

# Feasibility Investigation of Floating Solar PV-Hydro Grid-tied Hybrid System: A Case Study of Green Energy Boost in Shan State, Myanmar

M. M. Naing<sup>(1)</sup>, A. Z. Ya<sup>(1)</sup>

<sup>(1)</sup> *Department of Electrical Power Engineering, Yangon Technological University, Insein Road, East Gyogone, Insein Township, Yangon, Myanmar.  
+95-9-970287815, myomyintng.ytu.ep@gmail.com*

**1. Introduction** – Myanmar is blessed with the enormous potential of Eco-friendly Renewable Energy resources. Hence, it is encouraging more and more generation of these not only for the improvement of the electrification rate but also for the development of Low-Carbon society. This research work focuses on the techno-economic analysis of the Floating Solar Photovoltaic (PV)-Hydro Grid-tied Hybrid System. It is intended to contribute in Myanmar Agenda 2030: National Electrification Planning towards Universal Access. Moreover, it is in line with the Goal No. 7 of the world's SDGs. The philosophy of this research is to harvest the different Energies in one location as well as to investigate the impact of the integration of Floating Solar PV System at the conventional Hydropower Dam. The project area is located in the Shan State Plateau and belongs to the middle and high mountain terrain in Myanmar. The Nam Pai River is a tributary of the east bank of Ayeyarwady River Basin, with a total length of 229 km. Nam Pai River was studied as the Cascade Hydropower Project and regarded as the Nam Pai-1 (Upper), Nam Pai-2 (Middle), and Nam Pai-3 (Lower) plants. Nam Pai-1 and Nam Pai-2 are pure run-off river type. Nam Pai-3 is the Dam type with regulating pondage function and thus, it is considered for the installation of the proposed System. The design capacity of the Nam Pai-3 Hydropower is 30 MW and the additional power is generated from the Floating Solar PV System. The proposed system can cover the regional supply and the excess Electrical Energy will be sold to the National Grid System of Myanmar.

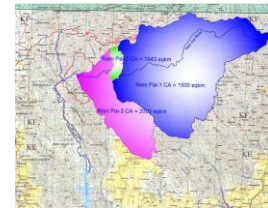


Image 1. Catchment Area of Nam Pai Cascade Projects

**2. Methodology** – The novel configuration of the Floating Solar PV-Hydro Grid-tied Hybrid System is modelled in the powerful software tool, HOMER Pro. The input data are collected and the parameters are validated. Then, the thousands of Hybrid Energy Systems are simulated.

**Table I.** Energy and Potential of Resources of the Floating Solar Project

Energy	Potential of Resources
Annual Average Solar GHI	4.93 kWh/m <sup>2</sup> /day
Annual Average Flow Rate	63333.33 L/s

**3. Results and Discussion** – The simulation results are analysed and the Optimal Model is selected. The benefits obtained from the proposed System are significantly mentioned. The Climate Change impact from the Hydropower Plant is reduced by the implementation of Floating Solar PV System due to the reduced evaporation rate about 80%. Meanwhile, the efficiency of the Solar PV System is increased according to the cooling effect from the floating structures in the Dam. There are 30 Hydropower Dams generating 71.160 GWh. The more penetration of the Renewable Energy development can be obtained from the installation of the Floating Solar PV Systems at the appropriate Dams.

**4. Conclusions** – This research is useful as the reference for the real implementation of the Floating Solar PV-Hydro Hybrid System in Myanmar. This innovative Grid-tied System can be contributed towards the Sustainable Future.