A Technical Discussion on Microhydropower Technology and its Turbines

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Abstract

Shortage of electricity supply and other forms of modern energy is serious in most of the developing countries, contributing to low economic and social development. The situation is worse in rural communities, which are often marginalised from grid-based electricity supply because of economic and technical reasons. Currently, development agencies involved in rural power supply in developing countries recommend microhydropower (MHP) as the most robust and reliable source of off-grid power generation. However, in scholarly articles, MHP technology is not popular compared to other renewable energy technologies. This may have contributed to its limited application in off-grid power supply in some countries. Availability of scholarly literature on MHP as the case with wind and solar energies can therefore help to scale-up the level of discourse on the technology among both technical and non-technical stakeholders.

In this paper, the MHP technology has been reviewed in general and the turbines in particular. General description of the technology including challenges and factors for successful implementation of the technology has been given. It has been found that technological issues are among the major challenges and that the turbine is one of the critical technological components of the MHP project. The paper has reviewed common MHP turbines, focusing on their operating principles, merits and demerits with respect to MHP and suitable operating conditions. Factors to consider when selecting suitable turbine for the site and procedure for selecting the turbine have also been outlined in the paper. The paper has been written in a tutorial manner so that the discussions therein, though technical, are shared with stakeholders of different professional backgrounds. It is hoped that the paper provides additional knowledge on MHP technology and in particular on turbines that are used in MHP supply. This can lead to better practical implementation of the technology.

Keywords

Microhydropower; Appropriate technology; rural energy supply; Off-grid electricity; Small-scale turbines; Renewable energy