

# WORLD SMALL HYDROPOWER DEVELOPMENT REPORT 2013

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ZIMBABWE



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# 1 Africa

## 1.1 Eastern Africa

### 1.1.14 Zimbabwe

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#### Key facts

Population	12,619,600 <sup>1</sup>
Area	390,759 km <sup>2</sup>
Climate	Tropical; moderated by altitude <sup>1</sup>
Topography	Mostly high plateau with higher central plateau (high savannah); mountains in east <sup>2</sup>
Rain Pattern	Rainy season: November to March. <sup>1</sup> Rainfall decreases from east to west. The eastern mountains receive more than 1,000 mm annually, while Harare has 810 mm and Bulawayo 610 mm. The south and southwest receive little rainfall. <sup>3</sup>

#### Electricity sector overview

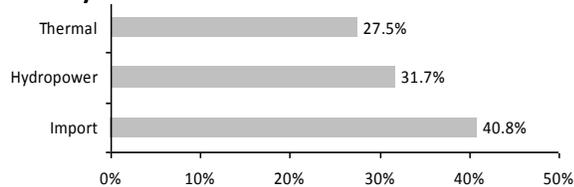


Figure 1 Electricity generation in Zimbabwe

Source: Tradingeconomics<sup>4</sup>, Clean Energy Portal – Reegle<sup>1</sup>

Note: Data from 2009.

In rural Zimbabwe, 80-90 per cent of people are heavily dependent on wood fuel. Rural populations light their homes with kerosene and carry out essential food processing tasks such as milling grain, using diesel-powered systems. Access to electricity is estimated nationally at nearly 40 per cent, but access to electricity in the rural areas of the country is about 19 per cent, due to very high costs of extending the national electricity grids. Electricity consumption was 998 kWh per capita in 2006.<sup>1</sup>

In accordance to the government policy to embark on reforms of the electricity sector, a new Electricity Act was enacted in 2002, bringing about the restructuring and unbundling of the Zimbabwe Electricity Supply Authority (ZESA) from a vertically integrated utility into separate successor companies focusing on generation,

transmission and distribution, and service companies. The new Act also provided for the setting up of an autonomous regulatory body that would encourage new investment in the electricity sector through appropriate regulatory, fiscal and environmental frameworks, harmonized with those of the South African Development Countries (SADC) and through strategic partnerships.

In 2005, the Zimbabwe Electricity Regulatory Commission was established in accordance with section 5 of the Electricity Act. However, in line with regional trends in the regulation of the energy sector a policy for the establishment of an all-encompassing energy sector regulator that seeks to harmonize regulation in the energy sector is being adopted. In this regard, the Ministry was in the process in 2012 of enacting the Energy Amendment Bill which seeks to synchronize the Petroleum Act, the Electricity Act and other renewable energy Acts that will provide for, among other things, the setting up of an energy regulator to harmonize regulation in the energy sector as a whole.<sup>5</sup>

#### Small hydropower sector overview and potential

The total hydropower potential on Zambezi River for Zimbabwe and Zambia is 7,200 MW. There is a potential to generate 120 MW from small and mini-hydropower resources (20 MW from existing dams, 60 MW from proposed dams and 43 MW from run-of-river sites).<sup>6</sup>

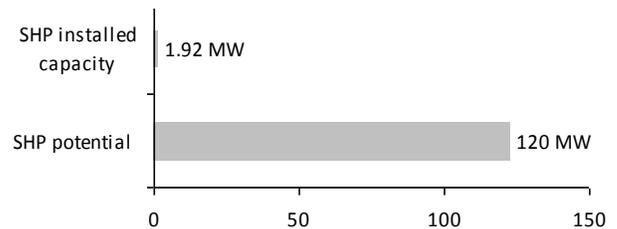


Figure 2 Small hydropower capacities in Zimbabwe

Source: Mbohwa<sup>7</sup>, Shakyá<sup>8</sup>

The total installed small hydropower capacity in Zimbabwe is unknown, however, there is information on a few projects (see figure 2). A plant of 750 kW at Rusito, in the Chimanimani area, is connected to the national grid and has a Power Purchase Agreement (PPA) with the national utility ZESA. Other plants are installed at Kwenda (80 kW), Sithole-Chikate (30 kW), Svinurai (10 kW), Mutsikira (10 kW), Rusitu (700 kW), Nyafaru (40 kW), Aberfoyle (30 kW) and Claremont (250 kW).<sup>7,8</sup>

Recently the Masvingo Rural District Council has approved a US\$13 million, 5-MW small hydropower project at Lake Mutirikwi. The application was made by the Great Zimbabwe Hydro-Power Company, jointly owned by a Zimbabwean company, ZOL, and its South

African partner, NuPlanet. The plant is one of two currently being developed in Zimbabwe. It will be situated on the 52 year-old, 63 metre crested Mtirikwi Dam near Masvingo and will consist of one 5-MW Francis turbine. Project commissioning is expected to begin by March 2014.<sup>9</sup> The site has a very delicate hydrology that called for an intense interaction between the developers and the downstream users of the water. The project is expected to enter into a Clean Development Mechanism Programme of Activities for small hydropower in southern Africa.<sup>10,11</sup> Another 5-MW facility at Tokwe-Murkosi is planned for completion in 2013.<sup>12</sup>

Detailed plans do exist for the Manyuchi dam hydropower plant. ZESA has long had plans to generate electricity from the dam, but so far nothing has materialized due to the shortage of funding. Studies,

however, show that the water availability should make it possible to drive two 350-kW turbines 6,000 hours per year to generate 4.2 GWh of electricity per year.<sup>13</sup>

Table 1 gives an overview of small hydropower projects prioritized by the Zimbabwe Government for future development. Table 2 provides examples of implemented micro hydropower schemes in Zimbabwe.

Table 1  
**Priority small hydropower projects in Zimbabwe**

District	Site	Type of plant	Capacity (MW)
Mwenezi	Manyuchi	Dam	1.4
Masvingo	Mutirikwi	Dam	5.0
Mutasa	Osborne	Dam	3.0
Bikita	Siya	Dam	0.9
Mutasa	Duru	Run-of-river	2.3
Nyanga	Tsanga	Run-of-river	3.3

Source: Ministry of Energy and Power Development<sup>5</sup>

Table 2  
**Micro hydropower schemes in Zimbabwe**

Name	Capacity (kW)	Head (m)	Flow (l/sec)	Turbine; Number of jets	Uses of power
Chipendeke	25	41.00	100	Pelton ; 3 jets	Household; end use, clinic, primary school
Dazi	20	121.00	30	Pelton; 1 jet	Household; end use, clinic, primary school
Nyafaru	20	25.18	150	Crossflow; 1 jet	Primary and secondary schools, boarding school facilities, clinic

Source: Khennas and Barnett<sup>14</sup>

Note: The schemes are part of the part of the Practical Action project.

### Renewable energy policy

A draft policy energy framework was passed in 2008. The objectives of the Energy Policy are:<sup>15</sup>

- To ensure accelerated economic development;
- To facilitate rural development;
- To promote small-medium scale enterprises;
- To ensure environmentally friendly energy development;
- To ensure efficient utilization of energy resources.

### Barriers to small hydropower development

With the current economic and political situation in Zimbabwe improving, the drive by the Government to encourage independent power producers, the prospects for the development of small hydropower are promising. The Government has in section 3.5 of their Energy Policy 2008 commented on the reasons for the limited penetration of renewable energy technologies in general including small hydropower:<sup>16</sup>

- No clear policy and strategy;
- Limited qualified and experienced personnel;
- High upfront costs for the installation of the technologies;
- Poor appreciation and demonstration of benefits;
- Poor back-up service especially in remote rural areas;
- Lack of foreign currency to import components;

- Application of ineffective marketing strategies (technology drive).

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