

## **Small is beautiful: ‘Hydroger’ a means of energy and sustainable development**

“During our childhood when there was no provision of electric light in the village, we were not allowed to go out after the dusk. It was believed that evil spirits were roaming around. Now things have changed for better, electricity is available and we have lights at night and people are educated too,” said 70-year-old gentleman Mr Peter Tep of Old Tseminyu village in Kohima district of Nagaland. The village is inhabited by more than 2000 population of Regma Naga tribe in more than 200 household. It is the situation for many of the present electrified villages in Nagaland.

However, there are many villages out of conventional electricity grid, till now. Imagine the situation of villages located far-away from the electricity grid, where people still use kerosene lamps at night. Such villagers are even unable to keep their kerosene lamps on for long hours at night, because insufficient availability of the fuel which they have to collect after a long five-six kilometer walk to the nearest market place and have to procure it in an exorbitant price. So, their night life is cut short.

In reality, energy is considered as the critical input to our day today work and economy. Our livelihood is linked with our production and processing systems. Access to energy makes differences in perception and expectation of life. There is energy divide. Some people have access to multiple sources of energy and use it lavishly. On the contrary, some are deprived from basic energy requirement. When our planner did the energy planning they were influenced by the need and priority of big players who needed energy to energies their factory, their shopping malls, run their air conditioner etc in big cities and metropolis. Big approaches like setting up big hydel dams for energy generation creates threat to our wildlife and biodiversity, common people’s livelihood by altering the river ecosystem and fabricate conflict on sharing water, energy and other natural asset, etc. But if we really cater for equality and justice we have think in an alternative way. Energy which is renewable, environment friendly and sustainable is primary prerequisite to meet the targets of Millennium Development Goals (MGD).

Against all these strange circumstances of big approaches, the approaches of small hydro power plants bring hope with minimized scale of negative impact and maximizing the scale of positivity in decentralization of energy generation, people’s ownership to energy production process, empowering people to overcome fear about technology and above all energy for their self reliance.

‘Pico-hydel’ is the best option among the approaches of small hydro. A hydel power generation unit with less than 5kw is called as Pico-hydel. Basic requirement for such unit is a flowing stream/source of water with adequate height differences (head). It do not require a large volume of water, it can materialize over even a small stream. A 1kw pico hydro can provides 24kwh of 220V, 50 Hz AC power per day, which can support minimum quality of power to rural families. In this area of Pico-hydel, ‘Nagaland Empowerment of People through Energy Development (NEPeD)’ has paved a new path for North Eastern Region. NEPeD is an autonomous body under the Government of Nagaland and is registered as an independent society under the Societies Registration Act-1860.

In pursuing their vision for sustainable development and people's empowerment, NEPeD undertook their endeavor in the area of Pcio hydel from the beginning. Initially, they procured the small turbine for the purpose; they found some difficulties in the areas of regulated control of generation of power along with involved uncertainty in supply chain. So, they took up own initiatives to design and developed a turbine in their own way. Ultimately they came up with 'Hydroger'; it is a term coined by them, with amalgamation of two words, 'Hydro and Generator'. The mechanism is very simple; it comprises of cylindrical cast iron housing and alternator which is connected to the turbine through the shaft. Hydropower is used to turn the turbine to generate energy. The system have two categories of turbine; viz. Impulse and Reaction turbine. The Impulse turbine which produce power primarily from head pressure, utilize closed diversion system (fig.1, plate-1). On the other hand Reaction turbines, which produce power from water volume, normally work best with an open diversion system (fig.2, plate-2). NEPeD has set up the Centre of Excellence for Renewable Energy Studies (CERES) for mass production of Hydroger in Industrial Estate, Dimapur.

Right now such a Hydroger has a capacity of 3kw, with rated Rpm of 750, frequency 50Hz, single phase and Voltage 230 to 240V. Required discharge range is 10 to 40 liters/second and head range 9 to 35 meters. NEPeD also produce a prototype Electronic Load Controller (ELC), which is an essential component of Hydroger. Its main function is to give a steady power output using a simple electronic load sensors to control of constant Rpm of a generator, required frequency, overload, high voltage, low voltage and short circuiting. ELC can also be used as synchronizer for coupling parallel connection of Hydrogers. Gross weight of Hydroger is 78 kg and ELC is 1kg, so it is not very difficult to carry to intricate location for installation. Total cost involved for Hydroger and ELC is around sixty thousand excluding the transportation cost.

At NEPeD office of Old Secretariat Complex, their Energy Team Member, Ms. Ayong Chng and Ms. Margaret Chasie share their experiences of implementation of Hydroger installation and electrification programme. Till date it has implemented in 20 sites including nine individual farm sites. They said that, in case of village electrification programme, NEPeD provides infrastructure and technical guidance and support; villagers contribute labour and locally available required material like bamboo. Initially villagers will form a committee called as 'Hydroger Management Committee', it is mandatory to have 3 male members and 3 female members in this committee. NEPeD also organize training for them to train them about operation, maintenance and management of the unit. Usually every household contribute twenty rupees monthly as charges of electricity, out of collected money payment of two person looking for operation and management was meet along with other requirement of maintenance. In this way a decentralized people centered system begins to function.

After installation and continuation supply people find out their own way take the benefits of this electricity. For example, the Kingjung village of Tuensang district, where a system was installed and give power connection to 95 household. After a short duration, people make prioritization of their need, like in the day hours generated power used for rural enterprises like carpentry works, blacksmith works, etc and night hours for household lighting and street lighting. Interestingly, with the availability of light at night

people have started to carry out some works which can be performed inside the house, e.g. different handicraft work.

Ms. Ayong Chng and Ms. Margaret Chasie, said that now the villagers are becoming more concerned to managed and protect the catchment of the stream from where they are utilizing water to run the hydroger. Because they understand that if there is no water, no power from Hydroger and to get it they have to protect the stream's catchment. A new concept of watershed conservation and protection has evolved automatically.

The Hydroger based energy generation system breeds positive impacts by evolving a model for sustainable electricity generation managed by grass root groups; brings added value to agricultural product, supporting rural enterprises like carpentry, blacksmith trade etc. Moreover, it mobilizes user group for on-site training on installation of hydroger. In a long run it develops some bare foot rural engineers. Above all it empowers people to run a system of their own to meet their day to day energy needs. This approach rightly reflects concept advocated by E.F. Schumacher in his famous book 'Small is beautiful: economics if people matter', "... the function of work to be at least three fold, to give a man a chance to utilize and develop his faculties; to enable him to overcome his ego-centeredness by jointing with other people in a common task and to bring forth the goods and services needed for a becoming existence." (Chapter-4, page 58). ■

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