

## **Abstract**

The necessity of reliable and affordable energy is crucial issue in Kenya, especially in the context of rural areas where majority of people live. Rural people require energy options that generate income and social benefits such as good lighting, clean drinking water, health services, cottage industry, education and improved agricultural activities. However, forms of energy used in rural areas cannot necessitate such kind of benefits, since 70% of the population still depends on biomass. Electricity is known to provide all these range of services. Currently, more than 96% of rural the population do not have electricity considering its role in provision of modern energy services. This is due to inability of the Rural Electrification Programme(REP) to extend electricity to majority of rural areas. Electricity supply through grid extension to rural areas is frequently not an option due to sparse settlements, cost of infrastructure and low consumption load. Decentralised stand-alone systems such as small-scale hydropower schemes are considered technically and a commercially viable alternatives to grid extension, especially when deployed to areas of hydropower potential. This is because they can be exploited on small scale, are highly reliable, low cost and are considered environmental benign. There exist a huge potential for small-scale hydropower development in Kenya, but it has not been tapped to any significant extent. Only a few schemes exist, with little information about their role in community development. The study attempts to explain as to why community electrification has not been enhanced through deployment of small-scale hydropower schemes. Roles of such schemes in rural development and circumstances in which they should be deployed to offer meaningful energy services over a long period have also been explored. Inadequate policies to promote development of small-scale hydropower schemes have been identified as major barrier. The study is based on three case studies of community small-scale hydropower projects that have been implemented in Kenya. The following is a summary of principle findings:

- SSH schemes would have role to play in household fuel substitution, diversification and power productive end-uses but cannot substitute fuelwood for cooking, which constitutes over 70% of the monthly energy expenditure. Over 80% of pico hydropower consumers are dissatisfied with power supplied by the project due to limitations in the supply. Consumers are reverting to traditional sources of energy.
- Current schemes are operating within a policy vacuum and are implemented based on ad-hoc licensing agreements to generate and distribute power. There is no policy, publication or any document on technical standards for small-scale hydropower sub-sector in Kenya. In absence of any technical standards, SSH schemes have been implemented based on the prudent practice standards.
- SSH produce expensive power in comparison to electricity supplied by national grid, but competitive to solar and lead acid batteries. The schemes are not financially viable due to high operation cost and lower revenues. Consumers pay lower tariffs than the real cost.
- Capital subsidy is necessary to reduce costs of installing schemes. SSH will not be attractive for private sector funding due to risks associated with community-managed schemes.
- Limited technical expertise coupled with poor understanding of the system operations has encouraged tampering and damaging Thima scheme whose beneficiaries resort to using unqualified technicians.
- Developing SSH programme involves many institutions. However, framework of involving key stakeholders even in the current case study schemes is still lacking. The role of intermediary organization is crucial to the success of community SSH.
- Involving beneficiary communities in SSH is key to the success of the project. However, working with or strengthening established institutions is likely to lead sustained service.