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## A Case Study of Status and Potential of Small Hydro-Power Plants in Southern African Development Community

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### Abstract

The Southern African development community is having a major challenge in connection with desires for energy in the region. There is the need to increase energy security and admittance to modern energy services immediately, particularly in the rural areas as well as addressing the challenges posed by the current energy systems on human health and the environmental. The rapid growth of renewable energy capacity in the region contains all the potentials that can answer to quite a lot of problems for instance: rapidly increasing electricity saturation, including remote areas detached from the grid infrastructure. Old resources need to be replaced as well as producing new once to adequately generate to meet the growing demand. Renewable energy and energy-efficient technologies in addition to services are an essential part of the new energy dynamic in the region. To meet these demands, the region needs to, rapidly develop and connect existing renewable energy resources and embrace energy efficiency, as a matter of priority. The existing potential sites in the region are mentioned and Small-scale hydropower is one of the most cost-effective energy technologies to be considered for electrification in the countries since it has low environmental impacts and can have a significant benefit if implemented in rural areas for electricity production. There is therefore the need for all development community, policy makers and regulators, local and global investors, developers and project promoters to support by providing funds, making good policies to protect the energy sector in other to solve the problem.

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## 1. Introduction

Small hydropower is one of the renewable energy technologies that have great potential within the sub-Saharan African region. Admittance to current, renewable energy empowers countries to make improved lives for their people through the provision of lighting streets to decrease crime, providing electricity for making local goods, as well as housework and providing portable water all over the countries in the sub-Saharan regions. An insufficiency of energy has effectually inhibited the development of sub-Saharan Africa with an estimated 70 percent of people deprived of reliable access to electricity. For example, Gabon and Nigeria, industries find it difficult in their production since electricity remains costly and unreliable. As stated by the African Development Bank [1], industrialists within the region experience an average of 56 days of power cut per year due to power outages. [2]. on the word of the International Energy Agency [3], sub-Saharan Africa will need more than \$30 billion in investment to attain widespread electricity by 2030. Rural areas will need the highest amount of the funds, with more than 85 percent of the inhabitants requiring access to consistent electricity. The complex nature of the energy sector further hinders the growth of rural electrification and in turn small hydropower development in SADC. Overlapping responsibilities between ministries such as the Ministry of Energy and Mines, the Ministry of Communal Development and the Ministry of Development Planning and Finance (which is responsible for investment planning and coordination with foreign donors), slows down the growth process of small hydropower. Fiscal barriers to small hydropower development consist of a lack of incentive for foreign investments and high transportation costs for equipment's. Lack of small hydropower surveys and data availability as a basis for carrying out is also a major constraint is the continent. Local hydropower sources can play a very important role in the electrification of rural areas in Southern African Development Community to ensure the sustainability of hydropower. As the potential for small hydropower (schemes with an installed capacity of less than 10 MW) is typically found away from the larger population areas it is a very suitable energy source for rural electrification purposes. It can be used either as standalone power source or in hybrid systems with other energy sources. Depletion of fossil fuel and the inability to meet the rising demand of electricity are some drawbacks for the economic development of Africa. This paper focuses on the potential of small hydropower in the Southern African Development Community due to its numerous rivers and canals providing off-grid power to the remote areas and also to the areas that are still outside the main grid network. It further reflects on the current energy scenario within the region, the need to provide the establishment of widespread small hydropower that can help overcome the current power crisis and play a role in the economic progress of the Countries.

### 1.1 Definition of Small Hydropower

No internationally agreed definitions exist for the different sizes of hydropower. A generic distinction between 'large' and 'small' hydropower is that the latter can be seen as installations up to 10 MW of installed capacity. Most countries in Sub-Saharan Africa use this limit to define small hydro, although Mozambique uses 25 MW as the upper limit for small hydro [4]. The upper limit is usually taken in line with the World Commission on Dams as 10 MW of installed capacity though large countries like China and India tend to put the limit higher at 50 MW and 25 MW respectively. The definitions can vary based on manufacturers and countries. In Africa the general term for installation less than 10MW (OR1MW), in feeding local grid (10,20kv) is termed small hydropower [5], However, a capacity of up to 10 MW is a generally accepted norm by the European Small Hydropower Association (ESHA), the European Commission, and UNIPEDE (International Union of Producers and Distributors of Electricity). Small hydropower is a recognized and mature technology with good records in Africa. A lot of African countries have a great history of small scale hydropower, but most of these stations over time are in poor condition. Some for the reason that the national grid reached their location and some due to lack of maintenance.

### 1.2 Overview of small hydropower worldwide

Currently, small hydropower plants with a capacity of 10 MW, exist in 148 countries or regions worldwide with additional four other countries known to possess resource potentials. The discoveries of World Small Hydropower Development Report (WSHPDR) 2016 shows that small hydropower potential has globally increase from the approximated 173 GW in 2013 as indicates by World Small Hydropower Development

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