



# អគ្គិសនីកម្ពុជា

## ELECTRICITE DU CAMBODGE

### ANNUAL REPORT 2011





## Chairman's Statement



On behalf of the Board of Directors, I would like to express sincere appreciation to EDC for bringing out its Annual Report for the year 2011. We are proud and appreciative of the achievements of EDC during 2011 and strongly believe that EDC is moving towards its

goal and vision to be the foremost power utility in Cambodia that builds deep customer relationship with a reputation for supplying reliable and affordable electricity to its valuable customers.

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

On this occasion, I wish to extend my personal and 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 works that EDC is well placed to realize its vision and goals.



**Tun Lean**

**Chairman of the Board**



## **From RGC Delegate in charge of Managing EDC**



Once again, it gives me a real pride to present the annual report for the year 2011. The vision of Electricité du Cambodge (EDC) is to become the leading power utility in the Kingdom of Cambodia by striving to meet the customers' load demand, and improving the quality and reliability of supply.

During 2011, our energy sale increased by 15.85% over the previous year to reach 2,353.50 GWh our system loss was reduced to 8.18%. Our revenue grew by 15.46% over the previous year to reach 1,846 Billion Riels. We have a combined workforce of 2,760 staff members serving 418,066 customers.

During 2011, the construction of 230 kV line from Takeo to Kampot under KfW loan with a length of 73 km and 230 kV line project from Kamchay Hydropower plant to Kampot with a length of 11 km, and Kampot substation were successfully completed and put into operation. Moreover Kamchay Hydro power plant was energized to supply power to national grid via the above transmission lines. This has further strengthened our supply ability to serve more load centers.

The construction of 230 kV line from Phnom Penh to Battambang under BOT scheme with a length of 300 km was almost completed and 230 kV line from Kampot to Preah Sihanouk under ADB and JICA loan with a length of 88 km was under construction. These projects are expected to be completed in 2012. With the completion of these projects, the National Grid will be extended from Phnom Penh to cover Kampot, Preah Sihanouk, Kampong Chhnang and Pursat provinces and will get connected to the Battambang - Banteay Meanchey – Siem Reap grid.

In addition, rural electrification and transmission projects under different financing also provided for expansion of the 22 kV line to supply rural people who live in the potential areas with available source of supply such as West Phnom Penh, Kampot, Preah Sihanouk, Takeo, Kampong Speu, and Battambang. The target of this project is to energize 50,000 rural customers while 612 km of MV line and 656 km of LV line are constructed and 84,650 customers are already served.

Moreover, EDC also invested its own fund in sub-transmission line projects to supply in some potential provinces such as: 22 kV lines extending from the above projects in Battambang province to supply the power in Pursat province with the length of 153 km and the construction of 28 km of 22 kV sub-transmission line and 95 km of 35 kV sub-transmission line to import power from Vietnam to supply to Monduliri and Kratie provinces respectively. We have signed 71 power purchase agreements rural electricity enterprises (REEs) with EDC for bulk supply to provide electricity in their areas.



In accordance with the strategy and the support by Royal Government of Cambodia, EDC has attracted various grants and loans that support by Aus-aid, ADB, and China Exim Bank to implement grid expansion projects for rural electrification in many parts of Cambodia. Feasibility studies are being carried out for these projects and are to be implemented in the following years.

The above efforts have resulted in many direct and indirect benefits to thousands of households and businesses across the country. This is clearly a concrete and real progress in helping Cambodia to build a stronger foundation for sustainable economic and social development.

We would like to take this opportunity to acknowledge the contribution and commitment of all our employees who played such an indispensable role in the success of this organization. We are highly indebted to the great guidance and wisdom given to us by **Samdech Akak Mohasena Padey Decho Hun Sen, Prime Minister of the Kingdom of Cambodia**. We are grateful to the Ministry of Industry, Mines and Energy for their on-going sectorial direction and relentless efforts and to the Ministry of Economy and Finance for their support. Our special appreciation goes to the Electricity Authority of Cambodia for its valuable input and support and to the Board of Directors of EDC. We also highly value the support by all our client groups. In addition, we highly appreciate the continued assistance extended to us by all development partners and of a good professional and cooperative relationship by all IPP partners.

With these achievement and encouragement, we are ready to bring EDC and the power sector to higher level of development. We hold high hope for better days ahead.



**Keo Rottanak**

**RGC Delegate in charge of Managing EDC**



## **VISION**

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

## **MISSION**

Provide sufficient and consistently reliable power supply to consumers in its entire coverage areas at a competitive price. Improve the business operation to excellence and efficiency and participate in implementation of the government policies on poverty reductions, environmental preservation and socio-economic development.

## **FUNCTION 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 make capital investments, in appropriate response to market requirements and earn profit and raise productivity.

**EDC** is required to abide by the conditions of its license issued by the Electricity Authority of Cambodia (EAC) 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.

**EDC** shall limit its business activities to the types stipulated in its Statute and license granted by EAC.

**EDC** is permitted to be responsible for:

- 1- Generation, transmission, and distribution of electric power with the purpose of meeting the demand of all category of buyers;
- 2- Export electric power to neighboring countries and import electricity from neighboring countries;
- 3- Construct and operate national electric grid for energy transmission in order to ensure adequate and quality supply ;
- 4- Construct and operate sub-transmission system for distribution of electricity and to facilitate connections and operations of EDC and other distribution systems;

- 5- Sell electric power and other related services;
- 6- Purchase, transfer, and exchange electricity from other generators.

**EDC** has its source of capital from:

- 1- grant contribution from the Royal Government;
- 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;



## **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 has been serving Battambang-city all along.

By virtue of Kret N° 665-NS of October 10, 1958, the first two companies, CEE and UNEDI, merged under the name of ELECTRICITE DU CAMBODGE.

During 1971 to 1979, the power sector in the country passed through two dangerous events: civil war (1971-1975) 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 re-integrated 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 re-named Electricité du Cambodge and was attached to the Ministry of Energy. After 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 few provinces continued 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 through-out Cambodia. EDC is a judicial organization with administrative, financial and managerial autonomy. EDC is responsible for its profit and losses and liable for its debts to the extent of the value of its assets.



## **MANAGEMENT STRUCTURE**

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

### **Board of Directors**

As of 2011, EDC's Board comprises of the following seven members:



**H.E. Tun Lean**  
Chairperson  
Representative of the Ministry of Industry, Mines and Energy



**H.E. Keo Rottanak**  
Member  
RGC Delegate in charge of Managing EDC  
Advisor to the Prime Minister



**H.E. Chan Sothy**  
Member  
Representative of the Ministry of Economy and Finance



**H.E. Hem Khanh Tony**  
Member  
Representative of the Council of the Ministers



**Mr. Hang Touch**  
Member  
Representative of EDC's Employees





**Mr. Ku Khemlin**  
Member  
Representative of the Ministry of Justice



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

### **EDC's Management**

EDC is headed by a RGC Delegate in charge of Managing EDC, with the ranking equivalence of a Secretary of State in the Government who reports to the Board of Directors, which in turn reports to the shareholding Ministers. EDC's Managing Director is assisted by three Deputy Managing Directors, eight Executive Directors. As of 2011, the Management Level of EDC comprises of:



**H.E. Keo Rottanak**  
RGC Delegate in charge of Managing EDC  
Advisor to the Prime Minister



**H.E. Chan Sodavath**  
Deputy Managing Director  
Planning and Technique



**Mr. Chhung Ung**  
Deputy Managing Director  
Finance and Business



**H.E. Eng Kunthea**  
Deputy Managing Director  
Administration and Training





**Dr. Praing Chulasa**  
Executive Director  
Dept of Corporate Planning and Projects



**Miss. Sin Sovanny**  
Executive Director  
Dept of Finance and Accounting



**Mr. Ly Tikhea**  
Executive Director  
Dept of Administration



**Mr. Nou Sokhon**  
Executive Director  
Dept of Transmission



**Mr. Ros Chenda**  
Executive Director  
Dept of Generation



**Mr. Chea Sinhel**  
Executive Director  
Dept of Business and Distribution



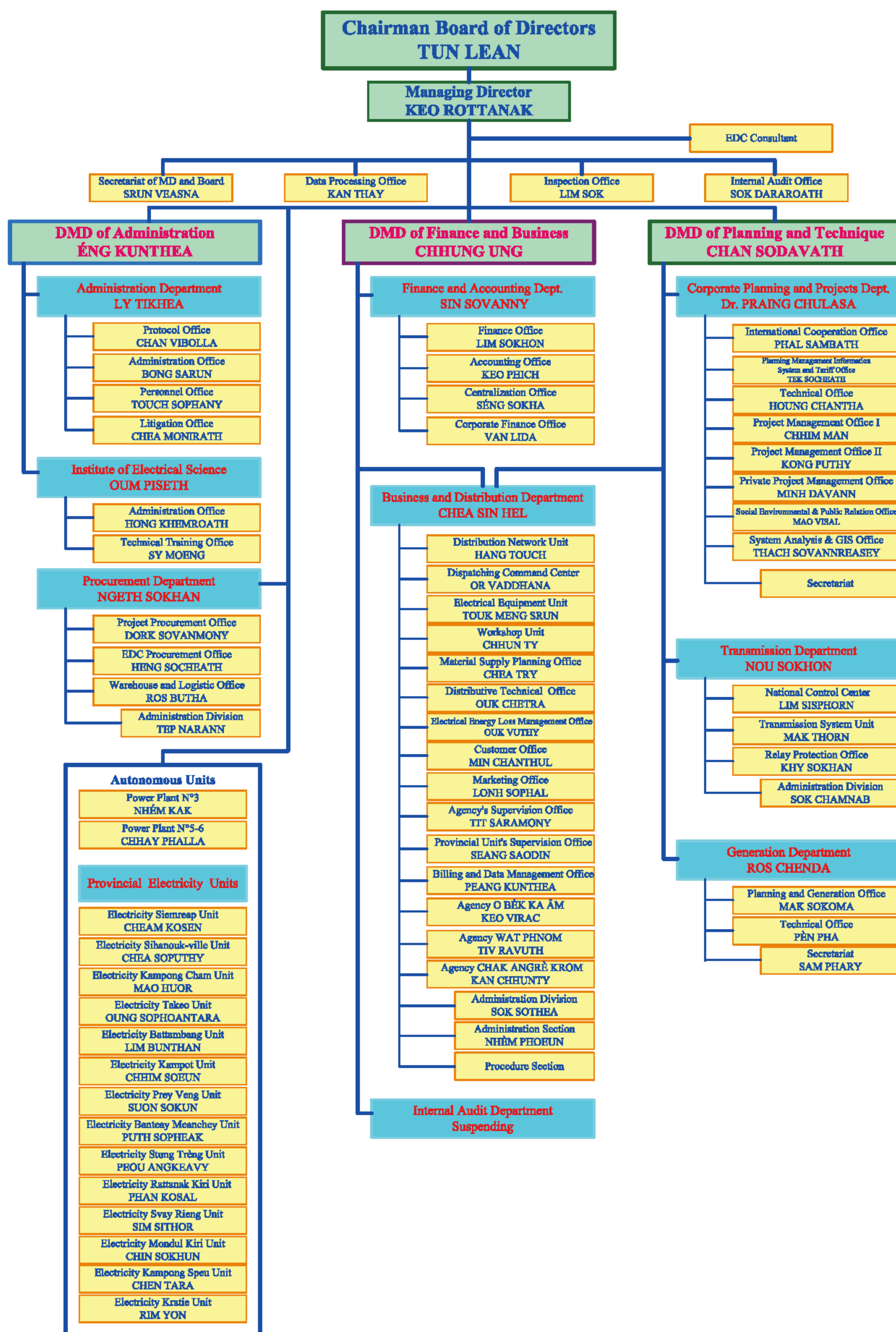
**Mr. Nget Sokhan**  
Executive Director  
Dept of Procurement



**Mr. Oum Piseth**  
Executive Director  
Institute of Electrical Science



# Organization Chart of EDC





## HUMAN RESOURCES DEVELOPMENT

In 2011, 577 trainees have been trained in 87 batches at the EDC's Institute of Electrical Science. The breakups of the trainees for different trainings are: 207 trainees on distribution network, 52 trainees on Power Plant Protection , 107 trainees on metering, 142 trainees on safety, 45 trainees on generation and 24 trainees on high voltage transmission line.

EDC is also collaborating with other educational institutes for training in order to improve the quality of work and provide new knowledge to its staff.

**Table 1: EDC's Staff from 2006 to 2011**

Type	2006	2007	2008	2009	2010	2011
Doctorate	1	1	1	1	1	2
Post-graduated	62	71	85	91	104	119
Engineer & other graduated	343	381	390	446	551	672
Vocational Technicians	344	326	351	358	390	429
Skilled Workers	273	260	247	245	246	207
High school, Unskill	1,191	1,180	1,167	1,219	1,278	1,331
<b>Total</b>	<b>2,214</b>	<b>2,219</b>	<b>2,241</b>	<b>2,360</b>	<b>2,570</b>	<b>2,760</b>

The EDC's Management has the following Vision for the betterment of its Employees:

- To provide its employees with opportunities for professional growth and advancement on the basis of their performance, integrity and loyalty to the EDC.
- To provide its employee with competitive remuneration and benefits to ensure good living conditions.
- To guarantee fairness, equal treatment and opportunity to employees, to maximize their contribution to the development of EDC.

To provide suitable working conditions that facilitates an open and honest communication of information among employees to promote teamwork, productivity and cooperation for the organization's growth.



## THE AREAS OF OPERATION, THEIR DEMAND & SUPPLY

The areas of operation of EDC and the position of demand and supply during the year 2011 are described below:

**PHNOM PENH (PHN), AND SUB-URBAN AREA:** Phnom Penh is the capital city of Cambodia. In this report the system supplied from GS1, GS2, GS3, and GS4 is termed as Phnom Penh System. The EDC Phnom Penh's coverage area includes Phnom Penh and the suburban areas around Phnom Penh in Kandal Province.

Phnom Penh System get power supply from own power plants (EDC) and IPPs and import from Vietnam. The installed capacity of generation plant of EDC is 44.00 MW and that of IPPs is 185.48 MW and import from Vietnam is about 135 MW. All power plants are located in the city except Kirirom hydro power plant with installed capacity of 12 MW, which is located in Kampong Speu province at about 110 km from Phnom Penh.

In 2011, for the Phnom Penh System, the peak demand was 349.40 MW. The supply from generation and import in Phnom Penh System has increased from 1,699.86 GWh in 2010 to 1,918.52 GWh in 2011 and the system loss has decreased from 9.39% in 2010 to 8.66% in 2011.

**SIEM REAP (SRP):** Siem Reap is the area of tourist attraction and located in Northwest part of Cambodia. Electricity supply in Siem Reap is from generation from own power plant and import from Thailand.

The main operational features of power system in Siem Reap for 2011 are: available capacity - 50.50 MW, peak demand - 39.07 MW, energy received by import from Thailand at 115/22kV substation and own generation - 214.15 GWh, total length of MV and LV lines - 626.10 cct-km and number of customers - 26,156.

**SIHANOUKVILLE (SHV):** Sihanoukville is the seaside tourist area, located in southwestern part of Cambodia. Earlier the power system in Sihanoukville was isolated and was supplied by Power Plants of IPP and EDC, together having a capacity of 19.60 MW. In 2011, under RETP project, the system has been connected to Kampot system, which imports power from Vietnam via 22 kV line. This has increased the availability of power resulting in supply to more areas and to other licensees in Sihanoukville Province. The annual power available was 76.22 GWh, peak demand 16.40 MW and the number of customers in EDC distribution area were 11,472. The line length of MV and LV network was 322.81 cct-km.

**KAMPONG CHAM (KGC):** Kampong Cham is located in the eastern part of Cambodia. The isolated power system in Kampong Cham is supplied by an IPP while some part of the system received imported power from Vietnam in 2011. The annual availability of power was 38.46 GWh, installed capacity 9.18 MW, peak demand 8.45 MW and 11,739 customers. The line length of MV and LV network was 144.01 cct-km.

**Memot and Ponhea Krek:** The supply system for Memot and Ponhea Krek is located in Kampong Cham province and has MV system with rated voltage of 22 kV. In 2011, the system had total MV and LV lines of 192.49 cct-km, 6,804 customers and peak demand of 10.44 MW. The power supply to these areas is imported from Viet Nam since 2002 with the contracted capacity of 10 MW and in 2011 the import was 43.52 GWh.



**BATTAMBANG (BTB):** Battambang is located in the North-Western part of Cambodia. The 115 kV transmission line for import of power from Thailand is connected with Siem Reap and Banteay Meanchey system. Battambang city is supplied from import from Thailand and generation from own power plant. The Battambang power system has an available capacity of 23.20 MW, total MV and LV lines 642.90 cct-km and 32,756 customers. The energy available in 2011 was 67.83 GWh and peak demand 16.77 MW.

**BANTEAY MEANCHEY (BTC) AND MONGKUL BOREI:** Banteay Meanchey is located in northwestern part of Cambodia. Banteay Meanchey is supplied from import from Thailand and generation from own power plant. The capacity of power system is 23.08 MW. In 2011, the energy available was 28.37 GWh, peak demand of 6.28 MW and 16,085 customers were connected. The line length of MV and LV network was 223.60 cct-km.

**STUNG TRENG (STR):** Stung Treng is a remote and sparsely populated province located in the northeast of Cambodia. The power system of Stung Treng town was connected to the Laos system at 22 kV since 2010. The system has a capacity of 3.64 MW (1.64 MW of generation and 2 MW of import from Laos), total MV and LV lines 132.94 cct-km and 3,090 customers. The peak demand in 2011 was 2.37 MW and the available energy was 6.65 GWh.

**RATTANAKKIRI (RTK):** Rattanakiri is situated bordering Vietnam's central Highlands and Laos. The power system of Rattanakiri is with an installed capacity of 0.96 MW of own hydro generation, 0.80 MW of IPP generation, 7 MW imported from Vietnam via 35 kV sub-transmission line, has total MV and LV lines 124.42 cct-km and 3,197 customers. In 2011, the peak demand was 2.24 MW and annual available energy was 9.47 GWh.

**TAKEO (TKO) AND ANG TASOM:** Takeo is located in the plain region of southern Cambodia. The 230 kV line from Vietnam and the Takeo substation was energized on 31<sup>st</sup> March 2009 to import power from Vietnam. Takeo continues to have its own generation system with installed capacity of 1.56 MW. In 2011, it had a peak demand of 4.73 MW, total MV and LV line of 280.14 cct-km, energy available of 13.11 GWh and 7,682 customers.

**KAMPOT (KPT):** Kampot is located in the Southern part of the country. EDC's own power plant with installed capacity of 3.08 MW and import from Viet Nam by 22 kV line via Kampong Trach (KGT) is used for supply to Kampot city. In 2011, generation and import was 32.75 GWh, peak demand 5.47 MW, 7,796 customers and a distribution system with total MV and LV lines 289.86 cct-km.

**Kampong Trach (KGT):** The power system is in Kampot province, and it imports electricity from Viet Nam since 2002. In 2011 the contracted capacity is 10 MW and the system has total MV and LV lines 45.42 cct-km, 2,676 customers, available energy 14.92 GWh and peak demand 2.38 MW.



**PREY VENG (PRV):** Prey Veng is located in the south east of the country. The power system of Prey Veng City has generation with installed capacity of 2.44 MW by EDC's own generation and also supply from Svay Rieng which imports power from Vietnam. The supply system has MV and LV line 100.27 cct-km, with 4,725 customers and peak demand of 1.46 MW. The energy available in 2011 was 6.60 GWh.

**SVAY RIENG (SVR):** Svay Rieng is located in the south-east of the country. The power supply is by import from Vietnam and own generation. Available capacity of power system is 8.30 MW; import and generation in 2011 were 23.80 GWh with peak demand 5.40 MW and 11,390 customers. The line length of MV and LV network was 406.17 cct-km.

**Bavet (BVT):** The power system for Bavet is in Svay Rieng province and supply is by import from Vietnam. In 2011, the supply system had 2,562 customers and peak demand of 11.20 MW, energy imported of 59.35 GWh and total MV and LV lines of 39.68 cct-km.

**Mondulkiri (MDKR):** The power system of Mondulkiri was taken over by EDC in 2010. The installed capacity for generation is 370 kW of hydro generation and 300 kW of diesel generation. Under EDC control, in 2011 generation was 2.34 GWh with peak demand of 0.62 MW and had 1,444 customers. The line length of MV and LV network was 64.48 cct-km.

**Keosiema (KSM):** The power system for Keosiema is in Mondulkiri province. Supply is by import from Vietnam with a contracted capacity of 0.36 MW. Import was 1.03 GWh, and 973 customers. The line length of MV and LV network was 44.00 cct-km.

**Kratie (KRT):** The power system of Kratie was taken over by EDC in 2011. The isolated power system in Kratie is supplied by an IPP with installed capacity of 2.72 MW. Under EDC control, in 2011 generation was 2.32 GWh with peak demand of 2.08 MW, and had 3,552 customers. The line length of MV and LV network was 46.79 cct-km.

**Snuol (SNL):** The power system is in Kratie province. This system is supplied by imported power from Vietnam with annual energy of 4.64 GWh, and 1,051 customers.

**Kampong Speu (KPS):** In mid 2011, Kampong Speu was upgraded to province branch office while it has been under Phnom Penh System previously. This new provincial branch was in charge the system in Kampong Speu town and the areas along National Road No.4 getting power supply from Kampong Speu substation. Its annual sale energy is 15.97 GWh, and 6,274 customers. The line length of MV and LV network was 417.33 cct-km.

## **IMPORT FROM THAILAND AND VIETNAM AT HIGH VOLTAGE**

EDC imports power from Thailand through 115 kV Aranya Prathet – Banteay Meanchey line which supplies to Banteay Meanchey, Battambang and Siem Reap grid substations. During 2011, EDC imported 315,747,100 kWh from Thailand through 115 kV connection.



The 230 kV double circuit transmission line from Vietnam to Takeo was commissioned on 31<sup>st</sup> March 2009. The 230 kV double circuit line from Takeo to GS4 in Phnom Penh was charged on 8<sup>th</sup> May 2009. During 2011, EDC imported 1,133,793,029 kWh from Vietnam. In coming years this grid system is expected to get connected to more lines and substations and cover more areas and take the form of the National Grid.



**Table 2: Installed Capacity and Output, MW**

Year		2006	2007	2008	2009	2010	2011
Location	Capacity						
PHN	Installed	214.78	224.78	247.28	453.48	429.48	429.48
	Output	192.40	200.49	217.49	317.49	317.89	332.89
EDC	Installed	45.60	45.60	45.60	45.60	44.00	44.00
	Output	42.60	42.60	42.60	42.60	41.00	41.00
CUPL IPP	Installed	37.10	37.10	37.10	37.10	37.10	37.10
	Output	31.90	31.99	31.99	31.99	31.99	31.99
CETIC IPP	Installed	12.00	12.00	12.00	12.00	12.00	12.00
	Output	11.00	11.00	11.00	11.00	11.00	11.00
KEP IPP	Installed	49.20	49.20	49.20	49.20	49.20	49.20
	Output	45.00	45.00	45.00	45.00	45.00	45.00
CITY Power IPP	Installed	7.68	7.68	7.68	7.68	7.68	7.68
	Output	6.90	6.90	6.90	6.90	6.90	6.90
CEP IPP	Installed	49.20	49.20	49.20	49.20	49.20	49.20
	Output	45.00	45.00	45.00	45.00	45.00	45.00
COLBEN IPP	Installed	14.00	14.00	14.00	20.20	20.20	20.20
	Output	10.00	10.00	10.00	10.00	10.00	10.00
TH IPP	Installed	-	10.00	10.00	10.00	-	-
	Output	-	8.00	8.00	8.00	-	-
COLBEN PPSEZ IPP	Installed	-	-	12.40	12.40	-	-
	Output	-	-	10.00	10.00	-	-
Suvannaphum IPP	Installed	-	-	10.10	10.10	10.10	10.10
	Output	-	-	7.00	7.00	7.00	7.00
West PP (VN) IMP	Installed	-	-	-	200.00	200.00	200.00
	Output	-	-	-	100.00	120.00	135.00
Provinces	Installed	64.14	165.88	154.24	163.04	174.67	187.09
	Output	57.76	159.36	150.06	156.26	167.89	178.99
SRP	IPP	Installed	5.30	8.30	-	-	-
		Output	4.50	8.30	-	-	-
	EDC	Installed	10.50	10.50	10.50	10.50	10.50
		Output	10.50	10.50	10.50	10.50	10.50
	IMP	PPA	-	40.00	40.00	40.00	40.00
		Output	-	40.00	40.00	40.00	40.00
SHV	EDC	Installed	7.40	7.40	7.40	5.60	5.60
		Output	6.20	6.20	6.20	5.00	5.00
	IPP	Installed	-	8.00	8.00	14.00	14.00
		Output	-	7.00	7.00	10.00	10.00



**Table 2: Installed Capacity and Output, MW (Con't)**

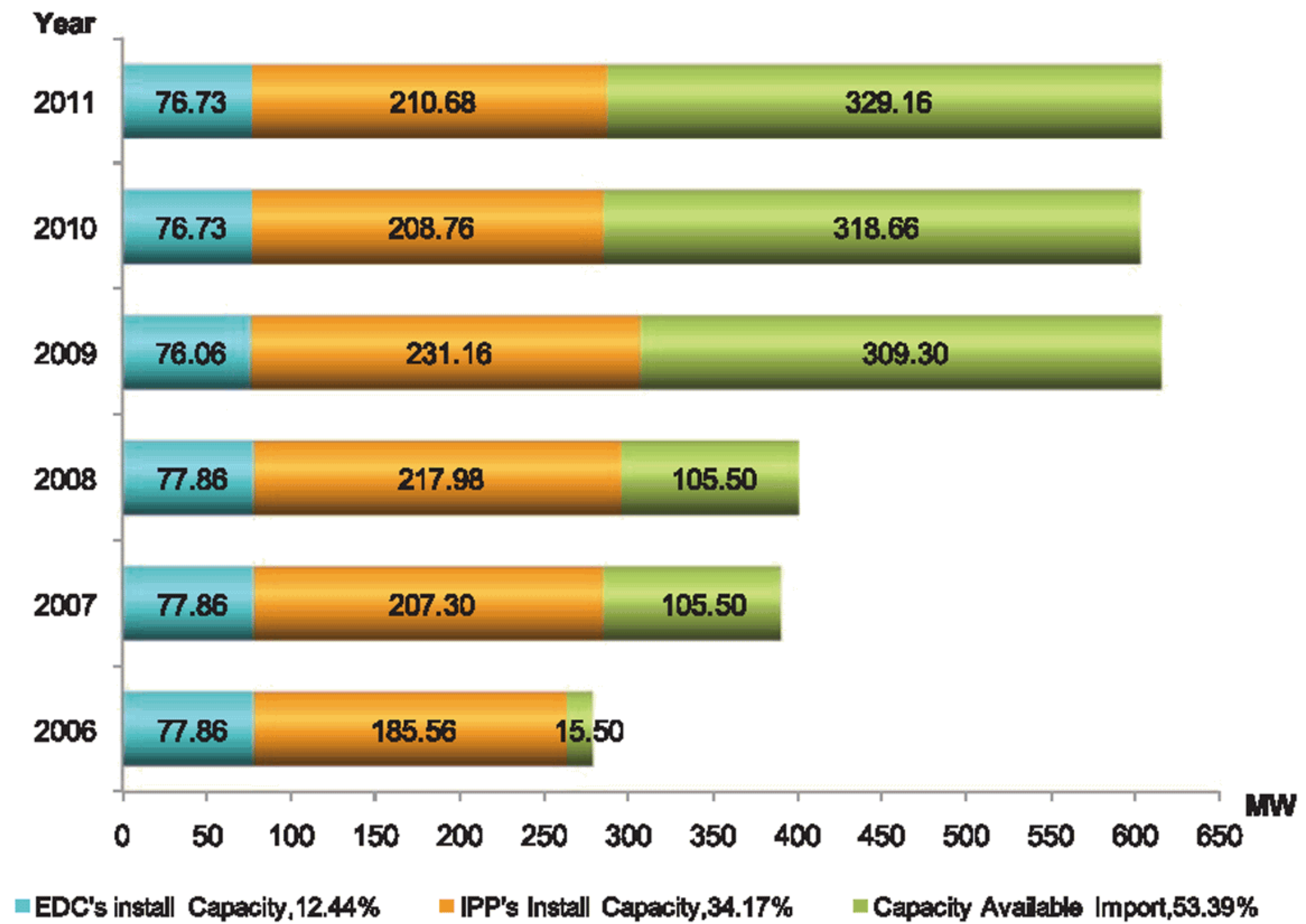
Year			2006	2007	2008	2009	2010	2011
Location	Capacity							
KGC	IPP	Installed	3.40	3.40	7.68	7.68	7.68	7.68
		Output	1.90	1.90	7.00	7.00	7.00	7.00
	IMP	PPA	-	-	-	-	-	1.50
		Output	-	-	-	-	-	1.50
PKK	IMP	PPA	2.00	5.00	5.00	5.00	5.00	5.00
		Output	2.00	5.00	5.00	5.00	5.00	5.00
MMT	IMP	PPA	3.00	5.00	5.00	5.00	5.00	5.00
		Output	3.00	5.00	5.00	5.00	5.00	5.00
TKO	EDC	Installed	1.56	1.56	1.56	1.56	1.56	1.56
		Output	1.50	1.50	1.50	1.50	1.50	1.50
	IMP	PPA	-	-	-	3.00	3.00	4.00
		Output	-	-	-	3.00	3.00	4.00
BTB	EDC	Installed	1.60	1.60	1.60	1.60	3.20	3.20
		Output	0.80	0.80	0.80	0.80	2.40	2.40
	IPP	Installed	7.12	7.62	-	-	-	-
		Output	5.70	6.10	-	-	-	-
	IMP	PPA	-	20.00	20.00	20.00	20.00	20.00
		Output	-	20.00	20.00	20.00	20.00	20.00
KPT	EDC	Installed	3.08	3.08	3.08	3.08	3.08	3.08
		Output	3.00	3.00	3.00	3.00	3.00	3.00
KGT	IMP	PPA	1.00	3.00	3.00	3.00	10.00	10.00
		Output	1.00	3.00	3.00	3.00	10.00	10.00
PRV	EDC	Installed	1.64	1.64	1.64	1.64	1.64	1.64
		Output	1.50	1.50	1.50	1.50	1.50	1.50
	IMP	Installed	-	-	-	0.80	0.80	0.80
		Output	-	-	-	0.80	0.80	0.80
BTC	EDC	Installed	3.08	3.08	3.08	3.08	3.08	3.08
		Output	3.00	3.00	3.00	3.00	3.00	3.00
	IMP	PPA	-	20.00	20.00	20.00	20.00	20.00
		Output	-	20.00	20.00	20.00	20.00	20.00
STR	EDC	Installed	1.64	1.64	1.64	1.64	1.64	1.64
		Output	1.50	1.50	1.50	1.50	1.50	1.50
	IMP	PPA	-	-	-	-	2.00	2.00
		Output	-	-	-	-	2.00	2.00



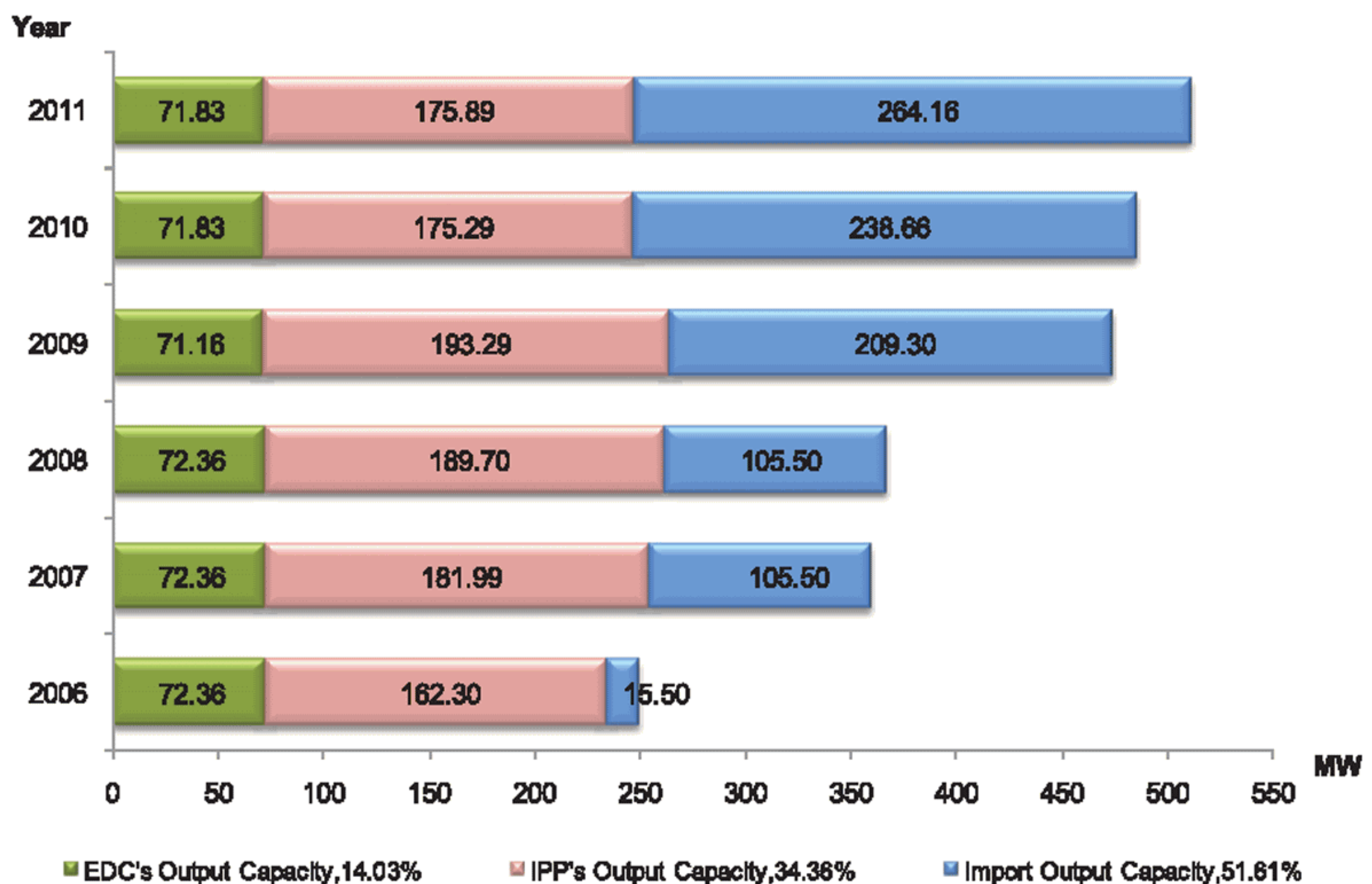
**Table 2: Installed Capacity and Output, MW (Con't)**

Year			2006	2007	2008	2009	2010	2011
Location	Capacity							
RTK	IPP	Installed	0.56	0.80	0.80	1.60	1.60	0.80
		Output	0.40	0.80	0.80	1.40	1.40	0.80
	EDC	Installed	0.96	0.96	0.96	0.96	0.96	0.96
		Output	0.96	0.96	0.96	0.96	0.96	0.96
	IMP	PPA	-	-	-	-	-	7.00
		Output	-	-	-	-	-	7.00
SVR	EDC	Installed	0.80	0.80	0.80	0.80	0.80	0.80
		Output	0.80	0.80	0.80	0.80	0.80	0.80
	IMP	PPA	7.50	7.50	7.50	7.50	7.50	7.50
		Output	7.50	7.50	7.50	7.50	7.50	7.50
BVT	IMP	PPA	2.00	5.00	5.00	5.00	5.00	5.00
		Output	2.00	5.00	5.00	5.00	5.00	5.00
MDKR	EDC	Installed	-	-	-	-	0.67	0.67
		Output	-	-	-	-	0.67	0.67
KSM	IMP	PPA	-	-	-	-	0.36	0.36
		Output	-	-	-	-	0.36	0.36
Kratie	IPP	Installed	-	-	-	-	-	2.72
		Output	-	-	-	-	-	1.20
Snuol	IMP	PPA	-	-	-	-	-	1.00
		Output	-	-	-	-	-	1.00
Total	Installed		278.92	390.66	401.52	616.52	604.15	616.57
	Output		250.16	359.85	367.55	473.75	485.78	511.88
Percentage , %			89.69%	92.11%	91.54%	76.84%	80.41%	83.02%





**Figure 1: Install Capacity in 2011**



**Figure 2: Output Capacity in 2011**



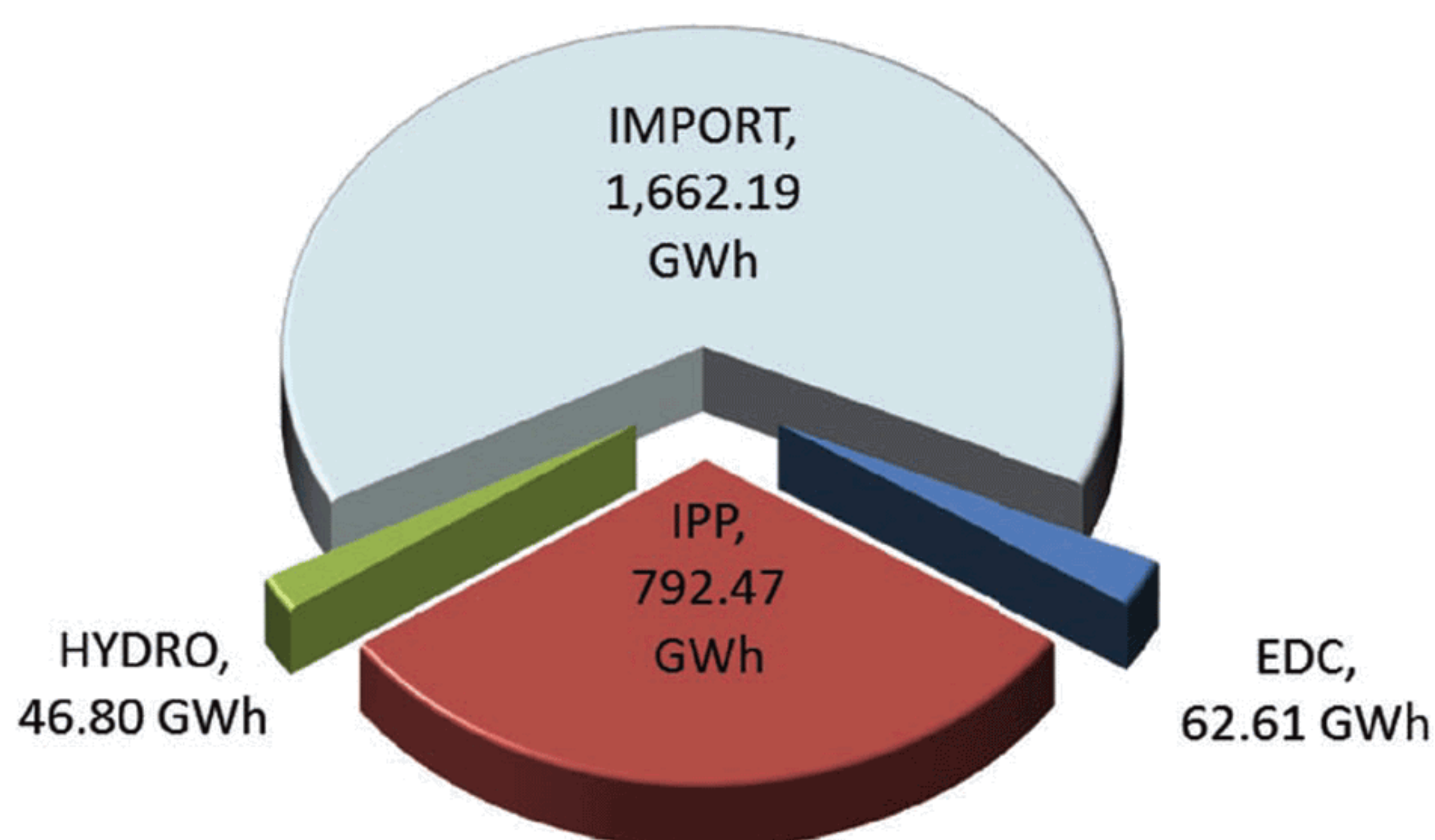
**Table 3: Energy Generation, GWh**

Year	2006	2007	2008	2009	2010	2011
Location						
<b>PHN</b>	<b>906.74</b>	<b>1,109.55</b>	<b>1,275.80</b>	<b>1,375.94</b>	<b>1,699.86</b>	<b>1,918.52</b>
EDC's	113.6	98.9	143.85	82.861	33.08	<b>48.52</b>
CUPL	260.75	258.49	258.71	182.22	120.21	<b>133.41</b>
Jupiter	49.08	-	-	-	-	-
CETIC	47.69	46.53	43.32	44.41	24.21	<b>38.25</b>
T.H	-	14.7	34.5	17.31	-	-
KEP	223.98	277.99	317.85	256.25	230.38	<b>231.90</b>
CITY POWER	36.16	38.24	41.82	34.11	18.23	<b>25.26</b>
CEP	166.01	315.55	325.88	269.48	247.29	<b>227.70</b>
COLBEN	7.8	54.02	46.45	53.24	35.80	<b>34.17</b>
S.L Garment	1.67	5.13	4.41	5.76	4.05	<b>11.86</b>
COLBEN PPSEZ	-	-	35.66	45.06	-	-
Suvarnaphum	-	-	23.36	28.03	32.07	<b>46.50</b>
VN	-	-	-	357.21	954.55	<b>1120.96</b>
<b>EDC Province</b>	<b>199.75</b>	<b>268.56</b>	<b>349.62</b>	<b>441.93</b>	<b>542.63</b>	<b>645.55</b>
SRP	75.32	100.58	136.9	165.20	193.98	<b>214.15</b>
SHV	30.43	37.62	46.73	51.16	64.96	<b>76.22</b>
KGC	10.18	11.65	15.54	25.27	34.95	<b>38.46</b>
PKK	11.88	16.56	18.37	26.92	25.98	<b>32.27</b>
MMT	11.85	12.6	9.19	10.56	10.40	<b>11.26</b>
TKO	3.59	4.38	5.75	7.39	9.28	<b>13.11</b>
BTB	21.53	24.66	32.26	38.25	49.73	<b>67.83</b>
KPT	4.88	5.62	7.8	10.17	20.82	<b>32.75</b>
KGT	1.36	2.14	3.91	5.39	8.68	<b>14.92</b>
PRV	2.07	2.35	2.8	3.36	4.68	<b>6.60</b>
BTC	3.48	10.33	14.18	19.16	24.63	<b>28.37</b>
STR	1.58	2.56	3.53	4.39	5.80	<b>6.65</b>
RTK	4.79	5.01	5.78	6.41	8.19	<b>9.47</b>
SVR	2.11	5.44	9.45	12.91	18.15	<b>23.80</b>
BVT	14.7	27.07	37.42	55.37	60.86	<b>59.35</b>
MDKR	-	-	-	-	1.10	<b>2.34</b>
KSM	-	-	-	-	0.45	<b>1.03</b>
KRT	-	-	-	-	-	<b>2.32</b>
SNL	-	-	-	-	-	<b>4.64</b>
<b>TOTAL</b>	<b>1,106.48</b>	<b>1,378.12</b>	<b>1,625.42</b>	<b>1,817.87</b>	<b>2,242.49</b>	<b>2,564.07</b>



**Table 4: Generation Sources during 2011, GWh**

LOCATION	EDC	IPP	HYDRO	IMPORT	TOTAL
<b>EDC p.p</b>	48.52	710.79	38.25	1,120.96	<b>1,918.52</b>
<b>SRP</b>	1.37	-	-	212.79	<b>214.15</b>
<b>SHV</b>	10.26	51.38	-	14.58	<b>76.22</b>
<b>KGC</b>	-	25.68	-	12.78	<b>38.46</b>
<b>PKK</b>	-	-	-	32.27	<b>32.27</b>
<b>MMT</b>	-	-	-	11.26	<b>11.26</b>
<b>TKO</b>	0.07	-	-	13.04	<b>13.11</b>
<b>BTB</b>	0.06	-	-	67.77	<b>67.83</b>
<b>KPT</b>	0.61	-	5.17	26.98	<b>32.75</b>
<b>KGT</b>	-	-	-	14.92	<b>14.92</b>
<b>PRV</b>	0.41	-	-	6.20	<b>6.60</b>
<b>BTC</b>	0.03	-	-	28.34	<b>28.37</b>
<b>STR</b>	0.05	-	-	6.60	<b>6.65</b>
<b>RTK</b>	-	2.30	2.15	5.03	<b>9.47</b>
<b>SVR</b>	0.13	-	-	23.67	<b>23.80</b>
<b>BVT</b>	-	-	-	59.35	<b>59.35</b>
<b>MDKR</b>	1.12	-	1.23	-	<b>2.34</b>
<b>KSM</b>	-	-	-	1.03	<b>1.03</b>
<b>KRT</b>	-	2.32	-	-	<b>2.32</b>
<b>SNL</b>	-	-	-	4.64	<b>4.64</b>
<b>TOTAL</b>	<b>62.61</b>	<b>792.47</b>	<b>46.80</b>	<b>1,662.19</b>	<b>2,564.07</b>

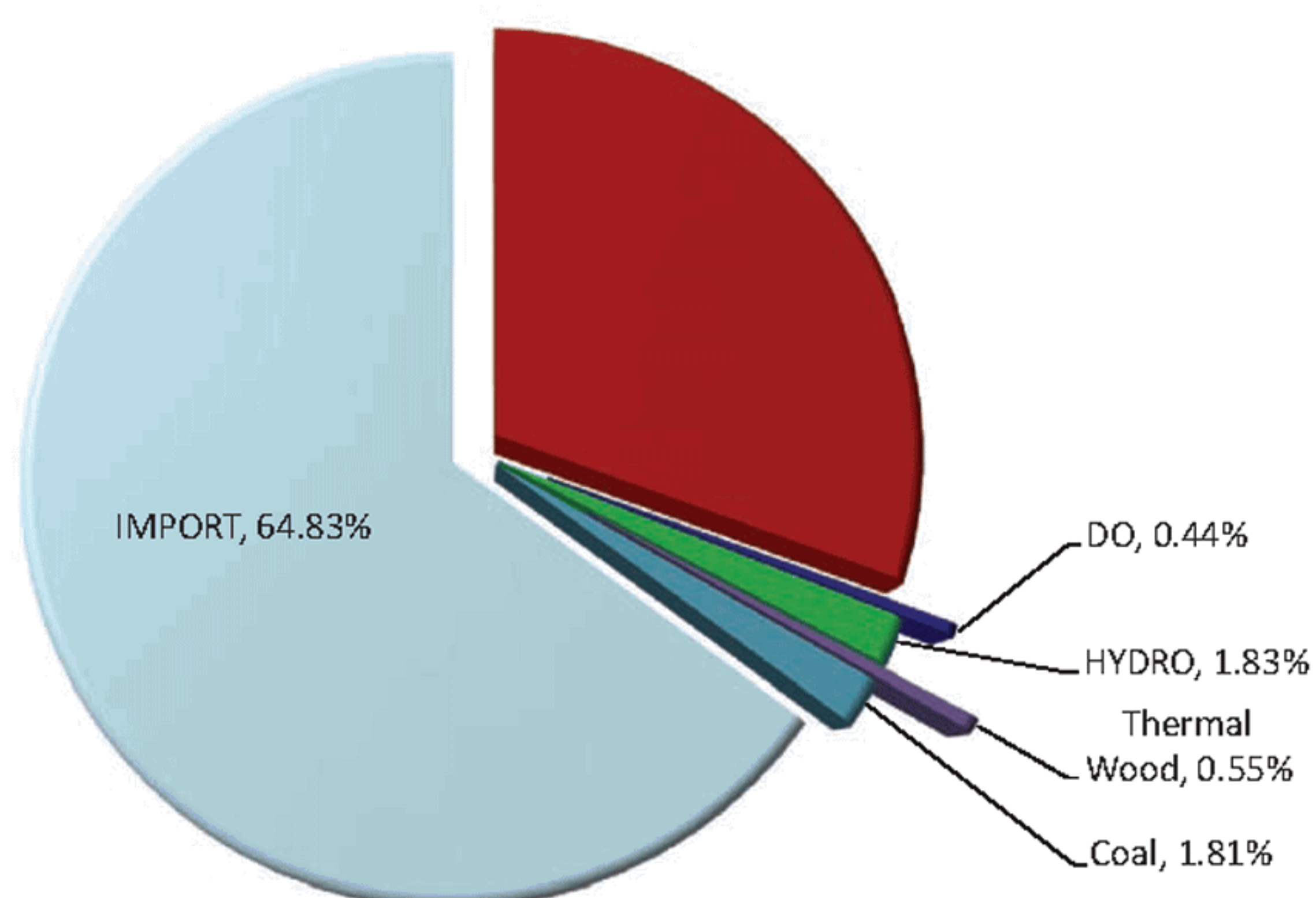


**Figure 3: Power Generation by Sources In 2011**



**Table 5: Generation by types during 2011, GWh**

LOCATION	HFO	DO	HYDRO	Thermal Wood	COAL	IMPORT	TOTAL
PHN	694.71	6.24	38.25	11.86	46.50	1,120.96	1,918.52
SRP	1.08	0.29	-	-	-	212.79	214.15
SHV	61.55	0.08	-	-	-	14.58	76.22
KGC	25.68	-	-	-	-	12.78	38.46
PKK	-	-	-	-	-	32.27	32.27
MMT	-	-	-	-	-	11.26	11.26
TKO	-	0.07	-	-	-	13.04	13.11
BTB	-	0.06	-	-	-	67.77	67.83
KPT	-	0.61	5.17	-	-	26.98	32.75
KGT	-	-	-	-	-	14.92	14.92
PRV	-	0.41	-	-	-	6.20	6.60
BTC	-	0.03	-	-	-	28.34	28.37
STR	-	0.05	-	-	-	6.60	6.65
RTK	-	-	2.15	2.30	-	5.03	9.47
SVR	-	0.13	-	-	-	23.67	23.80
BVT	-	-	-	-	-	59.35	59.35
MDKR	-	1.12	1.23	-	-	0.00	2.34
KSM	-	-	-	-	-	1.03	1.03
KRT	-	2.32	-	-	-	-	2.32
SNL	-	-	-	-	-	4.64	4.64
<b>TOTAL</b>	<b>783.02</b>	<b>11.41</b>	<b>46.80</b>	<b>14.15</b>	<b>46.50</b>	<b>1,662.19</b>	<b>2,564.07</b>

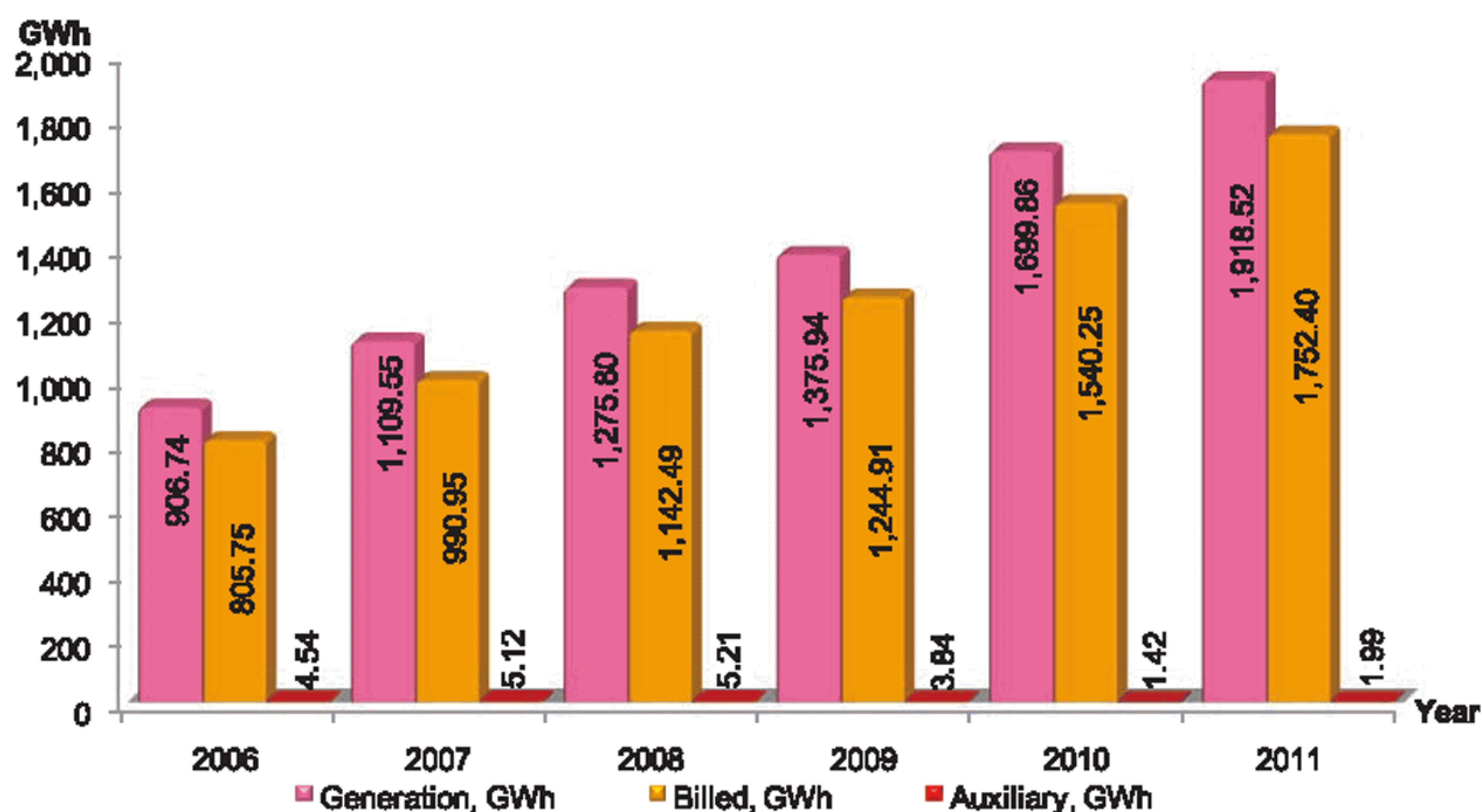


**Figure 4: Generation by type in 2011**



**Table 6: Breakdown of Yearly Peak Demand, MW**

Location	2006	2007	2008	2009	2010	2011
PHN	165.00	204.50	239.00	244.10	300.20	349.40
SRP	14.40	18.94	27.59	29.98	34.97	39.07
SHV	7.40	8.60	9.50	10.17	13.40	16.40
KGC	2.10	2.48	2.48	6.80	7.30	8.45
PKK	1.85	4.10	4.10	5.50	5.00	6.50
MMT	1.20	3.80	3.80	3.00	3.00	3.94
TKO	0.98	1.15	1.39	2.26	2.68	4.73
BTB	5.15	5.55	7.02	7.98	10.45	16.77
KPT	1.25	1.34	1.85	2.36	4.52	5.47
KGT	0.20	0.66	0.83	1.20	2.13	2.38
PRV	0.52	0.64	0.83	0.79	0.93	1.46
BTC	2.34	2.64	3.94	4.32	5.51	6.28
STR	0.53	0.71	0.98	1.08	1.96	2.37
RTK	1.45	1.30	1.68	1.78	1.94	2.24
SVR	0.80	1.30	2.24	2.80	3.70	5.40
BVT	2.70	4.51	4.81	9.50	11.00	11.20
MDKR	-	-	-	-	0.46	0.62
KRT	-	-	-	-	-	2.08
<b>TOTAL</b>	<b>207.87</b>	<b>262.17</b>	<b>312.04</b>	<b>333.62</b>	<b>409.14</b>	<b>484.76</b>

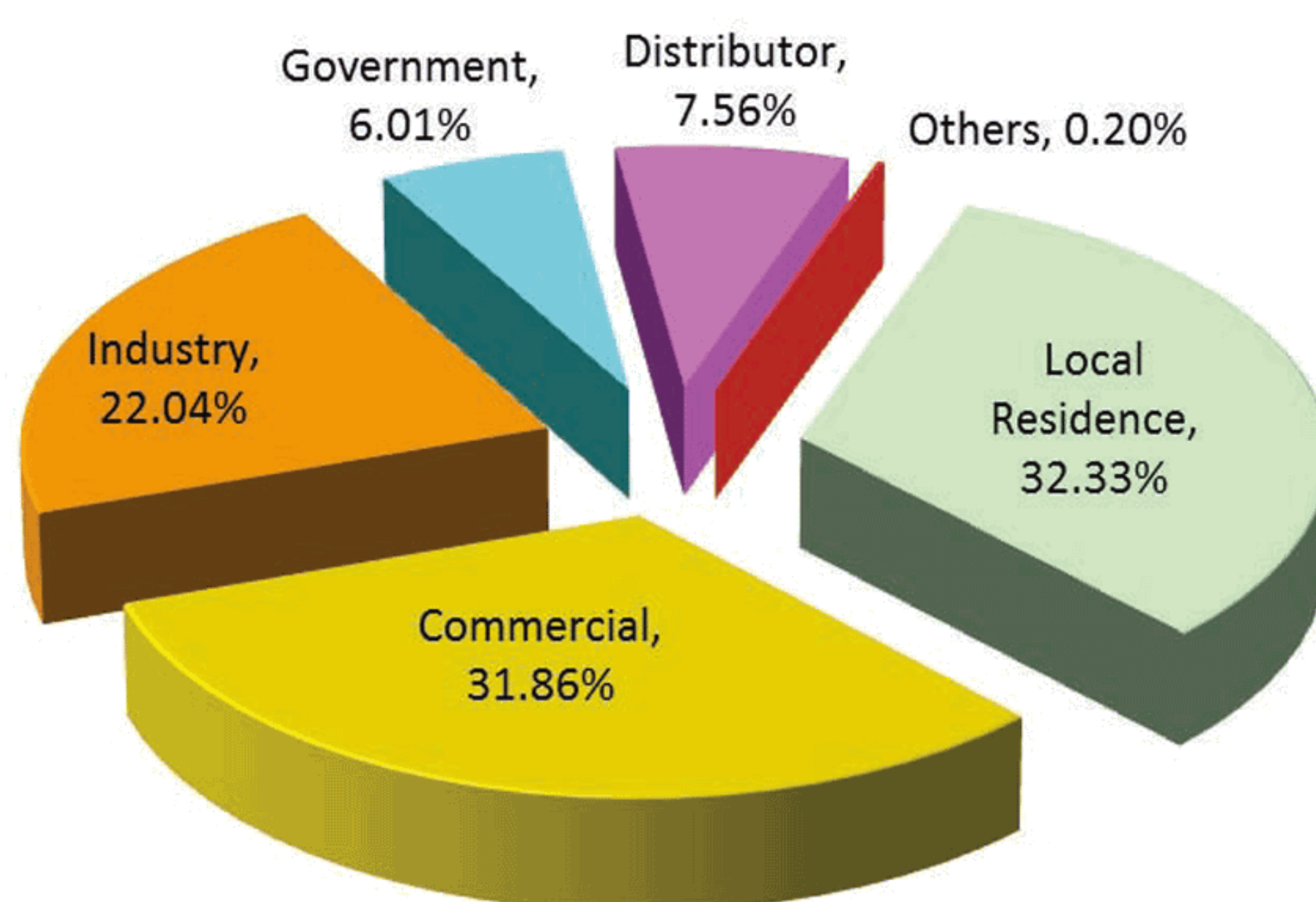


**Figure 5: Break Down of Generation, Billed and Auxiliary  
in Phnom Penh System from 2006 to 2011**

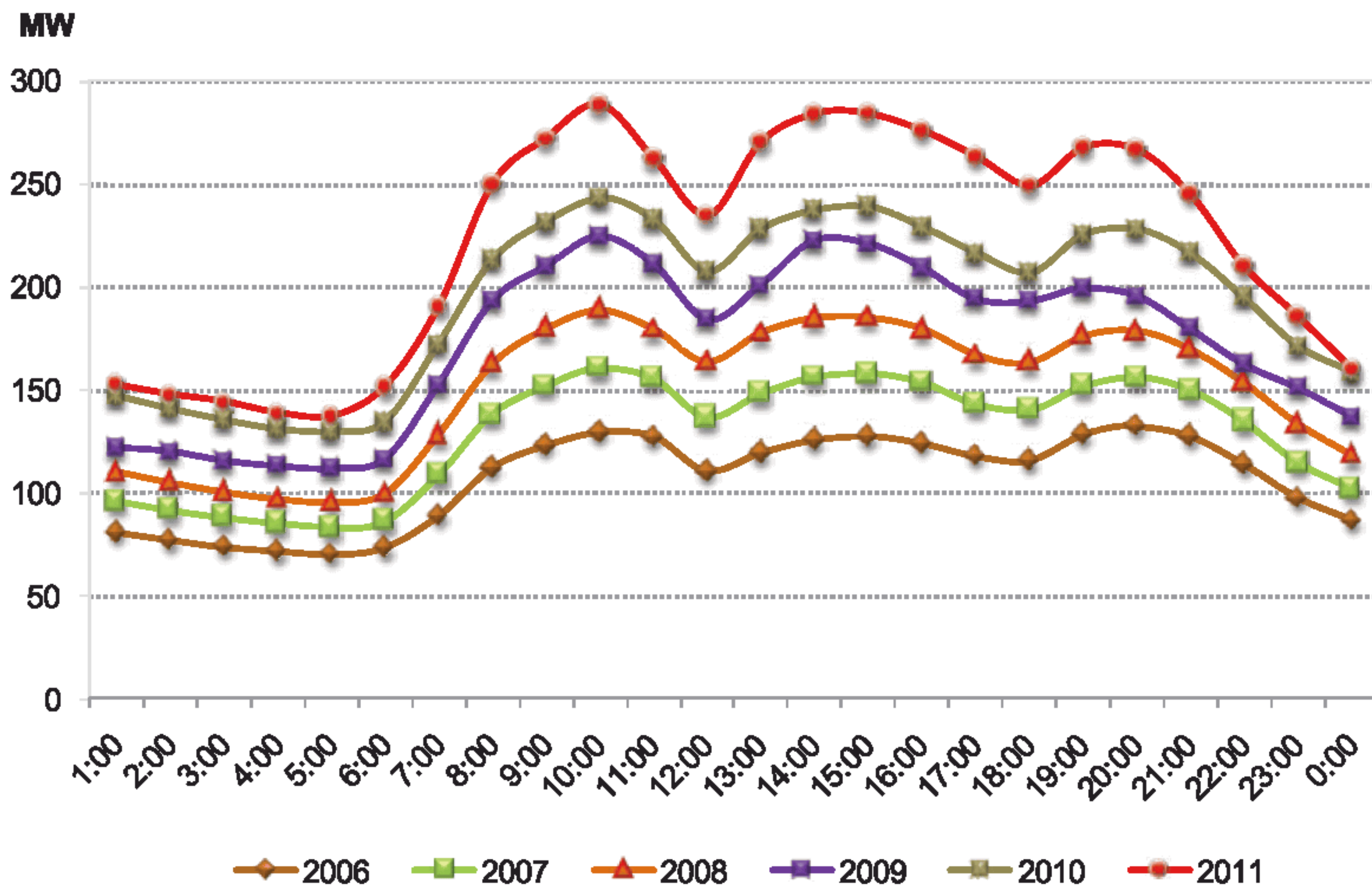


**Table 7: Energy Sales, GWh**

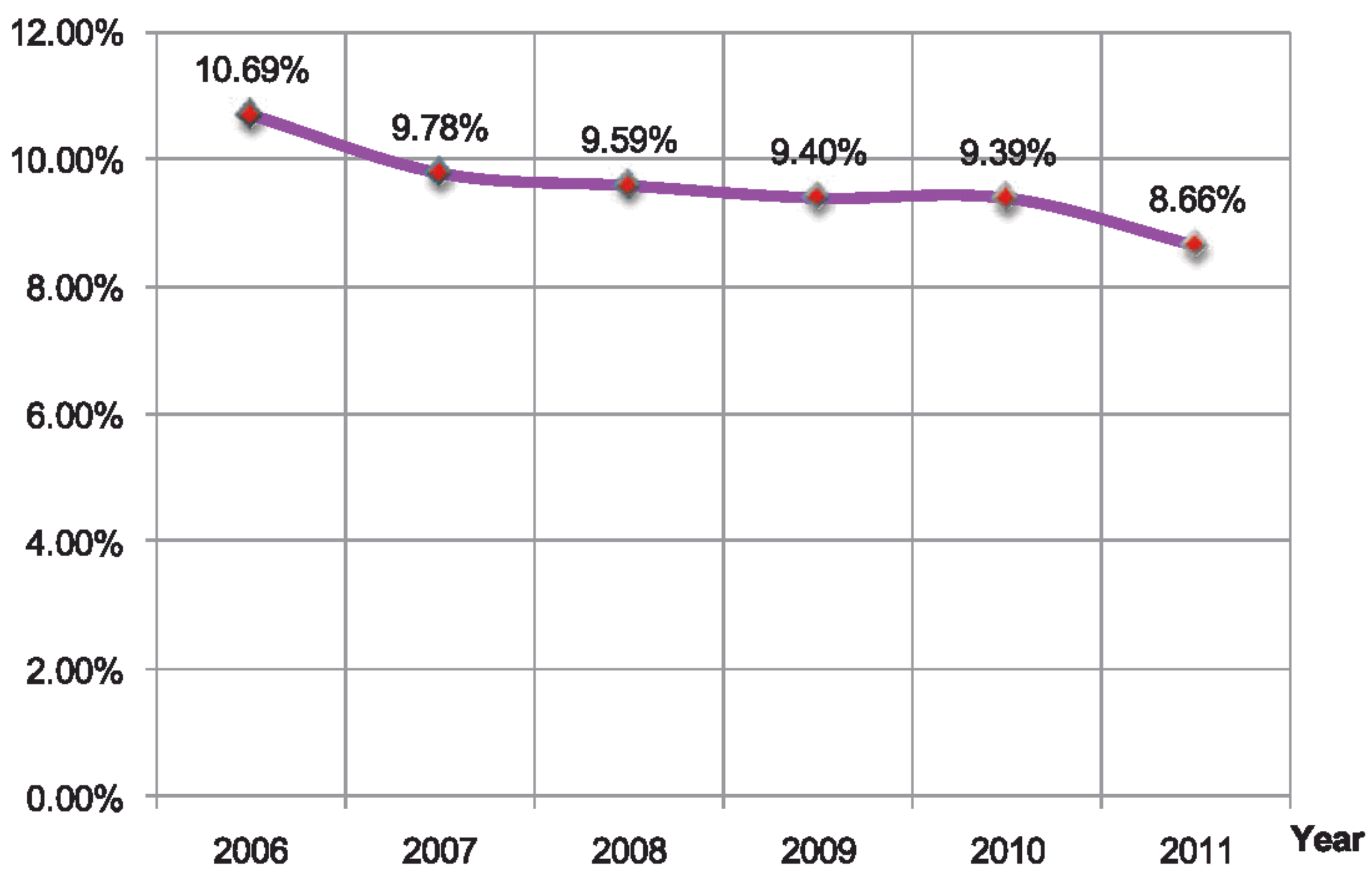
Year	2006	2007	2008	2009	2010	2011
<b>PHN</b>	805.75	990.95	1,142.49	1,246.53	1,540.25	<b>1,752.40</b>
<b>SRP</b>	62.84	83.14	117.29	145.12	170.97	<b>188.26</b>
<b>SHV</b>	25.74	32.46	41.26	45.48	58.13	<b>68.99</b>
<b>KGC</b>	8.40	9.65	13.26	22.23	31.31	<b>34.95</b>
<b>PKK</b>	11.27	15.73	17.43	25.56	24.99	<b>30.63</b>
<b>MMT</b>	11.25	11.94	8.69	10.00	9.80	<b>10.56</b>
<b>TKO</b>	3.17	4.00	5.11	6.62	8.41	<b>11.91</b>
<b>BTB</b>	16.82	21.17	28.59	34.27	45.41	<b>62.95</b>
<b>KPT</b>	3.45	4.95	7.01	9.09	15.21	<b>30.67</b>
<b>KGT</b>	1.22	2.06	3.68	5.11	8.20	<b>14.62</b>
<b>PRV</b>	1.62	1.97	2.41	2.88	4.17	<b>5.97</b>
<b>BTC</b>	2.84	8.79	12.65	17.28	22.62	<b>26.12</b>
<b>STR</b>	1.44	2.23	3.06	4.10	4.84	<b>5.79</b>
<b>RTK</b>	2.93	3.83	4.99	5.77	7.53	<b>8.67</b>
<b>SVR</b>	1.91	4.78	8.53	11.81	16.51	<b>23.33</b>
<b>BVT</b>	13.98	24.87	34.95	52.22	61.96	<b>55.01</b>
<b>MDKR</b>	-	-	-	-	0.83	<b>2.09</b>
<b>KSM</b>	-	-	-	-	0.37	<b>1.01</b>
<b>KRT</b>	-	-	-	-	-	<b>2.25</b>
<b>SNL</b>	-	-	-	-	-	<b>2.16</b>
<b>KPS</b>	-	-	-	-	-	<b>15.97</b>
<b>TOTAL</b>	<b>974.62</b>	<b>1,222.52</b>	<b>1,451.42</b>	<b>1,644.07</b>	<b>2,031.50</b>	<b>2,354.29</b>

**Figure 6: Energy Sale by Sector for Phnom Penh's System in 2011**





**Figure 7: Average Daily Load Curve from 2006 to 2011 in Phnom Penh**

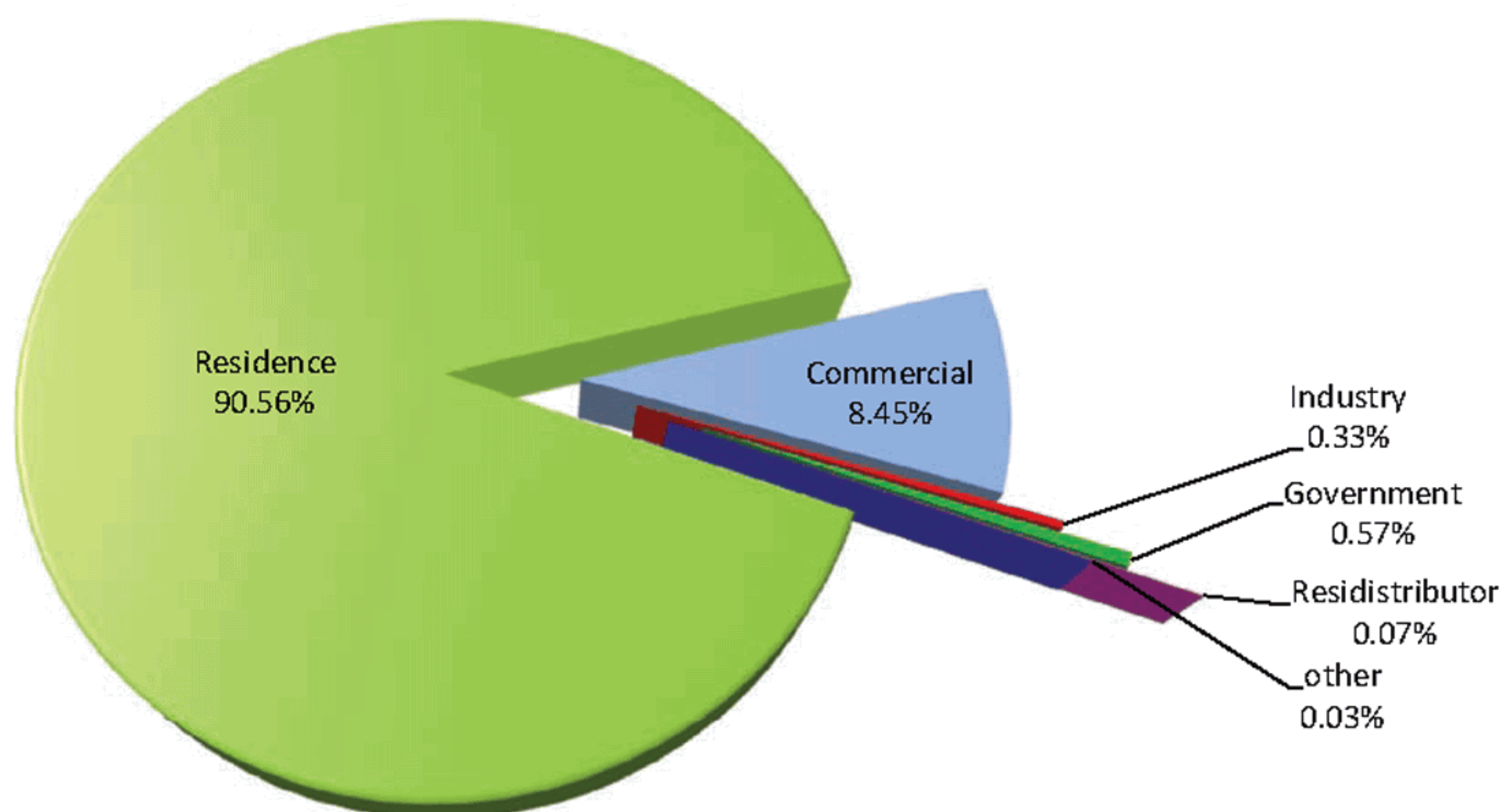


**Figure 8: System Losses in Phnom Penh System from 2006 to 2011**



**Table 8: Customer from 2006 to 2011**

Year	2006	2007	2008	2009	2010	2011
<b>PHN</b>	177,172	192,697	211,680	224,593	240,992	<b>256,642</b>
<b>SRP</b>	13,717	14,862	16,601	18,229	19,951	<b>26,156</b>
<b>SHV</b>	8,441	8,852	9,254	9,767	10,636	<b>11,472</b>
<b>KGC</b>	5,848	6,533	7,101	8,225	10,478	<b>11,739</b>
<b>PKK</b>	1,688	1,824	2,095	2,210	2,386	<b>2,519</b>
<b>MMT</b>	3,067	3,282	3,644	3,731	4,018	<b>4,285</b>
<b>TKO</b>	4,508	4,927	5,292	5,638	5,987	<b>7,682</b>
<b>BTB</b>	17,117	18,316	20,093	23,902	31,575	<b>32,756</b>
<b>KPT</b>	4,565	5,480	6,079	6,314	7,171	<b>7,796</b>
<b>KGT</b>	1,882	2,028	2,159	2,287	2,515	<b>2,676</b>
<b>PRV</b>	2,944	3,255	3,460	3,554	4,447	<b>4,725</b>
<b>BTC</b>	11,417	12,116	13,464	13,941	14,816	<b>16,085</b>
<b>STR</b>	1,923	2,158	2,378	2,502	2,636	<b>3,090</b>
<b>RTK</b>	2,722	2,569	2,667	2,770	2,910	<b>3,197</b>
<b>SVR</b>	4,917	5,717	7,325	8,565	10,795	<b>11,390</b>
<b>BVT</b>	1,802	2,044	2,213	2,301	2,495	<b>2,562</b>
<b>MDKR</b>	-	-	-	-	1,328	<b>1,444</b>
<b>KSM</b>	-	-	-	-	861	<b>973</b>
<b>KRT</b>	-	-	-	-	-	<b>3,552</b>
<b>SNL</b>	-	-	-	-	-	<b>1,051</b>
<b>KPS</b>	-	-	-	-	-	<b>6,274</b>
<b>Total</b>	<b>263,730</b>	<b>286,660</b>	<b>315,505</b>	<b>338,529</b>	<b>375,997</b>	<b>418,066</b>



**Figure 9: Customer by Type in EDC's System in 2011**



## TRANSMISSION AND DISTRIBUTION NETWORKS

The first 115 kV transmission line of 22.71 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 Hydro Power Plant to GS1. 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 PHN system by interlinking three grid substations.

The three provinces in North-Western Cambodia - Battambang, Banteay Meanchey, and Siem Reap are supplied by 115 kV transmission line of 185 km length by importing power from Thailand, and this line 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 to Takeo Grid Substation and the West Phnom Penh Substation (GS4) was put in service getting power supply from Vietnam. The 115 kV transmission line ring system connecting West Phnom Penh Substation (GS4) to the 3 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 link to Kamchay Hydro power plant with another 230 kV transmission line with a length of 11 km.

**Table 9: Transmission Facilities**

I	115 kV Transmission line	Voltage (kV)	Circuit	Section (mm <sup>2</sup> )	Line Length (Km)	Operation Year
1	GS1-GS3	115	1	2x250 mm <sup>2</sup>	11.50	1999
2	GS3-GS2	115	1	2x250 mm <sup>2</sup>	11.85	1999
3	GS1- GS_KAMPONG SPEU	115	1	150 mm <sup>2</sup>	40.93	2002
4	GS_KAMPONG SPEU - KIRIROM I	115	1	150 mm <sup>2</sup>	65.04	2002
5	Border-GS IE	115	2	400 mm <sup>2</sup>	4.00	2007
6	GS IE -GS BMC	115	2	400 mm <sup>2</sup>	43.00	2007
7	GS BMC - GS SR	115	1	400 mm <sup>2</sup>	85.00	2007
8	GS BMC - GS BTB	115	1	400 mm <sup>2</sup>	53.00	2007
9	GS4 - GS1	115	1	2x250 mm <sup>2</sup>	29.80	2009
10	GS4 - KEP	115	1	2x250 mm <sup>2</sup>	22.80	2009
11	KEP - GS2	115	1	2x250 mm <sup>2</sup>	6.60	2009
<b>Total length</b>					<b>373.53</b>	
II	230 kV Transmission line	Voltage (kV)	Circuit	Section (mm <sup>2</sup> )	Line Length (Km)	Operation Year
1	Vietnam-Takeo	230	2	450 mm <sup>2</sup>	50.00	2009
2	Takeo-WPP (GS4)	230	2	630 mm <sup>2</sup>	47.00	2009
3	Takeo-Kampot	230	2	450 mm <sup>2</sup>	73.00	2011
4	Kampot-Kamchay Hydro Power Plant	230	2	630 mm <sup>2</sup>	11.00	2011
<b>Total length</b>					<b>181.00</b>	



**Table 10: Grid Substation Facilities**

No.	Grid Substation Name	Rate Voltage (kV)	Number	Capacity (MVA)	Operation Year
1	GS1	115/22/15	1	50	1999
		115/22	1	50	
2	GS2	115/22/15	1	50	1999
		115/22	1	50	
3	GS3	115/22	2	50	1999
4	Kampong Speu	115/22	1	6.3	2002
5	Battambang	115/22	1	25	2007
6	Banteay Meanchey	115/22	1	25	2007
7	Siem Reap	115/22	1	50	2007
8	WPP (GS4)	230/115	2	200	2009
		115/22	2	50	
9	Takeo	230/22	1	16	2009
10	Kampot	230/22	1	50	2011

The voltage of medium voltage systems of EDC generally is 22 kV. During 2009 and 2010, Distribution network in Phnom Penh, Kampong Speu, Prey Veng, Banlung (Rattanakiri), Stung Treng, and Sihanoukville have been strengthened with 22 kV medium voltage lines. The detailed data of lines of different voltages are shown in the following table.

**Table 11: Distribution Facilities of EDC System**

Location	Item	2006	2007	2008	2009	2010	2011
<b>PHN &amp; Kandal</b>	Line Length, cct-km	1,410.46	1,459.53	1,518.54	1,602.85	1,877.16	<b>2,058.16</b>
	Medium Voltage	628.93	669.40	698.71	741.81	932.64	<b>1,076.08</b>
	Low Voltage	781.53	790.13	819.83	861.04	944.52	<b>982.08</b>
	# MV Substation	714.00	883.00	1,196.00	1,412.00	1,591.00	<b>1,875.00</b>
<b>KPS</b>	Line Length, cct-km	-	-	75.03	116.22	134.72	<b>417.33</b>
	Medium Voltage	-	-	20.13	61.32	60.94	<b>74.07</b>
	Low Voltage	-	-	54.90	54.90	54.90	<b>54.08</b>
	# MV Substation	-	-	22.00	23.00	23.00	<b>62.00</b>
<b>SRP</b>	Line Length, cct-km	190.76	168.25	277.03	287.19	417.02	<b>626.10</b>
	Medium Voltage	87.13	59.26	154.91	160.48	192.06	<b>350.32</b>
	Low Voltage	103.63	108.99	122.12	126.71	224.96	<b>275.78</b>
	# MV Substation	52.00	58.00	91.00	95.00	126.00	<b>158.00</b>
<b>SHV</b>	Line Length, cct-km	140.22	135.69	139.55	173.78	265.61	<b>322.81</b>
	Medium Voltage	58.31	65.09	65.09	99.32	203.36	<b>203.96</b>
	Low Voltage	81.90	70.60	74.46	74.46	80.47	<b>93.74</b>
	# MV Substation	45.00	58.00	64.00	69.00	144.00	<b>155.00</b>



**Table 11: Distribution Facilities of EDC System (Con't)**

<b>Location</b>	<b>Item</b>	<b>2006</b>	<b>2007</b>	<b>2008</b>	<b>2009</b>	<b>2010</b>	<b>2011</b>
<b>KGC</b>	Line Length, cct-km	123.26	116.63	50.08	52.60	141.62	<b>144.01</b>
	Medium Voltage	66.07	59.48	22.56	22.84	50.80	<b>50.97</b>
	Low Voltage	57.19	57.15	27.52	29.76	90.82	<b>93.04</b>
	# MV Substation	58.00	60.00	29.00	31.00	52.00	<b>59.00</b>
<b>PKK</b>	Line Length, cct-km	28.65	-	33.35	33.35	39.55	<b>43.85</b>
	Medium Voltage	18.70	-	22.55	22.55	23.59	<b>26.90</b>
	Low Voltage	9.95	-	10.80	10.80	15.96	<b>16.95</b>
	# MV Substation	17.00	-	29.00	29.00	27.00	<b>31.00</b>
<b>MMT</b>	Line Length, cct-km	52.76	-	42.41	45.17	46.37	<b>148.64</b>
	Medium Voltage	32.30	-	21.64	23.10	23.10	<b>23.17</b>
	Low Voltage	20.46	-	20.77	22.07	23.27	<b>23.29</b>
	# MV Substation	19.00	-	27.00	30.00	31.00	<b>37.00</b>
<b>TKO</b>	Line Length, cct-km	104.17	104.17	105.39	104.17	105.93	<b>280.14</b>
	Medium Voltage	31.30	31.30	31.30	31.29	31.77	<b>158.31</b>
	Low Voltage	72.88	72.88	74.10	72.88	74.16	<b>121.83</b>
	# MV Substation	28.00	28.00	29.00	31.00	31.00	<b>101.00</b>
<b>BTB</b>	Line Length, cct-km	116.50	148.79	172.11	216.21	248.73	<b>642.90</b>
	Medium Voltage	40.70	38.42	56.18	44.05	74.89	<b>401.03</b>
	Low Voltage	75.80	110.36	115.93	172.16	173.84	<b>241.86</b>
	# MV Substation	47.00	47.00	55.00	96.00	79.00	<b>227.00</b>
<b>KPT</b>	Line Length, cct-km	83.00	121.19	92.29	94.78	147.67	<b>289.86</b>
	Medium Voltage	34.90	47.35	32.77	32.77	68.42	<b>205.61</b>
	Low Voltage	48.10	73.84	59.51	62.01	79.25	<b>84.25</b>
	# MV Substation	24.00	24.00	28.00	30.00	38.00	<b>71.00</b>
<b>KGT</b>	Line Length, cct-km	38.70	-	39.73	39.93	45.18	<b>45.42</b>
	Medium Voltage	20.90	-	21.68	21.68	25.05	<b>25.05</b>
	Low Voltage	17.80	-	18.05	18.25	20.13	<b>20.37</b>
	# MV Substation	12.00	-	13.00	12.00	24.00	<b>31.00</b>
<b>PRV</b>	Line Length, cct-km	42.80	45.31	45.72	83.19	100.27	<b>100.27</b>
	Medium Voltage	9.30	10.07	10.32	47.79	53.12	<b>53.12</b>
	Low Voltage	33.50	35.24	35.40	35.40	47.15	<b>47.15</b>
	# MV Substation	9.00	13.00	14.00	14.00	17.00	<b>17.00</b>
<b>BTC</b>	Line Length, cct-km	179.40	183.08	146.68	146.69	136.40	<b>159.71</b>
	Medium Voltage	37.90	43.61	33.66	33.66	29.50	<b>41.42</b>
	Low Voltage	137.00	139.47	113.03	113.03	106.90	<b>118.29</b>
	# MV Substation	37.00	40.00	32.00	32.00	33.00	<b>39.00</b>
<b>MKB</b>	Line Length, cct-km	-	-	46.10	46.95	49.60	<b>63.89</b>
	Medium Voltage	-	-	13.40	14.25	15.37	<b>29.66</b>
	Low Voltage	-	-	32.70	32.70	34.23	<b>34.23</b>
	# MV Substation	-	-	13.00	13.00	17.00	<b>26.00</b>
<b>STR</b>	Line Length, cct-km	40.10	-	47.23	111.43	74.06	<b>132.93</b>
	Medium Voltage	10.30	-	12.98	77.18	39.81	<b>92.18</b>
	Low Voltage	29.80	-	34.25	34.25	34.25	<b>40.75</b>
	# MV Substation	10.00	-	12.00	12.00	14.00	<b>25.00</b>



**Table 11: Distribution Facilities of EDC System (Con't)**

<b>Location</b>	<b>Item</b>	<b>2006</b>	<b>2007</b>	<b>2008</b>	<b>2009</b>	<b>2010</b>	<b>2011</b>
<b>RTK</b>	Line Length, cct-km	25.50	53.03	53.03	56.02	54.12	<b>124.42</b>
	Medium Voltage	2.50	21.69	21.69	24.28	20.29	<b>90.18</b>
	Low Voltage	25.20	31.34	31.34	31.74	33.83	<b>34.24</b>
	# MV Substation	11.00	14.00	19.00	13.00	14.00	<b>30.00</b>
<b>SVR</b>	Line Length, cct-km	28.00	28.97	209.27	212.37	235.50	<b>406.17</b>
	Medium Voltage	12.80	10.71	120.29	121.99	127.98	<b>314.00</b>
	Low Voltage	15.20	18.26	88.98	90.38	90.38	<b>92.17</b>
	# MV Substation	10.00	24.00	40.00	40.00	53.00	<b>56.00</b>
<b>BVT</b>	Line Length, cct-km	28.00	-	30.35	30.35	31.74	<b>39.68</b>
	Medium Voltage	12.80	-	11.21	11.21	11.21	<b>11.95</b>
	Low Voltage	15.20	-	19.14	19.14	20.53	<b>27.73</b>
	# MV Substation	10.00	-	31.00	32.00	35.00	<b>50.00</b>
<b>MDKR</b>	Line Length, cct-km	-	-	-	-	61.67	<b>64.48</b>
	Medium Voltage	-	-	-	-	29.67	<b>32.24</b>
	Low Voltage	-	-	-	-	32.00	<b>32.24</b>
	# MV Substation	-	-	-	-	40.00	<b>42.00</b>
<b>KSM</b>	Line Length, cct-km	-	-	-	-	44.00	<b>44.00</b>
	Medium Voltage	-	-	-	-	20.00	<b>20.00</b>
	Low Voltage	-	-	-	-	24.00	<b>24.00</b>
	# MV Substation	-	-	-	-	16.00	<b>16.00</b>
<b>Kratie</b>	Line Length, cct-km	-	-	-	-	-	<b>46.79</b>
	Medium Voltage	-	-	-	-	-	<b>28.75</b>
	Low Voltage	-	-	-	-	-	<b>18.04</b>
	# MV Substation	-	-	-	-	-	<b>13.00</b>
<b>Total</b>	<b>Line Length, cct-km</b>	<b>2,632.28</b>	<b>2,564.64</b>	<b>3,123.89</b>	<b>3,453.25</b>	<b>4,256.92</b>	<b>6,201.57</b>
	<b>Medium Voltage</b>	<b>1,104.84</b>	<b>1,056.38</b>	<b>1,371.07</b>	<b>1,591.57</b>	<b>2,033.57</b>	<b>3,309.94</b>
	<b>Low Voltage</b>	<b>1,525.14</b>	<b>1,508.26</b>	<b>1,752.83</b>	<b>1,861.68</b>	<b>2,205.55</b>	<b>2,476.14</b>
	<b># MV Substation</b>	<b>1,103.00</b>	<b>1,249.00</b>	<b>1,744.00</b>	<b>2,014.00</b>	<b>2,405.00</b>	<b>3,125.00</b>



## **CAMBODIA POWER DEVELOPMENT PLAN**

### **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 secured 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 supply to all sectors of the Cambodian economy,
- Encouraging efficient use of energy and to minimize environmental effects resulting from energy supply and use.

### **Power Demand Forecast**

According to Power Development Plan of the Kingdom of Cambodia prepared in 2007, electricity demand is expected to face a significant increase for the next 14 years. Electricity generation in Cambodia is projected to grow from 278.92 MW and 1,106.48 GWh in year 2006 to 2,750 MW and 15,200 GWh in year 2020. To meet the future demand, the Royal Government has developed Power Development Plan up to 2024.

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

**Table 12: Cambodia's Power Demand Forecasting**

<b>Year</b> <b>Demand</b>	<b>2011</b>	<b>2015</b>	<b>2020</b>
<b>Power, MW</b>	484.76	1,500	2,750
<b>Energy, GWh</b>	2,564.07	8,800	15,200

### **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.
- Expand hydro development based initially on smaller size hydro which are easily accessible such as Kirirom, and subsequently mid and large size hydro projects like Kamchay, Stueng Atay, Middle Stueng Russei Chrum, Battambang, Lower Srepok II or Lower Sesan.



### Generation Development Plan 2011-2020

No.	Project Name	Type	Power (MW)	Year
1	Kamchay Hydro Power Plant	Hydro	194.1	2011
2	Kirirom III Hydro power Plant	Hydro	18	2012
3	100 MW Coal Power Plant (CEL) in Sihanouk Ville	Coal	100	2013
4	Stueng Atay Hydro Power Plant	Hydro	120	2013
5	Stueng Tatay Hydro Power Plant	Hydro	246	2015
6	Lower Stueng Russey Chhrum Hydro Power Plant	Hydro	338	2015
7	700 MW Coal Power Plant (CIID) in Sihanouk Ville - Phase 1	Coal	240	2015
8	Lower Sesan II Hydro Power Plant	Hydro	400	2016
9	700 MW Coal Power Plant (CIID) in Sihanouk Ville - Phase 2	Coal	120	2017
10	Stueng Chay Areng Hydro Power Plant	Hydro	108	2017
11	Srepok III + Srepok IV Hydro power plants	Hydro	565	2018
12	700 MW Coal Power Plant (CIID) in Sihanouk Ville - Phase 3	Coal	340	2019
13	Sambor Hydro Power Plant	Hydro	450	2019
14	Coal Power Plant (III) or Gas Power Plant	Coal/Gas	400	2020
<b>Total</b>			<b>3,639.10 MW</b>	



## Transmission Master Plan

### Transmission Development Plan 2012-2020

No.	Transmission Line	Circuit	Length (km)	Year
1	115kV line from Kirirom I-Kirirom III	1	32	2012
2	230kV line from GS4-GS Kampong Chhnang(NPP)-GS Pursat-GS Battambang	2	302	2012
3	230kV line from GS Pursat-GS Osom	2	175	2012
4	230kV from GS Kampot-GS Steung Hav (SHV)	2	88	2013
5	115kV from GS Steung Hav-GS Sihanouk Ville	2	11	2013
6	115kV loop line Phnom Penh	2	42	2013
7	230kV loop line Phnom Penh	2	48	2013
8	230kV line from Phnom Penh(NPP)-Kampong Cham	2	110	2013
9	115kV line from Atay Hydro-GS Osom	2	10	2013
10	230kV line Loa-Steung Treng	2	56	2014
11	230kV line Steung Treng-Kratie	2	126	2015
12	230kV line Kratie-Kampong Cham	2	110	2015
13	230kV line Osom-Upper Reussey Chrum Hydro power	2	32	2015
14	230kV line lower-Upper Reussey Chrum Hydro power	2	10	2015
15	230kV line Upper Reussey Chrum Hydro power-Tatay Hydro power	2	37	2015
16	230kV line Phnom Penh-Sihanouk ville (Along National Road No.4)	2	220	2016
17	230kV line Atay-Cheay Areng	2	32	2017
18	230kV line Cheay Areng-Phnom Penh (GS NPP)	2	145	2017
19	230kV line Phnom Penh-Neak Loeung-Svay Rieng	2	120	2018
20	230kV line Kampong Cham-Kampong Thom (GS KGT)-Siem Reap	2	250	2019
Total length			1,956 km	



## **Power Interconnection with Thailand**

The Power Cooperation Agreement (MOU) with Thailand was signed on 3<sup>rd</sup> February 2000. This MOU provided a framework for the power trade and technical assistant between these two countries and opens the power access to the third countries. The 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 will be established, both countries can be participated widely in term of receiving and supplying the power.

At present Electric Power between Cambodia and Thailand is transmitted at 22 kV and 115 kV levels. An agreement was signed with Trat Province (Thailand) to supply power to Koh Kong province (Cambodia) and Poit Pet (Cambodia) by using 22 kV line. The above areas have been connected since 2001. Recently, 115 kV transmission line from Arranh Prathet substation, Thailand connection to BTC, BTB and SRP has been commissioned in 2007.

## **Power Interconnection with Viet Nam**

The Power Cooperation with Viet Nam was signed in 10<sup>th</sup> 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 line and interconnection between high voltage links are encouraged.

Since 2002, EDC has imported power from PC2 to supply 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 Monduliri Province, Kompong Ro in Svay Rieng Province. The connection for import at Phnom Den Takeo Province was energized in 2009. The interconnection transmission project for import power from Viet Nam to Phnom Penh by 230 kV has been energized in March 2009.

## **Power Interconnection with Lao PDR**

The Power Cooperation with Lao PDR was signed in 21<sup>th</sup> 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 by medium voltage (22kV) line and interconnection between high voltage links are also encouraged. The 22 kV interconnection line from Lao to Steung Treng was charged during 2010.

Both countries had discussed and agreed on power interconnection from Southern part of Lao PDR (Ban Hat, Cham Pasak Province) to Stung Treng of Cambodia by 115 kV line.



## **Sub-regional Interconnection**

Interconnections between the isolated grids of the countries within the Mekong Basin (Cambodia, Laos, Thailand, Viet Nam, 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 in 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 link between Cambodia and Viet Nam are ranked as fourth and classified as a potential short to medium term project for completion before 2010.







**ELECTRICITE DU CAMBODGE**  
**BALANCE SHEET**  
**AS AT 31 DECEMBER 2011**

	<b>2011</b> <b>KHR'000</b>	<b>2010</b> <b>KHR'000</b>
<b>ASSETS</b>		
<b>Non-current assets</b>		
Property, plant and equipment	1,226,183,735	1,066,646,944
Intangible assets	292,514	401,132
Other non-current assets	201,655,662	194,285,357
	<b>1,428,131,911</b>	<b>1,261,333,433</b>
<b>Current assets</b>		
Inventories	141,853,139	117,391,960
Trade receivables	214,729,859	174,691,472
Other current assets	72,295,085	11,584,313
Cash and cash equivalents	408,817,458	289,457,512
	<b>837,695,541</b>	<b>593,125,257</b>
<b>Total Assets</b>	<b>2,265,827,452</b>	<b>1,854,458,690</b>
<b>EQUITY</b>		
Assigned capital	680,173,081	662,390,444
Retained earnings	309,565,644	159,775,668
	<b>989,738,725</b>	<b>822,166,112</b>
<b>LIABILITIES</b>		
<b>Non-current liabilities</b>		
Non-current portion of borrowings	574,808,559	441,027,798
Non-current portion of finance lease liability	17,106,796	17,192,408
Customer deposits	78,258,708	68,164,789
Provision for retirement benefit	1,356,918	864,135
Deferred tax liability-net	5,752,559	1,585,002
	<b>677,283,540</b>	<b>528,834,132</b>
<b>Current liabilities</b>		
Current portion of borrowings	254,634,897	200,234,757
Finance lease liability	17,708	13,651
Trade and other payables	323,312,610	272,301,325
Income tax	20,839,972	30,908,713
	<b>598,805,187</b>	<b>503,458,446</b>
<b>TOTAL LIABILITIES</b>	<b>1,276,088,727</b>	<b>1,032,292,578</b>
<b>TOTAL EQUITY AND LIABILITIES</b>	<b>2,265,827,452</b>	<b>1,854,458,690</b>



**ELECTRICITE DU CAMBODGE**  
**INCOME STATEMENT**  
**For the year ended 31 December 2011**

	<b>2011</b> <b>KHR'000</b>	<b>2010</b> <b>KHR'000</b>
<b>Revenue</b>		
Electricity revenue	1,808,509,354	1,577,667,850
Connection service revenue	15,691,822	12,866,750
Revenue from transfer of assets from customers	9,010,137	-
<b>Other income</b>	<u>12,957,205</u>	<u>8,498,287</u>
	<b><u>1,846,168,518</u></b>	<b><u>1,599,032,887</u></b>
<b>Costs and expenses</b>		
Cost of power purchased	(1,348,820,232)	(1,144,613,037)
Salaries and employee benefits	(64,344,846)	(47,764,116)
Fuel cost	(60,830,107)	(32,782,648)
Depreciation and amortization	(49,791,987)	(40,111,790)
Import duties	(35,821,899)	(31,262,376)
Finance cost - net	(33,944,188)	(23,385,520)
Foreign exchange loss - net	(6,766,640)	(7,284,996)
Other operating expenses	(53,401,703)	(44,093,732)
	<b><u>(1,653,721,602)</u></b>	<b><u>(1,371,298,215)</u></b>
<b>Profit before income tax</b>	<b>192,446,916</b>	<b>227,734,672</b>
Income tax expense	(42,656,940)	(44,615,217)
<b>Net profit for the year</b>	<b><u>149,789,976</u></b>	<b><u>183,119,455</u></b>
<b>NET PROFIT</b>	<b><u>149,789,976</u></b>	<b><u>183,119,455</u></b>



**ELECTRICITE DU CAMBODGE**  
**STATEMENT OF CASH FLOWS**  
**For the year ended 31 December 2011**

	<b>2011</b> <b>KHR'000</b>	<b>2010</b> <b>KHR'000</b>
<b>Operating activities</b>		
Profit before income tax	192,446,916	227,734,672
Non-cash adjustments:		
Depreciation and amortization	49,791,986	40,111,790
Finance costs-net	33,944,188	23,385,520
Reversal of impairment loss on trade receivables	(3,880,674)	(894,261)
Provision for inventory obsolescence	3,725,877	1,412,521
Provision for retirement benefits	492,783	198,953
Foreign exchange losses-net	(2,065,750)	(12,941,938)
Loss on disposal of assets	598,173	2,544,085
Working capital adjustments:		
Increase in trade receivables	(45,167,850)	(22,923,945)
Decrease (increase) in other current assets	4,125,649	(9,904,251)
Increase in inventories	(67,123,901)	(44,973,693)
Increase in trade and other payables	51,011,285	37,743,754
Increase in customer deposits	10,093,918	8,265,876
	<b>227,992,600</b>	<b>249,759,083</b>
Income tax paid	(52,184,895)	(35,435,446)
Interest paid	(14,509,745)	(5,421,736)
Interest received	3,763,579	1,304,092
<b>Net cash generated from operating activities</b>	<b>165,061,539</b>	<b>210,205,993</b>
<b>Investing activities</b>		
Purchases of property, plant and equipment	(68,884,618)	(92,213,377)
Proceeds from sale of property, plant and equipment	7,057,087	4,765,678
(Increase) decrease in other assets	(3,743,534)	7,480,619
Purchases of intangible assets	-	(357,010)
<b>Cash used in investing activities</b>	<b>(65,571,065)</b>	<b>(80,324,090)</b>
<b>Financing activities</b>		
Proceeds from borrowings	22,909,596	6,235,352
Payments on borrowings	(3,026,250)	-
Payments on finance lease	(13,874)	(10,694)
<b>Net cash generated from financing activities</b>	<b>19,869,472</b>	<b>6,224,658</b>
Net increase in cash and cash equivalents	119,359,946	136,106,561
Cash and cash equivalents as at 1 January 2011	289,457,512	153,350,951
<b>Cash and cash equivalents as at 31 December 2011</b>	<b>408,817,458</b>	<b>289,457,512</b>