



Hydropower enhances lives in Indonesia

The energy industry is undergoing profound change. Fossil fuel reserves are dwindling. Their impact is harmful to the environment. To reduce our reliance on scarce fossil fuels we must explore every possible source of renewable energy.

There is a lot of energy in water. Hydropower – energy derived from flowing water – is becoming an increasingly attractive option as a major future energy source.

Hydropower plants can provide the most cost-competitive generating option among all renewable sources. Cost-efficient energy production delivers low-cost bills. Discover the technological, economic, and environmental benefits of hydropower.

Development of Hydropower Plants in Indonesia The Challenge

More than 86 million people in Indonesia still lack even basic access to electricity. Royal HaskoningDHV is involved in developing small-scale hydropower plants to produce a combined total of 100 MW. The first stage of the project involves four mini hydropower plants, bringing sustainable energy to around 55,000 people in Central Java.

Our Solution

The project consists of four cascaded run-of-river hydropower plants on the Merawu river: Karekan (6 MW), Watupayung (2.4 MW), Pandansari (6 MW) and Tempuran (1.2 MW).

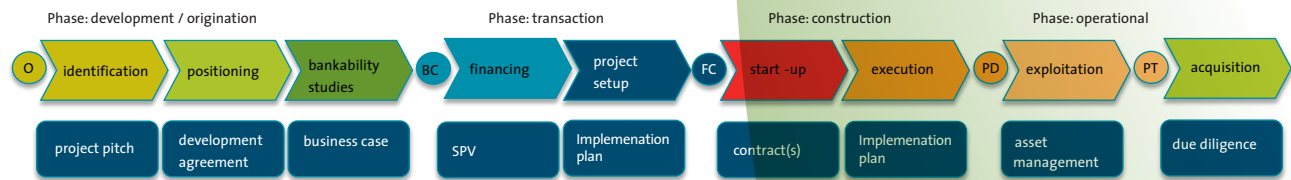
Infrastructure includes diverging weirs, sediment traps and penstocks. The powerhouses will each contain several turbines. A transmission line will connect to the 20 kV grid, and access roads will also be constructed. The impact on the local environment will be small and manageable. Royal HaskoningDHV is responsible for the full scope of service of the hydropower project life-cycle, including:

- Review local feasibility study - technical review and gap analysis
- Evaluation of business case
- Hydrological study - data analysis and modelling, on-site discharge measurements, production of flow duration curves and design discharge
- Preparing detailed design and tender documents for the four plants
- Tender assistance
- Construction management.

The Outcome

The electricity will be sold under a feed-in tariff agreement of about 4 \$ct for a period of 25 years. The \$30 million investment has a return on investment of seven years. The supply of power to these communities will bring wider benefits, supporting increased economic activity and providing employment.

Hydropower



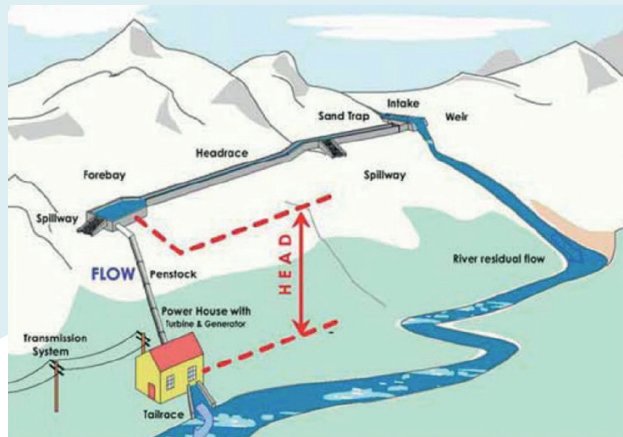
Hydropower Project Life Cycle: The first stage concerns Project Origination which is the stage between the Origin of projects (O) to establishing a Business Case (BC). The second stage is the transaction up to Financial Close (FC). The Third stage is the construction phase of the project upto project

Hydropower is generally defined as 'power derived from the energy of falling water' and uses hydropower plant (HPP) to produce electricity from this power. These can be classified as follows:

- Run-of-river (RoR) HPP
- Reservoir / Dam HPP
- Pumped Storage Plants

Hydropower Classification:

- Mini <10 MW
- Medium <100 MW
- Large >100 MW



Run-of-river Hydropower Plant

The main consultancy services:

Development phase:

- 1) Project identification
- 2) Site Reconnaissance Study
- 3) Pre – Feasibility Study
- 4) Bankable Feasibility Study
- 5) Review Feasibility Study
- 6) Environmental & Social Study
- 7) Watershed Management
- 8) Basic Design (for EPC)

Transaction phase:

- 1) Investment and Financial Services
- 2) Due Diligence (technical and financial)

Construction phase:

- 1) Detailed Engineering Design and Tender Documents
- 2) Tender Assistance and Bid Assessment of Contractors
- 3) Construction Management and Supervision

Operational phase:

- 1) Defects Liability Period and Monitoring
- 2) Capacity Building for O&M power plant
- 3) Condition assessment, refurbishment and upgrading

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