

# Chapter 7

## **Cambodia's Electricity Sector in the Context of Regional Electricity Market Integration**

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## CHAPTER 7

# Cambodia's Electricity Sector in the Context of Regional Electricity Market Integration

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*Cambodia's integration into the regional electricity market is a policy priority. With a constrained supply-side, the increasing demand posts a critical challenge for electricity sector development. Against this backdrop, this paper provides an overview of the current situation of Cambodia's electricity sector and explores other critical issues in the sector. Diesel and heavy fuel oil is the major source of power generation as hydropower will be the successor source in the future. Tariffs range from US¢9-25/kWh for EDC grid and US¢40-80/kWh for rural areas. Electrification rate through grid expansion is about 24.72 per cent in 2009. Cambodia's electricity tariff remains one of the highest in the region and the world. With a consolidate license, EDC, the state-owned utility, is the dominant key player in the electricity market. Two main institutions playing important roles in governing the electricity sector include MIME and EAC. The electricity sector remains underinvested. Only large scale investment projects are preferred in the market. High-voltage transmission connections, large-scale hydropower dams, and coal-fired plants have been the focused priority for power development thus far. Barriers to investments include huge capital requirement for large-scale projects, insufficient legal and institutional framework, and high administrative costs. Therefore, it is essential that national grid development is accelerated and more investment is encouraged in order to reduce current high tariffs. Investment climate must be enhanced to be conducive to foreign and local investment.*

## **1. Introduction**

Energy cooperation is one of the focused priorities in the East Asia Summit (EAS) region. To advance this cooperation, energy market integration is, among other things, laid out by the member countries to address barriers of trade and investments in the energy sector across the region. Being a member of the sixteen-countries-EAS region, Cambodia, one of the poorest countries in the region, needs to take steps to accelerate this envisaged integration and to fulfill its increasing demand for electricity for continued economic development.

Cambodia has achieved strikingly high rates of economic growth over the past ten years; the real gross domestic product (GDP) grew on average 8.0 % per annum. This robust growth has stimulated substantially-increasing demands for electricity. With a constrained supply-side, Cambodia faces critical challenges in satisfying this greater demand. In this regard, regional electricity market integration serves as a useful tool for Cambodia to optimize benefits enhancing the domestic electricity sector and to further regional energy cooperation.

Despite remarkable improvement in the energy sector, the electrification rate in Cambodia remains low. The majority of the population is not connected to electric power networks. Moreover, electricity cost remains one of the highest in the region and the world. Investment in the electricity sector represents a small proportion of the total investment needed for electricity sector development.

Although electricity imports from neighboring countries have been on the rise, the supply of electricity still suffers shortage and reliability. Electricity market players are diverse, ranging from small Rural Electricity Enterprises (REEs) and Independent Power Producers (IPPs) to the state-owned utilities while a national power grid has not yet materialized. In terms of regional cooperation, the government's current policies and strategies have significant effects and implications for electricity supply and coverage in Cambodia.

Against this background Cambodia's electricity sector has steadily developed in the past decade, although its development has not been at parity with the pace of economic development. Therefore, to better understand the current situation of the Cambodia's

electricity sector, this paper considers the overall situation and progress of the sector in the context of regional integration. It is crucially important to shed light on furthering development of the electricity sector in Cambodia and integrating Cambodia's electricity market into the region.

With the main purpose of providing a general background of the electricity sector in Cambodia, the study has five objectives as follows:

- 1) To lay out an overview of Cambodia's electricity sector covering issues such as supply, demand, transmission, tariffs, investment, access, electrification, and government strategies and policies;
- 2) To summarize present strategies and policies of the Cambodian government in regards to the ASEAN Power Grid (APG);
- 3) To understand the current situation of investment in the electricity sector covering issues such as key market players, main investment barriers, and the attraction of foreign investment in the sector;
- 4) To illustrate a case study of Cambodian electricity imports from Vietnam; and
- 5) To explore other issues which are significant and relevant to electricity sector.

## **2. Overview of the Cambodian Economy**

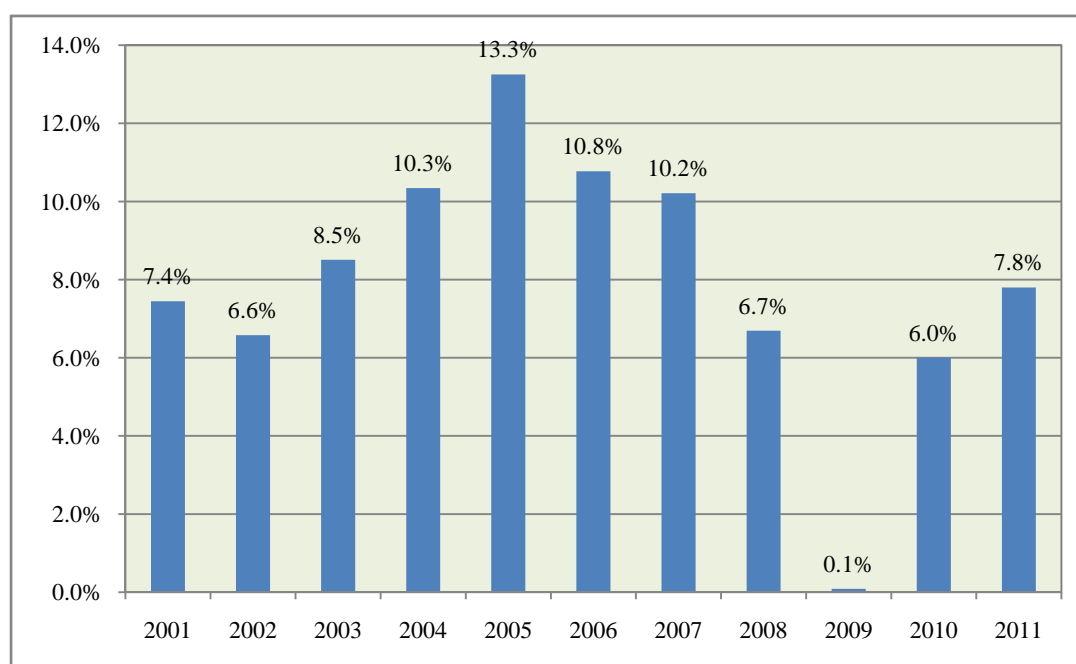
Cambodia, officially known as the Kingdom of Cambodia, is a member of the Association of the Southeast Asian Nations (ASEAN) and Greater Mekong Subregion (GMS). Situated at the heart of the GMS, Cambodia is a land of rice and forest covered by the Mekong River and Tonle Sap Lake (ESMAP, 2005). It is bordered with Thailand and the gulf of Thailand in the West and South respectively, Vietnam in the East, and Lao PDR in the North. With a total area of 181,035 Km<sup>2</sup>, Cambodia has a total population of about 15 million, of which approximately 80 % live in rural areas.

Cambodia had gone through several civil wars over three decades since the military coup d'état in 1970. In particular, the Cambodian economy had been gravely destroyed during the genocidal Democratic Kampuchea regime during 1975-1979. As a result, the economy plunged into almost zero levels of growth because either physical or non-

physical infrastructure had been demolished. The economy began to develop from this level as a socialist economy before it embarked upon free-market economy in 1989 (MoE, 2002). The country had its first national election in 1993, and the economy developed gradually and steadily to be a post-conflict economy in 1999 when reconciliation among all political tendencies was successfully accomplished.

In the last decade, Cambodia enjoyed exceptionally high rates of economic growth. The economy grew 8.0% per annum on average during 2001-2010.<sup>1</sup> The economy experienced the highest growth rate at 13.3 percent in 2005. Later, it declined from 6.7% in 2008 to 0.1% in 2009 due to global economic downturn in 2008/2009 because Cambodia's major economic sectors such as garment, tourism, and construction dramatically contracted. Real GDP growth started to edge up again to around 6.0% in 2010 and was estimated to realize a rate of 7.8% in 2011 (Khin, *et al.* 2012). In the meantime, Cambodia needs to achieve at least an average growth rate of 6-7% per annum to achieve sustainable poverty alleviation in accordance with government policy ambitions. In this regard, development of the electric power sector needs to be hastened to support sustainable growth and economic development.

**Figure 1: Cambodia's Real GDP Growth Rate over 2001-2011**



Source: Data compiled from NIS and EIC estimate (2011).

<sup>1</sup> Data compiled from the National Institute of Statistics (NIS).

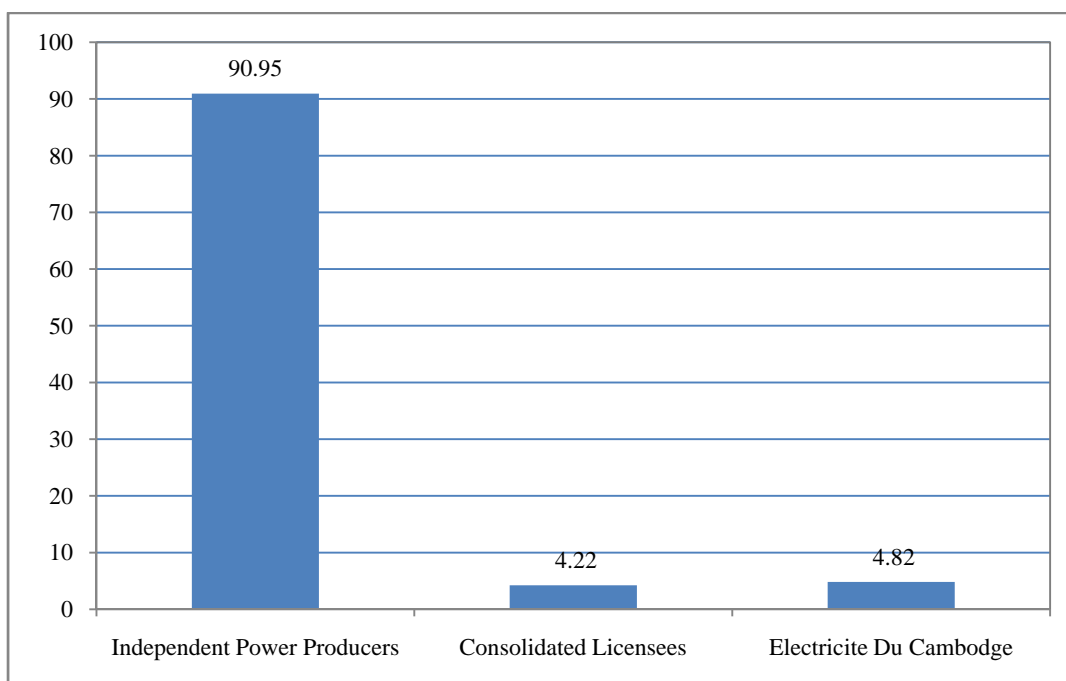
### 3. Electricity in the Energy Sector

#### 3.1. Overall Situation

The power sector in Cambodia is supplied by different sources such as heavy fuel oil (HFO), diesel, gasoline, gas, wood, coal, hydropower, wind and solar energy, biomass, and biogas (World Bank, 2006). The major source of power generation is diesel and HFO. Cambodia actively seeks other alternative sources which have high possibility for power generation. Noticeably, hydropower, which holds considerable potentials for power production in Cambodia, will become the major source in the long term (World Bank, 2006).

Electric power supplied throughout the country is sourced from three different types of licensees including the state-owned Electricite du Cambodge (EDC), IPPs, and consolidated licensees including REEs. However, REEs supply electricity typically in the rural areas. As shown in the following Figure 2, the capacity of electricity sent out by IPPs accounts for approximately 90.95% of electricity supply in Phnom Penh, followed by 4.82% by EDC and 4.22% by consolidated licensees.

**Figure 2: Proportion of Energy Sent Out by Licensee in 2010 in Phnom Penh (%)**

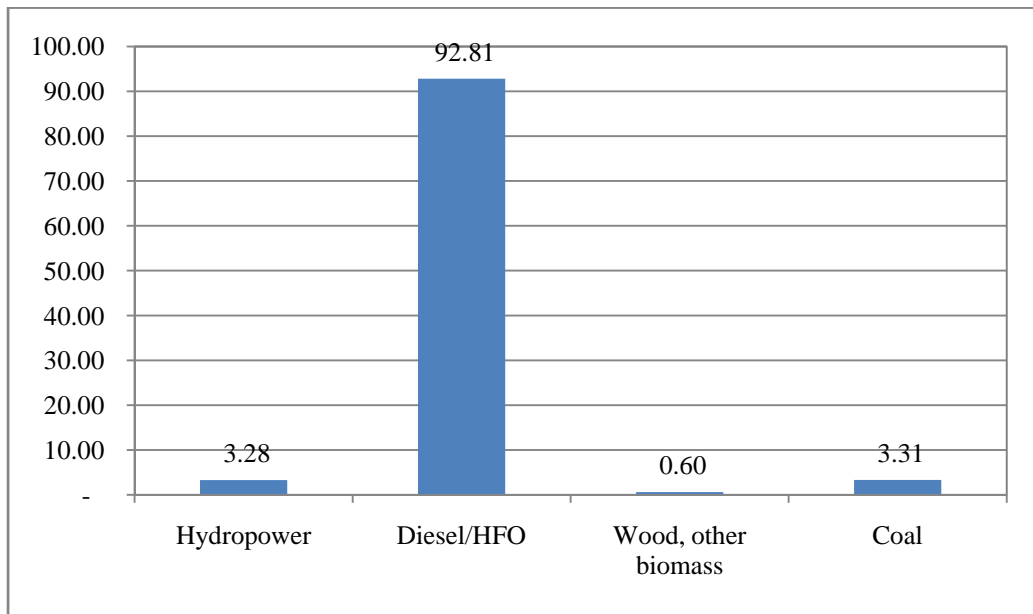


Source: EAC Annual Report 2010.

Although the Electricity Authority of Cambodia (EAC) reports the usage of different sources of power, the main source of power in which licensees across the country are utilizing is diesel which is imported from abroad making the electricity tariff very volatile. In 2010, diesel accounted for almost 93% of the total power sources used to generate electricity (Figure 3).

This indicates that the price of electricity is rather unstable because it is attached to the cost of diesel. Given the fact that Cambodia is an oil-importing country, the cost of diesel is quite sensitive to global market movements; thus, the price of electricity moves generally along with the fluctuation of the cost of diesel. It is worthwhile noting that the volatility of the electricity price significantly affects the ability of consumers to pay electricity bills and impacts investors' sentiments.

**Figure 3: Proportion of Energy Sent Out by Sources in 2010 (%)**



Source: EAC Annual Report 2010.

According to the EAC, consumers' demand for electricity increases every year; hence, the demand for electricity-producing capacity installed must also be increased. In 2002, the number of consumers was only 182,930 (Table 1). Consumer numbers increased about 268% to reach 672,709 in 2010. In the meantime, installed capacity edged up around 310% from 614.03 million kilowatt-hour (kWh) in 2002 to 2,515.67 million kWh in 2010. Within the next 15 years, the demand of power in the country is

expected to increase by as much 500% reaching about 3,000 Megawatts (MW) in 2025 (Phnom Penh Post (PPP), 2012).

**Table 1: Number of Energy Consumers by Year**

Items	2002	2003	2004	2005	2006	2007	2008	2009	2010
Number of consumers	182,930	231,964	272,668	306,176	358,270	415,141	487,426	552,521	672,709
% increase over previous year		26.80	17.55	12.29	17.01	15.87	17.41	13.35	21.75
Energy available in million kWh	614.03	692.66	814.13	977.26	1,203.20	1,516.73	1,858.36	2,076.99	2,515.67
%increase over previous year		12.81	17.54	20.04	23.12	26.06	22.52	11.76	21.12
Energy sold in million kWh	525.69	599.04	702.31	858.36	1,057.16	1,349.12	1,664.40	1,853.50	2,254.04
%increase over previous year		13.95	17.24	22.22	23.16	27.62	23.37	11.36	21.61

Source: EAC Annual Report 2010.

With current supply capacity, reliability remains a concern for consumers. Blackouts have been routinely reported, especially in Phnom Penh municipality as the supply capacity reaching peak level, particularly in the dry season, is still below the demand. Phnom Penh is currently requires electricity up to 400 MW per day, but the current supply available is only 290 MW of which half is imported from Vietnam (PPP, 2012). Therefore, there is a huge need for investment in electricity to fulfill demand which is steadily increasing over time. An overview of electricity supply is shown in the following Table 2.

**Table 2: Electricity Sector in Cambodia at a Glance**

Description	Unit	2009	2010	% Change
Electricity generated	million kWh	1,234.59	968.36	(21.56)
Electricity imported from Thailand	million kWh	324.25	385.28	18.82
Electricity imported from Vietnam	million kWh	518.15	1,162.03	124.27
Total electricity import	million kWh	842.40	1,547.31	83.68
Total electricity available	million kWh	2,076.99	2,515.67	21.12
Generation Capacity	kW	372,129	360,078	(3.24)
Number of consumers	#	552,521	672,709	21.75
Electricity sold to consumers	million kWh	1,853.50	2,254.04	21.61
Overall loss	%	10.76	10.40	

Source: EAC Annual Report 2010.



According to the Asian Development Bank (ADB), the number of households supplied with electricity from the main electricity grid was 633,123 in 2008 (ADB, 2011). As set out in the development plan, this number is expected to increase to 1,131,190 by 2013. Electrification rate through grid expansion in Cambodia is about 24.72% in 2009, but it is expected to move up to 35.17% by 2013 (ADB, 2011).

Cambodia is on track to achieve a target of increasing the length of high-voltage transmission network by 100 Km from 2005 to 2010 and increasing per capita use of electricity from 54 kWh in 2005 to 89 kWh in 2010 in terms of improving access to a reliable and affordable power supply (ADB, 2007a). Nonetheless, challenges remain in meeting the rising demand of the growing economy, improving access to electricity, and reducing its costs in rural areas.

### **3.2. Electricity Tariffs**

Electricity service providers (ESPs) set prices for their electric power services supplied to consumers; however, the set prices require approval from the EAC. As stipulated in the electricity law, the approval is required to ensure that prices are reasonably affordable by consumers and businesses of ESPs are carried out efficiently, qualitatively, sustainably and transparently (EAC, 2008). The EAC determines and reviews the tariff rates, charges, and service terms and conditions for the electricity service provided by licensees (ESPs). Within ninety days from the receiving date of any application by licensees requesting the EAC to determine or revise their tariff, the EAC either approves, revises, or disapproves requests (Royal Government of Cambodia (RGC), 2001).

Cost of electricity generation is the single largest component of the price of electricity supplied by licensees to consumers. In this regard, unlike other commodities in the market, the electricity price is not determined by demand and supply interaction. It is very much dependent on input factors of the supply side. Specifically, it hinges on the cost of producing electricity per kilowatt-hour. Moreover, electricity is a natural monopoly service in Cambodia; ESPs have significant power in setting the electricity tariff and manipulating the electricity market.

On the one hand, electricity tariff rates in Cambodia vary considerably depending on the source of electric power generation. Almost 95% of the cost of electricity supply is related to the cost of fuel. Licensees generating electricity from diesel or HFO or

purchasing electricity from IPPs, with costs of electricity purchase linked to the cost of fuel, the price of electricity supply is extremely high. Moreover, it varies critically according to the fuel cost.

The cost of electricity supplied by hydropower plant or purchase from neighboring countries fluctuates little. As a result, the tariff of electricity provided to consumers by licensees getting electric power from such sources does not change frequently.

On the other hand, different types of tariffs have been applied by different types of ESPs to different categories of customers. IPPs importing electric power supply from neighboring countries apparently have the tariff rates lower than IPPs that generate electric power using diesel or HFO (EAC, 2007).

Given the fact that tariffs are set by each ESP based on full-cost recovery principle, the tariff levels, vary from area to area; and, there is a huge discrepancy between urban and rural customers. Rural customers generally pay higher tariffs than their urban counterparts (CRCD, 2006b). As Phnom Penh residents pay the electricity bill at a tariff rate of around 18.00 US¢ /kWh, some rural residents pay the tariffs rate as high as USD 1.00/kWh. This large gap is due to various factors such as differences in supply capacity of ESPs, economy of scale, load factor, fuel transportation cost, cost of capital and financing, power supply losses, and risk premium for rural customer's low capacity to pay the bill. The following Table 3 and 4 present the fundamental tariffs charged by EDC by categories of consumers and distribution areas, respectively.

**Table 3: Tariff of EDC in 2010 in Phnom Penh, Kandal and Kampong Speu Province**

Categories of Consumers	Tariffs (US¢ /kWh)	Condition
Domestic in Phnom Penh and Takhmao Town of Kandal Province	15.25	All kWh if monthly consumption does not exceed 50 kWh
	18.00	All kWh if monthly consumption exceeds 50 kWh
Domestic in Kampong Speu province	18.00	All domestic consumers
Embassy, NGO and foreign residents and institutions	20.5	
Customers paid by government budget,  Commercial and industrial customers	Tariff rate= average cost of total electricity purchased in previous month + 3.6 US ¢ /kWh	For small commercial and Industrial customers
	Tariff rate= average cost of total electricity purchased in previous month + 2.8 US ¢ /kWh	For medium commercial and Industrial customers
	Tariff rate= average cost of total electricity purchased in previous month + 2.4 US ¢ /kWh	For big commercial and Industrial customers
	Tariff rate= average cost of total electricity purchased in previous month+2.0 US Cents/kWh	For commercial and Industrial customers who are connected directly to MV

Source: EAC Annual Report 2010.

**Table 4: Electricity Tariff of EDC at Other Provinces in 2010**

Distribution Areas of EDC	Tariffs (US Cents/ kWh)	Condition
Provincial Town of StuengTreng	30.5	All consumers
Provincial Town of Ratanakiri	16.75	All consumers
Provincial Town of Kampot	27.5	All consumers
Provincial Town of Prey Veng	30.5	All consumers
Memot	12.5	Bun Rany Hun Sen Primary and High School
	16.25	Small consumers
	12.5	Medium consumers
	11.5	Medium Voltage
	16.25	Small consumers
Ponhea Kraek and Bavet	12.5	Medium Voltage
	11.5	Medium Voltage
	16.25	Small and medium
Kampong Trach	11.5	Big consumers
Svay Rieng, Kampong Row, SvayTeap	16.25	All consumers

Source: EAC Annual Report 2010.

Cambodia's electricity tariff is one of the most expensive in the Southeast Asian region. Tariff rates range from US¢9-25 per kWh for EDC grid and US¢40-80/kWh for rural areas (Lieng, 2010). As shown in Table 5 below, the average electricity prices for industrial consumers range from US¢11.71 to US¢14.63 which is the highest among the ASEAN economies.

**Table 5: Electricity Tariff in ASEAN Nations (US¢ /kWh)**

Country	Residential	Commercial	Industrial
Brunei	3.82-19.11	3.82-15.29	3.82
Cambodia	8.54-15.85	11.71-15.85	11.71-14.63
Indonesia	4.60-14.74	5.93-12.19	5.38-10.14
Lao PDR	3.34-9.59	8.80-10.36	6.23-7.34
Malaysia	7.26-11.46	9.67-11.10	7.83-10.88
Myanmar	3.09	6.17	6.17
Philippines	6.65-10.52	--	--
Singapore	19.76	10.95-18.05	10.95-18.05
Thailand	5.98-9.90	5.55-5.75	8.67-9.43
Vietnam	2.91-9.17	4.38-15.49	2.30-8.32

Source: ASEAN Center for Energy (2011).

Table 6 demonstrates monthly electricity prices of EDC by consumer categories in Phnom Penh, Kandal province and Kampong Speu provincial town in 2010. The prices on average are quite high across consumer categories. They are in the range of US¢18-23 per kWh.

**Table 6: Monthly Electricity Tariffs of EDC for Phnom Penh, Kandal Province and Kampong Speu Provincial Town in 2010 (US Cents/kWh)**

Categories of Consumers	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Small	22.99	20.26	20.05	19.9	20.21	19.92	19.57	19.21	19.32	19.25	19.5	19.68
Medium	22.19	19.46	19.25	19.1	19.41	19.12	18.77	18.41	18.52	18.45	18.7	18.88
Big	21.79	19.06	18.85	18.7	19.01	18.72	18.37	18.01	18.12	18.05	18.3	18.48
Medium Voltage	21.39	18.66	18.45	18.3	18.61	18.32	17.97	17.61	17.72	17.65	17.9	18.08

*Source:* EAC Annual Report 2010.

There are three important reasons behind the skyrocketing prices in the country. First, although Cambodia is endowed with an abundance of hydropower resources, it depends heavily on costly fuel-based engines or generators to produce electricity. Furthermore, accessibility to sources of electric power is quite limited. While coal power plants have been constructed to provide more electric power to consumers, only several hydropower plants are being operated to extract electricity.

Second, with isolated electricity generation systems across the country, the electricity infrastructure stays vastly fragmented although considerable progress has been made. According to Breeze (2010), Cambodia's electricity infrastructure was almost completely destroyed by war as were facilities of electricity supply (EAC, 2008). Presently, the national grid is being constructed to bring electricity supply to provinces throughout the country (EAC, 2011).

Third, high tariff is caused by significant electric power loss. Inefficient electric power facilities, small fragmented diesel-based generation systems, and lack of interconnection within the system can explain this electric power loss very well (EAC,

2008). Overall power loss for the country is on average 11.05 %; however, the power loss for rural areas stays around an extremely high rate of 25.34 % (EAC, 2008).

The following Table 7 presents the energy situation in Cambodia with power loss in 2010 which is supplied by EDC only.

**Table 7: Energy Situation Supplied by EDC in 2010**

Area of Supply	Installed Capacity (kW)	Energy Purchased (kWh)	Energy Sent Out by Generation (kWh)	Energy Transferred from/to other Branches (kWh)	Energy Sold to Other Licensees (kWh)	Number of Consumers	Energy Sold to Consumers (kWh)	Loss in %
Phnom Penh Grid System	45,560	1,676,055,488	31,702,495		60,412,598	246,973	1,488,183,010	9.32
Banteay Meanchey Grid System	15,580	272,123,600	1,287,558		6,899,043	66,300	231,476,332	12.81
Kampot	3,080	3,951,740	665,179	15,841,180	546,046	7,168	14,559,593	26.16
Sihanoukville	5,600	51,522,280	8,655,407		721,770	10,632	57,086,359	3.94
Kampong Cham		34,951,440			12,499,998	10,474	18,683,236	10.78
Prov. Town of Prey Veng	1,640	4,032,974	631,732		418,520	4,445	3,695,679	11.80
Prov. Town of Steung Treng	1,640	5,748,768	50,784			2,634	4,768,664	17.78
Pro. Town of Ratanakiri	960	6,359,699	1,766,000			2,904	7,448,230	8.34
Prov. Town of Svay Rieng	1,000	18,039,900	108,640		173,730	10,789	16,280,618	9.34
Khum Bavut		60,861,000				2,494	57,564,164	5.42
Memot District		10,403,000				4,015	9,759,063	6.19
Ponhea Krek District		25,977,000			14,099,259	2,385	10,550,045	5.11
Kampong Trach District		28,585,992		(15,841,180)	4,060,892	2,513	8,188,704	1.73
Monduliri	670		1,821,545			1,328	1,571,300	13.74
Keoseyma District		764,700				861	589,694	22.89
<b>Total</b>	<b>75,730</b>	<b>2,199,377,581</b>	<b>46,689,340</b>		<b>99,831,856</b>	<b>375,915</b>	<b>1,930,404,691</b>	<b>9.61</b>

Source: EAC Annual Report 2010.

## 4. Governance of the Electricity Sector

### 4.1. Policy and Regulatory Framework

According to the Royal Government of Cambodia (RGC), there are four main objectives of energy sector development policy detailed out as follows:

- 1) Providing an adequate supply of electricity throughout the country at reasonable and affordable price;
- 2) Ensuring reliable and secure electricity supply which facilitate investment in Cambodia and development of the national economy;
- 3) Encouraging exploration of environmentally and socially acceptable energy resources needed to supply all sectors of the Cambodian economy; and
- 4) Encouraging efficient use of energy to minimize environmental effects resulting from energy supply and use.

To prepare a governing framework for the electric power supply and services throughout the country, the “**Law on Electricity**” was adopted by the National Assembly on November 6, 2000 and then promulgated by the Royal Degree on February 2, 2001. This law covers all activities related to the supply, provision of services and use of electricity, and other associated activities of power sector. It helps reform the current electricity sector, and is endorsed to boost private investors in the power sector in a fair, just, and efficient manner for the benefit of the Cambodian society.

Overall, this law has key components including:

- 1) Establishing the principles for operation of the sectors;
- 2) Establishing favorable conditions for competition, private investment, private ownership and commercial operation of the electric power industry; and
- 3) Establishing and defining the functions of the EAC and the Ministry of Industry, Mine and Energy (MIME).

In this regard, there are three main players who have considerable power in the electricity sector in Cambodia: the MIME, EAC and EDC. The EDC is the most influential of the three in the electricity market. Other players in the market include

IPPs, REEs, and other licensees that import electricity from neighboring countries or own stand-alone diesel generators.

In addition to the Law on Electricity, RGC also specifies the development of the energy sector in the National Strategic Development Plan (NSDP) with the prioritized aims of increasing electricity supply capacity and reducing tariff rates to an appropriate level while strengthening institutional mechanism and management capacity. To achieve the desired goals, the development of the electricity sector is set out in the Rectangular Strategy Phase II of the fourth-mandate RGC.

To ensure sustainable development of the electric power sector, an electrification master plan was worked out for: (1) electricity generation development including hydropower resources development and development of coal or gas power plant, (2) electricity import to coordinate the development of the border zones of the kingdom and (3) the development of transmission grid throughout the country in order to establish the electricity transmission system of Cambodia (EAC, 2009). Furthermore, RGC will encourage the construction of low cost electricity generating plants by using local energy sources such as hydro-power, natural gas, and coal.

As the electricity sector in Cambodia is fundamentally governed by the Law on Electricity, sub-decrees and other regulations have subsequently been issued by the EAC. Table 8 presents a list of noticed electricity legal documents.

**Table 8: Important Legal Documents in Electricity Sector**

No.	Name of Standard Documents	Promulgated by	Date Promulgated
1	Electricity Law of the Kingdom of Cambodia	The King	February 2, 2001
2	Sub-Degree on the Rate of the Maximum License Fees applicable to Electric Power Service Providers in the Kingdom of Cambodia	RGC	December 27, 2001
3	Procedures for Issuing, Revising, Suspending, Revoking, or Denying Licenses	EAC	September 14, 2001
	Revision 1		December 12, 2002
	Revision 2		
4	Regulations on General Conditions of supply of Electricity in the Kingdom of Cambodia	EAC	January 17, 2003
	Revision 1		December 17, 2004
5	Regulatory Treatment of Extension of Transmission and Distribution Grid in the Kingdom of Cambodia	EAC	October 28, 2003
6	Regulations on Overall Performance Standards for Electricity Suppliers in the Kingdom of Cambodia	EAC	April 2, 2004
7	Procedure for Filing Complaint to EAC and for Resolution of Complaint by EAC	EAC	April 2, 2004

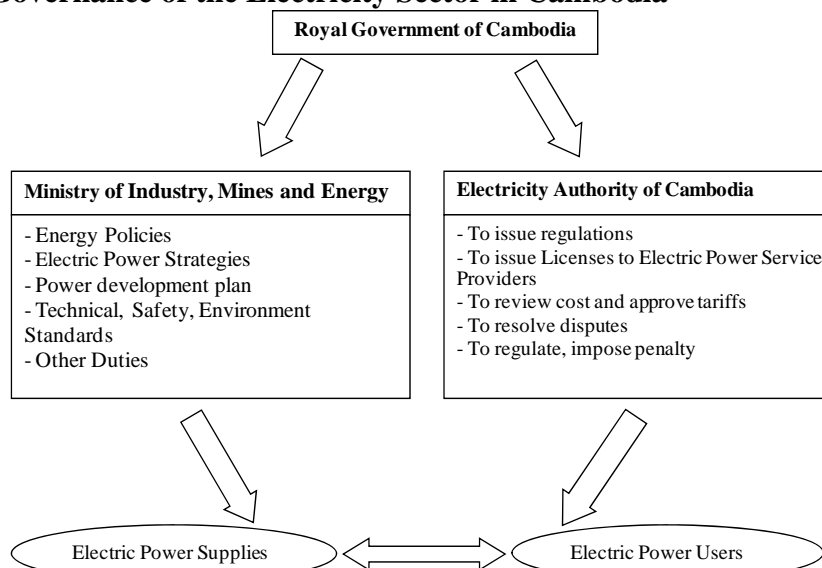
No.	Name of Standard Documents	Promulgated by	Date Promulgated
8	General Requirements of Electric Power Technical Standards of the Kingdom of Cambodia First Amendment	MIME	July 16, 2004 August 9, 2007
9	Sub-Degree on Creation of Rural Electricity Fund of the Kingdom of Cambodia	RGC	December 4, 2004
10	Sub-Degree on Principles for Determining the Reasonable Cost in Electricity Business	RGC	April 8, 2005
11	Prakas on Principles and Conditions for issuing Special Purpose Transmission License in the Kingdom of Cambodia	MIME	July 21, 2006
12	Specific Requirements of Electric Power Technical Standards of the Kingdom of Cambodia	MIME	July 17, 2007
13	Regulations on General Principles for Regulating Electricity Tariffs in the Kingdom of Cambodia	EAC	October 26, 2007
14	Procedures for Data Monitoring, Application, Review and Determination of Electricity Tariff	EAC	October 26, 2007
15	Grid Code	EAC	May 22, 2009

Source: EAC Annual Report 2010.

## 4.2. Institutions

Under the electricity law, there are two main institutions playing important roles in governing the electric power sector in Cambodia, namely MIME and EAC. Whilst MIME is mainly responsible for the formulation of policies and strategies, EAC is a legal public entity being granted the right from RGC to be an autonomous agency to regulate the electricity services and to govern the relation between the delivery, receiving, and use of electricity. Roles of these two government agencies are illustrated in the following Figure 4.

**Figure 4: Governance of the Electricity Sector in Cambodia**



Source: EAC Annual Report 2010.



#### 4.2.1. *Ministry of Industry, Mines and Energy*

As set out in the Law on Electricity, the MIME has the following roles:

- Responsible for setting and administrating the government policies, strategies and planning in the energy sector.
- Providing the EAC information on policies, strategies, planning of energy sector and its decision on:
  - Investments in the rehabilitation and development of the energy sector in the short, medium and long term;
  - Restructuring, private sector participation and privatization of public utilities;
  - Promotion of the use of indigenous energy resources in the generation of electricity;
  - Planning and agreements on the export and import of electricity;
  - Subsidies to specific classes of customers and priorities regarding consumers of electricity;
  - Promotion of efficiency in generation, transmission, distribution and consumption of electricity and action taken to create a comprehensive electricity conservation program for Cambodia; and
  - Electricity sector emergency and energy security strategies.

#### 4.2.2. *Electricity Authority of Cambodia*

The EAC is a legal public entity, being granted the right from the RGC to be an autonomous agency to regulate electricity services and to govern the relation between the delivery, receiving and use of electricity.

The Law on Electricity regulates the roles of the EAC as follows:

- To issue, revise, suspend, revoke or deny the licenses for the supply of electricity services;
- To approve tariff rates and charges and terms and conditions of electric power services of licensees, except where the authority (EAC) consider those rates or charges and terms and conditions are established pursuant to a competitive, market-based process;
- To order to implement guidance procedures and standards for investment programs by licensees;
- To review the financial activities and corporate organization structure of licensees to the extent that these activities and organization directly affect the operation of the power sector and the efficiency of electricity supply;
- To approve and enforce the performance standards for licensees;

- To evaluate and resolve consumer complaints and contract disputes involving licensees, to the extent that the complaints and disputes relate to the violation of the condition of licenses;
- To approve and enforce a uniform system of accounts for all licensees;
- To prescribe fees applicable to licensees;
- To determine the procedures for informing the public about affairs within its duties, in order to ensure that the EAC comply with the principle of transparency;
- To issue rules and regulations and to make appropriate orders, and to issue temporary and permanent injunction for electric power service;
- To impose monetary penalty, disconnect power supply, suspend or revoke the license for the violations of this Law, standards and regulations of EAC; and
- To require the electric power services and the customers to obey the rules relating to the national energy security, economic, environment and other government policies.

#### 4.2.3. *Electricite Du Cambodge*

According to the EDC Annual Report 2007, the EDC, the state-owned public utilities entity, has the following functions and responsibilities:

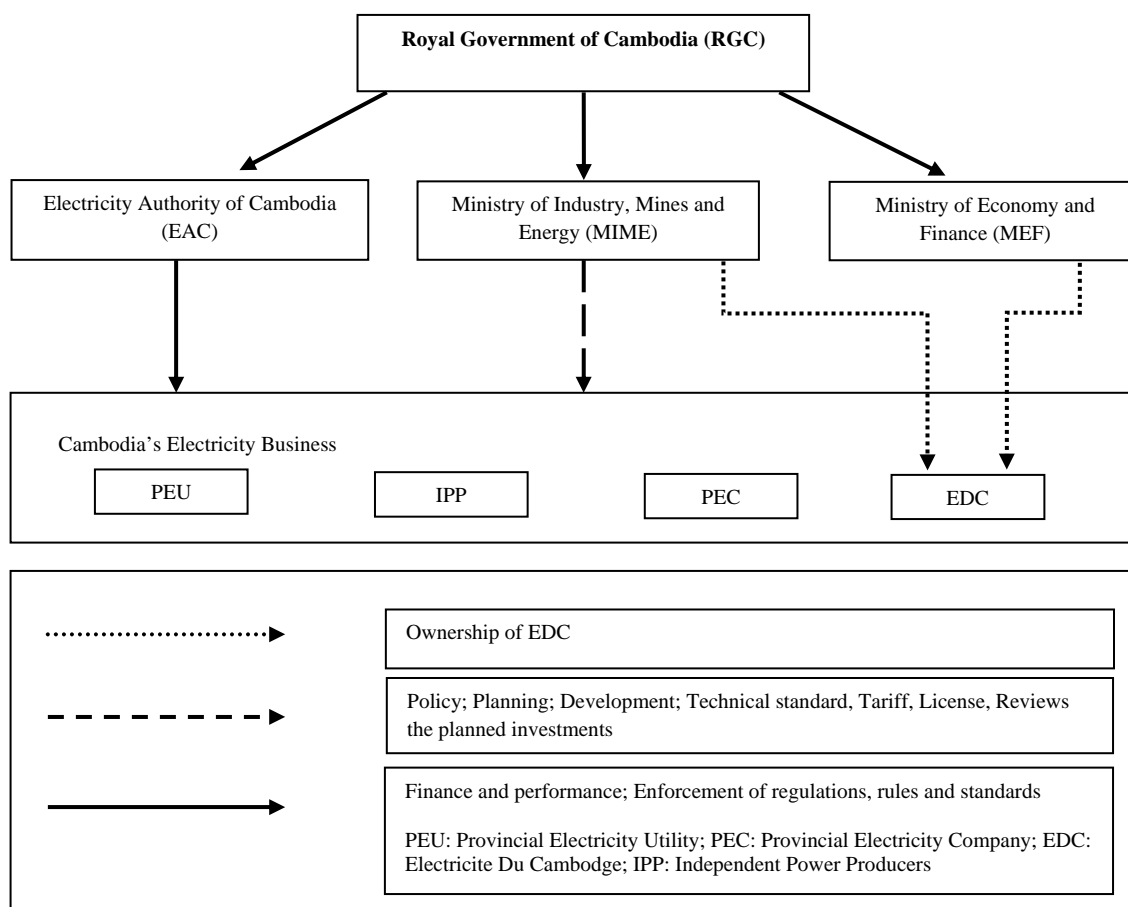
- To develop, generate, transmit and distribute electric power throughout Cambodia;
- To operate as a commercial entity, independently organize production and operation in accordance with market demand and seek to earn a profit, increase the value of its assets, create economic, benefits and raise labor productivity;
- To prepare, build, own, finance, lease and operate power generation and sub-stations, transmission lines, distribution networks and other infrastructure necessary;
- Eliminate inefficiencies from operation, reduce unnecessary costs;
- Maximize the output and reliability of the assets, customer satisfaction with higher quality and better services; and
- To be polite, receptive, act promptly with customers' concerns.

Co-owners of the EDC are the MIME and the Ministry of Economy and Finance (MEF). Based on the EAC Annual Report 2010, the EDC is currently holding a consolidate license that has the following components:

1. Generation license: giving the right to EDC to generate electricity for the purpose of supply to its transmission and distribution system.

2. National Transmission License: giving the right to EDC to transmit electricity for the purpose of supply to any distribution system and bulk power consumers throughout Cambodia.
3. Distribution license: giving the right to EDC to distribute and supply electricity to any premises in the authorization distribution areas.

**Figure 5: Structure of the Electricity Sector**



Source: Adapted from MIME (2009).

### 4.3. Electricity Service Providers

There are different types of licensees providing electric power services throughout the country. They are the state-owned EDC, private entities including IPPs in provincial towns, provincial department of MIME electricity operators, licensees in small towns, and REEs (World Bank, 2006).

The EDC, a national utility enterprise co-owned by MIME and MEF, was granted a consolidate license from the EAC to generate, distribute and transmit electricity throughout Cambodia. It currently supplies electricity in the areas of Phnom Penh/Kandal, eight provincial towns, and four small isolated systems near the Vietnamese border. As a consolidate licensee, the EDC can also generate power up to 95 MW and purchase from IPPs around 86.4 Megawatts in 2004 (CRCD, 2006a).

Licensed ESPs have been dramatically increased during the past seven years. This increase has edged up from 104 valid licensees in 2004 to 278 in 2010, an increase of 167 percent. However the supply of electricity is still in shortage, especially in Phnom Penh capital city, and is accompanied by high tariffs. REEs operate small diesel generators and produce electricity for their own use and for neighboring customers. Their supply operation ranges from twenty to a few hundred customers. The number of REEs in the country overall was estimated at around 500 (CRCD, 2006a).

**Table 9: Types of ESPs with Installed Capacity (MW) in 2001**

<b>Supplier</b>	<b>Areas Supplied</b>	<b>Installed Capacity</b>
Electricite du Cambodge (EDC)	6 Major towns, including Phnom Penh (MIME 2002)	32
Independent Power Producers selling to EDC	Phnom Penh and Kompong Cham	127
Provincial Electricity Operators (provincial departments of MIME)	10 Provincial towns	14
Rural Electricity Enterprises (REE) operating mini-grids	4 Provincial towns and hundreds of smaller towns and villages (estimated 600 REEs)	60
Battery Charging Services (REEs which do not also operate a mini-grid)	1500 battery charging services (REEs) in hundreds of towns	38
Imported Power from Thailand and Vietnam (22kV lines)	7 Borders towns	15
Private stand-by diesel generation (large scale only)	All areas, bug mainly Phnom Penh and Siem Reap	116
<b>Total</b>		<b>402</b>

Source: CRCD 2004.

## **5. Regional Cooperation and Trade**

### **5.1. ASEAN Power Grid**

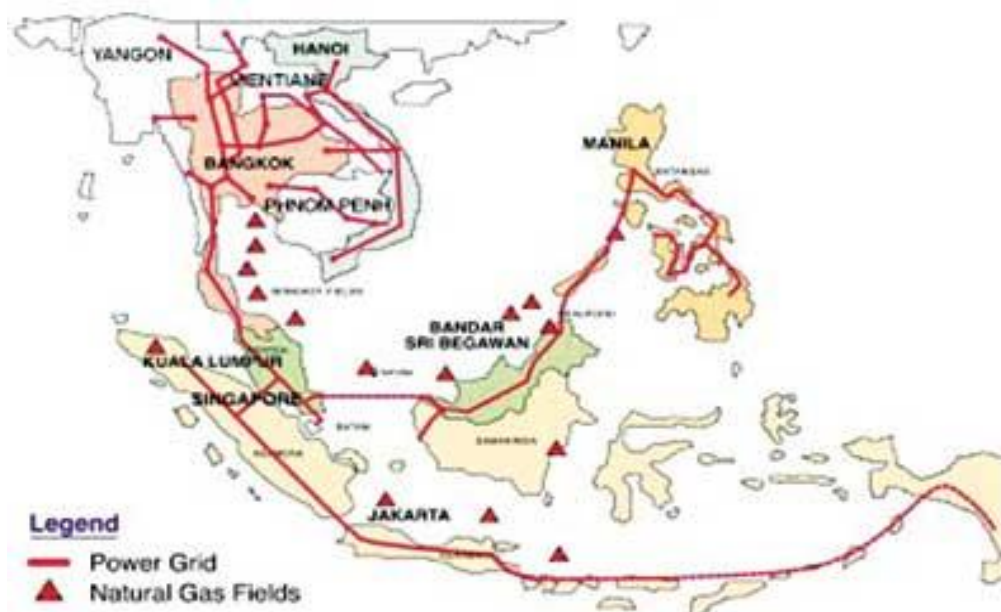
Shared concerns among the ASEAN nations over energy security and sustainability are the key drivers for the opening up of energy markets within the region. To accentuate energy cooperation, the Heads of ASEAN Power Utilities Authorities (HAPUA) was established in 1981. However, little progress had been achieved until 1999 when the ASEAN Plan of Action for Energy Cooperation 1999-2004 (APAEC), a five-year plan covering energy cooperation which is a component of the ASEAN Vision 2020, was adopted. This was followed by the second five-year APAEC 2004-2009 which was endorsed by ASEAN energy ministers in 2004; Both APAECs consists of six programs including ASEAN Power Grid (APG), Trans-ASEAN Gas Pipeline (TAGP), coal utilization, energy efficiency and conservation, renewable energy utilization, and regional energy policy and planning.

APAEC 2010-2015 is the third action plan for the implementation of energy cooperation, which continues from the previous two series of APAEC. This third APAEC enacted in 2009 composes of seven programs including: (1) APG, (2) trans-ASEAN gas pipeline, (3) coal and clean coal technology, (4) renewable energy, (5) energy efficiency and conservation, (6) regional energy policy and planning, and (7) civilian nuclear energy.

In this regard, APG remains one of the key thrusts in energy cooperation; the implementation of APG is under the supervision and coordination of HAPUA. The implementation of APG so far is in the form of bilateral arrangements among member countries (APAEC, 2009). As of June 2011, the implementation plan laid out 16 projects proposed cross-border interconnection bilaterally; the plan then proposes gradually enlarging to a sub-regional basis aiming to form a totally integrated region. Of the 16 interconnection projects, 4 are in operation, 3 are under construction, and 9 are under preparation (e.g. study or negotiation) (Table 10).

Enhancement of bilateral political relations between member countries and closer regional energy cooperation were recorded as the benefits of the operation of the four completed interconnection projects (Nicolas, 2009).

**Figure 6: Interconnection of Power Grid in ASEAN**



Source: Power Engineering International

**Table 10: Status of Implementation of Interconnection Projects under APG**

No.	Project	Status
1	P. Malaysia – Singapore	Operation
2	Thailand - P. Malaysia	Operation
3	Sarawak - P. Malaysia	Preparation
4	P. Malaysia – Sumatra	Preparation
5	Batam – Singapore	Preparation
6	Sarawak - West Kalimantan	Preparation
7	Philippines – Sabah	Preparation
8	Sarawak - Sabah – Brunei	Preparation
9	Thailand - Lao PDR	Construction
10	Lao PDR – Vietnam	Construction
11	Thailand – Myanmar	Preparation
12	Vietnam – Cambodia	Operation
13	Lao PDR – Cambodia	Construction
14	Thailand – Cambodia	Operation
15	East Sabah - East Kalimantan	Preparation
16	Singapore – Sumatra	Preparation

Source: Compiled from Hermawanto (2011).

Cambodia joined ASEAN as the 10<sup>th</sup> member country in 1999. Being a signatory party of the Memorandum of Understanding on ASEAN Power Grid (APG-MoU) endorsed in 2007, Cambodia has duties to fulfill the objective of the MoU that states that *“member countries agree to strengthen and promote a broad framework for the Member Countries to cooperate towards the development of a common ASEAN policy on power interconnection and trade, and ultimately towards the realisation of the ASEAN Power Grid to help ensure greater regional energy security and sustainability on the basis of mutual benefit.”*

Against this backdrop, Cambodia has actively implemented the agreed plan of actions. Cambodia has completed the construction and put into operation the two projects under the APG framework. They are Project No. 12 and 14, which is the bilateral arrangement between Cambodia and Vietnam, and Cambodia and Thailand, respectively. However, it is noteworthy that under Project No. 12 and No. 14, as well as Project No. 1 and No. 2 which are presently under operation, new sub projects have been proposed to promote further interconnection in the region.

There is no specific policy document to carry out the APG in Cambodia. Given the proposed projects in the APG framework are bilateral agreements among member countries in characteristics, Cambodia has incorporated those agreed projects into its overall national power development plan. In this regard, the Power Sector Development Plan (PSDP) was prepared by MIME in 2007 (EDC, 2010).

A rural Electrification Master Plan focusing on the use of renewable energy has also been prepared and implemented. To implement the Rural Electrification Policy, the government has established a Rural Electrification Funds (REF) to promote equity in access to electricity supply services and encourage private sector to participate in investments in rural power supply services in a sustainable manner, in particular to encourage the use of new technologies and renewable energy. These efforts have been undertaken not only to advance the domestic electricity sector but also to facilitate regional cooperation under the frameworks of GMS, ASEAN, and EAS, and other sub-regional cooperation.

Moreover, the RGC will encourage construction of electricity transmission lines covering all parts of the country to enable the supply of quality and low cost energy from all sources to meet the demand in cities, provinces, urban and rural areas. The

government has indicated that it intends to gradually integrate Cambodia's electric power system into the networks of the GMS and ASEAN countries (Ministry of Planning (MoP), 2009).

## **5.2. Greater Mekong Subregion**

As initiated by the ADB, the Greater Mekong Subregion Economic Cooperation Program (GMSECP) was launched by six member countries around the Mekong River including Cambodia, China, Lao PDR, Myanmar, Thailand, and Vietnam. The energy sector is one of the focal priorities of this sub-regional cooperation. According to IRM-AG (2008), most of the tasks of the energy sector are included in the overall work plan for the development of power trade in the region agreed to in April 2005 by all GMS countries and their development partners through the Regional Power Trade Coordination Committee (RPTCC).

In this spirit, Cambodia has signed various power sector cooperation agreements with its neighboring countries. These agreements are in line with energy cooperation and eventual regional integration of the Greater Mekong Subregion. A power cooperation agreement between Cambodia and Vietnam was signed on June 10, 1999. With this agreement, power supply to border areas by medium voltage connections and interconnection between high voltage lines are promoted (EDC, 2010). Likewise, Cambodia and Lao PDR entered into a power sector cooperation agreement on October 21, 1999.

MoU on power cooperation between Cambodia and Thailand was signed on February 3, 2000. EDC (2010) stated that "this MoU provided a framework for the power trade and technical assistance between these two countries and opened power access to the third countries." ADB (2007b) stated that the power sector cooperation agreement between Cambodia and Thailand set up a framework for power trade and technical assistance between the two economies.

The national power master plan was updated in 2004 for the purpose to promote electric power development to be in line with the GMS regional master plan (ADB, 2009). At the present, PSDP 2007 provided an overall plan of action for the implementation of electric power development plan. Generation and transmission master plan is presented in the following Tables 11 and 12.



**Table 11: Generation Master Plan 2008-2021**

No.	Year	Power Station	Type	MW	Remark
1	2008	SR-BTB-BMC - Thailand	Import	80	Completed in 2007
2		Kampong Cham - Vietnam	Import	25	By 22 kV
3	2009	Phnom Penh - Vietnam	Import	200	Completed
4	2010	Stung Treng - Lao PDR	Import	10	By 22 kV
5		Kamchay	Hydro	193	Postpone to 2011
6		Kampong Cham - Vietnam	Import	10	Cancel
7	2011	Kirirom III	Hydro	18	
8		Coal SHV	Coal	100	
9	2012	Stung Atay	Hydro	120	
10		Coal SHV	Coal	100	
11	2013	Retirement - C3 (GM)	DO	3	
12		Coal SHV	Coal	100	
13		Lower Russei Chrum	Hydro	338	
14		Upper Russei Chrum	Hydro		
15	2014	Coal SHV	Coal	100	
16	2015	Stung Tatay	Hydro	246	
17		Coal SHV	Coal	100	
18		Stung Treng - Lao PDR	Import	20	
19		Kampong Cham - Vietnam	Import	22	
20	2016	Lower Se San II	Hydro	420	
21		Lower Sre Pok II	Hydro		
22	2017	Stung Chay Areng	Hydro	240	
23	2018	Coal SHV	Coal	300	
24	2019	Sambo	Hydro	450	
25	2020	Kampong Cham - Vietnam	Import	31	
26	2021	Coal/Gas SHV	Coal/Gas	450	

Source: EDC Annual Report 2010.

**Table 12: Transmission Master Plan 2008-2021**

No.	Year	Project	High Case			Remark
			Line Type	Section (mm <sup>2</sup> )	Line Length (Km)	
1	2008	230kV VN-PP S/S Connection	D-C	630	111	Completed in 2009
2	2010	230kV Takeo-Kampot	D-C	400	100	Postpone to 2011
3	2010	115kV Lao PDR-Stung Treng	D-C	240	56	Postpone to 2014
4	2010	230kV Kampot-SHV	D-C	630	82	Postpone to 2013
5	2011	115kV Kampong Cham-Kratie	D-C	630	87	Postpone to 2015
6	2011	230kV Kampot-Kamchay Hydro Connection	D-C	630	20	
7	2011	115kV Stung Treng-Kratie	D-C	400	130	
8	2012	230kV WPP-Kampong Chhnang-Pursat-Battambang	D-C	630*2B	310	
9	2012	230kV Pursat-O Soam	D-C	630	80	
10	2012	115kV O Soam - Atay include S/S	D-C	630	30	
11	2012	115kV GS1-SWS-NPP	D-C	250*2B	28	
12	2012	115kV GS2-SPP	D-C	250*2B	25	
13	2012	115/230kV NPP-Kampong Cham	D-C	400*2B	120	
14	2013	230kV Lower & Upper Russei Chrum - O Soam	D-C	630	30	
15	2013	230kV WPP-SHV include Veal Rinh S/S	D-C	630	220	
16	2014	115kV SPP-EPP-NPP	D-C	250	20	
17	2014	115kV EPP-Neak Loeung-Svay Rieng S/S connection	D-C	250*2B	122	
18	2017	230kV Kratie-Lower Se San 2 - Vietnam	D-C	630	90	
19	2017	230kV WPP-NPP	D-C	630	25	
20	2017	230kV NPP-Kampong Cham-Kratie-Se San 2 - VN	D-C	630	300	
21	2018	230kV Sre Ambil-Koh Kong-O Soam	D-C	400	200	
22	2019	230kV Sambor-Kratie	D-C	630	30	
23	2021	230kV Kampong Cham-Kampong Thom-Siem Reap-Battambang-Thailand	D-C	630	350	

Source: EDC Annual Report 2010.

### 5.3. Electricity Import from Vietnam

As outlined in the MoU on APG and GMSECP, electricity is one of major energy commodities identified for cooperation in terms of assistance, trade and investment. With limited capacity to produce electricity domestically, Cambodia needs to cooperate with neighboring countries to fill the energy gap. Currently, Cambodia imports electricity from all neighboring countries, including Lao PDR, Thailand, and Vietnam.

Cambodia's import of electricity from Lao PDR is currently at 22 kilovolts (kV) to areas in Steung Treng province. The import from Thailand is currently at 22 kV via

various connections and currently at 115 kV through the Thailand-Banteay Meanchey-Battambang and Siem Reap lines. Likewise, the import from Vietnam is at present at 22 kV via a number of connections and at 230 kV through the Vietnam-Takeo-Phnom Penh 230 kV line (EAC, 2010).

In regard to Vietnam, there is an Electricity Trade Agreement between the MIME of Cambodia and the Ministry of Industry of Vietnam. Governmental agencies, such as the EDC and Electricity of Kratie of Cambodia, have signed Power Purchase Agreements (PPAs) with Vietnam Power No.2 for the electricity import at a number of points for supply of electricity to areas located near the Cambodia-Vietnam border either by themselves or through other licensees.

According to the report released by EAC, Cambodia's import of electricity from Vietnam totaled 518.1 million kWh in 2009 (EAC, 2010). It jumped about five times the level of the previous year which was 100.1 kWh. This substantial import was about 40.0 percent of the total electricity produced domestically; the total electricity generated in 2009 was 1,234.6 million kWh according to data released by EAC in 2010.

EAC (2010) also stated that with grid substations (GS) at Takeo province and GS4 at Phnom Penh in Cambodia, the double circuit 230 kV line from Vietnam to Phnom Penh was commissioned in 2009. Hence, given stable electricity import from Vietnam, EDC could terminate PPA with SHC (Cambodia) International Pte Ltd for the high-cost diesel generation at Phnom Penh.

It is noteworthy that import of electricity from Vietnam has not only reduced the burden of demand for electricity but also the price. EAC (2010) revealed that based on the PPA, which was signed between Vietnam Power No. 2 and the EDC and other state-owned utilities in Cambodia, the Vietnam Power No. 2 charges a fixed tariff rate at 6.9 US¢ per kWh for supply to Cambodia at medium voltage lines (22 kV or 15 kV).

Meanwhile, investments from Vietnam in the electricity sector are significant. Recently, an electrical Vietnamese company has invested USD 3 million in its Cambodian factory, and is hoping to inaugurate its operation in mid-2012 and employ between 100-120 people (PPP, 2011).

Increased trade and investment in the electricity sector between Cambodia and Vietnam are rather substantive, but their challenges, obstacles, and opportunities have not been widely studied. More importantly, the economic impact of this electricity

market integration has been barely noticed. Therefore, a study to review this integrated electricity market and its impact should be conducted to shed light on the possibilities arising from further integration.

## 6. Investments in the Electricity Sectors

### 6.1. Current Situation

In line with the policy of the RGC in increasing electricity coverage, investments in the electricity sector have continued to increase over the past decade. With sole responsibilities of EAC in granting licenses to ESPs, the number of licenses issued is on the rise. According to data released by the latest report of EAC, the total licenses issued by EAC increased from 21 in 2002 to 278 in 2010.

Out of the total 278 licenses issued in 2010, the number of consolidate licenses is 221 which takes the biggest share. The second biggest share is the distribution license which reached 27 followed by the generation license which is at 19 licenses. The breakdown of licenses by category is illustrated in the following Table 13.

**Table 13: Number of Licenses Issued by Category during 2002-2010**

Type of License	2002	2003	2004	2005	2006	2007	2008	2009	2010
EDC	1	1	1	1	1	1	1	1	1
Generation	6	7	8	11	14	14	20	19	19
Distribution	4	7	8	9	13	16	21	25	27
Consolidate (Generation + Distribution)	10	69	87	98	114	147	172	197	221
Retail					1	1	1	1	1
Special Purpose Transmission						1	1	3	3
Consolidate (SPT + Distribution)							2	3	6
<b>Total</b>	21	84	104	119	143	180	218	249	278

*Source:* EAC Annual Report 2010.

Regarding big energy investment (over USD 1 million), four investment projects were approved by the Council for the Development of Cambodia (CDC) in 2010. Total registered capital for those four projects was USD 20 million. It recorded an increase of around 41% from USD 14.2 million in 2009.<sup>2</sup> Though there was no investment project in the energy sector approved in 2011.

## **6.2. Investment Shortage in Electricity**

Expansion of electricity capacity and coverage requires enormous capital investments. Yet, the government is unlikely to be able to allocate its limited budget for this huge financial requisite of investments. As a result, private sector participation is of crucial importance to accelerate power sector development.

Low cost of electricity is one of the RGC's priorities to attract both foreign and domestic investments and to eradicate poverty as clearly stated in the NSDP Update 2009-2013, an overarching national development policy paper (MoP, 2009). This policy paper encourages participation of the private sector in electricity investment in various areas such as electricity generation and distribution, expansion of national transmission grid that facilitates power imports from neighboring countries, and the hydropower development projects (Ryder, 2009).

A national power grid is a crystal-clear goal of RGC to distribute electric power service to all villages across the countries (EAC, 2011). It is also to connect with transmission lines of neighboring countries, as regional integration is the defined target. Hence, high-voltage transmission connections, large-scale hydropower dams, and coal-fired plants have been the focused priority for Cambodia's power development plan (Ryder, 2009).

Private electric power producers are, thus, unlikely to sustain their businesses in the long term. Ryder (2009) found that "Cambodia's private electricity companies provide essential service yet the EAC describes them as an 'interim solution' until the state utility, EDC, can bring its preferred IPP projects online."

According to Purka & Litwin (2003) and Ryder (2009), REEs, small-scale electric power service providers delivering electricity to rural households, are operating in a stiff

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<sup>2</sup> Data compiled from the CDC.

business environment. Access to affordable capital is a common obstacle for most of REEs if not all, and requesting long-term permit from the regulatory agency to operate their businesses is very difficult. They also operate under high levels of uncertainty due to unclear rules for stand-alone operations, mini-grid operations, and future larger grid connections (Ryder, 2009).

Hence, private small-scale investments in the electricity sector seem unable to be sustained in the long term, and only large-scale investments appear to be viable. Break through investments in the electricity sector require a huge amount of capital, and risk is quite high in terms of investment payback. Therefore, capital requirement is very likely an investment barrier causing the current investment shortage in this sector. A lack of legal and regulatory framework in the sector is also a determinant of the investment shortage.

### **6.3. Policy Options**

As electricity imports represent a large proportion of total electricity supply and electricity shortage remains persistent, developing further electricity production in the country is a necessity. Moreover, Cambodia is endowed with an abundance of hydro resources which should be utilized to increase electricity generation.

The power grid is, on the other hand, quite integrated with neighboring countries in the GMS region, but is noticeably limited within the country. Specifically, the electric power networks are well connected to neighboring countries such as Thailand, Lao PDR, and Vietnam, but have not yet been sufficiently developed to provide electricity across the country. Hence, more investment is required to hasten development of the national power grid.

With these critical challenges, there are a few policy options readily available to the government. First, enhancing the investment environment with a clear-cut policy direction for this sector is of fundamental importance in order to attract foreign and local investment. Second, public-private partnership for hydropower development and grid expansion appears as a preferable solution as long as it is accompanied with good environmental policy. Third, joint development of hydropower resources with countries in the ASEAN or GMS region is one of the viable options to electricity sector development in the country.

## 7. Concluding Remarks

Sources in the energy sector in Cambodia are mixed. However, the main source consists mainly of diesel and HFO. As a result, the electricity price is significantly volatile given the cost of diesel and HFO in the market. More importantly, the electricity price is the highest in the Southeast Asia region as electricity is extracted from these costly energy sources. A great discrepancy of electricity price is also found between urban and rural areas due to difference in supply capacity, economies of scale, load factor, power supply loss and risk premium between urban and rural ESPs. However, demand for electricity keeps increasing dramatically in urban and rural areas.

MIME and EAC are the regulatory entities in the electricity sector. As set out in the Law on Electricity, these two institutions have different functions and responsibilities. Meanwhile, key players in the electricity market include the EDC, IPPs, and REEs. Nonetheless, the EDC is the most influential, forming almost a monopolistic public utility providing electricity to Phnom Penh capital and other provincial towns.

Cambodia seems to be on track in implementing the APG action plan, completing two connection projects with Thailand and Vietnam. MoUs with three neighboring countries have already been signed to implement the electricity market integration as set out in the GMS cooperation framework. This has reduced the burden for electricity demand as well as tariffs to some extent.

Investment in the electricity sector has increased steadily during the past decade. However, this sector still remains under invested given rising demand. Big investment projects seem to be preferred in the energy sector development plan of the government. Thus, capital is very likely the most challenging constraint in addition to the lack of legal and regulatory framework, and high risk of investment paybacks.

Therefore, an improved investment environment is the pre-requisite to attract more investment in the sector to serve increasing demand for electricity as the economy grows steadily.

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