The Development of NamNgum 1 HydroPower Station Expansion Project Unit 6 – 7 – 8

Under the supervision of Lao People's Revolutionary Party that have always considered the important of the creation and development of the country in order to be better and more civilization, meanwhile focused on improving the livelihood of Lao people, also the sustainable development of human resources and natural resources to be as abundance as other nations. Presently, the facilities for the development in any sectors in Laos, both government and private sectors included business units, having more opportunities to access to funding either national or international fund, according to the accordance of the visions and policies of the Lao PDR to the international level, which attached more investors to invest in Laos, and this influences the stabilities and better progress into Lao business.



Simultaneously, in every sectors of the government are participated all plans that aimed to achieve the goals of socio-economy aspects. And so the front sectors that the government has set the priority to, at the same time, the investors has been paying attention to is the hydropower generation, this sector has been very important and making a good progress in term of socio-

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economy development, since the power is the basic need in any field of works/sectors for instance: industrial works, agriculture, irrigation, services, fisheries and also tourism. Furthermore, the power is the main source for daily activities of each household and person. Therefore, the Lao party and government has seen its important and now focused on the hydropower generation together with the rural development which can be observed by the development of the infrastructure and other facilities, in order to turn the hydropower sector into the main source of the national economy development, the essential part is to contribute the income to the national budget, promote the expansion of Lao economy to support the governmental policies in order to lead Laos out of one of the least developed countries in 2020.

When focusing in hydropower sectors recently, Laos needs more power for domestic use than before, which shown that in the previous years with the sudden increased of the demand of power from 10% to 15% per year, This trend caused by the growth of economy such as industrialize, argiculture and services. Besides, the supply of power for each household has been increasing based on the governmental policies which aim to promote and improve the livelihood of population in Laos. For hydropower generation's works in the year 2014, all HPP in Laos be able to produced the power of about 3,223 MW, with the use of 813 MW for domestic use and distribution in the country, for the remaining, it was exported to the neighbouring countries in order to exchange to funding for other development feilds of the countires. Therefore, this does not mean that Laos could generate power more than the demand in the country, whereas the distribution and transmittion line in each region is not sufficient and not yet connected; meantime the geographical of some areas are still lack of facilities in generating nor distributing power in support to the demand of the population, therefore in some areas it still needs to import the power from the neighbouring countries and that is the reason why within surrounded areas of the HydroPower Plant (HPP) in Laos, there is the remaining power and can be exported.

Nam Ngum 1 HPP is one of the most important HPP in Laos which was built in 1968, located in Keoudom district, Vientiane province; which can be claimed to be one of the longest hydropower generator that have been operated in Laos and account for 19.1% in whole domestic supply recently, particularly, account 33.5% in the dry season, NNG1 HPP has become the huge HPP and play the very important role in term of providing the power to Lao people in the nation and also to the neighboring countries like Thailand. Most of you might know very well that the NNG1 HPP has been built and operated since 1971 which the construction project has been developed and renovated in 3 phases as follows:



- Phase 1 of NNG1 HPP was commenced in 1968 and was commissioned in 1971. The facilities in this phase include a power plant at the base of the dam with two 15 MW generating units and provisions for 3 additional units. The generation units supply to EDL's single circuit high voltage transmission line, with transmission capacity of 115 kV, from Nam Ngum site through Vientiane Capital at Phonetong Substation to EGAT's grid at Nongkhai (Thailand) Substation.

- Phase II of NNG1 HPP began its activities in 1976 and was successfully commissioned in 1978, the facilities in this phase includes installation of an extension of the powerhouse to accommodate two new generating units of 40 MW each, connecting to EDL's double circuit high voltage transmission lines, with transmission capacity of 115 kV, from NNG1 HPP site through Vientiane Capital City at Phonetong Substation to EGAT's grid at Udonthany 2 (Thailand) Substation.

- Phase III of NNG1 HPP began its activities in 1983 and was successfully commissioned in 1984. The 40 MW generating unit was installed in order to fully utilize the hydro potential and facilities which are already installed. After the completion of this phase, the average annual energy production is 865 GWh/year.

- In 2003 - 2004, NNG1 HPP has been renovated to extent the capacities of the generating unit 1 and 2, to increase the generating capacity for 2.5 MW of each unit. Therefore, at this moment, the NNG1 HPP has the total capacity installation of 155 MW.

NNG1 HPP is always in the progress of development, which shown on the researches and surveys about the possibilities to expand the capacities of hydropower generation, in order to make the most benefit for Lao nation. Most of you already have the right understanding about the HPP, that hydropower generation of NNG1 HPP is based on Ngum River which is one of the major rivers in the Lao PDR, also on of Mekong River' tributaries. Whereas some information that might be missing is that after the feasibility studies of the potential hydropower generation of Nam Ngum from both Lao and foreign researchers, they both agreed that Nam Ngum offers a hydropower potential up to 1,600 MW from various possible sites, these shown the potential that Lao PDR be able to supply huge amount of power if there are suitable facilities/conditions, not only support the demand within the country but also be able to export to the neighboring countries. However, in the initial phrase Laos would not be able to build/invest a huge project that install that much capacity comparing to the research, since Laos was still lack of many factors such as fund, human resources, therefore, started with building a small project and only operated for domestic use purpose and only some remaining part that can be exported to nearby countries.

In 2014, after there is additional survey and also the favorable factors like financial support and human resources, so there is an extension project of NNG1 HPP, which is the extension project of the hydropower generator unit 6-7-8. All in all, based on the capacity of the natural resource in the areas, which is the huge Nam Ngum Reservoir that contain a lot of m^3 of water and can be surely generated the hydropower for more than 155 MW like before. The other interesting point about the reason why there is an extension project, is that there is tariff reform in tax policies which now in consideration of the government, the reform includes the exceptional "time and season of use", therefore, if there is the tariff reform, it will be the favorable factor for larger expansion project. As a result of the financial analyses and feasibility study it was confirmed that the expansion of 120 MW would be the ideal option for promoting the production in the dry season and will reduce the rate of the power import in the peak hours during the dry season, because recently the power import has been constantly increasing and it has made financial burden to EDL.

For the NNG1 HPP station expansion project included 2 parts as followed:

- **Unit 6 (40MW):** The project owner is EDL who is the representative of the Lao government and signed contract with Nippon Koei Co., LTD Nippon Koei Co, LTD, Joint Venture of Electric Power Development Co.,Ltd and Lao Consulting Group Ltd to be consultant.

For the construction contractor is still under the process of bidding, the construction will start at the end of 2016 and will take 36 months to complete, which expected to be done in 12/2019 (based on the master plan). Essentially, this project is built for combat the demand of the power in the peak load during the dry season and will also contribute in the management of the Nam Ngum 1 reservoir to be effective especially during the discharge periods in the wet season so it can be very beneficially, therefore this project will contribute the power generation of 56 GWh/year.



- **Unit 7 and 8 (80 MW):** The project owner is EDL who is the representative of the Lao government and the construction contractor is DONGFANG ELECTRIC INTERNATIONAL CORPORATION Company, the project construction started since 20/12/2014 and will take 3 years to finish, the expected date is 20/12/2017. This project is built to supply the demand for power in the whole domestic that have been constantly increasing especially in the capital city, during the peak load in the dry season, which is the periods that the demand could not be satisfied and the very high power import rate.

Until now the progress of the project construction is about 46.85% for (Unit 7-8), for (Unit 6) the project construction will start at the end of 2016, according to the benefits that this project would offer, it reflects in so many aspects, not just the expansion of power generation from 155 MW to 275 MW, this power is not only for domestic use but also export to the other countries and bring in the foreign currency into Laos in order to improve the socio-economy within the nation, and more importantly is to support the strategy that the government set out, which is to lead Laos out of one of the least development countries in 2020, Another important thing is to increase the

power generating during the peak load in the country, in order to reduce the power import from oversea and also this expansion project will be the good opportunity to rebuilt and extend the capacity of the grid system, turning the system into system in term of import and export, also using the existing transmission line and other facilities in order to maximize the benefits for Lao nation. Moreover, this project offered the opportunity to build another crossing bridge of Nam Ngum River, for the local people there to be more comfortable in crossing and in term of transportation, while in the past they only use boat for crossing the river. Therefore, this bridge will contribute in promoting the tourism and also become the link to benefit the development of these areas in the future, Last but not least NNG1 HPP still play its important role as it always did which are: preserve the huge fisheries source, protection for drought and flood, provide water for irrigation for agriculture, still continually being the source for submerge/underwater plants to conserve the abundance of vegetable and food, also being the huge catchment to store the rain, continue on building and developing tourist destination to attach more tourists, besides, protect and promote aquatic organism in order to contribute in the abundance to biodiversity and become the district and province's protected areas, promote the water transportation and continue to expand the clean hydropower generation source in the sustainable way.

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