Microhidro Power for Rural Electrification in Indonesia

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Renewable Energies for Community
A view from Japan and Asia
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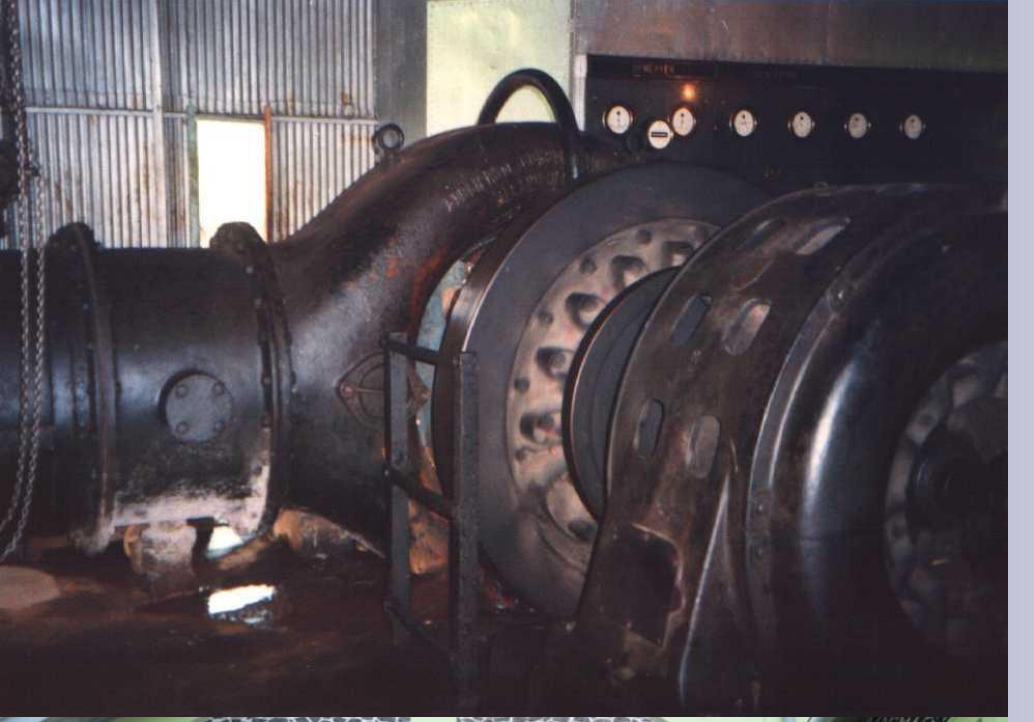
Faisal Rahadian
ASOSIASI HIDRO BANDUNG
Indonesian Small Hydro Power Association
Jl. Sabang No. 25 Bandung INDONESIA
Phone ++62 22 4240310
hidrobandung@yahoo.com



Bandungte Electriciteits masatsehappij (PLN)
Francis, 700 kW, 1923

History

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, hydro**electric** 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 potensial 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.

LOCAL CAPABILITY DEVELOPMENT

- 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 then 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 Propeler Turbine up to 60 kW
- Tubular Propeler Turbine up to 200 kW
- Electronic Load Controler (ELC), Induction Generator Controler (IGC), Digital Turbine Controler (DTC), Flow Control System

LOCAL MANUFACTURER

- 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 esported to ASEAN Country, African Country and European Country ass well

Indonesia as Regional Learning Centrer for MHP

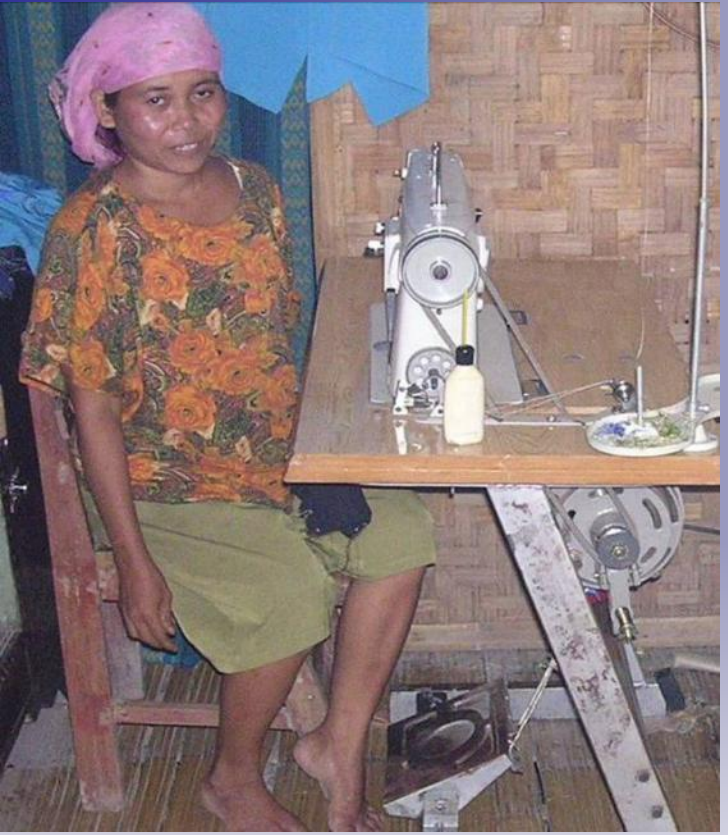
- Indonesia has accumulated a lot of MHP know how in the power range of up to 250kW in the last 20years.
- In Indonesia about 400 qualified people represent a experience of **4000 Man/Years** in all aspects of building and operating MHP in the range up to 1000 kW
- This know how should be accessed to 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 40 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 2014 was about 82%
- In addition to the grid extension, rural electrification program is based on renewable energy application.

Microhydro power Advantage

- Empowerment local small enterprise trough 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

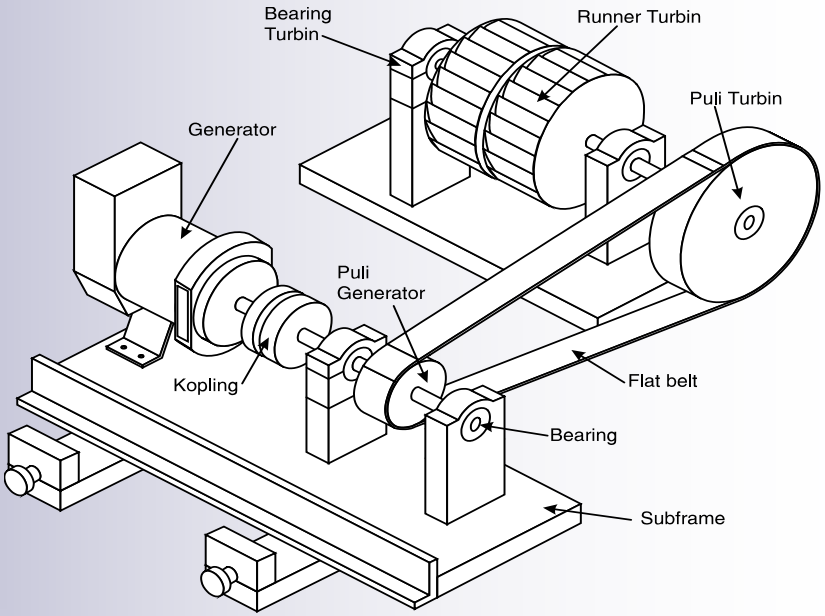
Step of Microhidro Power Development for Rural Electrification

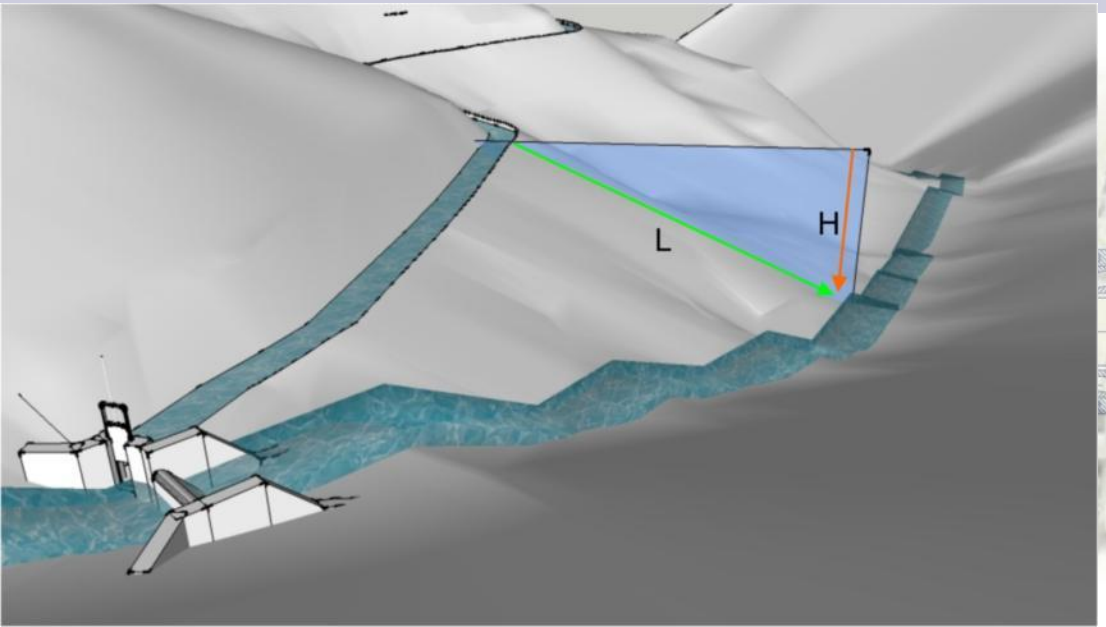
Try to Understand What They Need

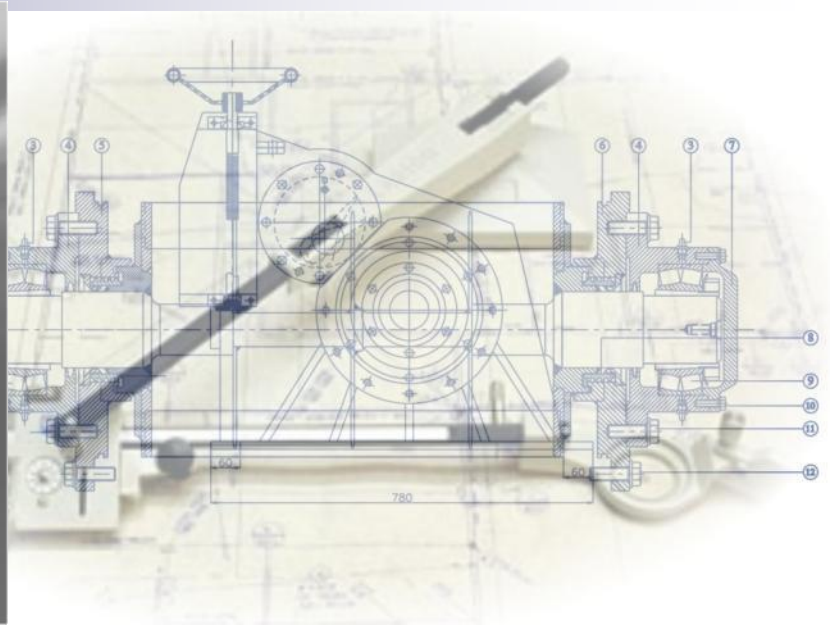
Planning, Surveying, Feasibility Study

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

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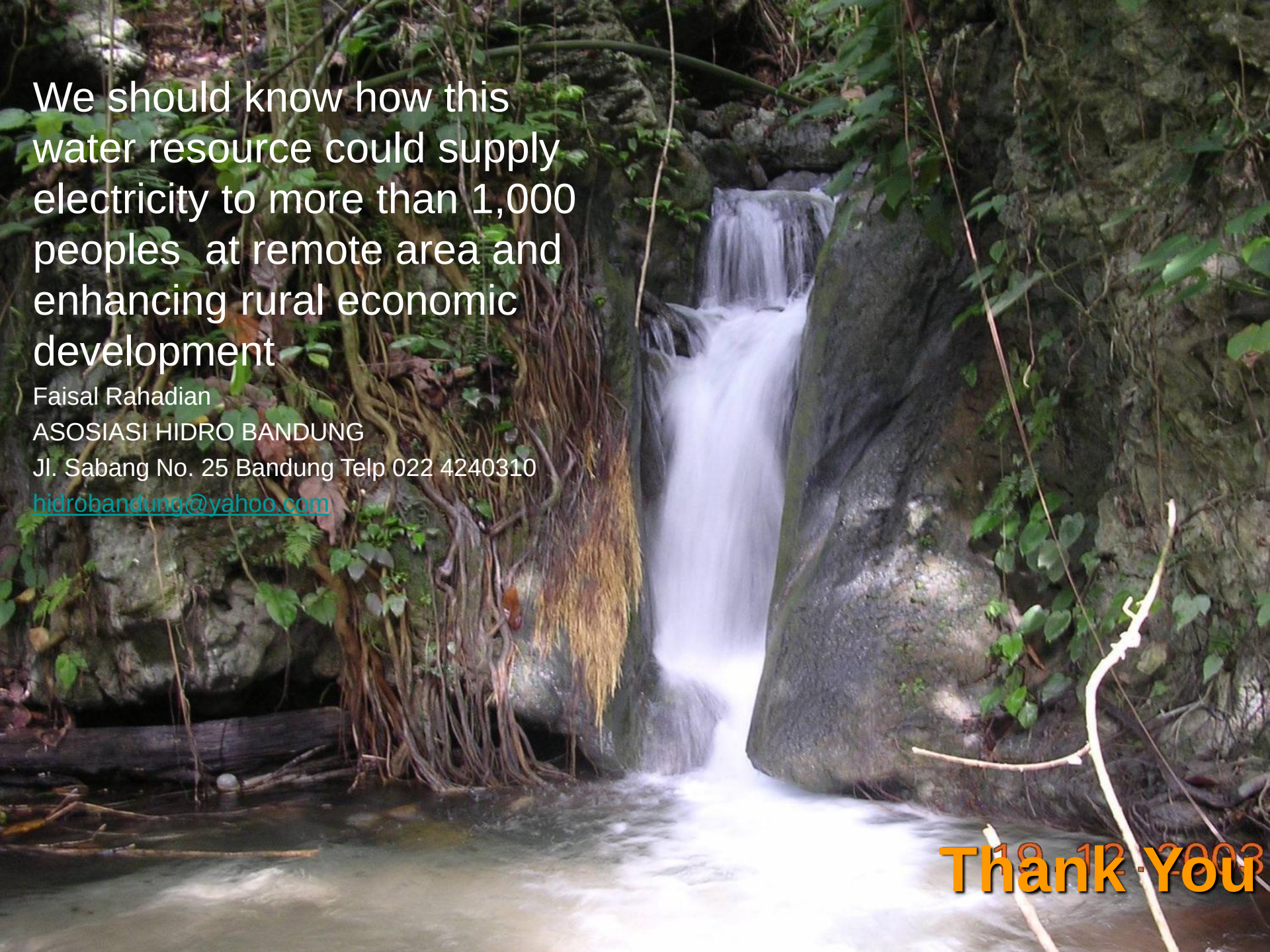
Training of Operation and Management

Productive Use of Electricity

Smiling After Microhydro Imlementation



We should know how this water resource could supply electricity to more than 1,000 peoples at remote area and enhancing rural economic development

Faisal Rahadian
ASOSIASI HIDRO BANDUNG
Jl. Sabang No. 25 Bandung Telp 022 4240310
hidrobandung@yahoo.com

Thank You