Disclaimer

Published in 2013 by United Nations Industrial Development Organization (UNIDO) and International Center on Small Hydro Power (ICSHP).

2013 © UNIDO and ICSHP

All rights reserved

This report was jointly produced by United Nations Industrial Development Organization (UNIDO) and International Center on Small Hydro Power (ICSHP) to provide information about small hydropower. The document has been produced without formal United Nations editing. The designations employed and the presentations of the material in this document do not imply the expression of any opinion whatsoever on the part of the Secretariat of UNIDO and ICSHP concerning the legal status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries, or its economic system or degree of development. Designations such as “developed”, “industrialized” and “developing” are intended for statistical convenience and do not necessarily express a judgement about the stage reached by a particular country or area in the development process. Mention of firm names or commercial products does not constitute an endorsement by UNIDO or its partners. The opinions, statistical data and estimates contained in the articles are the responsibility of the author(s) and should not necessarily be considered as reflecting the views or bearing the endorsement of UNIDO and its partners.

While every care has been taken to ensure that the content is useful and accurate, UNIDO and ICSHP and any contributing third parties shall have no legal liability or responsibility for the content or the accuracy of the information so provided, or for any loss or damage caused arising directly or indirectly in connection with reliance on the use of such information.

Copyright: Material in this publication may be freely quoted or reprinted, but acknowledgement is requested, together with a copy of the publication containing the quotation or reprint.

Recommended citation:
1 Africa
1.1 Eastern Africa

1.1.14 Zimbabwe
Wim Jonker Klunne, Council for Scientific and Industrial Research, South Africa

Key facts

<table>
<thead>
<tr>
<th>Key facts</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Population</td>
<td>12,619,600(^1)</td>
</tr>
<tr>
<td>Area</td>
<td>390,759 km(^2)</td>
</tr>
<tr>
<td>Climate</td>
<td>Tropical; moderated by altitude(^3)</td>
</tr>
<tr>
<td>Topography</td>
<td>Mostly high plateau with higher central plateau (high savannah); mountains in east(^2)</td>
</tr>
<tr>
<td>Rain Pattern</td>
<td>Rainy season: November to March.(^4)</td>
</tr>
<tr>
<td></td>
<td>Rainfall decreases from east to west.</td>
</tr>
<tr>
<td></td>
<td>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.(^3)</td>
</tr>
</tbody>
</table>

Electricity sector overview

<table>
<thead>
<tr>
<th>Electricity sector overview</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thermal</td>
</tr>
<tr>
<td>Hydropower</td>
</tr>
<tr>
<td>Import</td>
</tr>
</tbody>
</table>

Figure 1 Electricity generation in Zimbabwe
Source: Tradingeconomics\(^5\), Clean Energy Portal – Reegle\(^1\)
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.\(^1\)

In accordance with 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.\(^5\)

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).\(^6\)

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.\(^5\)

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).\(^6\)

In accordance with 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.\(^5\)

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).\(^6\)

In accordance with 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.\(^5\)

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).\(^6\)
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 Mtilikwi Dam near Masvingo and will consist of one 5-MW Francis turbine. Project commissioning is expected to begin by March 2014.9 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.10,11 Another 5-MW facility at Tokwe-Murkosi is planned for completion in 2013.12

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.13

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

<table>
<thead>
<tr>
<th>District</th>
<th>Site</th>
<th>Type of plant</th>
<th>Capacity (MW)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mwenezi</td>
<td>Manyuchi</td>
<td>Dam</td>
<td>1.4</td>
</tr>
<tr>
<td>Masvingo</td>
<td>Mutirikwi</td>
<td>Dam</td>
<td>5.0</td>
</tr>
<tr>
<td>Mutasa</td>
<td>Osborne</td>
<td>Dam</td>
<td>3.0</td>
</tr>
<tr>
<td>Bikita</td>
<td>Siya</td>
<td>Dam</td>
<td>0.9</td>
</tr>
<tr>
<td>Mutasa</td>
<td>Duru</td>
<td>Run-of-river</td>
<td>2.3</td>
</tr>
<tr>
<td>Nyanga</td>
<td>Tsanga</td>
<td>Run-of-river</td>
<td>3.3</td>
</tr>
</tbody>
</table>

*Source: Ministry of Energy and Power Development*

Table 2
Micro hydropower schemes in Zimbabwe

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

*Source: Khennas and Barnett14*

*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:15

- 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:16

- 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).

References


