RENEWABLE ENERGY BEST PRACTICE CASE STUDY
IRISH ENERGY CENTRE, RENEWABLE ENERGY INFORMATION OFFICE

MICRO-SCALE HYDROPOWER PROJECT
Site: Kilkenny, County Kilkenny
Starting-up date:1994

1. AIM OF PROJECT

This project was carried out as a joint venture between an energy consultant and the owner of a sawmill located at the site of an exiting water mill. Their objective was to refurbish the water mill in order to meet the electricity needs of the sawmill and generate revenue from the sale of surplus electricity.

An additional aim was to demonstrate the manufacture, installation and operation of alternative low-head technologies for use in self-build projects.

2. DESCRIPTION

The characteristics of the site at which the refurbishment took place include a head of 0.6 to 2 m and an average flow for the river of 30 m/sec.

The refurbishment project involved the installation of 3 key pieces of equipment an open flume propeller turbine, an undershot waterwheel and a tube turbine.

The open flume propeller turbine is 1m in diameter, with cast steel blades of the owner's own design welded onto a cylindrical hub. Transmission is Vee belt. At 220 rpm, the turbine generates 30 kW at 1.8 m head.

The open shoot water wheel is a 5 m diameter millwheel with aluminium curved blades designed for air induction to improve the aeration of the river. The machine develops 22 kW electrical at a head of 1.5 m.

The horizontal-axis tube turbine is 1m in diameter. The blades were fabricated from flat plate on site; transmission is via a toothed belt drive. The unit gives a power output of 40 kW electrical at 2 m head. All 3 machines were manufactured on site.

3. OWNER

The plant is owned in a joint venture by the energy consultant and sawmill owner.

4. INVESTMENT AND FINANCING

The installed costs for the project totalled in the region of IR£35,000. Electricity bills for the sawmill are minimised and revenue is derived from the sale of surplus electricity. The project was personally financed without borrowings or grants. The payback period is estimated at 3 years.

5. RESULTS (ENERGY DETAILS)

Annual output from the plant is in the region of 500,000 kW hrs.

The project has successfully demonstrated the manufacture, installation and operation of the open flume propeller turbine, undershot waterwheel and tube turbine as alternative low-head technologies for use in self-build projects.

6. ENVIRONMENTAL IMPACT

By displacing the need to burn fossil fuels, the installation reduces carbon dioxide emissions by approximately 5,000 tonnes per year. In addition, emissions of gases that contribute to acid rain and air pollution are avoided. Aqua tic life is protected through the installation of electric fish barriers on the talirace. Further more, the mill wheel has a beneficial aerator effect.

7. USERS

The mill wheel is a satisfactory solution to low-power, low-head hydropower in terms of construction, reliability and ease of maintenance. In addition, it is benign to fish movements and provides excellent aeration.

The self-build option is suitable in situations where labour is plentiful but cash and OEM parts are scarce. The potential for replication of this project is widespread and can be undertaken as part of heritage conservation works at disused mill sites.

8. MAIN MANUFACTURE AND SERVICE SUPPLIERS

Design and Manufacture

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9. MORE INFORMATION

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