

The Leuwi Kiara Micro Hydro Power Project Open Flume Propeller Turbine Technology introduced

Developments in the micro hydro power sector in Indonesia are not confined only to the development of new schemes. Unfortunately it is a fact that many efforts in the past to build micro hydro power projects for rural electrification failed as a result of bad planning, poor workmanship and low quality equipment being installed. In 2003 the West Java local Government commissioned Wahana Pengembangan Usaha (WPU), a Bandung based NGO active in MHP technology development and dissemination, to conduct a survey on 10 failed schemes in the province to assess their rehabilitation potential. They also made available funds for the rehabilitation of one "pilot" scheme with a view to replicating this approach if successful. The Leuwi Kiara MHP scheme was selected from 10 sites assessed. Located in the village of Nagrog, Tasikmalaya regency, the village is approximately 95 km south of Tasikmalaya. Access to the village is only possible with a 4 x wheel drive vehicle due to the poor condition of the road.

The scheme, financed by the West Java provincial Government, was originally built in 1996. After only 6 months operation, however, persistent breakdowns of the equipment rendered the scheme non-operational.

Open Flume Propeller Turbine Technology a viable solution for low head sites in Indonesia

The lay out of the Leuwi Kiara MHP is a conventional "run of river" set-up. WPU in collaboration with Cihanjuang Inti Teknik (CIT), Bandung, a local MHP equipment manufacturer and partner of MHPP prepared the detailed design for the project. Considering the relatively low head available (4 meters), it was decided to adopt an open flume propeller turbine. CIT together with the assistance of MHPP are currently developing a range of open flume turbines specifically for low head applications. Initial results indicate an operational efficiency of between 70-75% with production costs significantly less than those of a cross flow turbine for similar site conditions.

CIT has been working together with MHPP over the past years focussing on propeller turbine development. Their expertise and extensive experience in steel casting qualifies them for the manufacture of propeller turbines where the majority of components are preferably cast as opposed to fabricated. The scheme is controlled by a electronic load controller (ELC) manufactured and supplied by PT. Heksa Prakarsa Teknik, Bandung (HPT).

Project Management

Total power output of the scheme is 12kW. This power supplies approximately 100 households in the village. Each household is equipped with a 110 watt supply.

This presence of an electricity supply in the village rep-

resents a significant improvement in the overall living conditions of the villagers. The scheme operates on a lump sum payment basis as is normal for such small schemes in Indonesia. Over consumption is controlled by the installation of a 0.5 ampere circuit breaker at each household.



Photo 1. Open Flume Propeller Turbine with ELC in the background installed in the Leuwi Kiara MHP, Tasikmalaya Regency, West Java. The equipment was manufactured and supplied by CIT and HPT, Bandung.

Alor, NTT pursues mini hydro options MHPP - Dinas Pertambangan & Energi Alor, NTT - PROMIS

The island of Alor in NTT is certainly one of the less developed regions of NTT with regard to its basic infrastructure. The complex logistics associated with energy supply on islands such as Alor make the utilization of renewable energy sources an attractive option where suitable potential can be harnessed. Addressing this situation MHPP in cooperation with GTZ-PROMIS carried out a field visit to Alor during December 2003 to assess the hydraulic potential on the island and supervise the on-going construction of one scheme currently being built with funds provided by the local government. The MHP currently under construction in the village of Apui was visited and a report submitted to the respective authorities highlighting aspects of the schemes construction which require special attention to ensure efficient and reliable operation after completion. Electro-mechanical equipment for this scheme is being supplied by manufacturers supported by MHPP in Bandung. The civil construction is being undertaken by local civil contractors. The scheme is scheduled to go into operation in March - April 2004. Additionally at the request of Mr. Victor Tanghana, the head of the local Dept. of Mining and Energy, site visits were carried out to the villages of Pintu Mas and Wakapsir to assess their suitability for possible future development.

The Dewata MHP one full year of trouble free operation

Following one full year of operation, representatives from MHPP conducted a monitoring field trip to the Dewata power plant in January 04. During the field trip engineers carried out a detailed assessment of the various components of the scheme as well as conducting interviews with managers and operators to ascertain the plants condition and performance during its inaugural year of operation. Overall the findings of the visit were extremely positive. The scheme has experienced no serious breakdowns and periods where the back-up diesel generators were required (ie. during excessively dry periods) were minimal. The total production for 2003 was fully in line with the projections made in the feasibility study, and due to the steady increase in fuel prices, the economic analysis predictions have been exceeded.

Table 1: Performance Statistics of the Dewata MHP

Average Production	kWh/month	70,000
Mean Load	kW	94
Avoided Diesel Consumption	Lit/month	24,500
Avoided CO2 Emissions	Tons/month	73.50
Avoided Energy Costs	US\$ / month	6,500

MHPP was also very pleased to see evidence that the estate company highly values the presence of the scheme and is diligently conducting continuous preventative maintenance and up-grading work on the civil structures and surrounding environment. This is viewed as particularly important on areas where there is a risk of landslides and erosion particularly during the monsoon season when the estate experiences extremely high rainfall.

Future Developments:

During 2004 the estate company has made provisions for the trial replacement of a number of the oil burners currently used in the tea drying process with electrically powered equivalents. For a large part of the year the MHP is capable of producing more power than is required to supply the electricity requirement of the factory, which could be utilised in the tea drying process. It is projected these savings would enhance the overall performance of the power plant by approximately 25% significantly reducing the overall pay-back period for the project.

MHPP will continue to cooperate with PT. Chakra in optimization of the Dewata MHP plant to ensure the full demonstration effect of the scheme is exploited and hopefully initiating similar initiatives from other estates where suitable potential exists.

First grid-connected MHP is officially inaugurated by the Director General for Electricity & Energy Utilization

December 5th saw 2003 drawing to a close with the official inauguration of the first grid-connected small private renewable energy power project in Indonesia. The inter-connection of the Kalimaron mini hydro power scheme in Seloliman, Mojokerto, East Java with the PLN grid represents a major milestone in Indonesia's renewable energy history. Almost 18 months after the introduction of a ministerial decree which requires PLN to purchase power from

small renewable energy producers below 1 MW, the first such scheme is now fully operational. During the inauguration ceremony conducted at the PPLH center attended by the head of the Mojokerto Regency and other local dignitaries, Director General of Electricity & Energy Utilization, Ir. Luluk Sumiarso congratulated MHPP, and other involved institutions for their contributions in pioneering the first such project in the country. He also congratulated the local PLN representatives for their constructive participation in the project and in particular in finding solutions to the many "unanticipated" problems inherent of such pioneering ventures. After the formal ceremony held within the grounds of the Environmental Education Center (PPLH) in the Seloliman village, the guests were escorted to the site where they were given an introduction to the technical aspects of the project from the MHPP team leader.



Photo 2. The Director General for Electricity & Energy Utilization, Ir. Luluk Sumiarso and PLN's deputy Director for Business Development are given an explanation of the power plant by Mark Hayton, MHPP team leader.

Comparative Study Tour Dept. of Mining & Energy West Sumatra visit grid-connected MHP in Seloliman, East Java

Within days of its official inauguration, the first grid-connected small private renewable energy power project in Indonesia was already capturing the attention of other regions. Representatives from the Dept. of Mines & Energy, accompanied by Mr. R. Muh. Enoch, head of the Micro Hydro Power Technology Development Center, University of Padang, West Sumatra (P3MH), conducted a comparative study tour to the Seloliman MHP project in December 2003. During the 2 day visit, the visitors studied both the technical set-up facilitating the inter-connection with the PLN grid as well the administrative aspects of the scheme. West Sumatra possesses a huge mini hydro potential which is largely untapped. The relatively extensive PLN grid network which exists in the rural areas of West Sumatra makes the province an ideal location for replicating the approach successfully demonstrated by the Seloliman project.



Mini Hydro Power Project (MHPP) is a cooperation project between the Directorate General of electricity and Energy Utilization within the Indonesian Ministry of Energy and Mineral Resources and German Technical Cooperation (GTZ) on behalf of German Government

EDITORIAL

Jl. Cisarua 193, Bandung 40142, Indonesia, Phone/Fax +62 (0) 22-203 21 28,
Web Site: <http://www.mhpp.org>

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