

MILLS – Development and Implementation of a Concept for the Use of Water Mills for Small Electrification as well as the Operation of Oil Presses and Corn Mills in Rural Residential Areas in Developing Countries: The Case of Ethiopia

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A small hydropower plant with a water wheel was developed, with technical specifications adjusted to the specific conditions in developing countries. These water wheels were planned according to requirements in rural residential areas, with a power output of 2 to 6 kW. In many developing countries, the area-wide supply of electricity is lacking. The use of the renewable energy “water power” represents an ideal solution to this problem in regions with high hydropower potential, e.g. Ethiopia. The living conditions of people in these regions, the sustainability and protection of the environment will be improved, resources preserved and emissions avoided.

The Triangle Cellsegment Waterwheel (TCW) was developed at the Research Centre for Water and Environmental Engineering (fwu) in cooperation with ProAqua Company of Engineers for Water- and Environmental- Technology Ltd and is particularly designed for manual assembly and production in rural areas of developing countries. However, the construction also allows for mass production. Main advantage of the TCW is the small number of different construction units, which can be manufactured with simplest means in small workshops in developing countries. The construction consists of shovels and traction spokes and can be manufactured with low costs. Simply detachable connections (screws and screw nuts) are needed for the assembly. The energy can be conveyed by a belt transmission directly for the operation of different machines (saws, hammers, mills, looms etc.) or the wheel drives a generator which produces electricity for universal appliance.

The aim of the applied research project is to create foundations for a standard by which small economical hydropower plants can be implemented as a modular design principle. Those optimised water mills could make an important contribution towards resolving energy as well as erosion problems in rural areas in developing countries.