Indonesian Microhydro Power Development

A Success Story

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In West Java, one of the main tea regions in Indonesia, the first turbine was installed in 1885. At this time the turbines were providing shaft power to tea rollers and other machinery in the tea factory but not directly driving generators. Later, with advancing turbine and generator technology, hydroelectric power plants were built. In 1910, forty private tea plantations owned hydropower plants, in 1925 there were already 400 with a total capacity of approx. 12.5 MW,
Microhydro Power for Electricity Generation

• Microhydro as the priority development due to environmental concern, relatively low cost and its huge potential in Indonesia (approx 7.500 MW)

• Priority for diesel fuel substitution for electricity generation in remote area and for rural electrification

• Reducing the CO2 emission by replacing diesel power

• Small hydro power has been the priority development due to environmental concern, cost, and potential resources. Since 1990, DGEEU collaborate with GTZ set the micro-hydro power project in Indonesia. One of the project targets is the technology transfer through the capacity building of local partner.
Indonesia had local capacity addressing all technical aspects of mini hydro power project development in particular local content of electro-mechanical equipment.”

- Simple but sophisticated turbine designs and fabrication technique encourage local manufacture.
- Considerably cheaper than imported equipment.
- Service, know-how and spare parts available locally.

- Francis Turbine up to 1 MW
- Crossflow Turbine T – 15 up to 400 kW
- Vertical Axis Propeller Turbine up to 60 kW
- Tubular Propeller Turbine up to 200 kW
- Electronic Load Controller (ELC), Induction Generator Controller (IGC), Digital Turbine Controller (DTC), Flow Control System
Turbines can now be produced locally covering a wide range of sizes suitable for a variety of projects (stand alone, captive, grid connected)

In 2005 the first locally manufactured T15 Cross Flow turbine with a runner diameter of 500mm was commissioned selling power to the grid.

The simple design allows good standardisation and manufacturing without sophisticated manufacturing facilities.

More than 10 turbine manufacturer 3 of them already exported to ASEAN Country, African Country and European Country as well
Indonesia as Regional Learning Centre for MHP

- Indonesia has accumulated a lot of MHP know how in the power range of up to 250kW in the last 20 years.
- In Indonesia about 400 qualified people represent an experience of **4000 Man/Years** in all aspects of building and operating MHP in the range up to 1000 kW.
- This know how should be accessed to accelerate the development of MHP in Indonesia and wide world.
- Objective: “To build up local capacity addressing all aspects of mini hydro power project development”
- **target groups** participants are private and public sector and educational institutions actively involved in MHP development, mainly active in the ASEAN region.
Rural energy condition in Indonesia

- More than 50 million Indonesians do not have access to reliable and affordable electricity services.
- About 6,200 villages are technically difficult to get the electricity through grid extension.
- Limited access to modern energy; electrification ratio in 2013 was less than 80%.
- In addition to the grid extension, rural electrification program is based on renewable energy application.
Microhydro power

Advantage

• Empowerment local small enterprise through electrical power sector : Rural or local added value addition : Reducing Urbanization
• Resources utilization without extraction small scattered unutilized water potentials
• Reducing fossil fuel consumption (at least village level)
• Increasing electrification ratio (off grid)
• Using local engineering & manufacturing & construction Improvement living condition and social welfare in rural area
• Increasing rural management capacity ; Environmental management (Protection and recovery of catchment area), Business management (Create village financial inflow or village capital accumulation process)
Utilizing the Electric Power for Productive Activities

Nowadays more than 600 Microhydro Power Plant supply electricity to rural area (off grid operation mode) in Indonesia. Rural communities implement Microhydro Power projects for electricity and productive use purposes:
• Embroidery, sewing
• Grain milling
• Domestic Lighting
• Desicated coconut
Step of Microhidro Power Development for Rural Electrification
Try to Understand
What They (Community) Need
Planning, Surveying, Feasibility Study
Design and Engineering

♦ Mechanical
♦ Electrical
♦ Civil Works
Local Manufacturing

- Magnetic Particle & Ultrasonic Testing
- Dry Running Test
- Turbine Assembling
Working Together with the Community
The Villagers as Beneficiary of the Project
Trian Run, Commissioning
Training of Operation and Management
Productive Use of Electricity
Smiling After Microhydro Implementation
We should know how this water resource could supply electricity to more than 1,000 peoples at remote area and enhancing rural economic development

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Thank You