Hydropower

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Acronyms and Abbreviations

EDC	:	Electricité du Cambodge
EIA	:	Environmental Impact Assessment
GDP	:	Gross Domestic Product
HFO	:	Heavy Fuel Oil
HPP	:	Hydropower Plant
IPP	:	Independent Power Producer
MIME	:	Ministry of Industry, Mines, and Energy
MRC	:	Mekong River Commission Secretariat
MW	:	Mega Watt

Executive Summary

Cambodia is one of the south-east Asian countries that is rich in water resources. According to the latest preliminary study, the total hydropower potential of the country is estimated at 10,000 MW, of which 50% is in the Mekong mainstream, 40% in its tributaries and the remaining 10% in the south-western coastal area outside the Mekong River Basin. It is estimated that there are about 60 possible sites of small to large hydropower projects in the whole country.

The power demand is increasing yearly due to the increase of population. It is estimated that the demand will increase up to 991 MW and the generated power will be 3488.4 GWh in 2020, with average annual growth rates of 12% and 9.4% respectively.

The major socio-economic effects of hydropower development in Cambodia include the displacement of population living within the reservoir area of the projects and their resettlements in new areas. The flooding resulting from the impoundment of water in front of a dam will remove land that is used for other purposes such as farming and forests, and which provide various ecological as well as economic benefits. On the other hand, all economic sectors (agriculture, industry, services and trade) and private households will benefit from sufficient and reliable energy production.

The construction of dams causes ecological consequences including climatic change, influences on the water and soil quality, flora and fauna, land use, etc. social impacts and potential new health risks such as chagas disease and bilharzia.

Dam projects for power and irrigation purposes are the most sensitive issue of all water-related projects in the Mekong Basin. The benefits of hydro-electricity are as follows: (i) low operation costs; (ii) high reliability of generation; (iii) high service and economic life (compared to thermal units); (iv) stable costs; and (v) independence from fuel prices. The impacts of dam projects include modification of:

- Changes in flows downstream of reservoir, river morphology, ground water patterns;
- Impact on ecology of wetlands, flood plains and coastal habitat due to storage or diversions;
- Impact on aquatic ecosystems due to disturbance, pollution or introduction of exotic flora and fauna;
- Impact on the spawning environment of inland fish, which are the primary sources of protein for Cambodians; and
- Changes in water quality parameters due to pollution, sedimentation etc. which affects consumptive or other human uses.

1. The State of Hydropower Development in Cambodia

Cambodia is one of the south-east Asian country rich in water resources. According to the latest preliminary study, the total hydropower potential of the country is estimated at 10,000 MW, of which 50% in the Mekong mainstream, 40% in its tributaries and remaining 10% in the south-western coastal area outside the Mekong River Basin. In addition to the Mekong River, some 25 major tributaries and hundred of small rivers are flowing through the country. There are about 60 possible sites of small to large hydropower Projects in whole country.

Cambodia's future electricity demand (forecast done by EDC in 1998) is from 273MW and 1036 GWh in year 2004 to 991 MW and 3488.4 GWh in year 2020. Due to the increase in demand not be satisfied by the existing power system. In particular the most urgent action lies in the upgrade of existing power plants and system. This is considered critical, as a continued shortage in the electricity supply will seriously restrain the ongoing reconstruction and socio-economic development of the country.

Cambodia needs to use its hydropower potential to meet future electricity demand and to reduce its dependence on imported fuel and for the power trade with neighboring countries.

The classification of hydropower plants in regard to their size has generally been referred to a large, medium and small hydropower plant. Since there are no definite international values as to what they really refer to, and for the sake of proper understanding in this proposal the following are designated [by Hydro-Electricity Department of the Ministry of Industry, Mines and Energy (MIME)] by the rated installed capacities of hydropower plants as shown in Table1

Table 1: Classification of Hydropower Plants

Type of HPP	Installed Capacity (kW)
Small: - Micro - Mini - Small	Up to 500 501 – 5,000 5,001 – 10,000
Medium	10,001 – 50,000
Large	More than 50,000

1.1. Hydropower Generation

Evaluation of potential hydropower schemes in Cambodia has generally concentrated on schemes identified studied and constructed before 1970: Kirirom I (10MW) and Prek Thnot (18MW). Recent initiatives in hydropower generation are as follows: (i) The installation of a 1MW Mini-hydropower plant in Ratanakiri Province; (ii) The rehabilitation of Kirirom I Hydropower plant; (iii) The completion of a feasibility study of the Kamchay Hydropower scheme by Experco International; and (iv) Two preliminary ranking studies for the Mekong River Secretariat (Lower Sre Pok II and Lower Se San II).

Recently, Cambodia has two hydropower stations:

- Chum II Hydropower Plant (1MW) in the north-east of Ratanakiri province, built in 1991 and was commissioned since 1993.

- The original Kirirom I Hydropower plant (10MW) was built with Yugoslavian technical and financial assistance commissioned in February 1968 and ceased operation due to the war in November 1970. It was linked to Phnom Penh by 120 km long, with 110 KV transmission line.

Currently, the Royal Government of Cambodia (RGC) has granted to the private company from China (CETIC) to rehabilitate with installed capacity 12 MW and to build 115 kV transmission line. It was commissioned since May 2002.

1.2. Hydropower Potential

Cambodia is rich of water resources for sustainable development of hydropower projects. 86% of Cambodia lies within the Catchment of the Mekong Basin. With the drainage area of 810,000 sq. km and the total length of 4,425 km, the main annual discharge entering Cambodia is in excess of 400 billion m^3, and it is estimated that with the contribution of downstream tributaries, some 500 billion m^3 are discharge to the sea annually.

The assessment of water resources for hydropower development in the Kingdom of Cambodia indicated that Cambodia has an abundant hydropower potential. The technical hydropower potential is about 4,347MW (or 7,182MW if Sambor HPP = 3,300MW), which the Mekong mainstream 1,445MW (or 4,280MW), Mekong Tributaries 1,908MW, outside Mekong Basin 994MW. The list of Priority Hydro Power illustrates in Table 2.

Table 2: List of Priority Hydro Power Projects

No	HPP's Name	Installed Capacity (MW)	Annual Energy Production (GWh/yr.)	Expected years of commission
1	Kirirom III *	13	70	2006
2	Battambang III	13	76	2008
3	Kamchay *	180	558	2010
4	Battambang II	36	187	2010
5	Battambang I	24	120	2010
6	Stung Tatay *	80	426	2010
7	Stung Atay *	110	588	2012
8	Middle Stung Russey Chrum *	125	668	2015
9	Lower Stung Russey Chrum *	125	656	2015
10	Upper Stung Russey Chrum *	32	211	2015
11	Stung Chay Areng *	260	1,358	2015
12	Sambor	467 or 3,300	2,800 or 14,870	2016
13	Lower Sre Pok II	222	1,174	2018

14	Power Se san II	207	1,065	2018

1.3. Power Demand Forecast

Peak power demand in Cambodia reached 542 GWh in energy production and 150 MW in generation capacity in 2001. Increase of the power demand is influenced by the increase of population, GDP, etc. Peak time in the daily load curve is observed at around 19-22 p.m.

According to the Cambodia Power Sector Strategy, it is estimated that the demand will increase up to 991 MW and the generated power will be 3488.4 GWh in 2020, with average annual growth rates of 12% and 9.4% respectively.

The majority of this growth will occur in the Phnom Penh. This increase in demand cannot be satisfied by the existing power system. This is considered critical, as continued shortage in the power supply, which will seriously restrain the ongoing reconstruction and socio-economic development of the country. The need for Cambodia will be to find the energy sources in order to meet future power demand and reduce its dependence upon imported fuel oil and to exchange of electricity with neighboring countries. The Table bellow depicts the expected power and energy output for Cambodia.

Table 3: Power Demand Forecast of the Cambodia

Year	2004	2006	2008	2010	2012	2014	2016	2018	2020
Power, MW	273	331	404	477	558	651	746	860	991
Energy production, GWh	1036	1215	1454	1700	1968	2292	2634	2914.8	3488.4

1.4. Existing Power Generation

Present electricity supplies comprise 24 small isolated power systems and there is no National Power Grid. By far the largest power system and consumer is in Phnom Penh. About 1/3 of the total fuel-oil imported into Cambodia is used for generating power. Electricity cost is very high in the region and varies from 9-30 US Cents per kWh. The total installed capacity for the entire country is about 160 MW, of which 112 MW is used in Phnom Penh. In Phnom Penh, EDC owned 50MW installed capacity, 12 MW from hydropower generation Kirirom I and the other 50MW are owned by Independent Power Producers (IPP), one CUPL from Malaysia (35MW) and another one Jupiter Power from Canada (15MW). The total installed capacity for provincial capitals are estimated 48MW, include 1MW from hydropower generation O Chum II. The total energy production in the year 2001 is about 542 GWh, i.e. about 48 kWh per capita, is the lowest in the region. In Phnom Penh some major hotels and factories do not connect to Electricité du Cambodge (EDC) grid and use their own generators. Only 15% of households have access to electricity.

1.5. Planned Hydropower Projects

Cambodia has not included any mainstream hydropower projects in its nearest future Power Development Plan, with aims at electrification and supply to cover domestic demand.

The size of the mainstream projects and the largest scheme on the main tributaries is too large to be developed for domestic supply alone. If developed they will be built for export to southern Vietnam or Thailand where there are deficits of generating capacity.

The effect of mainstream development on fish migration and reproduction needs to be further clarified before any decision on mainstream projects in Cambodia is made.

1.5.1. Short and medium term hydropower development plan

The short and medium terms of hydropower development in Cambodia are as following:

- Kirirom III, with installed capacity 13 MW(1);
- Kamchay, with installed capacity 180 MW(1);
- Battambang I, II & III, with installed capacity 73 MW;
- Stung Pursat I & II, with installed capacity 92 MW;
- Stung Sva Slap, with installed capacity 4 MW;
- O Tourou Trao, with installed Capacity 1,000 kW(1);
- Upper Stung Siem Reap, with installed capacity 600 kW;
- Lower Stung Siem Reap, with installed capacity 2,000 kW;
- Prek Dakdeur, with installed capacity 200 kW;
- O Romis, with installed capacity 200 kW; and
- O Moleng, with installed capacity 150 kW.

(1) Project outside the Mekong Basin

1.5.2. Long term hydropower development plan

The followings are the long term development plan of hydropower in Cambodia, which will be planned to export to riparian countries:

- Stung Tatay Hydropower Project, with installed capacity 80 MW(1);
- Stung Atay Hydropower Project, with installed capacity 110 MW(1);
- Middle Stung Russey Chrum Hydropower Project, with installed capacity 125 MW(1);
- Lower Stung Russey Chrum Hydropower Project, with installed capacity 125 MW(1);
- Upper Stung Russey Chrum Hydropower Project, with installed capacity 32MW(1);
- Stung Chay Areng Hydropower Project, with installed capacity 260 MW(1);
- Sambor Hydropower Project, with installed capacity 467 MW or 3,300 MW;
- Lower Se San II Hydropower Project, with installed capacity 207 MW;
- Lower Sre Pok II Hydropower Project, with installed capacity 222 MW;
- Stung Piphot Hydropower Project, with installed capacity 25 MW(1);

- Lower Se San III Hydropower Project, with installed capacity 375 MW; and
- Lower Sre Pok III Hydropower Project, with installed capacity 330 MW.

2. Power Sector Policy and Strategy

The RGC formulated a power sector development policy in October 1994, which aimed at:

- Providing an adequate supply of electricity throughout Cambodia at reasonable and affordable price;
- Ensuring a reliable, secure electricity supply at prices, which facilitate 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; and
- Encouraging an efficient use of energy and minimizing detrimental environmental effects resulting from energy supply and use.

To achieve the above objectives, the RGC has undertaken reform measures and rehabilitation of the power sector with the support of multilateral and bilateral agencies, which aimed at:

- Re-establishing an adequate supply of electricity nationwide through direct support of donors and private participation in generation;
- Strengthening sector managerial and implementing capability;
- Creating the environment required for sustained and efficient development of the power sector, open to competition and private participation; and
- Extending its power sector to rural areas.

Cambodia faces a major challenge to develop an adequate and reliable source of electric power in the years ahead. Based on intensive studies of the best means of providing a national electricity supply network, the RGC is formulating a power sector strategy for Cambodia to meet the growing demand for electric power over the next 15 years. The strategy consists of:

- Investment in the power sector;
- Priorities for generation and transmission;
- Establishment of the power sector's regulatory framework;
- Commercialization of EDC;
- Private sector participation; and
- Provincial and rural electrification.

2.1. Planned Power Generation

The Generation Development Plan has been developed on the following criteria:

- Base load thermal generation will be located at the coastal areas to give independent access to imported oil and thereby reducing the amount of oil transported on the Mekong;

- Peak load thermal generation in Phnom Penh,
- Small and medium size diesel units for base and peak load generation in the provincial towns and cities; and
- Hydropower development based initially on the easily accessible sites subsequently the export oriented projects: Stung Atay, Stung Russei Chrum, Chay Areng, Lower Se San 2, Lower Sre Pok 2 and also the three Battambang hydro sites.

The generation expansion projects have been prioritized as follows:

Stage 1 (2003 – 2008):

- Commissioning of Kirirom III 13MW hydropower plant (by private investment) in 2006;
- To develop of Battabang 3 Hydropower plant with installed capacity 13 MW and to commission in 2008;
- In order to cover the demand during this period other diesel and Heavy Fuel Oil (HFO) power plants also consider to develop such as: 10MW HFO power plant in Siem Reap (2004); 30MW HFO power plant in Phnom Penh (2005); extension of power station N^{o} 5 (C5) by 10MW (2005), additional 60MW HFO power plant in Phnom Penh (2008) and 180MW thermal power plant in coastal area (2008) connecting to National Grid.

Stage 2 (2008 – 2013):

- Construction of Kamchay hydropower plant 120MW in 2005 and expect to commission in 2010;
- By 2010, commission of Battambang 1&2 Hydropower plants total installed capacity of 60 MW;
- By 2010, commission of Stung Tatay Hydropower plant with 130 MW installed capacity;
- By 2012, commission of Stung Atay Hydropower plant with installed capacity of 110MW; and
- By 2012, commission of additional 90MW at the thermal plant in coastal area.

Stage 3 (2013 – 2020):

- By 2015, the commissioning of Middle Russey Chrum hydropower plant with an installed capacity of 125MW and Chay Areng hydropower plant with an installed capacity of 260MW;
- By 2016, commission of Sambor hydropower project;
- By 2018, commission of Lower Se San 2 hydropower plant with an install capacity of 207MW and Lower Sre Pok 2 with installed capacity 222MW; and
- By 2020, the commissioning of Stung Treng hydropower project with an install capacity of 980MW.

2.2. Existing Transmission System

At present, there is a Transmission Line linking from the Kirirom I Hydropower station to Phnom Penh Grid sub-station with 120 Km of length and 115 kV of voltage. The total length of 115 kV Transmission Line is about 135 Km, 22 kV and 15 kV is about 100 Km in Phnom Penh and Provincial Town respectively.

2.3. Planned Transmission System

The transmission development plan has been developed taking into account the following strategies to achieve Cambodia's electricity sector objectives:

- Reduce reliance on imported oil for energy generation (diversification of energy sources);
- Reduce reliance on the transport of oil to Phnom Penh for power generation;
- Reduce reliance on oil transport on the Mekong River through Vietnam to Phnom Penh;
- Increase operational efficiency of the system (minimize losses);
- Encourage least cost development of provincial load centers by a cost effective mix of grid expansion and local private generation;
- Increase competition in power generation by providing access to competitive sources of imported electricity from Vietnam, Thailand or Laos;
- Maintain the reliability of power supply at the level required and financially supported by customers; and
- Facilitate power trade.

The transmission system is proposed in three stages depending on the availability of the funds and the power generations plan.

2.4. Rural Electrification Plan

85% of the population of Cambodia is located in rural areas and can not access to the electricity. The provision of rural energy is a key factor in the rehabilitation and development of Cambodia. Electricity is very important for the improvement of living standards and an important infrastructure requirement for agricultural and small-scale industrial development in the rural areas.

In particular for the remote rural areas where located near by the stream flow which water is available whole year the micro-hydropower development is very sanctify.

The micro hydropower capability in Cambodia has not been thoroughly evaluated. Micro hydropower stations, which generate about 300W to 1 kW are quite common and require little capital. They will be ideal for small rural communities. If a micro hydropower capability exists in the vicinity of a village, it should be exploited for providing supply. As micro hydropower scheme are site specific, it is not possible to include them in a generalized rural supply strategy except, to mention that where possible they should be investigated as a source of rural supply in the first instance.

3. Socio-economic Effects

The present energy supply lies below demand. Electricity supply functions mainly in the larger cities. The electricity supply for economy and for the population needs further extension. Energy supply for rural areas lies far further behind the supply of the cities.

The major socio-economic effects of hydropower development in Cambodia are the following:

- The displacement of population living in the reservoir of the projects; and
- The need for resettlement of the displaced population.

The flooding resulting from the impoundment of water in front of a dam will prohibit land that use for other purposes such as farming, forests which provide various ecological as well as economic benefits. In particular, human settlements in the flooded areas will no longer be possible. Typically, some compensation is paid to the displaced person, and provision is made for him/her to continue to make a living in alternative sites.

In addition to these large projects on the Mekong, there are further possibilities in the mountainous regions with storage power stations, which do not require massive displacement of residents. Such development could only produce energy predominantly for local use and later on connected to an electrical grid to provide service for a larger region.

The factor, which requires particular consideration, is the extent to which a given population is displaced by each project. This factor will naturally vary depending upon the size and scope of the project as well as the density of settlement in the area where the project is located. In general terms, the extent of displacement will be less if the project is located in a less densely populated area. The alternatives may be described as one of developing the Mekong River, which flows largely through the Plateau and one of the mountainous regions in the east of the country, or the smaller rivers originating from the mountains in the western part of the country, in the Costal and the Tonle Sap regions.

The Mekong river projects (more than 1,000 MW) will be the largest project type, while the other river projects tend to be smaller. The Mekong river projects are situated in areas with a relatively high population density and as a result, the socio-economic impacts will be more serious. On the other hand, the delivery of benefits to the population will require substantial investment. In contrast, the small river projects (10-100 MW) will be located in areas, which have partly low population densities. Thus, the socio-economic effects of displacement may be lower per unit of water storage involved. Due to the limitations of topography, the small river projects are likely to affect fewer numbers of people and communities in absolute terms, while the delivery of benefits to the population may be less costly.

All economic sectors (agriculture, industry, services and trade) and private households will benefit from sufficient and reliable energy production.

An improved electrical energy supply in the cities will increase the movement of rural population to the cities. Another consequence of a better energy production is an increasing or the number of plants, trade and services establishments a stimulation of economy.

4. Ecological and Environmental Effects

In all cases, there has to be an exact analysis of the affected area. The data, which is available, now, such as, land use, vegetation and fauna cannot give a satisfying account of the area that will be used for hydropower.

For the construction of an environmentally friendly project, it is an absolute must, to consider the ecological complexity of a scheme, the size of a dam, with all its side effects on the environment.

The construction of dams causes the ecological consequences including climatic change, influences on the water and soil quality, the life flora and fauna, land use, etc. and also social impacts and new health risks such as leishmania, chagas disease and bilharzia.

Usually hydropower projects with low to medium capacity and high head are more ecologically favorable than projects with high capacity or fossil-power stations. Nevertheless these smaller hydropower projects might require larger areas. When constructing a hydropower project in a region that is inhabited by variations of tropical rain-wood, it is often the case that the vertical differences experienced are small. To compensate it is necessary to dam up larger sections of the river. The ecological consequences are of such projects are enormous.

To be able to include the influence on the environment it is necessary to identify the affected area. Therefore a description of the actual situation and the possible qualitative and quantitative effects must be done. A check of the sustainability by the environment is necessary.

For the construction of a hydropower plant it is necessary to keep the compensation water at a steady level to reduce the negative ecological effect. To prevent this, water flow must be as steady as possible.

The planning and construction of a hydropower plant starts or intensifies the traffic with trucks and other vehicles in an area. Division and destruction of the environment are the consequences. Living spaces of animals and plants, as well as man are disturbed or destroyed, because of air-pollution, water-pollution, noise, vibration, excavation, erosion and so on. All these things will have negative after-effects and it is necessary to decrease them.

The dam projects for power and irrigation purposes are the most sensitive issue for all water-related projects in the Mekong Basin. The benefits of hydro-electricity include:

- Low operation costs;

- High reliability of generation;
- High service and economical life (compared to thermal units);
- Stability costs; and
- Independence of ups in world market fuel prices.

The construction of hydropower plants will also initiate the erection of a transmission line system in Cambodia. At the long run, this system will guarantee the possibility of coordinated operating of all plants and reduce the costs of total generation and reserve capacity. Also, benefits for the environment must be accounted.

The major benefit from using hydroelectricity is the substitution of pollution caused by emissions of thermal or diesel plants to the local environment. The greater the reliance on hydropower will result in a decreased dependence upon imported fuels.

At the same time, hydropower dam may cause social and environmental impact on large geographical area in the downstream and upstream countries, affecting a wide range of sectors and local communities. The social and environmental impacts were not much concerned and might be minimize due to low population concentration, simple land use, and intact ecosystem. As alternative energy option was not diverse at the time, cheap electricity like hydropower combined with irrigation of large agricultural areas would justify the economic viability of dam projects.

Today hydropower is still on the top agenda of all riparian states. It is considered by MRC as renewable energy, relatively clean and does not cause air pollution and global warming (MRC Annual Report, 1998). A number of pre-planned hydropower dam projects are still in the study, though the selection of the hydropower sites. Therefore prospect of hydropower development in the Mekong Basin is substantial given the pressing needs in electricity and water driven by rapid population growth. The nature of environmental impact varies from dam to dam and maybe somehow predictable.

Environmental impact associated with hydropower dam development, especially the larger dams, will be on the increase as a result of change in political and economic measures, conservation needs, human concentration and uncontrolled land use planning.

The negative effects of dam projects include modification of:

- Changes in flows downstream of reservoir, river morphology, ground water patterns;
- Impact on ecology of wetlands, flood plaints and coastal habitat due to storage or diversions;
- Impact on aquatic ecosystem due to disturbance, pollution or introduction of exotic flora and fauna;
- Impact on the spawning environment of inland fish, which are the primary sources of protein for Cambodians; and
- Changes the water quality parameters due to pollution, sedimentation etc. which affects consumptive or other human uses.

Environmental Impact Assessment (EIA) is believed to be an important regulatory instrument for the mitigation of environmental impact of any development project. In Cambodia, the EIA process is governed by the Sub-Decree on Environmental Impact Assessment Process, which provides the requirement of EIA for any hydro project with the capacity of more than 1 MW. Though EIA process is yet to be improved, this sub-decree is seen as a good step towards sustainable development with minimal social and environmental impacts. So far, only one hydro-dam has recently resumed its operation in Kirirom I where EIA was positive. Another case of hydro-dam is the Prek Thnot multiple projects, which was studied again in 1995, but because of high cost for human resettlement, the project were postponed. Nevertheless, EIA is not always properly undertaken due to the unreliable data and limited time and resources for proper review. In terms of trans-boundary impact EIA is much more difficult and some time ignored.

Some issues related to the trans-boundary environmental impacts, because of the failure to take into account environmental impacts in the upstream and downstream countries. The case of Yali Hydropower dam construction of the 720MW Yali dam commenced in 1993 on the Se San River about 70 km upriver from the international border with Cambodia (NFTP, 2000), notably prior to the 1995 Mekong River Commission Agreement. Environmental Impact Assessment was conducted in the project area, but not including the area within the Cambodian territory. The Se San Basin has a total drainage area of 17,100 km², including 11,000 km² in Vietnam and 6,100km² in Cambodia. A study by NFTP has demonstrated that social and environmental changes in the downstream of Se San River, where is the Cambodia's territory was likely associated with the construction of the Yali hydropower dam. These findings are as follows:

- Irregular hydrological pattern;
- Social damage;
- Water quality problems;
- Change in riverine vegetation; and
- Impact on wildlife, fisheries and birds.

5. Conclusion

The predicted demand of electric energy in Cambodia can sufficiently be supplied in the short and medium future by constructing the suggested priority projects. It is necessary to properly prioritize these projects as full development.

The strategy for short-term development will meet the immediate energy needs of the country. The higher availability of electric energy will have additional benefits, such as increased employment.

The Cambodian hydropower potential gives us the optimism that the electric energy demand in the future can be supplied mainly by internal means. Further reliance on internal energy sources, such as hydropower, allow for a greater economic independence, thus enabling the economy to expand without external constraints on the energy supply. External constraints on the nation electricity supply have had deleterious effects to their economies. Considering the long term dimensions of Cambodia's electricity demand, it will be necessary to maintain studies regarding the future of the project.

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