Hydropower Development in Laos

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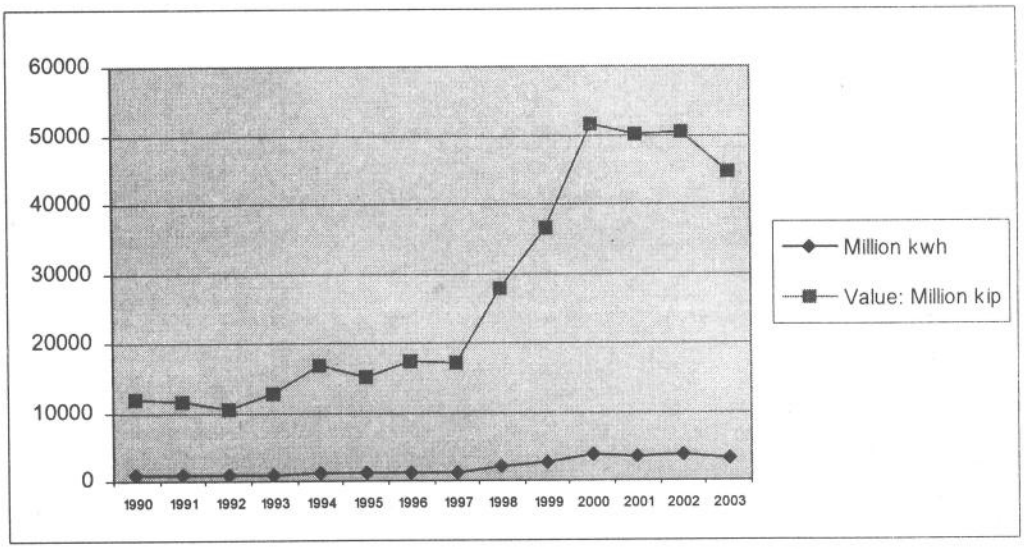
1. Justification of hydropower development for Laos

The Lao P.D.R is said to be rich in natural resources, particularly in hydropower potential throughout the country; yet it is still underdeveloped. In the past two decades, the government has committed itself to the development of the country; targeting self-sufficiency, poverty alleviation, utilizing agriculture as the base, and encouraging commercial production. Most recently the government has targeted industrialization and modernization. In order to realize the latter objectives, it is necessary to develop a sound infrastructure; power industry is one of the key sectors to it. The Government of Laos (GOL) assigned priority to developing the power sector under its Fourth, Five-Year Economic and Social Development Plan (1996-2000), by strengthening the domestic power supply system via the development of hydropower plants and the transmission/distribution system as a key policy initiative.

Figure 1. Power Production in Laos



Source: Ministry of Industry and Handicraft

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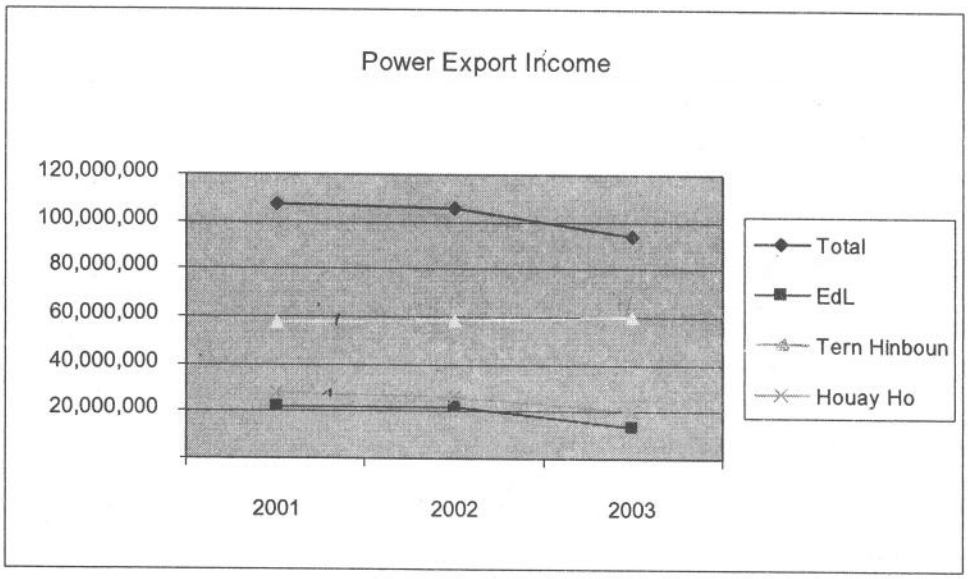
Although Laos has substantial hydrocarbon sources, such as coal in Xiengkhuang and Khammouan, Lignite in Xayaboury, and so on, none of the sources are commercially utilized for energy production. Therefore, the only indigenous energy is hydropower. To date, according to the report on Industrial Statistics 2004 by the Ministry of Industry and Handicraft, 96.38% of power production with the capacity of 620,004 KW is from the large size hydropower dam, and 2.70 from Diesel Engine, 0.9% from Small Scale Hydropower Dam, and 0.02% from solar power.

Laos cannot afford to import fuel for power generation because of trade balance constraints. Trade balance was deficit at 205, 190.8, 209.9 million US$ in fiscal year 2000, 2001, and 2002 respectively (Bank of Lao PDR). Electricity is the largest foreign currency earner. According to the Ministry of Industry and Handicraft (MIH), Industrial Report, the value of electricity export in 1996 was 29.7 million US$, dropping to 27 million in 1997. Since then, the export value has continuously increased, to 57.1, 82.9, 113.6 million in 1998, 1999, and 2000 respectively. There was a slight drop in 2001, to 107.2 million, 2002 to 106 million, and 2003 to 93.7 million US$. Therefore, the government expects income from power generation for poverty reduction, which is the most important current socio-economic policy supported by the international community.

Figure 2. Power Export



Source: Ministry of Industry and Handicraft

2. Industry Structure

The structure of power industry in Laos is unique. According to the organization chart outlined by ADB, Power Sector Strategy Study in the Lao PDR, electricity is under the Ministry of Industry and Handicraft, which is divided into two divisions: Hydropower Office and Rural Electrification Division. Commercial units, which include Electricité du Laos (EdL) and Power Sector Construction Companies, are directly supervised by the Ministry of Industry and Handicraft. In addition, there are currently two Independent Power Producers (IPP), i.e. Theun Hinboun Power Company Limited and Huai Ho Power Company Limited in service, whilst Nam Theun 2 Project is being developed. EdL is an exclusive power generator and distributor for the domestic market and has a large share in the export market. The existing IPPs are joint-venture companies with foreign investors which export generated electricity to Thailand. Thus, there is no competition in the domestic market. Recently, according to an interview with Mr. Vilaisone Souliya, technical staff of the Ministry of Industry and Handicraft, the government has organized a National Electricity Secretariat Committee, whose responsibilities are yet to be clearly defined.

EdL currently owns and operates four large hydropower plants and 36 small scale hydropower plants throughout the country. The four large scale plants are Nam Ngum in Vientiane Province with the capacity of 150 MW, Se Xet in Saravan (45 MW), Xelabam in Champasack (5 MW), Namleuk in Saisomboun Special Zone (60 MW). Two other large scale hydropower plants belong to IPPs, namely Teun Hinboun in Khammouan Province (210 MW), and Houay Ho in Attapeu Province (150 MW).

Table 1. Existing Power Plants in Lao P.D.R.

No.	Plants	Regions	Owners	Inst. Cap. (MW)	Average annual Energy (GWh)	Comm. years
1	Nam Ngum 1	Central 1	EdL	150	998	1971, 78, 84
2	Selabam	Southern	EdL	5	24	1970, 1993
3	Xeset 1	Southern	EdL	45	180	11/1991
4	Nam Dong	Central 1	EdL	1	5	1970
5	Nam Phao	Central 1	Provincial	1.6	-	1995
6	Nam Ko	Northern	Provincial	1.5	-	1995
7	Theun Hinboun	Central 1	IPP	210	1,620	4/1998
8	Houay Ho	Southern	IPP	150	617	9/1999
9	Nam Leuk	Central 1	EdL	60	230	4/2000

Source: EdL. (2001). Power Development Plan 2001-2010. P. 13

The IPPs are not pure private companies, but public-private joint ventures, as EdL has some shares in IPPs. In Theun-Hinboun, EdL has a 60% share; Nordic Hydropower AB holds 20% and MDX Lao Company Ltd. holds another 20%. EdL has 20% shares in Houi Ho Power Company Ltd, and 25% in Nam Theun 2 project. Nam Theun 2 will become the largest power generator at 1,000 MW when completed in 2007. IPPs are exporters and they do not compete in the domestic market. IPPs have two large size power plants, Theun Hinboun and Houi Ho. The former exported 1,485.3 million hwh, 1,453.6 million kwh, and 1,426.9 million kwh in 2001, 2002, and 2003 respectively; while the latter exported 541 million kwh, 573.3, and 432.8 million kwh correspondingly in the same period.

Investors in IPPs, apart from EdL, are international; however, the Thais have stakes in both. In Theun Hinboun, MDX, a Thai Company, holds 20% shares and in Houay Ho, Thais hold 20% shares. In addition, the forthcoming Nam Theun 2 project, Electricity Generating Public Company Limited (EGCO), a leading operator of independent generating capacity in Thailand, has a share of 25% and an Italian-Thai Development Public Company Limited (ITD), the largest publicly listed infrastructure construction company in Thailand, carries 15%. However, the Electricity Generating Authority of Thailand (EGAT) is the sole buyer of electricity generated in Laos. According to Chairarattananon and Nirukkanaporn, EGAT purchased 340 MW from Laos in 2002.

3. Price Negotiation Related Issues

Price negotiations are mostly made between a single buyer and a single seller; since, in the past, Laos exported electricity to only Thailand. According to SwedPower, the first contract on the export of electricity from Laos to Thailand was signed by EdL and EGAT in 1971 (June 22nd, 1971 and November 1971) the condition that EGAT buys excess power produced by Nam Ngum Dam at the price of 0.45 US cent per kWh. The contract was valid for 10 years from the commencement of the deliveries and could be extended by mutual agreement. In fact, the contract was only valid for a few years. From October 1, 1975, the energy prices were raised to 1.05 US cents per kWh, according to the supplementary agreement. The first contract expired in 1981. A new agreement was reached between EdL and EGAT, signed in October 1981, and valid from October 1, 1981. The agreement specified that the price was 3.1 US cents per kWh, with an increase of 9% annually for the following 5 years. Up to the mid 1980s, EGAT could no longer accept the price due to the drop in world fuel prices. After a series of discussions, including EGAT's disconnection for one month, a new agreement was reached in September

1987. According to the new agreement, the price was fixed at 3.05 US cents per kWh without any escalation clauses, valid for two years (SwedPower 1998).

In 1993, the Royal Thai Government and the Government of Lao PDR signed the Memorandum of Understanding (MOU) to develop 1500 MW electric power in Lao PDR to export to Thailand by the year 2000 (Houay Ho Hydropower Project). According to ADB, the current Agreement (MOU) between the Government of Laos and the Government of Thailand provides for the export of an additional 3,300 MW to Thailand. Also, the Lao and Vietnamese Government have signed MOU of additional 1,000 MW for power export to Vietnam. With the current production capacity of 625.8 MW and large potential resources, there are opportunities for development.

Some issues in relation to the price negotiation include the location and the distribution network. Laos does not have a National Grid that connects all the production facilities. In Laos about 5.5 million people live in an area of 236,800 km^2 and its topography is mountainous. It needs a huge investment in electricity transmission and distribution system to make electricity supply a universal service. Therefore, national coverage by electricity is low at less than 40% though it exports almost the same amount of electricity as the domestic consumption. Economically it makes sense to export bulk electricity to Thailand and import electricity from Thailand to distribute to the Thai border cities like Pakse and Savannakhet. Thus, the production and distribution is limited to the location it will be exported to. From an interview with Mr. Vilaisone Souliya, a technician of National Secretariat Committee of Electricity, Thailand intends to purchase the power from three points: Savannakhet, Vientiane, and Bokeo. Therefore, although several locations have been identified as feasible hydropower construction locations, the economically feasible ones are located close to the market.

A market for the power industry is in fact available, yet it very much depends on economic and external conditions. As mentioned above, the market of Lao power is mainly Thailand. There are 25 undeveloped hydropower dam sites in which foreign investors have shown interest; however, at the current oil price only a few are economically feasible and viable (MIH, 2001). At the moment, only hydropower development projects which can generate electricity at a lower price than IPPs in Thailand will be realized like Nam Theun 2. If international oil prices stay high, hydropower projects in Laos will become more competitive and will be able to expand to foreign markets. In the past, Thailand could accept the electricity price increase due to the increasing oil price in the world market, it would be more expensive to generate power using petroleum or other fuel, compared to the hydropower. When the oil price drops, however, EGAT asks price reduction of all generators who sell electricity to it in the

current market economy. Other market possibilities are Vietnam and Cambodia. In these markets, however, China and Myanmar could be future competitors.

One lesson can be learned from the story of Nepal (Chris Head, 2000). Nepal has a huge potential for hydropower resources, yet it is not able to export electricity to the neighboring countries. Political and economic issues play a strong role in the export. Therefore, it is necessary that the stability of political and economic issues and good relations with neighboring countries are well maintained.

The investment in the power industry is a very long-term investment. Houay Ho Hydropower and Nam Theun 1, for example, have a 30-year concession period. Therefore, a good investment climate is essential for both investors and the host country.

4. Financing of the Project

Hydropower development requires huge initial investment and a long construction time. One of the past two completed projects, Houay Ho Power Company, required US$220 million, out of which 50 million was financed through equity and the remaining through loans. Theun Hinboun required US$ 280 million; of which 110 million was equity and 170 million loans. "The Theun-Hinboun project was partly financed by an equity contribution from a Thai company and a loan from a syndicate of Thai commercial banks." (ADB 2004). The undergoing project, Nam Theun 2, requires US$1,070 million and the project plans to be financed through equity of 320 million, and the rest through loans. In Laos it is not easy to raise funds for such projects. Foreign investment is essential for the success of the project. Only a capable and well-known leader can organize an international consortium.

Financing is a decisive factor for the project as the investment fund is very big and long term. Also, financiers are sensitive to public opinion in the developed world which is generally unfavorable to hydropower development, known for damaging the natural environment.

5. Environmental Issues

Hydropower development makes an impact on natural environment and forces the relocation of affected people. In some of the recent developments, for example, the Nam Theun

2 Project, 4800 persons were resettled and 450 km^2 of land area will was flooded. In a feasibility study of Nam Ngiep 1, the number of resettlements is 1,600 people and 73.90 km^2 will be flooded (MIH 2001). Therefore, Compensation for relocation and economic loss caused by the project is very important and shall be carefully studied.

Hydropower development has two facets. One is the destruction of the natural environment. For example, Nam Ngum Dam reservoir flooded many villages with virtually no compensation to affected villagers during the civil war period. The other is the creation of a new environment. The newly emerged water reservoir created a rich fishing place supporting about 1,597 fulltime fishers (N. Mattson et al, 2000) and a beautiful tourist attraction which never existed before the dam construction. Environmentalists and ecologists who live in developed countries stress damages to natural environment but they seldom refer to the creation of new environments like above mentioned Nam-Ngum reservoir. Laotians are utterly bored with the stereotype reports on hydropower development and environmental issues by mass media owned by developed countries.

6. Conclusion

Hydropower has a significantly positive impact to the development of the Lao Economy; it contributes to the government's objective on poverty alleviations, and brings the country to a new phase of industrialization and modernization. The country has large potential to develop the hydropower industry under conditions of a favorable market and available funding. Thus, the market development and the guarantee of good investment climate by the government are essential to develop the sector. The IPP that makes importance of the bankerbility of power projects now dominates new power developments in most of the countries. The hard reality, at a time of liberalization and deregulation in the power sector, is the neglecting of long term economic benefits of hydropower plants. Laos has to wait for a time when a high priority is given to clean and renewable energy development from economic and environmental reasons.

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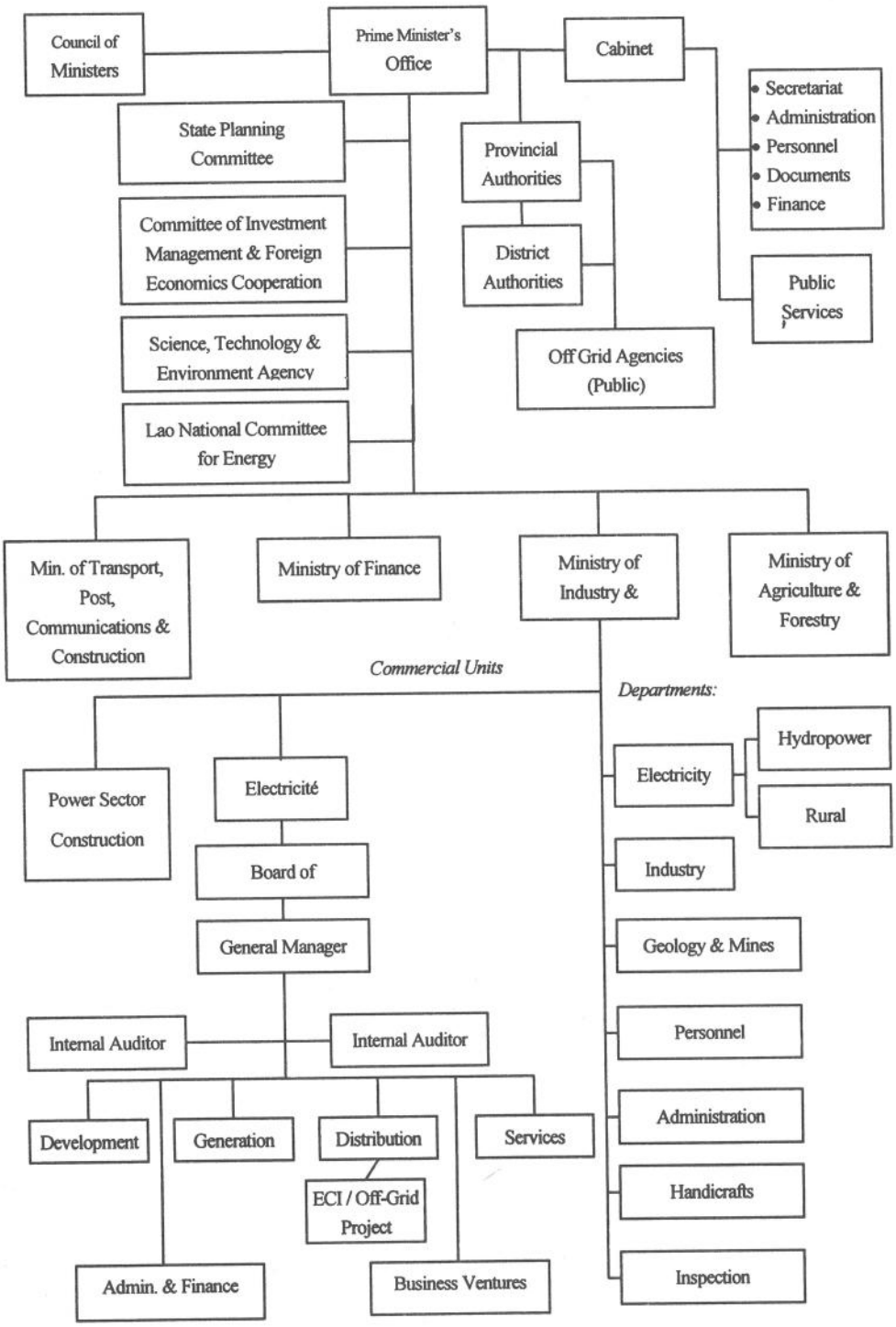
Appendix

Power Sector Agencies



Source: ADB TA 3374 – Lao PDR Power Sector Strategy Study