmission System Operation and Maintenance

Project Period: 2 years and nine months (33 months)

Implementation Agency: Electricite du Cambodge: EDC

Project Site: Phnom Penh power grid area

Target Groups: Staff of Transmission Department, Generation Department, Business and Distribution Department, and Instructors of the EDC Institute of Electrical Science

Direct Beneficiaries: Transmission Department, Generation Department and Business and Distribution Department of EDC and the EDC Institute of Electrical Science

Indirect Beneficiaries: Electrical power users in Phnom Penh city

Date: September 28, 2012

Narrative Summary	Objectively Verifiable Indicators	Means of Verification	Important Assumptions
<p><u>Overall Goal:</u></p> <p>Electrical power is stably supplied in Phnom Penh power grid.</p>	<ol style="list-style-type: none"> SAIFI in Phnom Penh power grid SAIDI in Phnom Penh power grid 	Data from EDC	
<p><u>Project Purpose:</u></p> <p>Electrical power is stably supplied in Phnom Penh bulk power system.</p>	<ol style="list-style-type: none"> Serious accidents or troubles¹ at TL and SS do not occur. The duration and the frequency of power outage are reduced. (Note: Since the causes of power outage vary and include issues such as balance of power demand and supply, JICA experts will review the detailed causes and judge whether this goal is fulfilled.) 	<ul style="list-style-type: none"> Reports on accident/troubles Data from EDC 	<ul style="list-style-type: none"> Power plants in Phnom Penh power grid supply power as planned. Electricity is stably imported from neighboring countries. Distribution facilities in Phnom Penh power grid are appropriately operated and maintained.
<p><u>Output:</u></p> <p>1. Capacity of operation and maintenance of transmission line (TL) and substation facilities (SS) in Phnom Penh bulk power system is enhanced.</p>	<ol style="list-style-type: none"> 1-1. Patrol and inspection of TL and SS are safely practiced complied with formulated rules. 1-2. Accidents/troubles at TL and SS are prevented from occurring. 1-3. The number of trainers who are certified as trainers² 	<ol style="list-style-type: none"> 1-1. List of rules formulated/report on patrol and inspection 1-2. Report on accidents/troubles/ Assessment by JICA experts 1-3. Progress report/report on trainings 	<ul style="list-style-type: none"> EDC appropriately allocates the budget for operation and maintenance for the facilities and staff training.

¹ Serious accident and troubles means fire on transformer or cut of conductors

² The target number is determined after activity 1-1.

<p>2. Basic capacity of enhanced power system operation such as planning, scheduling and actual execution is strengthened.</p>	<p>2-1. The planned outage coordination and operation is appropriately carried out complied with the formulated rules on the planned outage scheduling. (Firm information sharing and its conveyance through reciprocal coordination among relevant departments)</p> <p>2-2. Protection relays are properly operated. (to be specified after project is started)</p> <p>2-3. EDC staff is able to operate and maintain SCADA system and to supervise power system and control facilities utilizing SCADA. (to be specified after project is started)</p> <p>2-4. The number of trainers for power system operation³ at relevant departments of EDC.</p>	<p>2-1. Assessment of JICA experts/Plan of scheduled outage</p> <p>2-2 & 2-3. Assessment of JICA experts</p> <p>2-4. Progress report/report on trainings/Assessment by EDC top management and JICA experts</p>			
<p><u>Activities</u></p> <p>1-1. Review and analyze the current practice of operation and maintenance of transmission line (TL) and substation facilities (SS).</p> <p>1-2. Formulate rules⁴ for operation and maintenance for TL and SS</p> <p>1-3. Procure the equipment and tools for TL and SS training facilities</p> <p>1-4. Develop criteria to certify trainers</p> <p>1-5. Conduct training of trainers (TOT) on how to apply the formulated rules.</p> <p>1-6. Organize internal seminar to disseminate the existing and formulated rules to relevant staff of EDC (Trainers will be lecturers)</p> <p>1-7. Develop the training materials of formulated rules in Activity 1-2.</p> <p>1-8. Incorporate the revised program into the short course trainings at the EDC Institute of Electrical Science (EDC Training Center)</p> <p>1-9. Conduct OJT on patrol, inspection, operational safety and usage of tools for EDC staff (conducted by trainers)</p> <p>2-1. Review and analyze the current practice of power system operation (operation of</p>	<p style="text-align: center;"><u>Inputs</u></p> <table border="0" style="width: 100%;"> <tr> <td style="width: 50%; vertical-align: top;"> <p style="text-align: center;"><u>Japanese side</u></p> <ul style="list-style-type: none"> ● JICA Experts <ul style="list-style-type: none"> ➢ Chief Advisor ➢ Transmission Line 1 (leader) ➢ Transmission Line 2 ➢ Transmission Line 3 ➢ Substation facilities 1 (leader) ➢ Substation facilities 2 ➢ Substation facilities 3 ➢ System management (leader) ➢ System management (SCADA) ➢ System management (Relays) ➢ System management (Communication) ➢ Organizational/Training Management ➢ Training Management/Coordinator (long-term expert) ● Overseas trainings ● Provision of Equipment </td> <td style="width: 50%; vertical-align: top;"> <p style="text-align: center;"><u>Cambodian side</u></p> <ul style="list-style-type: none"> ● Office space for JICA experts ● Allocation and Assignment of counterpart personnel </td> </tr> </table>	<p style="text-align: center;"><u>Japanese side</u></p> <ul style="list-style-type: none"> ● JICA Experts <ul style="list-style-type: none"> ➢ Chief Advisor ➢ Transmission Line 1 (leader) ➢ Transmission Line 2 ➢ Transmission Line 3 ➢ Substation facilities 1 (leader) ➢ Substation facilities 2 ➢ Substation facilities 3 ➢ System management (leader) ➢ System management (SCADA) ➢ System management (Relays) ➢ System management (Communication) ➢ Organizational/Training Management ➢ Training Management/Coordinator (long-term expert) ● Overseas trainings ● Provision of Equipment 	<p style="text-align: center;"><u>Cambodian side</u></p> <ul style="list-style-type: none"> ● Office space for JICA experts ● Allocation and Assignment of counterpart personnel 	<p>● Trained staff of EDC is not transferred to other positions</p> <p>● Transmission line and substation facilities do not get damaged by sever natural disaster.</p>	<p><u>Pre-conditions</u></p> <p>-</p>
<p style="text-align: center;"><u>Japanese side</u></p> <ul style="list-style-type: none"> ● JICA Experts <ul style="list-style-type: none"> ➢ Chief Advisor ➢ Transmission Line 1 (leader) ➢ Transmission Line 2 ➢ Transmission Line 3 ➢ Substation facilities 1 (leader) ➢ Substation facilities 2 ➢ Substation facilities 3 ➢ System management (leader) ➢ System management (SCADA) ➢ System management (Relays) ➢ System management (Communication) ➢ Organizational/Training Management ➢ Training Management/Coordinator (long-term expert) ● Overseas trainings ● Provision of Equipment 	<p style="text-align: center;"><u>Cambodian side</u></p> <ul style="list-style-type: none"> ● Office space for JICA experts ● Allocation and Assignment of counterpart personnel 				

³ The target number is determined after activity 2-1.

⁴ The rules to be prepared: (1) patrol, (2) inspection, (3) work safety, and (4) equipment operation (only SS).

<p>generators, and power system supervision and facilities control) and related planning and scheduling work.</p> <p>2-2. Identify the framework of the enhanced power system operation to which planning and scheduling are properly related.</p> <p>2-3. Prepare manuals⁵ for the enhanced power system operation.</p> <p>2-4. Develop training materials based on the manuals prepared at activity 2-3. (activities are jointly carried out by JICA experts, Business and Distribution Dept. (mainly DCC), Generation Dept. Relay Protection Office, NCC Unit, and Institute)</p> <p>2-5. Conduct the training of trainers (TOT) to relevant staff of target departments utilizing the prepared manuals.</p> <p>2-6. Organize the internal seminar to disseminate newly identified framework of the enhanced power system operation, and the related rules.</p> <p>2-7. Incorporate the training program into the short course trainings at the EDC Institute of Electrical Science (EDC Training Center)</p> <p>2-8. Conduct trainings to the staff of relevant departments. (conducted by trainers)</p>		
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SAIFI: System Average Interruption Frequency Index, SAIDI: System Average Interruption Duration Index
NCC: National Control Center, DCC: Dispatching Control Center

⁵ Jobs to which manual and trainings are applied: (1) the planned outage coordination and scheduling, (2) the plan of economic commitment and dispatch of generators and daily demand & supply operation based on the prepared plan (firstly prepare training materials), (3) power system supervision and facilities control, (4) protection relays (firstly prepare training materials), (5) analysis of power failure causes and their appropriate statistical processing (firstly prepare training materials), and (6) formulating simulator training framework in NCC such as allocation of personnel together with their roles/jobs, support for training scenario development and so on.



	Schedule																											Responsible Organizations						
	1 year									2 year												3 year						Japan	Cambodia					
	1	2	3	4	5	6	7	8	9	#	#	#	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	
Output 1: Capacity of operation and maintenance of transmission line (TL) and substation facilities (SS) in Phnom Penh bulk power system is enhanced.																																	Chief Advisor, and Transmission Line (leader), Substation facilities (leader)	Director and Deputy Director of Transmission Dept.
1-1 Review and analyze the current practice of operation and maintenance of transmission line (TL) and substation facilities (SS)	■	■																														Transmission Line Experts, Substation Experts, Organization/Training Mgt, Training Mgt/Coordinator	Staff of Transmission System Unit, and the instructors of the Institute	
1-2 Formulate rules for operation and maintenance for TL and SS		■	■	■	■	■																												
1-3 Procure the equipment and tools for TL and SS training facilities	■	■	■	■	■	■	■	■																										
1-4 Develop criteria to certify trainers									■	■																								
1-5 Conduct training of trainers (TOT) on how to apply the formulated rules.										■	■																							
1-6 Organize internal seminar to disseminate the existing and formulated rules to relevant staff of EDC (Trainers will be lecturers)											■	■																						
1-7 Develop the training materials of formulated rules in Activity 1-2.												■	■	■	■																			
1-8 Incorporate the revised program into the short course trainings at the EDC Institute of Electrical Science (EDC Training Center)													■	■	■	■																		
1-9 Conduct OJT on patrol, inspection, operational safety and usage of tools for EDC staff (conducted by trainers)																																		
Output 2. Basic capacity of enhanced power system operation such as planning, scheduling and actual execution is strengthened.																																	Chief Advisor, and System Management (leader)	Director and Deputy Director of Transmission Dept.
2-1 Review and analyze the current practice of power system operation (operation of generators, and power system supervision and facilities control) and related planning and scheduling work	■	■																															System Management (leader, SCADA, Relay, Communication) Training Mgt/Coordinator	Staff of DCC, Planning and Generation Office, Relay Protection Office, NCC Unit, and instructors of the Institute
2-2 Identify the framework of the enhanced power system operation to which planning and scheduling are properly related.			■	■	■	■																												
2-3 Prepare manuals for the enhanced power system operation			■	■	■	■	■																											
2-4 Develop training materials based on the manuals prepared at activity 2-3. (activities are jointly carried out by JICA experts, Business and Distribution Dept. (mainly DCC), Generation Dept. Relay Protection Office, NCC Unit, and Institute)			■	■	■	■	■																											
2-5 Conduct the training of trainers (TOT) to relevant staff of target departments utilizing the prepared manuals.											■	■																						
2-6 Organize the internal seminar to disseminate newly identified framework of the enhanced power system operation, and the related rules.												■	■																					
2-7 Incorporate the training program into the short course trainings at the EDC Institute of Electrical Science (EDC Training Center)													■	■	■	■																		
2-8 Conduct trainings to the staff of relevant departments. (conducted by trainers)																																		
Kick-off Meetings, JCC, or other meetings	△																																	△

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Annex 3

Tentative List of Equipment

No	Field	Item	Specification	Quantity	Reference	
1	Transmission Dept	Safety Tools	Safety belt	10		
2			Safety Save Life	Anti fall	10	
3			Laser gloves		10	
4			Conductive uniform		10	
5			Rubber gloves		10	
6		Measurement Tools	Distance Meter	Digital type	1	
7			Ground resistance meter		1	
8			Insulation resistance meter		2	
9			Leakage current meter		1	
10			Windmill type voltage detector	For 115 kV	1	
11			Windmill type voltage detector	For 230kV	1	
12			Voltage meter		1	
13			Ampers meter		1	
14		Camera for corona discharge measurement(All day time)		1		
15		Inspection Equipments	Inspection equipments for transformer (1 set)		1	
16			Inspection equipments for circuit breaker (1 set)		1	
17			Inspection equipments for arrester (1 set)		1	
18			Inspection equipments for disconnect or (1 set)		1	
19		Others	Small tools (1 set)		1	
20	Institute of Electrical Science	Training Equipments	Training towers	115kV, 2 circuits, prototype	3	
21			Tester of protection and control relays (1 set)		1	
22		Safety Tools	Helmet		10	
23			Safety belt		10	
24			Safety shoes	Conductive Type	10	
25			Laser gloves		10	
26			Rubber gloves		5	
27		Measurement Tools	Thermo-hygrometer		1	
28			Voltage withstanding test equipment		1	
29			Windmill type voltage detector	For 115 kV	1	
30			Windmill type voltage detector	For 230kV	1	
31			Voltage detector	For 115 kV	1	
32			Voltage detector	For 230kV	1	
33			AC/DC tester		3	
34			Distance Meter	Digital type	1	
35			Ground resistance meter		1	
36			Insulation resistance meter		1	
37		Voltage meter		1		
38		Ampere meter		1		
39		Earthing Tools	Earthing system	For 115 kV	1	
40			Earthing system	For 230 kV	1	
41	HV and LV clamps			3		
42	Earth clamp			3		
43	3 phase earth rod set		For 115 kV	1		
44	Others	Binocular		2		
45		Small tools (1 set)		1		
46	Project Office	Office Equipments	Desk Top PC		2	For database of rules and manuals
47			Color copy machine with printer		2	
48			Uninterrupt Power System		2	
49			Projector		2	

JOINT COORDINATING COMMITTEE

1. Function

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

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

2. Membership

(1) Chairperson: Project Director

(2) Members:

-Cambodian side

Project Manager

Project Co-Manager

-Japanese side

Chief advisor and other JICA experts

Representative (s) from JICA Cambodia Office

-Other stakeholders appointed by the Chairperson *u*

SUMMARY OF EX-ANTE EVALUATION

RELEVANCE

- The Royal Government of Cambodia (RGC) addressed further rehabilitation and construction of physical infrastructure as one of the key policies in National Strategic Development Plan (NSDP) updated 2009-2013. The development of energy sector is included in sub-components to pursue this policy, and set up three major prioritized areas: These are 1) to increase electricity supply capacity, 2) to reduce tariff to an appropriate level, and 3) to strengthen institutional mechanism and management capability. In regard to third priority, the NSDP mentioned that the RGC would also pay attention to capacity building and institutional reform in the Electricity Authority of Cambodia (EAC), Electricite Du Cambodge (EDC) and other relevant ministries and agencies to improve management efficiency and the quality of electricity supply. Therefore, the Project aiming to enhance the capacity of EDC to stably supply electrical power focusing on transmission line/substation facilities and power system operation has consistency with the policy on energy sector in Cambodia.
- The EDC is responsible for the maintenance and management of the major part of the national grid and will be also responsible for a number of new transmission line and substation facilities which are currently under construction. The Transmission Department established in 2008 is responsible for operating and maintaining transmission line and substation facilities. Therefore, the EDC has strong needs of having personnel available with necessary maintenance and repair knowhow to meet a significant increase in the scale of the facilities. In addition, the National Control Center, established under the WB fund, is in preparation for its operation. EDC also needs to enhance the capacity of the power system operation with good collaboration among relevant departments within the EDC. Therefore, the proposed components of the Project meet the needs of the EDC.
- The EDC currently is extending the transmission line between Kampot and Preah Sihanouk with the assistance of JICA loan project of Greater Mekong Power Network Development Project (Cambodia Growth Corridor). Therefore, the capacity enhancement of operation and maintenance of transmission line and substation facilities and power system operation provided by this Project will certainly contribute to good operation and maintenance of newly constructed transmission line and to increase in the reliability of stable power supply.

EFFECTIVENESS

The Project ensures its effectiveness from the viewpoints as followed:

- The project purpose is to stably supply electrical power in Phnom Penh bulk power system. To fulfill this purpose, the Project has two components.
 - 1) Capacity of operation and maintenance of transmission line (TL) and substation facilities (SS) in Phnom Penh bulk power system is enhanced.
 - 2) Basic capacity of enhanced power system operation such as planning, scheduling and actual execution is strengthened.

Under the first component, the Project will train EDC engineers so as to become able to appropriately operate and maintain the relevant facilities complied with specified rules, such as

patrol, inspection, work safety and equipment operation (substation). The second component will focus on capacity enhancement of power system operation covering the issues of the planned outage coordination and scheduling, the plan of economic commitment and dispatch of generators and daily demand & supply operation based on the prepared plan, and power system supervision and facilities control. These two components are sufficient to fulfill the project purpose.

- There are several internal and external factors that may affect the fulfillment of the project purpose. These are as follows.
 - The EDC appropriately allocates the budget for operation and maintenance for the facilities and staff training.
 - Relevant departments of EDC have good coordination to carry out the project activities.
 - Trained staff in the Project remains in his/her original positions.
 - NCC needs to start its operation as confirmed in June 2012; otherwise, the degree of technical guidance on power system operation in regard to SCADA would be limited.

The Project will monitor these factors and ensure that these risks would not occur or adversely affect the project attainment.

EFFICIENCY

The Project ensures its efficiency as follows:

- The proposed implementation schedule of the Project secures sufficient lead time from the review and analysis of current practices of operation and maintenance and power system operation until training of EDC engineers. Also, it sets up approximately one year to provide training for EDC engineers by the trained staff. All activities are in place to produce expected outputs within the planned implementation period.
- EDC has experience to implement the JICA technical cooperation project; therefore, the Project will be smoothly started and implemented.
- The project activities have some critical paths in its schedule. The Project needs to ensure that related activities should be completed before proceeding to the next activities. Those are: formulation of relevant rules, the identification of framework of revised power system operation, procurement of equipment or tools for training, and preparation of teaching materials.

IMPACT

- The expected impact to be achieved after the Project is that electrical power is stably supplied in Phnom Penh power grid. Given that other important factors also have to be satisfied to achieve this goal besides the Project, it is difficult to verify the extent to which this Project will solely contribute to stable power supply in Phnom Penh power grid. Yet, the Project covers one of the important components for stable power supply and will certainly bring positive impacts in electrical power sector.
- The external factors toward achieving the overall goal of the Project is as follows:
 - Power plants in Phnom Penh power grid supply power as planned.
 - Electricity is stably imported from neighboring countries.
 - Distribution facilities in Phnom Penh power grid is appropriately operated and maintained.

SUSTAINABILITY

- Since any significant changes have not been observed in the policy of energy sector, especially in the electrical power sector, the favorable policy environment is likely to keep supporting the EDC in the future.
- The EDC's financial position has remained in surplus for the last five years; therefore, it is expected that the EDC will allocate a certain amount of budget to operation and maintenance of transmission line and substation facilities, and to the staff training for the Transmission Department and other relevant departments including the staff in charge of power system operation.
- The Project, firstly, train the key personnel in relevant technical areas, and afterward, the trained key personnel will provide training to other staff. Through the project activities, trainer will be able to acquire the substantial knowledge, experience and knowhow on operation and maintenance of transmission line and substation facilities and power system operation. They will instruct other EDC staff working outside of Phnom Penh bulk power system. Moreover, the instructors of the EDC Institute of Electrical Science (Training Center) will be involved in project activities and training program to be developed by the Project will be incorporated into the existing short training courses of the Institute. Therefore, the sustainability is high in technical aspect. *uh*



LIST OF EDC COUNTERPART PERSONNEL

1. Project Director
Deputy Managing Director, Planning and Techniques
2. Project Manager
Director of Transmission Department
3. Project Co-Manager
Director of Institute of Electrical Science
4. Staffs from Transmission Office, Transmission Department
5. Staffs from Relay Protection Office, Transmission Department
6. Staffs from National Control Center, Transmission Department
7. Staffs from Institute of Electrical Science
8. Staffs from Planning and Generation Office, Generation Department
9. Staffs from Dispatching Control Center, Business and Distribution Department
10. Other personnel mutually agreed upon as necessary *M*

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ORGANIZATION CHART
FOR THE ADMINISTRATION OF THE PROJECT

