

THESIS

**PROMOTION OF COMMUNITY BASED MICRO HYDROPOWER
PROJECTS: A CASE STUDY**



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For the Degree of

MASTER OF SCIENCE

IN

HYDROPOWER ENGINEERING

**CENTRE OF EXCELLENCE IN WATER RESOURCES ENGINEERING
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2008

ABSTRACT

Pakistan is blessed with abundance of renewable energy potential but so far this potential has not been harnessed except for large hydro electric projects. The hydropower is the most important commercially available renewable and very attractive source of energy. Hydropower plants capture the energy of falling water to generate electricity. A turbine converts the kinetic energy of falling water into mechanical energy. Then a generator converts the mechanical energy from the turbine into electrical energy.

Micro Hydropower Projects (MHP) are relatively small power sources appropriate in most cases for individual users or groups of users who are independent or far away from the grid electric supply. MHP have the plant capacity of power generation from 1 to 100 KW. Water is usually not stored or diverted over large tracts as natural flow of canals or streams are sufficient and generates electricity by harnessing small water falls of minimum 1m or water flowing with a velocity > 2 m/sec. Keeping in view the renewable, relatively small and cheaper source of power generation and energy demand in the area, the study for the promotion of micro hydropower projects is carried out over Hakra Canal in District Bahawalnagar.

Hakra Canal with a discharge of 3078 cusecs off takes at Jal Wala Head, from Sadqia Canal that originates from River Sutlej at Head Sulemanki. It travels along the

Indo-Pak border. The available heads and bulk supply of water are sufficient to propose MHP at canal to produce electricity and to supply the peripheral villages.

Micro Hydropower Projects have very much importance and significance all over the world and have full concentration both in developed and under developing countries to uplift the social economical aspects of the lives of their people.

The present study showed that head available at different R.Ds. along the main canal, ranges from 3 ft to 6 feet is sufficient to install MHP at selected sites to produce 1230 KW electricity. This electricity can be supplied to the nearby villages to improve the financial and economical conditions by using advanced mechanical systems income-earning activities. Improvement in health and reduction in diseases by the provision of new treatment facilities, clear water supply, proper sanitation and drainage systems. Massive reduction in indoor/ outdoor air pollution, kerosene oil and firewood consumption.

The most suitable layouts for installation of micro hydropower plants along The Hakra Canal are proposed with plants in BY-Pass Canal and Adjoining By-Pass Canal. Since these schemes are with low head and high discharges, the most suitable turbines proposed for these schemes are "Kaplan Turbines".

For this study it is recommended that AEDB with the cooperation of provincial and the local government representatives should make as easy procedure to solve the

power sales contract, terms and rates for the project. In order to implement the policies and to solve the regulatory barriers every provincial government should be responsible. Efforts should be made to simplify the set of procedures and rules through one window operation to create interest for the investors and to speedup the system of approval, permission, documentation and all agreements.