



Energy and Electricity Outlook of Cambodia

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The Government of Cambodia attaches great importance to the vital role of energy in achieving the goals of sustainable economic and social development. Energy consumption, however, grew moderately at a rate of 1.5% per year during the 1995-2001 period. In 2001, the total energy consumption of Cambodia was 2,481 thousand tons of oil equivalent (Ktoe), an increase of 4.6% from 2,361 Ktoe in 2000 (Table 1). Of this total, the residential and commercial sector accounted for 77%, transportation 18%, industry 3%, and agriculture 2%.

provincial power systems. At the national level, electricity is available to only 12% of the total household population. Electricity consumption per capita is 55 kWh, one of the lowest in the region. The overall power situation is expected to improve considerably when the ongoing rehabilitation and reconstruction of electricity infrastructures are implemented, which will enhance the country's power supply availability.

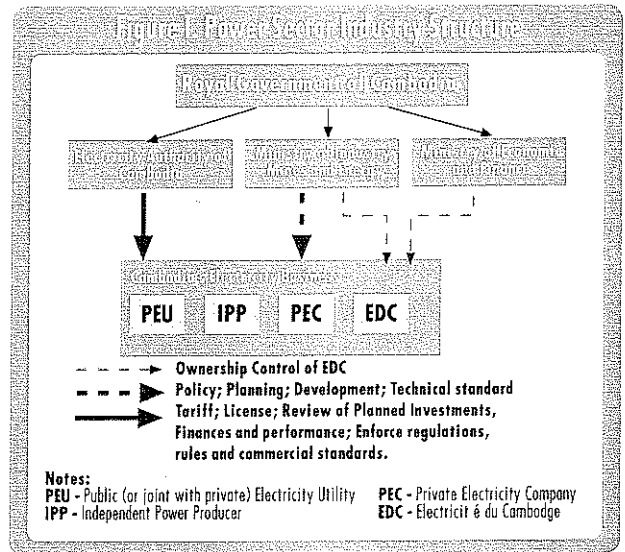


Table 1. Energy Consumption, 1995-2001 (in Ktoe)

Sector	1995	1997	1999	2000	2001
Industry	13	16	55	60	67
Residential & Commercial	2,009	2,125	1,767	1,834	1,908
Transport	277	326	389	422	459
Agriculture	-	-	43	45	47
Total	2,299	2,468	2,252	2,361	2,481

The country's entire commercial energy supply (e.g. petroleum products) is currently imported. Most households use traditional energy sources, mainly fuel wood. Twenty-two small and fragmented power generation systems provide electricity. Electricity generation grew more than five (5) times from 103,554 GWh in 1994 to 570,015 GWh in 2001 (Table 2). The largest electricity generating system is located in the capital, Phnom Penh, which accounts for about 75% of the country's total power demand. The total peak demand was 133 MW, 93 MW of which is accounted for by Phnom Penh and another 40 MW by all the other

Energy Policy

The Royal Government of Cambodia formulated its energy policy in October 1994, with the primary objective of ensuring energy security. To improve the country's economy, the various energy organisations must implement measures to

achieve energy security and ensure an adequate supply of affordable energy at all times. Ensuring energy security will help achieve the country's economic development goals, particularly in attracting local and foreign investments. Another goal of the energy policy is to encourage exploration and development of environmentally and socially acceptable energy resources such as new and renewable sources of energy. Specific policy measures and national guidelines will have to be formulated to ensure that energy resources are utilised

Table 2. Electricity Generation, 1994-2001 (in MW)

	1994	1997	1999	2001
Phnom Penh	82,240	218,400	264,220	495,836
Kampong Cham	1,360	2,580	3,990	4,480
Siem Reap	2,110	4,320	6,130	13,530
Sihanoukville	5,890	8,040	9,860	14,720
Kampong Speu	120	178	216	797
Kompot	1,430	2,204	3,631	12,655
Takeo	340	610	716	1,380
Ampong Chhnang	456	530	821	3,280
Prey Veng	255	552	756	1,308
Battambang	4,200	6,892	8,600	7,680
Anteay Meanchey	360	1,428	1,917	3,103
Stung Treng	298	289.5	327	349
Pursat	183	1,555	1,743	2,890
Preah Vihear	210	212	315	1,073
Modul Kiri	150	182	194	1,314
Rattanakiri	1,378	2,208	2,847	2,695
Koh Kong	1,386	1,600	3,267	4,798
Kampong Thom	268	674	857	1,186
Kratie	120	480	1,123	1,660
Svay Rieng	800	987	978	3,280

optimally. Finally, the energy policy shall be directed at encouraging the efficient use of energy in various sectors of the economy, particularly in the commercial

Table 3. Generation Capacity by Province 1997-2020 (in MW)

No	Provinces/Year	1998	2002	2008	2012	2016	2020
1	Banteay Meanchey	4.0	8.0	14.5	20	26	31
2	Battambang	3.5	8.6	18.5	27	33	37
3	Kampong Cham	4.9	10.5	17.9	23	29	36
4	Kampong Chhnang	1.1	12.2	4.0	5	7	10
5	Kampong Speu	1.0	2.9	5.9	9	16	28
6	Kampong Thom	1.5	3.4	6.4	9	11	13
7	Kampot	2.7	8.1	16.3	25	33	46
8	Kandal	2.2	5.5	9.2	12	15	20
9	Koh Kong	0.7	1.2	2.0	3	4	7
10	Kratie	1.9	4.4	8.0	11	14	19
11	Modul Kiri	0.1	0.3	0.6	1	1	1
12	Phnom Penh	60	131	256	356	484	649
13	Preah Vihear	0.3	0.7	1.4	2	2	2
14	Prey Veng	1.7	4.4	7.8	10	13	18
15	Pursat	1.3	3.2	5.9	8	11	16
16	Ratanakiri	0.9	1.3	1.9	2	3	3
17	Siem Reap	3.0	5.6	10.0	13	17	22
18	Sihanoukville	2.9	4.1	6.3	8	11	13
19	Stung Treng	0.2	0.7	1.3	2	2	2
20	Svay Rieng	1.0	2.2	3.9	5	6	6
21	Takeo	1.5	3.4	5.8	8	9	11
	TOTAL	96.4	212	403.6	559	747	987

Table 4. Initial Hydropower Projects for Private Sector Participation

No	Project Name	Capacity (MW)	Year	Status
1	Kirirom IV	23/102	56	D/S; P
2	Kirirom III	13/70	29	D/S; P
3	Kamchay	127/558	250	F/S; P; I
4	Battambang II	36/187	65	D/S; P; I
5	Battambang I	24/120	49	D/S; P; I
6	Stung Atay	110/558	156	D/S; P; I
7	Middle Stung Russey Chrum	125/668	275	D/S; P
8	Lower Stung Russey Chrum	125/656	130	D/S; P
9	Upper Stung Russey Chrum	32/221	65	D/S; P
10	Stung Cheay Areang	260/1,350	502	D/S; P
11	Stung Tatoy	80/250	215	D/S; P
12	Sambor	467/2,800	700	D/S; P; I
		3,300/14,870	3,940	
13	Lower Sre Pok II	222/1,174	339	Pr/S; P
14	Lower Sesan II	207/1,065	374	Pr/S; P

Table 5. Fuelwood Consumption Forecast

	2003	2004	2006	2008	2010
Expected Fuelwood Consumption (Ton)					
Fuelwood consumption	6,511,094	6,641,316	6,909,625	7,188,774	7,479,201
Fuelwood consumption with ICS	4,232,211	4,316,855	4,491,256	4,672,703	4,851,480
Potential Saving	2,278,883	2,324,460	2,418,368	2,516,071	2,617,720
Expected Charcoal Consumption (Ton)					
Charcoal consumption	47,030	47,971	49,909	51,925	54,023
Charcoal consumption with ICS	30,569	31,181	32,440	33,781	35,115
Potential saving	16,460	16,789	17,468	18,173	18,908
Total	13,116,247	13,378,572	13,919,060	14,481,427	15,056,447

and industrial sectors. Measures to minimise the detrimental environmental effects of energy use will be implemented.

Power Sector Outlook

The power generation capacity of Cambodia in 2002 was 212 MW and is expected to reach 991 MW by 2020 (Table 3). Cambodia's electricity supply industry was restructured in 2001, with the creation of the Electricity Authority of Cambodia (EAC) as regulator (Figure 1). Under the new structure, the players in the electricity business shall consist of the state-owned electricity company, Electricite du Cambodge, Public Electricity Utility (PEU), Private Electricity Company (PEC), and Independent Power Producers (IPP).

The Government has formulated a power sector strategy that aims to develop a national grid and to plant-up power plants in various locations to ensure the security of electricity supply. Under the Power Development Plan for the 2001-2006 period, several projects have been identified for implementation. The Southern Grid will be interconnected with Vietnam to supply electricity in Phnom Penh. The state-owned Electricite du Vietnam (EVN) has signed the power purchase agreement; the project is expected for commissioning in 2006. The Western Grid will be interconnected with the power grid of Thailand. The PPA of the Thailand-Lao PDR tie line has been signed; the commissioning date is 2004. During the same period, the Government plans to rehabilitate the Kirirom hydro power station and the 115 kV transmission line from Kirirom to Phnom Penh, which stretches for about 130 km.

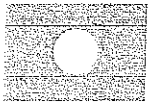
Other projects are also expected for implementation during the 2001-2006 period. These are: 1) rehabilitation of power generation and distribution systems in eight (8) provincial towns by 2005; 2) installation of 10 MW additional capacity in Siem Reap province by 2004; 3) construction of initial 4 MW plant capacity out of the 20 MW plant capacity target in Kompong Cham province by 2005; 4) installation of 30 MW additional capacity by an IPP by 2005; 5) construction of another 10 MW power project in Phnom Penh by 2006; 6) construction of grid-connected generation using renewable energy; and 7) implementation of stand-alone PV systems.

Several power projects have also been lined up during the 2006-2010 period. The Government shall give priority to the following projects: a) expansion of the Southern and Western Grids covering the provinces of Takeo and Sihanoukville; b) construction of two 90 MW unit each of thermal power plant for base load generation; c) construction of Kamchay and Battambang hydro power stations; d) expansion of the Northern grid, which includes the Phnom Penh-Battambang transmission lines; e) promotion of biomass cogeneration; and f) development and exploration of indigenous coal resources.

Hydropower development by the private sector will be given a strong push during the 2006-2010 planning period and beyond, with the planned construction of hydropower projects providing a total of 5,036 MW and costing USD 7,145 million (Table 4).

Fuel wood consumption is projected to increase from 6.5 million tons in 2003 to 7.5 million tons in 2010. Thus, the Government will intensify its campaign to use improved cook stoves (ICS), especially

in rural households. The use of ICS will save the country about 2.6 million tons of fuel wood in 2010 (Table 5). Over the same period, charcoal consumption is also projected to increase from 47 thousand tons in 2003 to 54 thousand tons in 2010.



LAO PDR

Energy Planning and Outlook of Lao PDR

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Lao People's Democratic Republic is highly dependent on traditional energy sources, mainly fuel wood, and to a lesser extent on coal and hydropower. The forest areas, which cover over 47% of the country, are a potential source for substantial traditional energy supplies. Petroleum energy is totally imported, with an average consumption of 243 million liters per annum during the period 1992-2000. The total energy consumption of Lao PDR for the period 1996 to 1999 is shown in Table 1. In 2001, the total primary energy supply was 1,600 thousand tons of oil equivalent (Ktoe). Biomass (fuel wood) and petroleum products accounted for about 90%, coal 1%, and electricity 9%, mostly hydropower. The production of biomass is steadily growing while electricity, mainly hydropower, is the fastest growing energy source (Figure 1).

Over the medium- to long-term outlook, Lao PDR emphasises the importance of energy security in its overall energy policy. The objectives of the energy policy are: 1) to

maintain and expand an affordable, reliable and sustainable energy supply in the country to promote economic and social development; 2) to promote power generation for export to provide revenues to meet the Government of Lao PDR (GoL) development objectives; 3) to develop and enhance the legal and regulatory framework to effectively direct and facilitate energy sector development; and 4) to strengthen institutions and institutional structures with respect to responsibilities, functions, and administration.

Sectoral Overview and Outlook Power Sector

The Lao power sector is still in its infancy. Electricity is provided only to about 38% of the population. The main suppliers of electricity are the state-owned Electricite du Laos (EdL) and independent power producers (IPPs). In 2001, electricity production was 3,653,660 GWh, 42.4% of which was accounted for by EdL and the remainder by IPP. About 78.59% of the total electricity produced was exported while the remaining

19.44% was used for domestic consumption. The residential sector is currently the major consumer of electricity and is expected to remain

so during the outlook period (Figure 2).

Onto 2010 and beyond, the power sector is expected to play a vital role in achieving the social and economic development objectives of the GoL. The strategies involve providing cheap and reliable electricity supply throughout the country and earning foreign exchange through electricity export to various countries in the region. The GoL power sector policy is expected to facilitate these strategies by encouraging optimal use of the country's natural resources, promoting efficiency in power sector institutions, and creating a conducive environment for responsible infrastructure investment, both public and private.

Coal

Lao PDR promulgated its Mining Law and Decree in 1997 and 2001 respectively.

Table 1. Total Energy Consumption of Lao PDR, 1996-1999 (Ktoe)

Year	Electricity	Fuel oil	City Gas	Coal	Fuel wood	Charcoal	Sawdust	Total
1996	84.38	590.3	1.76	21.75	847.46	17.09	4.12	1566.86
1997	96.33	895.63	2.68	11.34	868.65	15.72	3.83	1894.18
1998	114	561.62	1.6	13.76	890.36	14.46	3.56	1597.76
1999	125.65	339.56	1.07	16.33	912.6	13.31	3.31	1411.62

