

Annual Report 2018

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ELECTRICITE DU CAMBODGE

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Message from Chairperson



On behalf of the Board of Directors, I would like to express sincere appreciation to Electricité Du Cambodge (EDC) for bringing out its Annual Report for the year 2018. We are proud and appreciated the achievements of EDC during 2018 and we strongly believe that EDC is moving forward its goal and vision to be the foremost power utility in the Kingdom of Cambodia that builds a deep customer relationship

with a reputation for supplying reliable and affordable electricity to its valued customers.

The Board of Directors takes great pride in acknowledging the huge success of the EDC management and staff. The cumulative achievements in recent years have been unprecedented.

On this occasion, I wish to extend my personal heartfelt thanks to the management and staff of EDC who have worked tirelessly to create many enduring achievements. It is through their dedication and hard work that EDC is well placed to realize its vision and goals.

Victor Jona

Chairperson of the Board

Message from Minister attached to the Prime Minister Managing Director of EDC



CThese are
Our effort

It gives me great pride to present the annual report of Electricité du Cambodge (EDC) for the year 2018, as this year is another turning point of the power sector development in the Kingdom of Cambodia. The vision of EDC is to become the leading power utility in the Kingdom of Cambodia. We have always strived to meet our customers' load demand and focus on improving the quality and reliability of the power supply. During this year, we intensified our efforts further to strengthen our service support for our valued customers. Our energy sale for 2018 was 8,675 GWh, an increase of 24% over the energy sale of the previous year. The total system loss is around 8%. Our revenue grew by 10.5% over the previous year to reach 5,670 billion riels. We had a combined workforce of 5,354 staff members providing services to 1,086,812 customers.

At the end of 2018, Lower Sesan II, the largest hydropower plant in Cambodia, has been launched all eight machines with a total capacity of about 400 MW which annual generation approximately 1,500 GWh. A massive amount of energy from this hydropower plant has been transmitted to Phnom Penh capital city, which is the load center with various activities such as commercial, industrial, and development sectors, that currently consume high power demand as well as the future, through 230kV transmission line. Moreover, the remaining energy has also been supplied to some provinces nearby, such as Steung Treng, Rattanakiri, and Mondulkiri, through 35kV distribution lines.

In order to stabilize the power supply to large industrial plants with reasonable electricity tariffs, Electricite du Cambodge (EDC) has built 7 km of 115 kV high-voltage transmission line from Banteay Meas substation to the CHIP MONG INSEE CORPORATION (CMIC) cement factory, which is located in Banteay Meas district, Kampot province to supply the electricity for the production line. Moreover, EDC has also put into operation another 115 kV high voltage transmission line with a length of 1.8 km from the existing transmission line connected to Grid Substation Number 10 (GS10), located in Phnom Penh Special Economic Zone (PPSEZ). The launch of the above two projects is an indicator to implement the Industrial Development Policy (IDP) 2015-2025 issued by the Royal Government of Cambodia to expand electricity supply coverage to the heavy industrial zones to attract industrial investors. That would provide a great working opportunity for people living surrounding area.

Another new feasibility study of the solar park project in Thmat Porng, Kampong Speu province, was installed on 120 hectares of land with a capacity of 60MW which will annually generate the total amount of electricity of about 96 GWh. Renewable energy has become one of the prioritized critical energy resources, strongly encouraged by the Royal Government of Cambodia.

Initiation of construction of 230kV Transmission Loop Line in Eastern Part of Cambodian Phase II with a total length of 248 km, which 230 kV transmission line from Stung Treng substation to Ratanakiri substation is approximately 115 km and from





Kratie substation to Mondulkiri substation is around 133 km. This transmission line is expected to be completed by 2020 with loan financing from China Exim Bank. After this project is completed, Ratanakiri and Mondulkiri provinces would absorb energy directly from the national grid, which would improve efficiency and stability to provide a better electricity supply. It could also reduce the power import from Vietnam via a long 35kV distribution line, leading to disruption.

Phnom Penh City Transmission and Distribution System Expansion Project Phase II (JICA Phase II) was signed in May 2018. This project will improve the electricity supply more efficiently and reliably to reduce the risk of power outages in Phnom Penh city by modernizing and building interconnected distribution networks in the city to be Smart Grid Systems.

The signing ceremony was presided over by Samdech Akka Moha Sena Padei Techo HUN SEN, Prime Minister of the Kingdom of Cambodia, and the Chinese Prime Minister on constructing a 500 kV high-voltage transmission line from Don Sahong province, Laos. This transmission line would connect with the existing Stung Treng substation in early 2018. The project was supported and cooperated by the Laos side to expand energy trade and the solidarity between the two countries. Also, this project would meet the power demand and help increase the efficiency and reliability of the Cambodian grid system.

Additionally, tariff reduction plan strategy of the Kingdom of Cambodia 2015-2020, the Royal Government of Cambodia, represented by the Ministry of Mines and Energy, has issued a Prakas on the revision of the tariff structure in 2018 for implementation from 2019 to 2020. This revision would reduce the Levelized cost of electricity to the medium and low standard of living customers, especially for government officials and workers who consume less than 200 kilowatt-hours per month. 90% of households received direct benefits under this tariff reduction plan from the Department of Rural Electricity Fund of Electricite du Cambodge (EDC).

The total grant of USD 77.6 million has been implemented for extending the benefits of electrification to the population in the rural area, which funded by EDC with USD 74 million, the Kreditanstalt für Wiederaufbau (KfW) with USD 2.6 million, and the Asian Development Bank (ADB) with USD 1 million.

We would like to take this opportunity to acknowledge the contribution and commitment of all our employees and the consultants who have played such an indispensable role in the success of this organization. We are highly indebted to the excellent guidance and wisdom provided by Samdech Akka Moha Sena Padei Techo HUN SEN, Prime Minister of the Kingdom of Cambodia, who has always offered vital support at every major turning point.

We are also grateful to the Ministry of Mines and Energy (MME) for their ongoing sectoral direction and relentless efforts and to the Ministry of Economy and Finance (MEF) for their support. Our special appreciation goes to the Electricity Authority of Cambodia (EAC) and the Board of Directors of EDC for their valuable input and guidance.

We also highly value the support of all our client groups. In addition, we highly appreciate the continued assistance extended to us by all development partners, particularly the Exim Bank of the People's Republic of China and all our Independent Power Producer partners.

With such solid progress, EDC is moving forward with a renewed sense of optimism in its noble mission to develop the power sector in the Kingdom of Cambodia.

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H.E Keo Rottanak Minister attached to the Prime Minister Managing Director of EDC

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ABBREVIATION

Asian Development Bank
French Development Agency
ASEAN Power Grid
ASEAN Power Grid Consultative Committee
Association of South East Asian Nations
Biomass
Build Operate Transfer
Battambong
Banteay Meanchey
Bavet
Coal
Circuit-kilometer
China Export Import Bank (China Exim Bank
Compagnie des Eaux et Electricité
Compagnie Franco-Khmère d'Electricité
China National Heavy Machinery Corporation
Continue
Electricity Authority of Cambodia
Electricité du Cambodge
Electricité de Phnom Penh
East Phnom Penh
East Siem Reap
Fuel Oil
Grid Substation
Gigawatt-hours
Hydro
Headquarter
Industrial Estate
Indian Exim Bank
Import
Independent Power Producer
Japan International Cooperation Agency
KfW Development Bank
Kampong Trach
Kampong Cham
Kampong Speu
Kampot
Kratie
Keosiema



LDP			Looking for Development Partner
LSRC			Lower Stung Russei Chrom Hydropower Plant
LV	-		Low Voltage
MDKR			Mondulkiri
MIME		:	Ministry of Industry, Mines, and Energy
MME			Ministry of Mines and Energy
MMT			Memot
MOU			Memorandum of Understanding
MV			Medium Voltage
MW			Megawatt
NCC			National Control Center
NDF			Nordic Development Fun, Finland
NG			National Grid
NPP			North Phnom Penh
P2P			Power to the Poor
PHN			Phnom Penh
PKK			Ponhea Krek
PPA			Power Purchase Agreement
PST			Pursat
PRV			Prey Veng
REE			Rural Electricity Enterprise
REF			Rural Electrification Fund
RGC			Royal Government of Cambodia
RTK			Ratanakiri
RUPP			Royal University of Phnom Penh
SHS			Solar Home Systems
SHV			Preah Sihanouk Province
SNL			Snuol
SPP			South Phnom Penh
SRP			Siem Reap
STH			Steung Hav
STR			Steung Treng
SVP			Suvannaphum Coal-fired Power Plant
SVR			Svay Rieng
SWS			Switching Substation
ТКО			Takeo
UNEDI			Union d'Electricité d'Indochine
WPP			West Phnom Penh
WB			World Bank



EVOLUTION OF ELECTRICITE DU CAMBODGE

Electricity has come to Cambodia in 1906. Before October 1958, power and light in Cambodia were provided by three private companies:

- Compagnie des Eaux et Electricité (CEE)
- Union d'Electricité d'Indochine (UNEDI)

- Compagnie Franco-Khmère d'Electricité (CFKE).

The CEE served the Greater Phnom Penh Area. The UNEDI took care of all other provinces, except Battambang. The CFKE had been serving Battambang-city all along.

By virtue of Kret N° 655-NS of October 10, 1958, the first two companies, CEE, and UNEDI merged under the name of ELECTRICITE DU CAMBODGE.

During 1970 to 1979, the power sector in the country passed through two dangerous events: civil war (1970-1975) and turbulent history during the Khmer Rouge Regime (1975-1979). During this time, all kinds of generation, transmission, and distribution facilities were



destroyed not only in Phnom Penh but also in other areas.

In 1979, EDC was reintegrated into an administrative structure under Ministry of Industry and then transferred to Phnom Penh Municipality in 1991, by the name Electricité de Phnom Penh (EDP) to manage the electric supply in Phnom Penh while the electric generations in the provinces were managed by the Department of Industry of the provincial authorities.

In 1992, EDP was renamed Electricité du Cambodge and was attached to the Ministry of Energy. After the election in 1993, EDC was restructured under the Ministry of Industry, Mines, and Energy (MIME) and was responsible for the development, management, and operation of the power system in Phnom Penh. Power utilities in a few provinces continue to remain under the control of Provincial Authorities, which receive budgetary support through MIME.

In March 1996 by the Royal Decree # 0396/10, Electricité du Cambodge became an autonomous wholly state-owned limited liability company to generate, transmit and distribute electric power throughout Cambodia. EDC is a judicial organization with administrative, financial, and managerial autonomy. EDC is responsible for its profits and losses and liable for its debts to the extent of the value of its assets.

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EDC's vision is to become the leading power utility in the Kingdom of Cambodia by striving to meet customers' demands and to improve the quality and reliability of power supply.



Our mission is to provide sufficient and consistently reliable power supply to consumers in its entire coverage areas at a competitive price by improve the business operation to excellence and efficiency and participate in the implementation of the government's policies on poverty reduction, environmental preservation, and socio-economic development.



Role and Responsibilities

EDC has the rights and responsibilities for generating, transmitting and distributing electricity throughout the Kingdom of Cambodia in conformity with its commercial obligations stipulated by laws, statute, license and other regulations of the Royal Government of Cambodia.

EDC operates as a commercial enterprise with independence to organize its business of

generation, transmission, and distribution of electricity and raise capital investments, in the appropriate response to market requirements and earn a profit and raise productivity.

EDC is required to abide by the conditions of its license issued by the Electricity Authority of Cambodia in providing electricity service. EDC is required to achieve its objectives by implementing its business plan approved by its Board of Directors and in accordance with the national energy policy and national development plan.

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EDC is permitted to be responsible for: 1-Generating, transmitting, and distributing electric power with the purpose of meeting the demand for all categories of buyers 2-Exporting electric power to neighboring countries and import electricity from neighboring countries;

3-Constructing and operating national electric grid for energy transmission in order to ensure adequate and quality supply

4-Constructing and operating sub-transmission system for distribution of electricity and facilitate connections and operations between EDC and other distribution systems;

5-Selling electric power and other related services;

6-Purchasing, transferring and exchanging

electricity from other generators

EDC shall limit its business activities to the types stipulated in its Statute and license granted by EAC. EDC has its source of capital from:

1-Grant contribution from the Royal Government of Cambodia.

2-Assets and land transferred by the Royal Government to EDC as per Article 7 of the Sub-Decree No. 23

3-Capital generated from revenue as per the accounting rules of EDC.

4-Grant and other financing received by EDC with approval from the Officers;

5-Finance received by EDC from other financial sources with the approval of the Officers



ACH VUTHA (C) **Electricity of Kampong Speu** PUTH SOPHEAK (C **Electricity of Kratie**

Electricity of Tboung Khmum LOR POCH (C)

AO DIN (C)

Organization Chart of EDC 2018



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On behalf of the Royal Government of Cambodia, the Ministry of Mines and Energy and the Ministry of Economy and Finance are co-owners of EDC.

EDC is headed by Minister attached to the Prime Minister, Managing Director of EDC who reports to the Board of Directors, which in turn reports to the shareholding ministries. EDC's Managing Director is assisted by four Deputy Managing Directors and nine Executive Directors. As of 2018, the management level of EDC comprises of :





H.E. Victor Jona Chairperson Representative of the Ministry of Mines and Energy



Mr. Hang Touch Member Representative of EDC's Employees



Mr. Ky Khemlin Member Representative of the Ministry of Justice



Ms. Sok Sotheavy Member Representative of the Chamber of Commerce of Cambodia.



H.E Eng Kunthea Deputy Managing Director Administration and Training



Mr. Ly Tikhea Executive Director Dept of Administration



Mr. Oum Piseth Executive Director Institute of Electrical Science



Mr. Chhim Man Executive Director Dept of Procurement



Mr. Sarun Sakaranoch Executive Director Dept of Information Technology



Mr. Eam Vantha Executive Director Dept of Internal Audit



Mr. Chuong Heng Executive Director Dept of Inspection

G G FINANCIAL HIGHLIGHT

I- EDC Statement of Financial Position as end 2018

II- EDC Statement of Comprehensive Income for the ended year 2018

III- EDC Statement of Cash Flows for the year ended 2018

Our Revenue



Our Net Profit



Our Total Asset



Our Total Liabilities



Our Equity



EDC Statement of Financial Position as end 2018

	2018	2017
	KHR'000	KHR'000
ASSETS		
Non Current assets		
Property, plant, and equipment	6,351,846,726	5,303,220,990
Intangible assets	3,270,035	1,619,345
	6,355,116,761	5,304,840,335
Current assets		
Cash and bank balance	1,363,537,981	1,262,509,881
Trade and other receivables	871,546,509	665, 575, 498
Inventories	452,033,817	398,811,783
	2,687,118,307	2,326,897,162
TOTAL ASSETS	9,042,235,068	7,631,737,497
LIADIL MES AND FOLLOW		
EIABILITIES AND EQUITY		
Agginged Capital	020 110 067	899 601 461
Assigned Capital	2 054 724 202	000,001,401
Retained Barnings	3.884.853.270	3.201.966.251
Non-current liabilities		
Borrowings	3,620,936,956	3,044,017,533
Customer deposits	285,709,162	246,107,252
Provision for retirement benefits	4,526,265	3,870,310
Deferred tax liabilities, net	45,295,192	40,350,952
	3,956,467,575	3,334,346,047
Current liabilities		
Trade and other payables	975,643,661	862,893,437
Borrowings	132,768,360	172,138,360
Current income tax liability	92,502,202	60,393,402
	1,200,914,223	1,095,425,199
TOTAL EQUITY AND LIABILITIES	9,042,235,068	7,631,737,497

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EDC Statement of Comprehensive Income for the year ended 2018

	2018 KHR'000	2017 KHR'000
Revenue		
Electricity sales	5,532,428,482	4,621,417,322
Connection service fees	38,595,614	35,284,199
Other income	99,804,602	23,115,531
	5,670,828,698	4,679,817,052
Operating expenses		
Purchased power	(3,983,181,240)	(3,314,063,910)
Fuel costs	(14,699,010)	(5,277,383)
Import duty	(17,654,653)	(25,500,387)
Salaries and other benefits	(282,257,672)	(227,268,471)
Other operating expenses	(356,913,969)	(327,671,791)
Depreciation	(172,348,882)	(137,409,477)
Amortisation	(764,564)	(379,207)
Operating profit	843,008,708	642,246,426
Net finance costs	(80,902,054)	(76, 392, 568)
Profit before income tax	762,106,654	565,853,858
Income tax expense	(152,421,331)	(101,335,662)
Net profit for the year / total		
Comprehensive income for the year	609,685,323	464,518,196

EDC Statement of Cash Flows for the year ended 2018

	2018 KHR'000	2017 KHR'000
Cash flow from operating activities		
Net profit for the year	609,685,323	464,518,196
Adjustments for:		
Depreciation and amortisation	173,113,446	137,788,684
Foreign exchane loss(gain)	(11,873,210)	32,617,365
Loss on disposal of property, plant, and equipment	590,929	25,256
Interest expense	102,018,657	92,073,165
Income tax expense	152,421,331	101,335,662
(Reversal) / Addition of allowance		
for bad and doubtful debts	50,397	(2, 173, 357)
Allowance for retirement benefits	655,955	520,363
Allowance for inventory obsolescence	10,076,791	6,081,673
	1,037,193,192	832,787,007

	2018	2017
	KHR'000	KHR'000
Changes in:		
Trade and other receivables	(189,040,297)	(65,025,743)
Inventories	(199,177,171)	(192, 375, 393)
Trade and other payables	114,271,989	208,948,296
Customer deposits	39,601,910	31,194,080
Net cash generated from operations	802,849,623	815,528,247
Interest paid	(103,540,422)	(72, 155, 676)
Interest tax paid	(115,368,291)	(116,736,454)
Net cash generated from operating activities	583,940,910	626,636,117
Cash flows from Investing activities		
Purchases of property, plant, and equipment	(428,273,411)	(409,514,671)
Purchase of intangible assets	(2,012,154)	(549, 485)
Proceeds from disposal of property, plant, and equipment	348,892	37,156
Fixed deposit with banks	(21,473,120)	14,912,062
Capital reserve	(11,898,424)	(9,008,489)
Net cash used in investing activities	(463,308,217)	404,123,427
Cash flow from financing activities		
Proceeds from borrowings	46,623,808	9,249,31
Repayments on borrowings	(155,290,960)	(109,662,119
Grant Received	67,580,439	35,754,98
Net cash used in financing activities	(41,077,713)	(64,657,822
Net increase /(decrease) in cash and cash equivalents	79,554,980	157,854,868
Cash and cash equivalents at beginning of the year	1,150,791,683	992,936,81
Cash and cash equivalents at end of the year	1.230.346.663	1.150.791.68

EDC Statement of Cash Flows for the year ended 2018(Cont)

Human Resource Development

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I- Local Capacity Building

II-International Capacity Building

New skill and knowledge can spark a lifetime of change. For recent years, Electricité Du Cambodge (EDC), has designed and delivered programs in education for various subjects for our employee included local and abroad. With the high attention of the Royal Government of Cambodia under the wise leadership of Samdech Akka Moha Sena Padei Techo Hun Sen, the Prime Minister of the Kingdom of Cambodia has given high priority to the development of human resources in Cambodia which has been incorporated into the Rectangular Strategic Policy Program, Phase 4 of the Royal Government, the 6th Legislature of the National Assembly for the growth of employment, equity and efficiency, building the foundation towards for achieving the vision of Cambodia by 2050.

Supported to Implementing the Rectangular Strategy Phase 4 of the Royal Government of Cambodia, Electricite du Cambodge (EDC) has strived to overcome all obstacles to ensure the sustainability of the electricity supply in Cambodia, strengthening and enhancing the knowledge, skills and employment of employees is considered an important priority to support the development of human resources in the energy sector. Electricite du Cambodge (EDC) has provided opportunities for its employees by providing scholarships in foreign languages, technical skills and leadership skills, combined with scholarships provided by relevant partners through the Royal Government to ensure resources for potential future shifts.



Human Resource Development Target

Electricite du Cambodge (EDC) focuses on the development of human resources to promote the realization of the vision and mission of Electricite du Cambodge now and in the future. EDC's human resources have been developing through EDC's own training courses and through EDC's development partners. Electricite du Cambodge (EDC) is ready to send its employees to get general knowledge and develop the necessary skills both in the country and abroad.

Local Capacity Building

1_Institute of Electrical Sciences (IES)

Institute of Electrical Sciences (IES) is an essential training center for EDC's employees in Phnom Penh as well as Provincial Unit controlled by EDC. The employees may request for extra skills in addition to knowledge were educated to the existing courses proposed by IES every single year. The main purpose is to develop and absorb effectively the new knowledge to maximize their ability for improving their work.

In 2018, there were 1,574 trainees in 206 batches and 85 courses who comes from the departments and provincial units, were trained in IES on the various skills such as 422 trainees on the distribution network, 318 trainees on metering, 218 trainees on safety, 82 trainees on generation, 354 trainees on the high voltage transmission line, 62 trainees on software program and 45 trainees on technical English.



2_Australia Center for Education (ACE)

On November 23 2016, EDC also provided its employees the short courses for English training by collaborating with the Australia Center for Education (ACE) beyond the course study from its English part-time. Until now, there are 754 employees have been studying English course.

International Capacity Building

EDC has continued its efforts to collaborate with other national and international institutions to mobilize scholarships and short-term training in the power sector computer skills and foreign languages to increase wider knowledge and more understanding of the innovative technologies for its employees. As of 2017, EDC has established overseas study opportunities for employees at all levels to discover additional knowledge through scholarships such as:

• "EDC's Young Professional Scholarship" is the scholarship which EDC shoulders all expenses for studying the Master's Degree in only ASEAN countries. "EDC's Young Professional Scholarship" was established on September 17, 2015, in order to encourage and motivate employees who have the willingness to expand their knowledge and bring this knowledge to Cambodia. Until now, EDC has dispatched 7 employees to study Master's Degree in various fields in Thailand and Singapore.

• Japan's Grant Aid for Human Resource Development Scholarships (JDS) through the RGC, Cambodia is one of the twelve countries in the region that receive huge benefits from this scholarship. EDC has dispatched 20 employees to study Master's Degree in various fields such as electrical engineering, economic accounting and financial to the famous university in Tokyo and also Hiroshima. Japan's Grant Aid for Human Resource Development Scholarships (JDS) still comitted to gain more scholarships for EDC employees.

• EDC has signed an MOU with CHMC, a Development Partner Company to offer a Master's Degree in China. Until now, EDC has dispatched 6 employees to study Master's Degree in electrical engineering field.

• Ministry of Mines and Energy has signed an MOU with China Southern Power Grid Co., Ltd (CSG) to provide the scholarship to officers and EDC's employees to pursue the Master's Degree in China, with 14 scholarships was provided to EDC. Annual Report 2018 | Email: info@edc.com.kh | Website: www.edc.com.kh



Table 1: EDC Employees' Qualification from 2013 to 2018

Staff Education Level	2013	2014	2015	2016	2017	2018
Doctorate	4	4	4	5	6	6
Post-graduated	141	151	165	179	192	188
Engineering & other graduation	934	1,078	1,240	1,383	1,652	1,775
Vocational Technicians	570	736	917	1,175	1,372	1,585
Skilled Workers	180	178	173	168	159	158
High school, Unskilled	1,398	1,438	1,527	1,687	1,702	1,730
Total	3,227	3,585	4,026	4,597	5,083	5,442

In addition, EDC organized an event on a soft skill sharing program under the theme "The Power of Communication in Leadership" on March 23rd, 2018. Under supervision of H.E Keo Rattanak, Minister attached to the Prime Minister- Managing Director of EDC, shared his working and leadership experiences with total number of 1335 staff. This special event helped EDC improving their day to day work and relationship between EDC's management level and their subordinates.



I. Power Generating Facilities and Electricity Supply

II. Transmission Network

III. Distribution Network





Power Generating Facilities and Electricity

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I. Generation Sources

II. Demand and Supply in National Grid

Production of energy generation for filling consumption demand in the national grid system is currently focus on sustainable energy source (Clean Energy).

I - Generation Sources

For the year 2018, the total installed capacity is 2,562 MW, consisting of hydro (1330 MW), coal (535 MW), Fuel oil (251 MW), Biomass (31 MW), Solar(10MW) and power import from neighboring countries (409 MW) including Thailand, Vietnam, and Laos. Total energy generation is 9,427 GWh in which hydro shares 50.2%, coal 32.3%, fuel oil 3.3%, biomass 0.5%, solar 0.2% and import from neighboring countries 13.6%. As a result of domestic power source development, there has been dramatically decreasing in energy import from neighboring countries from 62% in 2010 to 13.6% in 2018 as well as fuel oil consumption from 34% in 2010 to 3.3% in 2017, and the annual generation growth is around 23% compared to 2017.

II. Demand and Supply in National Grid

As of 2018, Cambodian National Grid is connected with Vietnam HV System, Thai HV System, Hydropower plants located in Kampong Speu, Koh Kong and Pursat, (Hydropower plants located along Kirirom mountains and Kamchay mountains), and Coal-fired power plants located in Preah Sihanouk Province. The National Grid now supply power directly to 14 city/provinces: Phnom Penh, Kandal, Kampong Speu, Takeo, Kampot, Kep, Preah Sihanouk, Kampong Chhnang, Pursat, Battambang, Banteay Meanchey, Siem Reap, Kampong Cham, and Koh Kong. The four provinces of



Thong Khmum, Prey Veng, Kampong Thom, and Pailin are supplied electricity from the National Grid through sub-transmission lines connected to the National Grid. The peak demand in the coverage area is 1,537 MW, and generated energy is 9,427 GWh. Coverage areas are as follows:

PHNOM PENH AND SUBURBAN

AREAS: PHN is the capital city of Cambodia. The PNH system is supplied by National Grid via 230 kV substations such as GS4, GS6 and GS7 and with the total capacity of about 900 MW which is then delivered to 115 kV system via GS1, GS2, GS3, GS4, GS5, GS6, GS7, GS8 and GS10. Generated by local fuel oil power plants, about 194 MW is additionally injected into the system. EDC Phnom Penh's coverage area includes Phnom Penh, its suburban areas, and Ta khmau, the provincial town of Kandal Province.

In 2018, for Phnom Penh System, the peak demand is 887 MW. Supplying power to 695,756 customers, EDC has absorbed 9,064 GWh of energy from National Grid while, in 2017, there was only 7,346 GWh.

SIEM REAP: SRP is the area of tourist attraction and located in the northwest of Cambodia. The power system of SRP was



handed over to EDC on December 30, 1995. Electricity supply in SRP is from its own power plant and GS Puok (power import from Thailand via a 115 kV transmission line in 2007 and the system was connected to the National Grid in 2013). The main operational features of the power system in SRP for 2018 are around 110 MW of power supply originating from the National Grid and 10 MW from the local power generation. Peak Demand is 112 MW, 777 GWh of electrical energy supplied by the National Grid, 2,661 cct-km of MV and LV lines, and 76,023 customers.

PREAH SIHANOUK: SHV has the most stunning fine sandy beaches and is located in the southwestern part of Cambodia. The power system of SHV was handed over to EDC on June 11, 1996. Originally, the system was isolated and supplied by local power generation with an installed capacity of 20 MW. At the end of 2011, it was connected to KPT system that got power from the National Grid as well as imported power from Vietnam. At the end of 2012 and early 2013, the system was supplied by the National Grid through a 230 kV transmission line from GS KPT to GS STH and a 115 kV transmission line from GS STH to GS SHV. As of 2018, 90 MW of supply comes from the National Grid and 20 MW from the local power generation. This has increased the system's capability to supply power to more areas and to other licensees in SHV. The main operational features of the power system in SHV for 2018 are 515 GWh of the annual energy generation, 121 MW is the peak demand, 1,011 cct-km of MV and LV network, and 25,277 customers.

KAMPONG CHAM: KGC is a province with the most fertile rubber plantations, located in the eastern part of Cambodia. The power system of KGC was handed over to EDC on March 23, 1998. The system was supplied by local power generation in 1996. Some parts of the system received imported power from Vietnam in 2011. KGC system has been connected to the National Grid since 2013. The main operational features of the power system in KGC for 2018 are : 90 MW of power supply coming from the National Grid and 8 MW from the local power generation, 103 GWh is the energy generation, 35 MW peak demand, 872 cct-km of MV and LV lines, and 22,566 customers.

MEMOT AND PONHEA KREK: The

power supply system for MMT and PKK is a part of Kampong Cham province. The power supply to these areas has been imported from Vietnam since 2002 with the contracted capacity of 10 MW. As of 2018, the import is 58 GWh. The system has total MV and LV lines of 565 cct-km, 13 MW of peak demand, and 20,256 customers.

BATTAMBANG: BTB is the leading and economically potential province in term of agriculture, particularly rice production. It is located in the northwestern part of Cambodia. The power system of BTB was handed over to EDC on June 28, 2000. BTB system has covered the 22 kV sub-transmission lines in Pursat Province. A 115 kV transmission line for importing power from Thailand was connected with SRP and BTC systems in 2007. Then, it was linked to the National Grid in 2012. The system has been supplied by the National Grid via GS BTB(CPG) and GS BTB(CPTL) with the total capacity of 185 MW and 2 MW of local power generation. As of 2018, the system has 2,534 cct-km of the total MV and LV lines, 395 GWh of energy generation, 74 MW of peak demand, and 52,387 customers.

BANTEAY MEANCHEY AND MONGKUL BOREI: BTC is located in the northwestern part of Cambodia. The power system of BTC was handed over to EDC on August 14, 2003. BTC was supplied by its own power plant and imported power from Thailand in 2007. Then the system was connected to the National Grid in 2013. As of 2018, 68 MW of the supply capacity is from National Grid (GS BTC and GS IE), and 3 MW more is generated by the local fuel oil power plant. There are 139 GWh of the energy generation, 33 MW of peak demand, 520 cct-km of MV and LV network and 24,131 customers.

STEUNG TRENG: STR is a remote and sparsely populated province located in the northeast of Cambodia. The power system of STR was handed over to EDC on August 14, 2003. The power system of STR town has been connected to Laos system at 22 kV since 2010. As of 2018, the system has 51 MW of installed capacity (2 MW generated by its own power plant and 4 MW imported from Laos and 45MW from national grid), 799 cct-km of total MV and LV lines, 27 MW of peak demand, 94 GWh of the energy generation and 1,0782 customers.

RATANAKIRI: RTK is situated on the border of Vietnam's central highlands and Laos. The power system of RTK was handed over to EDC on August 14, 2003. As of 2017, the system has 4 MW of installed capacity that is the sum of fuel oil and hydro generations, 8 MW of power import from Vietnam via a 35 kV sub-transmission line, 803 cct-km of MV and LV lines, 18 MW of peak demand, 64 GWh of energy generation, and 9,665 customers.

TAKEO AND AND TASOM: TKO is

located in the plain region of the southern part of Cambodia. The power system of TKO was handed over to EDC on June 26, 2000. The 230 kV line from Vietnam to TKO substation was energized on 31st March 2009 to import power from Vietnam. As of 2018, 45 MW of the supply capacity comes from the National Grid and 2 MW from local fuel oil power generation. The system has a peak demand of 28 MW, 909 cct-km of MV and LV line. Generated energy from its own power plant, power import from Vietnam, and National Grid are 107 GWh supplied to 25,758 customers.

KAMPOT:KPT is located in the southern part of the country. The power system of KPT was handed over to EDC on August 14, 2003. The power from the local fuel oil power generation and import from Vietnam that has been transmitted via a 22 kV line through Kampong Trach are used for supplying in KPT city. The supply capacity from National Grid was about 45 MW in 2011. As of 2018, energy generation from its own power plant, National Grid, and power import from Vietnam is 109





GWh. The system has 21 MW of peak demand, 673 cct-km of MV and LV lines, and 15,478 customers.

KAMPONG TRACH: The power supply system for KGT is a part of KPT province, and it has imported electricity from Vietnam since 2002. The power system in KGT has been supplied by the National Grid since 2014. As of 2018, the contracted capacity has been 10 MW, and the system has 156 cct-km of the line length of MV and LV lines, 19 GWh of energy generation, 4 MW of peak demand, and 7,344 customers.

PREY VENG: PRV is located in the southeast of the country. The power system of PRV was handed over to EDC on August 14, 2003. The supply sources of PRV City system are comprised of EDC's own power generation with an installed capacity around 1 MW (in 2003) and imported power from Vietnam (in 2009). After energizing lines of the rural project, PRV has also got power from KGC system (in 2013), PNH system for supplying areas along National Road No.8 (in 2014), and Suvannaphum coal fired power plant (in 2015). There are 869 cct-km of MV and LV lines and 27 MW of peak demand. The available energy is 138 GWh supplied to 7,392 customers.

SVAY RIENG: SVR is located in the southeast of the country. The power system of Svay Rieng was handed over to EDC on August 14, 2003. The source of power supply consists of power import from Vietnam (in 2003), its own


power generation (in 2006), and Suvannaphum coal fired power plant (in 2015). The available capacity of the system is 8 MW. Power import and generation, as of 2018, are 277 GWh while the peak demand is 22 MW. The line length of MV and LV network is 695 cct-km to connect to 44,623 of customers have been supplied.

BAVET: The power system for BVT is a part of SVR province, and the power supply source for this area is from Vietnam. As of 2018, there is a peak demand of 29 MW, 16 MW of imported power from Vietnam, and the system has 6,034 customers.

MONDULKIRI: The power system of MDKR was handed over to EDC on May 10, 2010. The installed capacity of the system is comprised of 370 kW of hydro power generation, 300 kW of diesel power generation, and 1 MW imported from Vietnam. Under EDC control, as of 2018, available energy has been 7 GWh, and peak demand is about 6 MW. The line length of MV and LV network is 339 cct-km through which 4,546 customers have been supplied.

KEOSIEMA: The power system for KSM is in MDKR province. Supply source is by power import from Vietnam with a contracted capacity of 0.4 MW. The import has been 11 GWh and, a peak demand is 11 MW. The line length of MV and LV network is 131 cct-km through which 4,389 of customers have been supplied.

KRATIE: The power system of KRT was handed over to EDC on April 20, 2011. The system is supplied by local power generation with an installed capacity of around 1 MW (in 2011) and KGC system (in 2015). Under EDC control, as of 2018, a generation has been 61 GWh, and a peak demand is about 13 MW. The line length of MV and LV network is 823 cct-km through which 11,495 of customers have been supplied.

SNUOL: The power system is in KRT province. This system is supplied by 5 MW of imported power from Vietnam with the annual energy of 16 GWh and 3 MW of peak demand. The line length of MV and LV network is 218 cct-km through which 3,722 of customers have been supplied.

KAMPONG SPEU: On March 14, 2012, KPS branch was upgraded to a province unit as it had been under Phnom Penh System. This unit is in charge of the system in KPS town and the areas along National Road No.4, which get power supply from GS KPS. Some areas of KPS are getting power supply from GS4, GS6, and GS TKO. As of 2018, 45 MW of the supply capacity is from the National Grid. Energy generation from the National Grid has been 155 GWh, and the annual sale energy has been 111 GWh. Peak demand is 64 MW. The line length of MV and LV network is 802 cct-km through which 18,756 customers have been supplied.



Table 2 : Installed Capacity and Output from Power Plants and Import, MW

	Voar								
Loc	eation		Canacity	2013	2014	2015	2016	2017	2018
			Installed	1 / 1 /	1 958	1 962	2 097	2 515	2 565
Natio	nal Grid		Output	1 153	1,000	1,802	2,001	2,010	2,000
			Installed	1,219	1,727	1,841	1,976	2,386	2,416
Phno	m Penh		Output	968	1,531	1,779	1,905	1,965	2,345
			Installed	44	44	81	81	81	81
EDC	IPP	FO	Output	41	41	75	75	75	75
			Installed	37	37	-	-	-	-
CUPL	IPP	FO	Output	32	32	-	-	-	-
			Installed	49	49	49	49	49	49
KEP	IPP	FO	Output	43	43	43	43	43	43
			Installed	8	-	-	-	-	-
CITY Power	IPP	FO	Output	7	-	-	-	-	-
			Installed	49	49	49	49	49	49
CEP	IPP	FO	Output	45	45	45	45	45	45
			Installed	20	20	14	14	14	14
COLBEN	IPP	FO	Output	10	10	10	10	10	10
	IDD	70	Installed	12	12	12	12	12	12
Kirirom I	IPP	FO	Output	11	11	11	11	11	11
	IDD	70	Installed	18	18	18	18	18	18
Kirirom III	IPP	FO	Output	18	18	18	18	18	18
77 1	IDD		Installed	194	194	194	194	194	194
Kamchay	IPP	FO	Output	194	194	194	194	194	194
A .	IDD	FO	Installed	120	120	120	120	120	120
Atay	IPP	FO	Output	120	120	120	120	120	120
LCDC	IDD	FO	Installed	338	338	338	338	338	338
LSRU	IPP	FO	Output	169	338	338	338	338	338
Tratara	IDD	FO	Installed	-	246	246	246	246	246
Tatay	IPP	гO	Output	-	246	246	246	246	246
Lowen Cocon II	IDD	FO	Installed	-	-	-	-	400	400
Lower Sesan II	IFF	гU	Output	-	-	-	-	50	400
CEI	IDD	FO	Installed	120	120	120	120	120	120
CEL	11 1	FO	Output	100	100	100	100	100	100
CHDG	IDD	FO	Installed	-	270	270	405	405	405
CHIDG	11 1	10	Output	-	125	251	377	377	377
SVP	IPP	FO	Installed	10	10	10	10	10	10
	11 1	10	Output	8	8	8	8	8	8
Sunsean	IPP	FO	Installed	-	-	-	-	10	10
Sunscap	11 1	10	Output	-	-	-	-	10	10
Thailand	Imr	oort	PPA	-		120	120	120	120
	1		Output	-		120	120	120	120
Vietnam	Imr	oort	PPA	200	200	200	200	200	200
	1		Output	170	200	200	200	200	200
Lao	Imr	oort	PPA					-	30
	1		Output					-	30

Table 2 : Installed Capacity and Output from Power Plants and Import, MW (Cont)

	Year								
Loc	eation		Capacity	2013	2014	2015	2016	2017	2018
Due			Installed	195	231	121	121	129	149
Pro	vinces		Output	185	223	113	113	121	140
	FDC	FO	Installed	11	11	11	11	11	11
CDD	EDC	гO	Output	11	11	11	11	11	11
Shr	Import		PPA	40	80	-	-	-	-
	1111	port	Output	40	80	-	-	-	-
	IDD	FO	Installed	8	8	8	8	8	8
KCC	IFF	I FO	Output	5	5	5	5	5	5
NGC	Im	out	PPA	2	2	2	2	2	
	1111]	JOIL	Output	2	2	2	2	2	
	EDC	FO	Installed	6	6	6	6	6	6
CHIV	EDC	гO	Output	5	5	5	5	5	5
	IDD	EO	Installed	14	14	14	14	14	14
SUA	IPP	FO	Output	10	10	10	10	10	10
	IPP	DIO	Installed	-	-	-	-	2	2
	IPP	BIO	Output	-	-	-	-	2	2
TUZO	EDC	FO	Installed	2	2	2	2	2	2
TKO	EDC	FO	Output	2	2	2	2	2	2
	EDC	FO	Installed	2	2	2	2	2	3
DUD	EDC	FO	Output	2	2	2	2	2	3
BIB	Import		PPA	20	20	-	-	-	-
	Import		Output	20	20	-	-	-	-
	EDC	FO	Installed	3	3	3	3	3	3
DEC	EDC	FO	Output	3	3	3	3	3	3
DIU	Т		PPA	20	20	-	-	-	-
	Imp	Import		20	20	-	-	-	-
IZDT	EDC	FO	Installed	3	3	3	3	3	3
KF I	EDC	гО	Output	3	3	3	3	3	3
ROT	Т		PPA	10	10	10	10	10	10
KG1	1111	port	Output	10	10	10	10	10	10
VDC	IDD	PIO	Installed	-	-	6	6	6	23
IXI S	11.1	DIO	Output	-	-	6	6	6	22
DVV	Im	out	PPA	5	5	5	5	5	10
I KK	1111]	JOIL	Output	5	5	5	5	5	10
MMT	Tma	port	PPA	5	5	5	5	5	5
TATTAT T	Imj	JUL	Output	5	5	5	5	5	5
	FDC	FO	Installed	2	2	2	2	2	2
DV/D	EDC	гU	Output	2	2	2	2	2	2
ΓVK	T I	oont	PPA	3	3	3	3	3	3
	Imj	Jort	Output	3	3	3	3	3	3

Table 2 : Installed Capacity and Output from Power Plants and Import, MW (Cont)

	Year			0010	0014	001 -	0010	0015	0010
Loc	ation		Capacity	2013	2014	2015	2016	2017	2018
	DD C	ПО	Installed	2	2	2	2	2	2
	EDC	FO	Output	2	2	2	2	2	2
	TDD	DIO	Installed	-	-	-	-	4	4
CUTD	IPP	BIO	Output	-	-	-	-	4	4
SIK	IDD	DIO	Installed	-	-	-	-	2	2
	IPP	BIO	Output	-	-	-	-	2	2
	τ	4	PPA	4	4	6	6	6	6
	Import		Output	4	4	6	6	6	6
	FDC	FO	Installed	1	1	1	1	1	1
CVD	EDC	гU	Output	1	1	1	1	1	1
SVR	Im	out	PPA	8	7	8	8	8	7
	1111]	JOIL	Output	8	7	8	8	8	7
BVT	Im	out	PPA	16	16	16	16	16	16
DVI	1111]	JOIL	Output	16	16	16	16	16	16
	FDC	FO	Installed	1	1	1	1	1	1
КЪТ	EDC	rυ	Output	1	1	1	1	1	1
11111	IPP FO	FO	Installed	3	-	-	-	-	-
		FO	Output	1	-	-	-	-	-
SNL	Import		PPA	4	4	5	5	5	5
BILL	IIII	5011	Output	4	4	5	5	5	5
Off	Grid		Installed	11	14	14	14	14	22
	GIIU		Output	11	12	12	12	12	20
	FDC	FO	Installed	-	3	3	3	3	3
	EDC	rυ	Output	-	1	1	1	1	1
DTW	FDC	ц	Installed	1	1	1	1	1	1
MIK	EDC	11	Output	1	1	1	1	1	1
	Im	ort	PPA	8	8	8	8	8	13
	1111}	0010	Output	8	8	8	8	8	13
	FDC	FO	Installed	0.3	0.3	0.3	0.3	0.3	0.3
MDK	EDC	rυ	Output	0.3	0.3	0.3	0.3	0.3	0.3
	EDC	н	Installed	0.4	0.4	0.4	0.4	0.4	0.4
WIDIX	ШU	11	Output	0.4	0.4	0.4	0.4	0.4	0.4
	Im	ort	PPA	1	1	1	1	1	2
	1111]	5011	Output	1	1	1	1	1	2

	Year			0014	001 5	0010	0015	9019
Location		Capacity	2013	2014	2015	2016	2017	2010
IZCM			0.4	0.4	0.4	0.4	0.4	2
KSIVI	Import	Output	0.4	0.4	0.4	0.4	0.4	2
тс	ν Ψ Δ Τ	Installed	1,425	1,972	1,976	2,111	2,529	2,587
TOTAL Output		Output	1,164	1,766	1,904	2,030	2,098	2,505
Percentage (%)			82%	90%	96%	96%	83%	97%

Table 2 : Installed Capacity and Output from Power Plants and Import, MW (Cont)



Figure 1 : Installed Capacity by type from 2013 - 2018

Table 3 : Energy Generation from Power Plants and Import, GWh

Year	0019	9014	2015	0010	0017	9019
Location	2013	2014	2010	2016	2017	2018
National Grid	3,660	4,477	5,658	6,566	7,603	9,373
EDC's	36	26	9	72	35	56
CUPL	73	35	5	-	-	-
Kirirom 1	45	39	35	42	43	43
Kam Chay	463	424	363	438	406	533
Kirirom 3	90	80	79	82	87	90
ATAY	267	327	106	214	243	427
LRSCR	138	866	831	923	994	1,449
TATAY	-	104	736	859	899	1,152
LS II	-	-	-	-	-	1,032
KEP	140	80	51	115	114	103
CITY POWER	13	-	-	-	-	-
CEP	144	96	66	160	103	114
COLBEN	19	11	4	16	8	5
S.L Garment	6	1	4	7	5	1
Sunseap	-	-	-	-	5	16
Suvannaphum	30	43	34	52	38	14
CEL	139	654	620	574	655	503
CIIDG	-	167	1,474	1,766	2,877	2,539
Thai	417	350	139	147	87	212
VN	1,329	879	804	737	710	728
PP Sugar	1	10	23	23	38	48
SRP	4	5	4	8	2	6
SHV	25	9	3	11	-	6
KGC	32	8	0.2	2	-	4
ТКО	0.03	0.02	0.02	0.01	0.01	0.02
BTB	0.01	0.01	0.01	0.01	0.01	0.02
KPT	12	15	12	23	0.08	19
BTC	0.16	0.04	0.04	0.1	0.08	0.12
РКК	39	30	22	23	26	27
MMT	16	16	19	22	25	23
KGT	17	13	7	14	17	17
PRV	15	13	9	5	2	0.01
STR	11	14	18	35	54	66
SVR	33	137	155	164	110	0.02
BVT	87	-	-	-	-	129
Kratie	10	15	15	20	14	0.39
Snuol	9	10	11	12	7	11
Off Grid	28	35	42	47	62	53
MDKR	3	4	5	6	7	13
KSM	2	3	4	4	4	4
RTK	23	28	33	37	51	36
Total	3,688	4,512	5,700	6,613	7,665	9,427

Locatior	ı	Fuel Oil	Hydro	Biomass	Solar	Coal	Import	TOTAL
National Grid		307.55	4,725.86	50.30	15.75	3,042.40	1,231.31	9,373.17
DIN	EDC	55.50	-	-	-	-	-	55.50
PHN	IPPs	236.49	4,725.86	48.73	15.75	3,042.40	939.49	9,008.72
KPS				-	-			-
SRP		6.25		-	-	-		6.25
SHV		5.26		1.19				6.45
KGC		3.76		-	-	-		3.76
ТКО		0.02	-	-	-	-	-	0.02
BTB		0.02	-	-	-	-	-	0.02
KPT		0.08		-	-	-	18.92	19.00
BTC		0.12	-	-	-	-	-	0.12
PKK		-	-	-	-	-	27.44	27.44
MMT		-	-	-	-	-	23.10	23.10
KGT		-	-	-	-	-	16.85	16.85
PRV		0.01	-	-	-	-	-	0.01
STR		0.00	-	-	-	-	65.55	65.56
SVR		0.02	-	-	-	-	-	0.02
BVT		-	-	-	-	-	128.66	128.66
Kratie		0.01		0.38	-	-	0.01	0.39
Snuol		-	-	-	-	-	11.29	11.29
Off Grid		0.00	5.47	-	-	-	47.98	53.45
MDKR		0.00	1.83	-	-	-	11.08	12.91
KSM		-	-	-	-	-	4.24	4.24
RTK		-	3.63	-	-	-	32.67	36.30
TOTAL		307.56	4,731.33	50.30	15.75	3,042.40	1,279.29	9,426.62

Table 4 : Energy Generation from Power Plants and Import, GWh





Table 5 : Energy Sales, GWh

Location	2013	2014	2015	2016	2017	2018
PHN	2,531	2,956	3,748	4,289	4,807	5,985
SRP	270	319	376	447	511	573
SHV	96	141	186	232	309	488
KGC	44	43	68	75	94	126
Th. Khmum	-	-	-	-	-	8
PKK	37	29	23	23	26	15
MMT	15	15	19	23	23	13
CKV	-	-	-	-	-	1
ТКО	37	54	90	94	88	102
BTB	127	161	222	278	346	377
KPT	29	44	81	97	110	122
KGT	16	13	-	-	-	-
PRV	14	20	42	45	74	96
BTC	47	71	106	110	118	122
STR	10	12	16	35	24	41
KSL				-	20	42
RTK	21	26	31	35	45	60
SVR	26	129	159	186	229	267
BVT	87			-		-
MDKR	3	4	5	6	8	12
KSM	2	4	4	4	4	4
KRT	10	15	18	28	35	59
SNL	8	11	10	9	11	15
KPS	52	84	137	94	111	145
TOTAL	3,484	4,152	5,341	6,110	6,994	8,675



Figure 3 : Energy Sale by type in 2018

Table 6 : Yearly Peak Demand, MW

Location	2013	2014	2015	2016	2017	2018
National Grid	625	784	951	1,068	1,269	1,537
PHN	493	563	674	757	777	887
SRP	57	59	68	83	89	112
SHV	25	30	40	46	68	121
KGC	17	14	22	32	36	35
PKK	7	6	4	4	7	7
MMT	5	4	7	7	6	6
ТКО	9	18	20	23	21	28
BTB	23	26	47	65	71	74
KPT	6	13	18	16	15	21
KGT	3	3	5	3	3	4
PRV	3	8	14	15	21	27
BTC	11	19	23	24	26	33
STR	4	5	3	8	12	27
RTK	4	5	6	7	13	18
SVR	7	8	12	30	19	22
BVT	16	17	17	16	27	29
MDKR	1	1	1	2	4	6
KSM	0.5	1	1	1	1	1
KRT	2	3	3	8	9	13
SNL	1	2	2	3	2	3
KPS	-	-	38	42	46	64



Figure 4 : Daily Peak Load Curve from 2013 to 2018 in National Grid

Table 7 : Customer from 2013 to 2018

Location	2013	2014	2015	2016	2017	2018
PHN	299,774	319,423	522,517	610,582	652,858	695,756
SRP	32,725	36,694	40,949	48,482	61,745	76,023
SHV	13,146	14,238	15,975	17,930	20,157	25,277
KGC	13,003	14,876	16,999	19,436	21,341	22,566
РКК	2,849	2,996	3,958	6,644	7,401	8,058
ММТ	5,321	5,591	7,608	8,652	11,329	12,198
ТКО	13,081	15,636	20,203	21,899	23,732	25,758
BTB	40,735	42,336	45,216	47,899	50,093	52,387
KPT	10,559	11,234	11,989	13,128	14,249	15,478
KGT	3,499	3,670	4,176	5,759	6,651	7,344
PRV	5,790	6,110	6,497	6,742	7,129	7,392
BTC	18,022	19,217	21,186	22,348	23,568	24,131
STR	4,668	5,782	6,280	7,448	9,503	10,782
RTK	4,233	4,722	5,235	6,503	8,075	9,665
SVR	12,474	13,892	13,968	19,962	27,811	44,632
BVT	3,174	3,802	6,742	4,465	5,043	6,034
MDKR	2,070	2,195	2,348	2,692	3,735	4,546
KSM	1,337	1,554	1,753	1,926	3,825	4,389
Kratie	4,404	4,776	6,707	8,442	10,115	11,495
Snuol	1,167	1,238	1,311	1,827	2,576	3,722
KPS	10,828	11,159	12,996	14,409	16,410	18,756
Thb.K		-	-	-	-	423
TOTAL	502,859	541,141	774,613	897,175	987,346	1,086,812







Figure 6 : Distribution Losses from 2013 to 2018

C Transmission Networks

I. 115 kV Transmission Networks II. 230 kV Transmission Networks III. 115 kV Grid Substations IV. 230 kV Grid Substations

Transmission networks are the blood vessels that play an important role in transmitting energy from power plants to substations. The transmission lines of EDC are currently divided into two types: 230 kV and 115 kV and the near future is 500kV.

National Transmission Grid

The main purpose of the 115 kV ring bus line around Phnom Penh is to supply power to Phnom Penh area and to increase the reliability of power supply in Phnom Penh system by interlinking three grid substations. The first 115 kV transmission line of 23 km length linking the three grid substations (GS1. GS2, and GS3) in Phnom Penh System was energized in 1999. In 2002, another 115kV transmission line of 111 km length was erected to link Kirirom I Hydro Power Plant to GS1. The Major source of power supply for three provinces in the north - western Cambodia -Battambang, Banteay Meanchey, and Siem Reap are imported from Thailand via 115 kV transmission line of 185 km length which was commissioned at the end of 2007.

In 2009, the first 230 kV transmission line in Cambodian history with 97 km in length to supply power to Takeo Grid Substation and the West Phnom Penh Substation (GS4) was put in service getting power from Vietnam. The 115 kV transmission line ring system connecting West Phnom Penh Substation (GS4) to the three existing substations in Phnom Penh was also put in operation.

In 2011, the 230 kV transmission line with 73 km in length was extended from Takeo Grid Substation to Kampot Grid Substation and linked to Kamchay Hydropower plant with another 230 kV transmission line with a length of 11 km.

The 230 kV transmission line from Phnom Penh to Battambang has started operating since April 2012 with a length of 300 km and another 230 kV transmission line from Ou Soam substation (Koh Kong) to Pursat province substation with a length of 130 km under BOT construction scheme. The construction of 115 kV from 230/115/22 kV substation of CPG (Cambodia Power Grid) to connect with 115 kV substation of CPTL (Cambodia Power Transmission Line) which was put in service on September 01, 2012 permits the National Grid to be able to extend from a part of the southern grid (Phnom Penh, Kandal, Kampong Speu, Takeo, Kampot and Kep) to the northwestern grid (Battambang, Banteay Meanchey and Siem Reap) through Kampong Chhnang and Pursat provinces.

In 2013, the 230 kV transmission line from Kampot to Preah Sihanouk province under ADB and JICA loans with a length of 88 km and another 230 kV transmission line from Phnom Penh to Kampong Cham with a length of 110 km have been put in operation. These projects permit the National Grid to cover two more provinces: Preah Sihanouk and Kampong Cham.

In 2014, 11 km of 115 kV transmission line from GS STH to GS SHV, funded by JICA loans, and 12 km of 115 kV transmission line from Chhouk to Banteay Meas Substation, funded by EDC's budget, as well as 48 km of 230 kV transmission line in Phnom Penh Loop Line project, connecting GS 6 to GS 5 and funded by loans from China Exim Bank, were put in operation.

In 2015, a 115 kV transmission line was constructed to link our GS7 with GS2 and put into operation in 2015. This is a part of the Project for Phnom Penh Loop Line funded by China Exim Bank.A new interconnection point from Champasak province, Ban Hat Substation, Lao PDR to Kampong Sralau, Preah Vihear province, Cambodia, the initial design and



construction for the 115 kV transmission line was energized at 22 kV voltage level for the first stage until the transmission line from Lao border to Chey Sen Substation was completed.

In 2016, Phnom Penh - Bavet and Kampong Cham - Kratie - Stung Treng - Lower Sesan II Hydro Power Plant transmission lines with a total length of 426 km are under construction. These projects are expected to be completed by the end of 2017.

Projects for a transmission line surrounding Tonle Sap Lake (connecting Battambang - Siem Reap - Kampong Thom - Kampong Cham), Phom Penh Loop Line Phase 2 (NPP - Chroy Changvar - EPP - SPP), and a transmission line connecting Kampong Thom - Preah Vihear - Lao PDR Border are under study. These projects are funded by China Exim Bank.

In 2017, 230kV Transmission Line which connected from Lower Sesan II to Steung Treng substation and continued to Kratie substation and Kampong Cham substation have been operated for transmitting the power into the nation grid that allowed the consumer surround and under transmission line could absorb the maximum power directly, especially through the transmission line, it could sends a large amount of power to Phnom Penh where is a prime location in the industrial, comercial and development that is going to absorb huge amounts of electricity consumption in the future.

115kV Transmission line with the total length 141 km, connecting from GS7 to GS Kampong Soeng and GS Chrok Mates has been commsioned in early of 2017 that allowed the people in Svay Rieng and Prey Veng province could get the power directly from the national grid and reduce the importing power from neighboring country.

115 kV Transmission line with a total length 54 km linking from Lao border to Preah Vihear province was put into operation in 2017 . Then GS Preah Vihear has been put in operation in early 2018 that allow to import electricity from Laos through high voltage level to supply to Preah Vihear province and



parts of Kampong Thom and Stung Treng provinces. This is the opening of the new era of energy trade between the two countries for the first time via 115 kV Transmission line.

In addition, the 115kV transmission line extended from GS Banteay Meas to cement plant (Chipmong Insee) in Kampot province and Substation No.10 that was build inside the area of Phnom Penh Special Economic Zone were put in service. These achievements will provide reliability and stable supply to the heavy industries activity which is in line with Industry Development Policy of the Royal Government of Cambodia. Moreover, some transmission and distribution extension prospects in Phnom Penh, Kampong Cham, Kratie and Koh Kong under EDC, JICA and AFD fund was starting the construction and scheduled to finish by 2020 and 2021 respectively. As the result, The system in Phnom Penh will become large system and able to supply more capacity to meet the demand growth in this area.



Table 8 : 115 kV Transmission Facilities

Ι	115 kV Transmission line	Circuit	Cross Section (mm ²)	Line Length (km)	Operation Year	Capital Source
1	Phnom Penh Loop Line(GS2 - GS3 - GS4 - GS8 - GS10 - CEP - KEP)	1	2x240 2x250	38	1999	WB & EDC
2	GS Kirirom I - GS KPS	1	150	65	2002	BOT
3	GS KPS - GS5	1	150	38	2002	BOT
4	Thai Border (ARG) - GS IE	2	400	5	2007	BOT
5	GS IE - GS BMC	2	400	49	2007	BOT
6	GS BMC - GS SR	1	400	88	2007	BOT
7	GS BMC - GS BTB	2	400	57	2007	BOT
8	Kirirom I - Kirirom III	1	150	32	2012	BOT
9	GS BTB (CPG - CPTL)	2	$2 \ge 250$	1	2012	BOT
10	Lower Stung Atay Hydropower Plant - GS Ou Soam	2	400	14	2013	ВОТ
11	Upper Stung Atay Hydropower Plant - GS Ou Soam	1	400	4	2013	вот
12	GS STH - GS Sihanouk Ville	2	400	11	2014	JICA
13	GS Chhuk - GS Banteay Meas	1	400	12	2014	EDC
14	GS1 - GS5	2	2 x 240 & 2 x 250	9	2014	CEIB
15	GS5 - GS6	2	2 x 240	25	2014	CEIB
16	GS SR1 - GS SR2	1	400	26	2016	BOT
17	GS2 - GS7	2	2 x 240	17	2016	CEIB
18	Lao Border - GS Preah Vihear I	1	240	54	2017	CEIB
19	GS7 - GS Kampong Soeng	1	$2 \ge 240$	60	2017	CEIB
20	GS Kampong Soeng - GS Chrok Mates	1	2 x 240	81	2017	CEIB
21	GS Battambang - GS Ratanakmundol	2	400	34	2017	EDC
22	GS Ratanakmundol - GS Pailin	2	400	46	2017	EDC
23	GS Banteaymeas - GS Chip Mong	1	400	7	2018	EDC
24	GS3 - GS Toul kok	2	800 & 1000	6	2018	EDC
	Total length	779 km				

Table 9 : 230 kV Transmission Facilities

Π	230 kV Transmission line	Circuit	Cross Section (mm²)	Line Length (km)	Operation Year	Capital Source
1	Vietnam Border - GS TKO	2	400	50	2009	ADB - NDF
2	GS TKO - GS4 (WPP)	2	630	46	2009	ADB - NDF
3	GS TKO - GS - Chhuk - GS KPT	2	400	73	2011	KfW
4	GS KPT - Kamchay Hydro Power Plant	2	630	11	2012	ВОТ
5	GS4 - GS6	2	2 x 630	40	2012	ВОТ
6	GS6 - GS Kampong Chhnang	2	2 x 630	49	2012	ВОТ
7	GS Kampong Chhnang - GS Pursat	2	$2 \ge 630$	83	2012	ВОТ
8	GS Pursat - GS Battambang	2	$2 \ge 630$	123	2012	ВОТ
9	GS Pursat - GS Ou Saom	2	$2 \ge 630$	142	2012	ВОТ
10	GS KPT - GS Stung Hav(SHV)	2	630	82	2013	ADB - JICA
11	GS6(NPP) - GS Kampong Cham	2	2 x 400	97	2013	ВОТ
12	GS Ou Soam - Lower Russei Chrum Hydro Power Plant - Stung Tatay Hydro- Power Plant	2	2 x 400	75	2013 & 2014	вот
13	CEL Coal Power Plant - GS Stung Hav	2	2 x 400	2	2013	ВОТ
14	CIIDG Coal Power Plant - GS Stung Hav	2	2 x 630	1	2014	ВОТ
15	GS4 - GS7	2	2 x 630	24	2014	CEIB
16	GS Kampong Cham - GS Kratie	2	$2 \ge 630$	123	2017	ВОТ
17	GS Kratie - GS Steung Treng	1	$2 \ge 630$	117	2017	IEIB
18	GS Steung Treng - Lower Sesan II Hydro Power Plant	2	2 x 400	25	2017	вот
	Total length	1,163 km				

Table 10 : Grid Substation Facilities

No.	Grid Substation Name	Rate Voltage (kV)	Number of Transformer	Total Capacity (MVA)	Operation Year
1	GS1	115/22	2 x 75	150	1999(Upgraded in 2013)
2	GS2	115/22	3 x 50	150	1999 (Added 1 unit in 2013)
0	C C C	115/22	2 x 50	100	1999
3	GS3	115/22/15	1 x 50	50	2013
4	GS KPS	115/22	1 x 50	50	2002
5	GS BTB (CPTL)	115/22	$1 \ge 25$	25	2007
6	GS BTC	115/22	1 x 50	50	2007 (Upgrade in 2017)
7	CC CDD	115/99	$1 \ge 50$	50	2007
1	GS SRP	110/22	$1 \ge 25$	25	2017
0	CC4 (WDD)	230/115	$2 \ge 200$	400	2000
0	GS4 (WPP)	115/22	$2 \ge 50$	100	2009
0	CS TKO	930/99	1 x 16	16	2009
9	0.5 110	230/22	$1 \ge 50$	50	2015
10	GS KPT	230/22	$1 \ge 50$	50	2012
11	GS Kampong Chhnang	230/22	1 x 50	50	2012 Upgrade in 2017
12	GS Pursat	230/22	$1 \ge 25$	25	2012
10		000/11 =/00	2 x 90	180	2012(Added 1 unit in 2015)
13	GS BTB (CPG)	230/115/22	1 x 75	75	2018
14	GS5	115/22	3 x 50	150	2013 (Added 1 unit in 2015) (Added 1 unit in 2017)
15	CC CTTT	230/22	$1 \ge 50$	50	2013
15	GS STH	230/115	1 x 100	100	2018
16	GS6 (NPP)	115/22	$2 \ge 50$	100	2013
10		230/115	$2 \ge 200$	400	2010
17	GS Osom	230/115/22	1 x 150	150	2013
18	GS KGC	115/22	2 x 50	100	2013 (Added 1 unit in 2015)
		230/115	1 x 200	200	2017
19	GS Chhuk	230/115/22	1 x 100	100	2014
20	GS SHV	115/22	1 x 50	50	2014
21	GS Banteay Meas (SWS)	115	6.3	6.3	2014
22	GS7 (SPP)	230/115	2 x 200	400	2015 (Added 1 unit in 2017)
		230/22	$1 \ge 75$	75	2017
23	GS Tatay	230/35/22	1 x 60	60/60/40	2015
24	GS IE	115/22	1 x 50	50	2015
25	GS East Siem Reap	115/22	1 x 50	50	2016

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Table 10 : Grid Substation Facilities (Cont')

No.	Grid Substation Name	Rate Voltage (kV)	Number of Transformer	Total Capacity (MVA)	Operation Year
26	GS Kampongsoeng	115/22	$1 \ge 50$	50	2017
27	GS 8 (Toul Pongror)	115/22	$1 \ge 75$	75	2017
28	GS Chrok Mates	115/22	$1 \ge 50$	50	2017
29	GS Kratie	115/230	$1 \ge 50$	50	2017
30	GS Preah Vihea I	115/22	$1 \ge 50$	50	2018
31	GS Steung Treng	230/22	$1 \ge 50$	50	2018
32	GS 10	115/22	1 x 30	30	2018

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Distribution Networks

I. 35 kV Distribution Networks II. 22 kV Distribution Networks III. 0.4/0.23 kV Distribution line

The distribution line has an important role to supply power to end-user customers that cover every province. EDC's distribution network is divided into two categories:

- 1. Medium voltage network of 35 kV & 22kV.
- 2. Low voltage network of 0.4kV & 0.23kV.

Distribution Networks

The voltage of medium voltage systems of EDC generally is 22 kV and low voltage 0.4/0.23 kV. During 2009 and 2010, distribution network in Phnom Penh, Kampong Speu, Prey Veng, Banlung (Ratanakiri), Stung Treng, and Preah Sihanouk province have been strengthened with 22 kV medium voltage lines. The detailed data of lines of different voltages are shown in the following table.

Medium voltage lines of the total length of about 2,000 km in four provinces of Kampong Cham, Prey Veng, Kampong Speu, and Preah Sihanouk were commissioned under the rural electrification projects funded by China Exim Bank loan.

In addition, the construction of medium voltage lines of 1,200 km covering 6 provinces including Kratie, Stung Treng, Rattanakiri, Mondulkiri, Oddar Meanchey, and Siem Reap has been started under the rural electrification project phase II with funds from Royal Government of Cambodia. The project is expected to be completed in 2016. Preliminary work for construction of more than 2,040 km of distribution line in 14 provinces such as Kandal, Kampong Speu, Kampong Chhnang, Pursat, Siem Reap, Oddar Meanchey, Preah Vihear, Kampong Cham, Kratie, Stung Treng, Ratanakiri, Mondulkiri, Koh Kong, and Preah Sihanouk are under construction for which loan is sanctioned by China Exim Bank in Phase 2, 3, and 4.

Medium Voltage Sub-transmission line expansion project financed a loan by the



Asian Development Bank(ADB), which is being constructed in 5 provinces: Siem Reap, Kampong Cham, Kandal, Banteay Meanchey, which has a total length of 2,158 km. Then, the Rural Electrification Project utilizing grant funded by Australian Agency for International Development (AusAID) through the Asian Development Bank(ADB) with the contribution of Cambodian side with a total length of medium and low voltage lines about 620 km.

The distribution line expansion project in Koh Kong, Kampong Cham and Kratie which funded by the Agence Francaise De Developmente (AFD) has been conducted the feasibility study and bidding preparation.

Rural Electrification Extension Project Phase 5 and phase 6 have been started and conducted negotiations in order to further expand the rural electrification grid in 13 provinces, including Oddar Meanchey, Siem Reap, Battambang Province Prey Veng Province Province Mondulkiri Khmom Ratanakiri province and province Kompong Speu, with a total length of about 2.525 km.

The Rural Electrification expansion Project Phase VII, loan of China Exim Bank, which was contracted in June 2018, with a loan portfolio of approximately US \$ 82 million. The project will build a medium voltage distribution system in Cambodia covering 14 provinces such as Oddar Meanchey, Siem Reap, Battambang, Pailin, Pursat, Kratie, Prey Veng, Kampong Speu, Kampong Chhnang, Kampong Chhnang, Kampong Thom, Stung Treng, Takeo, Kampot, with a total length of 2,970 km.

The medium voltage distribution network expansion project and improve the electricity infrastructure in rural areas under the loan from German Development Bank's (KfW), covering four provinces in Cambodia, Kampong Thom, Siem Reap, Oddar Meanchey, and Preah Vihear provinces. The total length is about 320 kilometers.

Location	Item	2013	2014	2015	2016	2017	2018
	Line Length, cct-km	3,586	3,779	4,187	4,421	4,647	5,045
	Medium Voltage	2,204	2,325	2,641	2,759	2,897	3,126
PHN	Low Voltage	1,382	1,453	1,546	1,662	1,750	1,919
& Kandal	# MV Substation	2,385	2,665	2,994	3,367	3,879	4,346
	Indoor	-	1,076	1,218	1,356	1,549	1,753
	Outdoor		1,589	1,776	2,011	2,330	2,593
	Line Length, cct-km	806	825	401	614	775	802
	Medium Voltage	673	683	242	409	540	543
WDG	Low Voltage	132	142	160	205	235	259
KPS	# MV Substation	87	95	102	231	263	307
	Indoor	-	-	3	3	3	3
	Outdoor	-	95	99	228	260	304
	Line Length, cct-km	736	808	1,129	1,309	2,356	2,661
	Medium Voltage	414	462	749	861	1,279	1,359
2222	Low Voltage	322	346	380	448	1,077	1,302
SRP	# MV Substation	196	230	308	380	383	610
	Indoor	-	132	141	147	94	105
	Outdoor	-	98	167	233	289	505
	Line Length, cct-km	304	362	503	889	984	1,011
	Medium Voltage	208	266	401	773	864	869
	Low Voltage	96	96	103	116	120	142
SHV	# MV Substation	187	281	312	355	479	712
	Indoor	-	51	54	62	87	123
	Outdoor	-	230	258	293	392	589
	Line Length, cct-km	150	667	732	845	1,024	872
	Medium Voltage	52	548	607	679	823	641
	Low Voltage	98	119	125	165	201	231
KGC	# MV Substation	64	141	201	221	245	243
	Indoor	-	6	6	6	8	6
	Outdoor	-	135	195	215	237	237
	Line Length, cct-km	45	64	75	122	137	155
	Medium Voltage	27	46	50	71	69	71
	Low Voltage	18	18	25	51	68	84
PKK	# MV Substation	21	33	43	47	43	48
	Indoor	-	-	-	-	-	-
	Outdoor	-	33	43	47	43	48

Table 10 : Distribution Facilities of EDC System

Table 10 : Distribution Facilities of EDC System(Cont)

Location	Item	2013	2014	2015	2016	2017	2018
	Line Length, cct-km	48	216	246	281	283	410
	Medium Voltage	23	189	189	206	206	305
	Low Voltage	25	26	56	75	77	105
MIMT	# MV Substation	24	25	77	87	93	135
	Indoor	-	-		-		-
	Outdoor	-	25	77	87	93	135
	Line Length, cct-km	368	567	746	786	783	909
	Medium Voltage	158	316	353	356	345	372
miro	Low Voltage	210	251	394	431	437	537
ТКО	# MV Substation	113	167	188	188	169	181
	Indoor	-	17	25	26	6	6
	Outdoor	-	150	163	162	163	175
	Line Length, cct-km	692	691	696	2,276	2,465	2,534
	Medium Voltage	444	444	447	1,977	2,110	2,132
	Low Voltage	247	247	249	299	355	403
BTB	# MV Substation	240	240	252	696	743	782
	Indoor	-	-	1	7	8	8
	Outdoor	-	240	251	689	735	774
	Line Length, cct-km	339	339	436	658	673	673
	Medium Voltage	227	227	311	534	545	546
	Low Voltage	112	112	125	125	127	127
KPT	# MV Substation	105	105	187	229	245	262
	Indoor	-	-		7	7	7
	Outdoor	-	105	187	222	238	255
	Line Length, cct-km	76	76	100	121	144	156
	Medium Voltage	47	47	48	56	65	69
	Low Voltage	29	29	52	65	78	87
KGT	# MV Substation	44	44	47	53	63	68
	Indoor	-	1	1	2	2	1
	Outdoor	-	43	46	51	61	67
	Line Length, cct-km	474	790	794	824	867	869
	Medium Voltage	417	731	731	760	804	804
	Low Voltage	57	59	63	65	63	65
PRV	# MV Substation	21	194	202	247	290	333
	Indoor	-	-	4	8	8	8
	Outdoor	-	194	198	239	282	325

Table 10 : Distribution Facilities of EDC System(Cont)

Location	Item	2013	2014	2015	2016	2017	2018
*	Line Length, cct-km	174	181	229	229	247	1,147
	Medium Voltage	49	51	65	65	65	965
DMC	Low Voltage	125	130	164	164	182	182
BIC	# MV Substation	55	60	86	56	66	278
	Indoor	-	-	8	8	8	8
	Outdoor	-	60	78	48	58	270
	Line Length, cct-km	82	82	89	89	93	94
	Medium Voltage	45	45	46	46	47	47
MIT	Low Voltage	37	37	44	44	46	47
МКВ	# MV Substation	35	39	42	22	23	30
	Indoor	-	-	-	-	-	-
	Outdoor	-	39	42	22	23	30
	Line Length, cct-km	202	240	240	327	769	799
	Medium Voltage	132	151	151	227	600	630
CITED	Low Voltage	70	89	89	100	169	169
STR	# MV Substation	37	48	53	63	79	130
	Indoor	-	-	4	9	5	13
	Outdoor	-	48	49	54	74	117
	Line Length, cct-km	139	141	167	592	730	803
	Medium Voltage	92	92	103	492	586	603
	Low Voltage	47	49	63	100	145	201
RTK	# MV Substation	72	85	103	72	145	167
	Indoor		1	5	4	4	4
	Outdoor	-	84	98	68	141	163
	Line Length, cct-km	419	605	369	887	999	1,058
	Medium Voltage	325	466	154	670	664	674
<i></i>	Low Voltage	94	139	215	217	334	384
SVR	# MV Substation	54	76	114	284	252	317
	Indoor		-	5	5	5	5
	Outdoor		76	109	279	247	312
	Line Length, cct-km	186	-	-		120	161
	Medium Voltage	141	-	-		77	88
	Low Voltage	44		-	-	43	73
BVT	# MV Substation	21	-	-	-	41	45
	Indoor	-	-	-	-	-	-
	Outdoor	-	-	-	-	41	45

Table 10 : Distribution Facilities of EDC System(Cont)

Location	Item	2013	2014	2015	2016	2017	2018
* 	Line Length, cct-km	120	125	133	300	537	626
	Medium Voltage	73	77	85	243	398	487
	Low Voltage	47	47	48	56	139	139
MDK	# MV Substation	54	55	76	107	126	155
	Indoor	-	-	-		-	-
	Outdoor		55	76	107	126	155
	Line Length, cct-km	78	89	90	90	131	131
	Medium Voltage	46	48	48	48	83	83
	Low Voltage	32	41	42	43	48	48
KSM	# MV Substation	22	26	30	30	30	29
	Indoor	-	-	-	-	-	-
	Outdoor	-	26	30	30	30	29
	Line Length, cct-km	160	160	225	380	552	823
	Medium Voltage	123	123	139	279	434	625
	Low Voltage	38	38	85	101	118	198
KRT	# MV Substation	49	53	71	101	123	178
	Indoor	-	-	-	-	-	-
	Outdoor	-	53	71	101	123	178
	Line Length, cct-km	33	33	37	84	101	218
	Medium Voltage	19	20	24	25	40	108
	Low Voltage	14	14	14	60	61	110
SNL	# MV Substation	28	32	40	51	33	57
	Indoor	-	-	-	-	-	-
	Outdoor	-	32	40	51	33	57
	Line Length, cct-km	-	-	-		135	535
	Medium Voltage	-	-	-		82	480
(D) 171	Low Voltage	-	-	-	-	52	54
Th. Khmum	# MV Substation	-	-	-	-	36	115
	Indoor	-	-	-	-	-	-
	Outdoor	-	-	-	-	36	115
	Line Length, cct-km	9,216	10,838	11,622	16,127	19,550	22,490
	Medium Voltage	5,939	7,356	7,583	11,536	13,624	15,626
TOTAL	Low Voltage	3,277	3,482	4,040	4,591	5,926	6,864
IUIAL	# MV Substation	3,914	4,694	5,528	6,887	7,849	9,528
	Indoor	-	1,284	1,475	1,650	1,794	2,050
	Outdoor	-	3,410	4,053	5,237	6,055	7,478

RURAL ELECTRIFICATION FUND OF EDC

I. Establishment of Rural Electrification Fund (REF)

II. Work progress of **REF** after integration with **EDC**

Rural Electrification Fund is a part of EDC which etablished in 2012 for promoting the development of electricity system to the people who living in remote area in Cambodia.

Establishment of Rural Electrification Fund (REF)

The Royal Government of Cambodia (RGC) issued the Royal Decree No.NS/ RKT/1204/048 dated 4 December 2004 on the establishment of Rural Electrification Fund of the Kingdom of Cambodia under MME to accelerate the development of rural electrification. Then, on 22nd August 2012, RGC issued a new Royal Decree No. NS/RKT/0812/734, amending some articles of the old Royal Decree on the formation of Rural Electrification Fund, to integrate Rural Electrification with EDC as a department so that REF can continue to perform its works independently on Cambodian funding by receiving major fund from EDC and also grant and donations from external funding to assist in the development of rural electrification in Cambodia.

Work progress of REF after integration with EDC until the end of 2018

In 2018, REF's funding is from EDC, Kreditanstalt fur Wiederaufau (Kfw) and Asian Development Bank. During this year, EDC has provided a fund of 74 million USD, Kfw has provide a fund of 2.6 million USD, and ADB has provided a fund of 1 million USD, totaling 77.6 million USD, for extending the benefits of electrification to the population in rural area. The fund provided by EDC is also for operation of REF.



1- Power to the Poor (P2P)

The purpose of this program is to facilitate the poor households in rural areas to access to electricity for their houses from grid supply by providing interest free loan to meet (i)-costs for the connection fees of the electricity supplier, (ii)- costs for deposit to be deposited with the electricity supplier, (iii)-costs for purchasing of material and labor for the installation of wires from the connection point to its house, and (iv)- costs for the equipment and the installation of in-house wiring. During 2018, 257 rural families' equivalent to 1,182 people have directly benefited from this program.

2- Solar Home Systems (SHS) Program

The purpose of this program is to facilitate the remote rural household, which may not access to the electricity network for a long period, to access electricity through SHS. REF subsidies 100 USD per SHS to rural households, as assistance to reduce the cost of the SHS and purchasers, shall pay monthly installment without interest, in a period of four years. After the purchaser has paid the remaining cost in full, the SHS will become the property of the purchaser. During 2018, 19,750 rural families' equivalent to 90,850 people has directly benefited from this program.

3- Program for Providing Assistance to Develop Electricity Infrastructure in Rural Areas

The purpose of this program is to facilitate the private electricity supplier in rural areas having legal license to access fund for investing on expansion of electricity supply infrastructure to fully cover its authorized distribution area in order to allow all rural households to have access to electricity for use. During 2018, 107 licensees equivalent to the length of 1,696 km has directly benefited from this program

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4- The purpose of this program is to provide subsidy, under the framework of Strategic planning for reuduction the rate and gap of the tariff for sale of the electricity in the Kingdom of Cambodia for the year 2015 to 2020 in provinces and cities, to the licensees connected to the grid system for reduction of tariff for sale of electricity in rural areas.

The purpose of this program is to provide subsidy, under the framework of Strategic planning for reuduction the rate and gap of the tariff for sale of the electricity in the Kingdom of Cambodia for the year 2015 to 2020 in provinces and cities, to the licensees connected to the grid system for reduction of tariff for sale of electricity in rural areas. During 2018, 314 licences has been subsidy for reduction tariff for sale electricity in rural areas while 02 licences still not furnished the required data and application for subsidy yet.

5- Program for Promoting Access to Grid Electricity for ID Poor Households(P2P for ID Poor HH) under Output Based Aid (OBA) fund by ADB

The purpose of this program is to facilitating the ID Poor Household (the eligible beneficiary) in rural area by helping egilible low-income and vulnerable household to have access to electricity for their house from grid supply by providing subsidy of USD 100 per household through the electricity suppliers to meet i)_cost of material and labor the installation of service wires for service line within a length of 150m from the connecting point to ID Poor house, and ii)_cost of material and labor for the installation of in-house wiring.

Asian Development Bank (ADB) has provided a fund of 1 million USD for implementing in six target provinves of Kandal, Kampong Cham, Thboung Khmum, Kampong Thom, Siem Reap and Banteay Meanchey. The target number of the ID Poor HH beneficaries under the OBA program is 10,000 HHs. During 2018, 7,209 rural families' equivalent to 33,161 people has directly benefited from this program.





6- Program for Promoting Access to Grid Electricity for ID Poor Households(P2P for ID Poor HH) under Output Based Aid (OBA) fund by EDC

The purpose of OBA Program is to facilitate the ID Poor Households(the eligible beneficiary) in rural areas by helping eligible low income and vulnerable households to have access to electricity for their house from grid supply by providing sudsidy of USD 100 per household through the electricity suppliers to meet (i)-cost of material and labor for the installation of service wires for service line within a length of 150m from the connection point (meter on the pole) to its house and (ii)-cost of material and labor for installation of in-house wiring.

Electricite Du Cambodge (EDC) has provide a fund of USD 452,000 for implementing in target provinces of Pursat, Kampong Chhnang and other provinces. The target number of the ID Poor HH beneficaries under OBA program is 4,520 HHs. During 2018, 1,966 rural families' equivalent to 9,043 people has directly benefited from this program.

7- Program for Providing Electricity for Pumping for Agriculture Irrigation Uses

The purpose of this program is to facilitating to access electricity from the grid system for agricultural irrigation uses at concessional tariff rate for use during night time from 9:00 PM to 7:00 AM and normal rate for use during day time from 7:00 AM to 9:00 PM. in 2018, EDC, under this program, has signed contract with EM Construction for supplying the prepaid Time of Uses(TOU). EDC has also recruiting the contractor for supplying and construction of electricity infrastructures under this program.

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CAMBODIA POWER DEVELOPMENT PLAN

I. Power Sector Development Policy

II. Power Demand Forecast

III. Generation Master Plan

I- Power Sector Development Policy

The Royal Government of Cambodia formulated an energy sector development policy in October 1994, which aims at:

• Providing an adequate supply of electricity throughout Cambodia at reasonable and affordable price

• Ensuring reliable and securing electricity supply which facilitates investment in Cambodia and development of the national economy,

• Encouraging exploration and environmentally and socially acceptable development of energy resources needed for supplying to all sectors of the Cambodian economy,

• Encouraging efficient use of energy and minimizing environmental effects resulting from energy supply and use.

II- Power Demand Forecast

According to Power Development Plan of the Kingdom of Cambodia, prepared in 2015, electricity demand is expected to face a significant increase for the next 15 years. Electricity generation in Cambodia is projected to grow from 409 MW and 2,242 GWh i zn the year 2010 to 4,828 MW and 28,465 GWh in the year 2025. To meet the future demand, the Royal Government has developed Power Development Plan up to 2030.

The majority of this growth will occur in the southern grid which includes Phnom Penh. The Table below depicts the expected power demand and energy output for Cambodia.

Base Case	Unit	2018	2025	2030	
Peak in National Grid	MW	1,537*	4 000	10.740	
Peak in Whole Country	MW	1,690**	4,828	10,749	
Energy in National Grid	GWh	9,427*	00.407	A1 00 5	
Energy in Whole Country	GWh	9,739**	28,465	61,207	

Cambodia's Power Demand Forecasting

*Peak Demand and Energy in National Grid are actual data in 2018.

** Energy in the whole country is actual data in EAC Annual Report 2018

III- Generation Master Plan

Generation Master Plan has been developed on the following criteria:

• Peak thermal generation in Phnom Penh.

• Small and medium size diesel units for base and peak load generation in the provincial towns and cities.

• Expansion of hydro development based initially on smaller size hydropower plants which are easily accessible such as Kirirom I & III, and subsequently mid and large size hydro projects such as Lower Sesan II, Steung Pursat I Hydro Power Plant, Srepok 3A, 3B &4 Hydro Power Plant, Steung Metoek Hydro Power Plant, Prek Liang Hydro Power Plant and Steung Veal Thmor Kambot Hydro Power Plant.

Cambodia's Power Demand Forecasting

No.	Project Name	Туре	Capacity(MW)	Operation Year
1	Coal Fired Power Plant CEL II	Coal	135	2019
2	Solar Park Power Plant(Kampong Speu)	Solar	80	2019
3	Solar Park Power Plant(Bavet)	Solar	20	2020
4	Solar Park Power Plant(Battambang)	Solar	60	2020
5	Solar Park Power Plant(Banteay Meanchey)	Solar	60	2019
6	Solar Park Power Plant(Pursat)	Solar	30	2020
7	HFO/GAS Power Plant	HFO/GAS	400	2020
8	Coal Fired Power Plant (Hang Seng)	Coal	200	2021
9	Solar Park Power Plant(Kampong Chhnang)	Solar	60	2021
10	Coal Fired Power Plant CIIDG(Phase-I)	Coal	350	2022
11	Solar Park Power Plant(Kampong Chhnang_ADB)	Solar	60	2022
12	Waste Power Plant	Biomass	100	2022

Cambodia's Power Demand Forecasting(Cont)

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No.	Project Name	Туре	Capacity(MW)	Operation Year
13	Hydro Power Plant (Steung Pursat I)	Hydro	80	2023
14	Coal Fire Power Plant(CIIDG_Phase2)	Coal	350	2023
15	Coal Fire Power Plant(Royal Group_Phase1)	Coal	700	2024
16	Wind Power Plant	Wind	80	2024
17	Upper Tatay Hydro Power Plant	Hydro	150	2026
18	Solar Park Power Plant	Solar	100	2026
19	Veal Thmor kambot + MSRC Hydro Power Plant	Hydro	170	2026
20	Gas Combine Cycle Power Plant	Gas	1200	2027
21	Solar Park Power Plant	Solar	100	2027
22	Srepok 3A Hydro Power Plant	Hydro	68	2028
23	Srepok 3B Hydro Power Plant	Hydro	170	2028
24	Solar Park Power Plant	Solar	100	2028
25	Lower Sesan III Hydro Power Plant	Hydro	260	2028
26	Steung Metoek Hydro Power Plant	Hydro	100	2029
27	Prek Liang(1+2) Hydro Power Plant	Hydro	128	2029
28	New Gas Combine Cycle Power Plant	Gas	2400	2029
29	Solar Park Power Plant	Solar	100	2029
30	Steung Treng Hydro Power Plant	Hydro	1400	2029
31	Solar Park Power Plant	Solar	200	2030
	TOTAL		7	7,013 MW

Transmission 115kV Development Plan 2018 - 2025

No.	Project 115 kV Transmission Line	Length (km)	Year	Development Partner
1	GS2 - GS Hunsen Park and Grid Substation	5		BT
2	GS Rottanak Mundul - GS Pailin	45		EDC
3	GS3 - GS Toul Kork	5		EDC
4	GS5 - GS Chroy Changvar	18		CEIB
5	GS Kampong Cham - GS Praek Prosab (Kratie)	91	2019	AFD
6	GS Svay Antor - GS Kampong Soeng	46		CEIB
7	GS Preah Sihanouk - GS Ream	12		CEIB
8	GS Ream - GS Chamkar Loung	60		AFD
9	GS Kampong Thom - GS Preah Vihear	140		CEIB
10	Underground Line from GS1 - GS EDC HQ - GS Samdech Hunsen Park - GS Olympic Stadium - NCC - GS3	14	2020	JICA Phase 1



Transmission 115kV Development Plan 2018 - 2025(Cont)

No.	Project 115 kV Transmission Line	Length (km)	Year	Development Partner
11	GS Praek Prosab - GS Kratie	30	2021	AFD
12	GS Krolanh - GS Oddar Meanchey	80	2022	ВОТ
13	GS Chamkar Loung - Kirirom III Hydro Power	30	2024	CEIB
14	GS Kampot - GS Chip Mong	46	2024	CEIB
15	GS Chrak Mates - GS Pornhea Krek	75		CEIB
16	GS Pornhea Krek - GS Suong	45	2025	IEIB
17	GS7 - GS Koh Thom	40	2023	CEIB
18	GS Koh Thom - GS Takeo	45		CEIB
	Total		827km	

Transmission 230kV Development Plan 2018 - 2025

No.	Project 230kV Transmission Line	Length (km)	Year	Development Partner	
1	GS Battambang - East Siem Reap - Kampong Thom - Kampong Cham	350		CEIB	
2	Phnom Penh Loop Line Phase 2 (NPP - Chroy Changvar - EPP - NPP)	96		CEIB	
3	Tatay Hydropower - Phnom Penh	182		ВОТ	
4	GS Koh Kong - GS Koh Kong City	20	2019	AFD	
5	GS Chamkar Loung - GS Botumsakor	54		AFD	
6	GS Botumsakor - Tatay Hydropower	70		LDP	
7	GS Kratie - GS Mondulkiri	170		CEIB	
8	GS Ratanakiri - GS Stung Treng	120		CEIB	
9	GS Beak Chan - GS5 - NCC	20		JICA Phase II	
10	GS4 - GS Kampong Speu(New) - GS Kampong Speu	48		CEIB	
11	GS Steung Hav - GS Outres	16	2021	EDC	
12	GS Suong - GS Svay Antor	45		CEIB	
13	GIS2 · GS Prek Hou	15		CEIB	
14	GS5 - GS Sensok	6	2022	EDC	
15	GS Steung Treng- GS North Siem Reap	200	2025	CEIB	
16	GS North Siem Reap - GS East Siem Reap	44	2020	CEIB	
	TOTAL	1,456 km			

Transmission 500kV Development Plan 2018 - 2025

No.	Project 500kV Transmission Line	Length (km)	Year	Development Partner
1	GS Chamkar Luong - GS Bek Chan	198	2019	ВОТ
2	GS Steung Treng - Lao Border	55	2021	CEIB
3	GS Bek Chan - GS East Phnom Penh	45	2021	CEIB
4	GS East Phnom Penh - GS Suong	90	2022	CEIB
TOTAL			388	km




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C C REGIONAL COOPERATION

I. Power Interconnection with Thailand

II. Power Interconnection with Lao PDR

III. Power Interconnection with Vietnam

IV. Sub-regional Interconnection

I- Power Interconnection with Thailand

The Power Cooperation Agreement with Thailand was signed on 3rd February 2000. This agreement provided a framework for the power trade and technical assistant between these two countries and opened the power access to the third countries. The Power Purchase Agreement (PPA) was signed in 2002 and amended in 2007.

It encouraged the joint utilization of the existing natural resources of the two countries. When the power pool is established in the future, both countries will be able to participate widely in term of receiving and supplying the power.

Electric Power between Cambodia and Thailand is transmitted at 115 kV and 22 kV levels. 115 kV transmission line from Aranya Prathet substation, Thailand connection to BTC, BTB, and SRP was commissioned in 2007.

An agreement was signed with Trat Province (Thailand) to supply power to Koh Kong province (Cambodia) and Poit Pet (Cambodia) via 22 kV line. The above areas have been connected since 2001.

II- Power Interconnection with Lao PDR

The Power Cooperation with Lao PDR was signed on 21st October 1999. The agreement aims at the cooperation in Power Sector between the two countries. The supply of power to the areas along the border via medium voltage (22kV) lines and interconnection between high voltage links are also encouraged. The 22 kV interconnection line from Lao to Stung Treng was charged in 2010.

In 2015, A new interconnection point from Champasak province, Ban Hat Substation, Lao PDR to Kampong Sralau, Preah Vihear province, Cambodia, the initial design and construction for the 115 kV transmission line was energized at 22 kV voltage level for the first stage until the transmission line from Lao border to Chey Sen Substation was completed.

III- Power Interconnection with Vietnam

The Power Cooperation with Vietnam was signed on 10th June 1999. The agreement aims at the cooperation in Power Sector between the two countries. The supply of power to the areas along the border by medium voltage lines and interconnection between high voltage lines is encouraged.

In early 2009, EDC imported power from Vietnam via a 230kV transmission line to supply Phnom Den, Takeo Province, and Phnom Penh in March 2009. Since 2002, EDC has imported power from PC2 (Vietnam) to supply power to Memut and Ponhea Krek Districts of Kampong Cham Province, Bavet in Svay Rieng Province, Kampong Trach in Kampot Province, Koh Thom and Chrey Thom in Kandal Province, Snuol District in Kratie Province, Keo Seima District in Mondulkiri Province, Kompong Ro in Svay Rieng Province.

IV- Sub-regional Interconnection

Interconnections between the isolated grids of the countries within the Mekong Basin (Cambodia, Laos, Thailand, Vietnam, Yunan-China, and Myanmar) or even a further extension of this grid to include Malaysia and Singapore have been subjected to a number of studies which aim at improving the utilization of energy resources. The report of ASEAN interconnection Master plan has been adopted since 2002, presenting a clear study about the ASEAN interconnection. Meanwhile, the revision of the ASEAN Interconnection Master Plan is under study by the ASEAN study team. The study provides mostly an assessment of the viability and priority of regional interconnections based on the pre-feasibility studies. The study has postulated an urgent need to develop ASEAN Power Grid (APG). The **ASEAN Power Grid Consultative Committee** (APGCC) has been established. However, among the 10 interconnection options studies, the links between Cambodia and Vietnam are ranked as fourth and classified as a potential short to medium term project for completion before 2010.

Corporate Social Responsibilities

I. Assistance to the Army

II. Humanitarian Work

Apart from core business activities, EDC has contributed to social affairs, humanitarian work, human resource training and environmental protection through offering financial support, materials and other activities as follow:

I. Assistance to the Army

EDC has paid attention in contribution to social affairs with Infantry Brigade No. 42, the Battalion No. 702 and Intervention Brigade No. 14. In every two months, EDC leaders and its employees regularly visit the army at borders by bringing them some necessities as well as bunkers and houses.





II. Humanitarian Work

Besides, EDC has sponsored funds to the Headquarter of Cambodian Red Cross and its provincial branches to rescue people affected by flood and drought every year. In addition, in 2018, EDC donated 30,000 USD to Kantha Bopha Hospital which is an act of kindness of EDC's employees to save Cambodian children. EDC has further contributed to the construction of roads in Pursat Province



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