

Africa-EU Renewable Energy Cooperation Programme (RECP):
Higher Education for Renewable Energy

Country Mapping



Zimbabwe

May 2015



Figure 1: Map Zimbabwe (Danchurchaid, 2013)

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1 Zimbabwe at a Glance

1.1 Population and Geography

Table 1: Population (World Bank, 2014), (CIA, 2014a)

Population, total (2013)	14,149,648
Population, growth (2013)	3.1%
Population density (2013)	36.6 / km ²
Urban population (%)	39.6%
Life expectancy at birth (2013)	58.0 years
Major Cities (2012)	Harare (1,485,231), Bulawayo (653,337), Chitungwiza (356,840), Mutare (187,621) (Wikipedia, 2012)
Language	English (official), Shona, Sindebele, numerous but minor tribal dialects
Ethnic Groups	African 98% (Shona 82%, Ndebele 14%, other 2%), mixed and Asian 1%, white less than 1%
Religion	syncretic (part Christian, part indigenous beliefs) 50%, Christian 25%, indigenous beliefs 24%, Muslim and other 1%

Table 2: Geography and Climate (CIA, 2014a)

Location	Southern Africa, between South Africa and Zambia, landlocked
Area	390,757 km ²
Neighbouring Countries	Mozambique, Botswana, Zambia, South Africa
Climate	tropical; moderated by altitude; rainy season (November to March)
Terrain	mostly high plateau with higher central plateau (high veld); mountains in east
Natural hazards	recurring droughts; floods and severe storms are rare

1.2 Government & Legislation

Table 3: Government system Zimbabwe (CIA, 2014a), (Transparency International, 2013)

Official name	Republic of Zimbabwe
Conventional short form	Zimbabwe
Form of state	parliamentary democracy
Regions and districts	8 provinces: Manicaland, Mashonaland Central, Mashonaland East, Mashonaland West, Masvingo, Matabeleland North, Matabeleland South, Midlands 2 cities with provincial status: Bulawayo, Harare
Chief of State and Head of Government	Executive President Robert Gabriel Mugabe (since 31 December 1987)
Parties as distributed in the House of Assembly by seats	ZANU-PF 197, MDC-T 70, MDC-N 2, independent 1
Independence	18 April 1980 (from the UK)
Corruption perception index ¹	20 (of 100), Rank 157 of 177

President Robert Mugabe's Zimbabwe African National Union – Patriotic Front (commonly abbreviated ZANU-PF) has been the dominant political party in Zimbabwe since independence in 1980 (Wikipedia, 2014). A number of human rights abuses have occurred under Mugabe's presidency; the considerable economic decline between the 1998 and 2008 was among others caused by the expulsion of a substantial number of white farmers and the subsequent decline of agricultural production. The economic decline manifested itself in a serious hyperinflation reaching 231 million % according to official government figures (UNDP, 2014).

The executive power is owned by the executive president and the Cabinet. After a change of constitution in July 2013, the office of the Prime Minister was abolished.

The legislative power belongs to the bicameral parliament with a lower and an upper house, the latter being the House of Assembly with 270 seats, which is elected every 5 years, and the former being the Senate, which consists of 80 persons. The judiciary power is exercised by the judges in court.

With a Corruption Perception Index of 20, Zimbabwe ranks 157th out of 177 countries (Transparency International, 2013).

EU sanctions imposed on Zimbabwe since 2002, suspending EU aid to the government, have officially expired in November 2014.

¹ The corruption perception index is developed by Transparency International. A value of 0 is counted as highly corrupt and 100 as very clean.

1.3 Economy and Infrastructure

Table 4: Economic figures Zimbabwe (World Bank, 2014), (CIA, 2014a), (UNDP, 2013), (Zimbabwe National Statistics Agency, 2013)

Overview			
World Bank Rating	Low income		
Human Development Index HDI (2013)	0.397 (Rank: 172/187)		
GINI Index (2010) ²	50.1		
Population living below poverty line	72.3%		
Currency	Zimbabwean dollars (note: the US dollar was adopted as a legal currency in 2009; since then the Zimbabwean dollar has experienced hyperinflation and is essentially worthless)		
Economic Indicators	2011	2012	2013
GDP (in constant 2005 Billion US\$)	5.82	6.13	6.24
GDP per capita PPP (constant 2011 international \$)	1,626	1,667	1,646
GDP per capita growth (annual %)	9.5	2.5	-1.3
Unemployment, total (% of total labour force) (modelled ILO estimate)	4.0	4.0	--
Unemployment, youth (% of total labour force aged 15-24) (ILO)	6.6	7.0	--
Ease-of-doing-business index (1: most business friendly), 189 ranked countries	--	168	170
Inflation, consumer prices (annual %)	--	--	--
Structure of Economy	2011	2012	2013
Agriculture, value added(as % of GDP)	13.2%	13.2%	12.4%
Industry, value added (as % of GDP)	32.7%	31.6%	31.3%
Services, etc. value added (as % of GDP)	54.1%	55.2%	56.3%

The World Bank rates Zimbabwe as a Low Income Country. With a GDP per capita of \$ 1,646 in 2013, it is only half of the SSA average of \$ 3,269. Historically, the GDP per capita was as high as \$ 2,680 in 1998. It then continuously declined to \$ 1,286 10 years later as an effect of the serious economic meltdown. From 2009 on, Zimbabwe is in a phase of economic recovery.

²Figure refers to the last year of accessible data

The annual GDP growth numbers also reflect the strong historical volatility of Zimbabwe’s economy. At the peak of the economic crisis in 2008, the growth resembled minus 18%. The economy now stabilised to a certain extent with a growth rate of 9.5% in 2011, although recent numbers show smaller growth of 2.5% in 2012 and -1.3% in 2013. The launch of the 2011-2015 Medium Term Plan in 2011 based on the economic paradigm of the idea of shared growth and economic development raised some hopes for the economy (UNDP, 2013).

The economy is largely based on the service sector and the industrial sector, with a contribution to the GDP of around 56% and 31% respectively. Agriculture generates 12% of the income. The recent GDP growth from 2009 to 2011 was led by a strong growth in mining (107%), agriculture (35%) and services (51%), while recovery in manufacturing sector (22%) has been less vigorous (World Bank, 2014). The mining sector remains very lucrative, with some of the world's largest platinum reserves and the recent discovery of the biggest diamond field in the world in 2006 (UNDP, 2014).

After the unsuccessfully conducted and internationally criticised land reform turned the country into a net importer of food, the Zimbabwean agriculture is slowly recovering under the 10 years cooperation with the International Crops Research Institute for the Semi-Arid Tropics (ICRISAT), teaching methods of conservation agriculture, which increases yields and agricultural sustainability (Marongwe, et al., 2011).

Table 5: Infrastructure Zimbabwe (CIA, 2014a)

Railways	3,427 km
Roads	97,267 km, of which 18,481 km paved
Airports (2013)	196 in total of which 17 have paved runways
Telephones (main lines in use) (2012)	301,600
Telephones - Mobile cellular (2012)	12.614 million
Internet users (2009)	1.423 million

Zimbabwe made significant progress in infrastructure in its early period as an independent state, building a national electricity network with regional interconnections, an extensive and internationally connected road network, and a water and sewer system. However, the country has been unable to maintain its existing infrastructure since it became immersed in economic and political turmoil in the late 1990s. Zimbabwe now faces a number of important infrastructure challenges, the most pressing of which lie in the power and water sectors (Pushak & Briceño-Garmendia, 2011).

The telephone system was once the best in Africa, but now suffers from poor maintenance. The mobile cellular network is substantial and internet connection is available in Harare (CIA, 2014a). The ICT sector of Zimbabwe is now Africa's fastest growing market (UNDP, 2014).

2 Energy and Renewable Energy

2.1 Overview

Table 6: Country Energy Overview (EIA, 2014), (energypedia, 2014), (WHO, 2014)

	2001	2011
Energy use (TWh)	58.32	48.65
Energy production (TWh)	41.62	39.86
Net import of energy (% of Energy use)	28.64	17.96
Electricity consumption (TWh)	10.07	8.49
Electricity production (TWh)	7.58	7.30
Electricity consumption per capita (kWh/person)	805.36	649.23
Total electricity generation capacity (MW)	2,099	1,966
Electric power transmission and distribution losses (% of output) (not verified)	2,70%	0,85%
Access to electricity, in % of total population	n. a.	37.2 %
Urban	n. a.	80.0%
Rural	n. a.	19.0%
Electricity production by source (in % of total electricity production):		
Hydro	39.15 %	70.56 %
Nuclear	0.0 %	0.0 %
Oil, gas and coal sources	60.85 %	29.44 %
Renewable Energy excl. Hydro	0.0 %	0.0 %
Share of population using solid fuels (2012)	70%	

The comparison of the energy use and the energy production of Zimbabwe shows that currently over 80% of the overall energy used are from internal sources. Less than 20% of Zimbabwe's energy has to be imported. This dependence has decreased in the years from 2001 to 2011.

Electricity generation in Zimbabwe doesn't meet the country's demand, making it a net importer of electricity: Almost half of its supply comes from South Africa, Mozambique and to a lesser extend from the Democratic Republic of Congo. Zimbabwe's per capita electricity consumption of about 650 kWh was at a higher level than the SSA average of 535 kWh in 2011, but dropped from 805 kWh in 2001 to 650 kWh in 2011.

The electricity capacity of Zimbabwe has decreased from 2,099 MW in 2001 to 1,966 MW in 2011. In 2001 there were 754 MW capacity of hydro power installed and 1,345 MW of conventional thermal power. The conventional thermal power was reduced by 125 MW and the hydro power by 8 MW. In 2015 “(d)aily demand for power ranges between 1.9 to 2.2 GW, yet the grid can generate 1.19 GW on any given day” (PV Magazine, 2014), see also (Hivos, 2015).

The energy losses in the transmission and distribution grids of less than one per cent points could not be verified. The government targets to boost the electrification rate to 85% by 2020. At present, 80% of the urban population but less than 20% of the rural population have access to the grid. The share of population using biofuels stood at 70% in 2012 (comparison: Rwanda: >95%).

Energy generation in Zimbabwe has hardly increased in the past years; the consumption per capita falls steadily. On the other hand the government has plans to boost the electrification rate to 85% by 2020. Therefore another coal-fired power plant with 1,400 MW of capacity and additional 300 MW of hydropower shall be installed (energypedia, 2014).

2.2 Energy Policy

Table 7: Zimbabwe Energy Policy (Reegle, 2014), (IRENA, 2013), (REN21, 2014), (energypedia, 2014)

Organisation responsible for energy policies	Ministry of Energy and Power Development
Energy regulator	Zimbabwe Electricity Regulatory Commission
Government Agency	--
Energy policy publications	Electricity Act of 2002 Electricity Regulatory Bill (awaiting Presidential signature) Energy Regulatory Act (2011) National Energy Policy (2012)
Targets to increase use of Renewable Energy	--
Subsidies/Incentives for RE	--

The main public authority for the electricity supply industry is the Ministry of Energy and Power Development which “has overall responsibility for energy issues in Zimbabwe. The terms of reference include policy formulation, performance monitoring and regulation³ of the energy sector as well as research, development and promotion of new and renewable sources of energy” (Reegle, 2014).

The Zimbabwe Electricity Regulatory Commission (ZERA) is the statutory regulatory authority, following the Electricity Act of 2002. “ZERA has the authority to fully and

³ Regulation is the main task of the Zimbabwe Electricity Regulatory Commission (ZERA)

independently regulate the industry, and no entity can generate, transmit or distribute, nor import electricity, even for its own consumption, without permission from ZERA. This permission is granted in the form of a licence that stipulates strict rules of operation, which have to be adhered to by the licensee. The Commission is the only legal authority that can approve a tariff increase. Other tasks of the Commission include the production of codes and standards for the sector, the promotion of competition and private sector participation where feasible, establishing appropriate consumer rights and obligations in the sector, and the promotion of energy efficiency in the supply side through consumer advice and the issuing of guidelines” (Reegle, 2014).

Through the unbundling process, initiated by the government through the Electricity Act of 2002, Zimbabwe’s dominating utility, Zimbabwe Electricity Supply Authority (ZESA), was separated into several successor companies focusing on generation, transmission, distribution and service companies. This should encourage private participation, however the ZESA Holdings still dominates the sector (Reegle, 2014).

The National Energy Policy of 2012 aims for multiple Renewable Energy sources. The objectives are (Ministry of Energy and Power Development, 2012):

- to increase the access to affordable energy services
- to stimulate sustainable economic growth
- to improve the institutional framework in the energy sector
- to promote research and development in the energy sector, and
- to develop the use of renewable energy sources

2.3 Renewable Energy

2.3.1 Potential and Projects

Solar: Zimbabwe has one of the best solar regimes worldwide, with an average high direct insolation of 2,100 kWh/m² per year and minimum cloud cover. Therefore the potential for solar PV and solar water heaters is enormous, but has not been exploited thus far. “Currently installed solar power capacity is mainly situated in rural areas, as service centres such as schools and hospitals, although the private, individual home market is growing in the country. Solar-powered “base stations” for charging electrical appliances have also been installed, particularly through the national telecommunications company, NetOne” (Reegle, 2014). The Zimbabwean joint venture Green Rhino Energy Pvt Ltd plans to invest USD 400 million into a 150 MW solar park, to be located in the town of Marondera in the Mashonaland East province. The company aims to build 2,500 MW of solar parks in Zimbabwe during the next 15 years (SeeNews, 2014). In 2013, Zimbabwe Power Company (ZPC) invited bids for three 100 MW solar power projects. In August 2014, the State Procurement Board has however cancelled the tender after one winning bidder increased its price, while no agreement was made with two other firms (The Herald, 2014). Solar water heaters could significantly help to reduce the peak demand by 350 MW to 500 MW by

replacing electric water heaters in households (Ministry of Energy and Power Development, 2012).

Wind: In Zimbabwe the NGO ZERO, a regional environmental initiative, has financed some 1 and 4 kW wind turbines for an off-grid feasibility study, as well as providing power to municipal buildings such as clinics. Areas around Bulawayo and some pockets in the Eastern Highlands, have potential for power generation application, since the most prevalent wind speeds in these regions range from 4 to 6 m/s. These wind speed ranges have a high frequency and time distributions, particularly suited to power generation (Reegle, 2014).

Biomass: Wood fuel is the main energy source in Zimbabwe and will continue to be used by rural and low-income urban households for the foreseeable future. Currently, an annual consumption of 6 million tonnes of wood is estimated, whereas the sustainable output of natural forests is only 4.6 million tonnes. This leads to a supply shortage in most rural areas and a loss of 330,000 ha of forest area per year. The development and implementation of a strategy for the sustainable use of wood fuel is therefore an urgent need (Ministry of Energy and Power Development, 2012). The potential for biomass electricity generation in Zimbabwe is led by co-generation (bagasse) with estimated 633 GWh per year. Apart from sugarcane to generate electricity, the timber industry produces 70,000 tons of biomass waste annually. The majority of this waste is currently burned in the open air or dumped. “Before the imposed sanctions the biomass waste from timber industry was used to make chip boards and there was even a plan for further processing” (Shonhiwa, 2014). According to studies carried out by African Energy Policy Research Network (AFREPREN), more than 200 biogas plants have been installed around Zimbabwe, mainly by the Department of Energy. “Currently, there are more than 400 digesters installed countrywide, including municipal and domestic digesters” (Shonhiwa, 2014). The vast livestock population offers great potential for using biogas from animal waste for electricity generation. In the south of the country there are two sugarcane-crushing mills that use more than 1.3 million tonnes of bagasse to generate electricity used by the sugar factories” (Reegle, 2014). Currently, the first utility-scale (800kW) biogas power station is in a planning stage (Golba, Cattelaens, & Hayek, 2014).

Hydro: The gross theoretical hydropower potential is 18,500 GWh/year, and the technically feasible potential is 17,500 GWh/year of which about 19% has been exploited. Beside the large hydro power plants, there is potential for small-hydro across the country, estimated at 120 MW (Reegle, 2014). Four small hydro power plants with a total capacity of 21 MW have been commissioned between 2010 and 2014 and act as Independent Power Producers (IPPs) (PGI Group Ltd, 2015). Further hydro power plants are located at Rusito (750 kW), Kwenda (80 kW), Sithole-Chikate (30 kW), Svinurai (10 kW), Mutsikira (10 kW), Nyafaru (40 kW), Aberfoyle (30 kW) and Claremont (250 kW) (UNIDO, ICSHP, 2013). ZESA has outlined plans to add 300 MW to the Kariba hydro power plant to meet the target of boosting the electrification rate to 85% by 2020. The funding for this project has not been acquired yet (Reegle, 2014).

Geothermal: In 1985, 50 MW of geothermal potential was identified, but little has been done since then for any further resource assessment. It is reasonable to assume from the country's geographic location near to the geologically-active Rift Valley region of Africa that geothermal power is an option (Reegle, 2014).

2.3.2 Market and Jobs

“The sector is primarily controlled by the state-owned company, Zimbabwe Electricity Supply Authority Holdings (ZESA Holdings, www.zesa.co.zw), which, through its subsidiaries Zimbabwe Power Company (ZPC), and the Zimbabwe Electricity Transmission and Distribution Company (ZETDC), generate, import and distribute all electrical energy in the country” (Reegle, 2014). The interests of the Zimbabwean renewable energy industry are represented by the Solar Energy Industries Association of Zimbabwe (Weiss & Schwarzmüller, 2001).

Up to now, there is no sound market study addressing the Renewable Energy job market. Nevertheless, recent findings from IRENA’s latest international study show that there is huge potential by the renewable energy sector (in Zimbabwe foremost PV, biogas, and solar water heater) to create new jobs (IRENA, 2013a).

2.4 Conclusion: Barriers, Trends and Patterns

Zimbabwe aims at reaching an electrification rate of 85% by 2020 (energypedia, 2014). In order to achieve this goal and to cope with the increasing demand there is a project for 300 MW of additional hydro power capacity and for a 1,400 MW large-scale coal fired power plant. The favourable geographical location for the use of solar PV and solar water heaters is not adequately exploited. There is no target for the development of the renewable energy sector in Zimbabwe. “But, the government of Zimbabwe is now pushing for Renewable Energy, e.g. by exempting the duty for renewable energy devices. It has also strongly supported the construction of the ethanol plant in Chisumbanje. Currently, a number of micro-hydro power plants are being constructed in Zimbabwe” (Shonhiwa, 2014).

3 Education and Higher Education

3.1 Primary and Secondary Education

The Zimbabwean education sector follows a 7-4-2 system, consisting of seven years primary school, followed by the secondary school which is split into a four-year “O” level and a two-year “A” level. The academic year is split into three terms and runs from January to December. (US Embassy, 2008).

The majority of the children enter primary school during their sixth year. The language of instruction in urban areas is English, while children in rural areas are taught in their mother tongue during the first two years, switching to English afterwards. Primary school finishes with national exams in four subjects: Mathematics, English, Shona or Ndebele and Content, the latter comprising natural and social sciences (Kotecha, Wilsom-Strydom, & N Fongwa, A Profile of Higher Education in Southern Africa - Volume 2: National Perspective, 2012).

Students compete for places in the “O” level at secondary school based on exam results, interviews and placement tests. After the final “O” level exam, only a small share of students gets entrance to the “A” level, which is the prerequisite to enter a university. The majority of “O” level graduates remains with poor employment perspectives due the high unemployment rate in Zimbabwe. Beside entering the job market or returning to small-scale farming, they may proceed with vocational training or continue at a teaching or nursing college. Both “O” and “A” level exams are centrally set and marked by the Zimbabwe Examinations Council (Kotecha, Wilsom-Strydom, & N Fongwa, A Profile of Higher Education in Southern Africa - Volume 2: National Perspective, 2012).

The enrolment ratio for primary, secondary and tertiary education is rather high in comparison to other sub-Saharan countries (see Table 8).

Table 8: Gross Enrolment Ratio in the primary, secondary and tertiary education sector (Kotecha, Wilsom-Strydom, & N Fongwa, A Profile of Higher Education in Southern Africa - Volume 2: National Perspective, 2012)

	Primary Education	Secondary Education	Tertiary Education
Gross Enrolment Ratio	101% (2006)	40% (2006)	6% (2010)

3.2 Higher Education

3.2.1 Shape of higher education

In Zimbabwe there are nine public universities as well as five church-related universities that are fully internationally accredited. The flagship is the University of Zimbabwe which is a comprehensive university offering faculties of Medicine, Law, Engineering, Agriculture,

Business as well as Arts and Sciences. The University of Zimbabwe (UZ) was the only university in Zimbabwe at the time of independence. As the increase of secondary school graduates exceeded the available capacity at UZ, the National University of Science and Technology (NUST) was founded in Bulawayo in 1991 with a focus on sciences and engineering. In the past two decades, seven other public universities have been established in order to respond to the increasing demand for tertiary education, and three more state universities are expected to be created in the near future. In addition, there are five private universities. “Generalist university degrees (Bachelor of Arts and Bachelor of Science) are three years with a fourth honours year offered and specialist degree programs are either three or four years in duration. Degrees of medicine, engineering and law take five years to complete” (Kotecha, Wilsom-Strydom, & N Fongwa, A Profile of Higher Education in Southern Africa - Volume 2: National Perspective, 2012).

The currently existing nine public universities account for about 77 per cent of all higher education enrolment, with five private universities accounting for about 23 per cent (SARUA, 2012a). The existing state and privately-owned universities in Zimbabwe are listed in Table 9:

Table 9: Universities in Zimbabwe (SARUA, 2012a), (SARUA, 2014)

State universities	Privately-owned universities
Bindura University of Science Education	Africa University
Chinhoyi University of Technology	Catholic University
Great Zimbabwe University	Solusi University
Harare Institute of Technology	Women’s University
Lupane State University	Zimbabwe Ezekiel Guti University
Midlands State University	
National University of Science and Technology	
University of Zimbabwe	
Zimbabwe Open University	

At the public universities, it can be observed that the majority of enrolments listed in

Table 10 are in business, management and law, followed by the humanities. Among the major fields of study, agriculture has the lowest enrolment. Although the science, engineering and technology (SET) fields have a relatively high level of enrolment, more needs to be done if higher education is to produce the human capital needed to meet the demands of the knowledge economy.

Table 10: Student enrolment by major field of study and level of study (SARUA, 2012a)

	Undergraduate	Postgraduate < Masters	Masters	Doctoral
Agriculture	1,450	0	29	9
Business, management and law	12,585	479	1,982	47
Education	4,350	46	330	213
Health sciences	1,975	3	32	5
Humanities and social sciences	10,319	50	567	16
Science, engineering and technology	4,832	422	337	22
Other	581	0	0	0

Enrolment at the postgraduate level accounts for a very small proportion of the total enrolment in public universities in Zimbabwe. While there are more than 36,000 enrolments at undergraduate level, there are fewer than 4,000 students registered for master's degrees and fewer than 350 pursuing doctoral studies in Zimbabwean higher education institutions.

On the other hand, there are many more applications for undergraduate and postgraduate studies than universities could accommodate. For the 2009/2010 semester there were about 27,500 applications for undergraduate studies but only 45 per cent of them could be accepted. For postgraduate studies only 36 per cent of 5,000 applications were accepted. Thus, there is a big gap between the willingness to study and the availability of appropriate university places.

Therefore, especially the places for postgraduate studies are rare and many applicants have to wait. Thus, there is room for improvement by adding new masters'.

Table 11: Number of qualifications awarded per field of study and level of study (SARUA, 2012a)

	Undergraduate	Postgraduate < Masters	Masters	Doctoral
Agriculture	571	5	47	0
Business, management and law	1,680	123	516	1
Education	277	20	72	1
Health sciences	219	0	32	0
Humanities and social sciences	1,378	27	108	0
Science, engineering and technology	777	0	50	2
Other	309	0	1	0
Total	5,211	175	826	4

3.2.2 Higher education policy

The Ministry for Tertiary and Higher Education (MTHE) is the main governing body for higher education in Zimbabwe. According to its vision, it aims to “guarantee Zimbabwe as a regional leader in the creative use of new and existing knowledge, skills, attitudes and resources through the local mobilisation and provision of quality higher and tertiary education” (Ministry of Higher and Tertiary Education, 2015).

The ministry implemented a five-year strategic plan between 2006 and 2010 with a number of goals to further develop the higher education sector. These include the enhancement of quality education, the promotion of science and technology in higher education and the improvement of the resource base of higher education institutions by income-generating projects (Kotecha, 2008).

A number of statutory bodies monitor and regulate the higher education sector in Zimbabwe, these include:

- The Zimbabwe Council for Higher Education (ZIMCHE), which is responsible for the quality of the offered qualifications and the accreditation of universities and degree programmes
- The National Manpower Advisory Council (NAMACO), which supervises an industrial committee which is responsible for the identification and monitoring of training needs
- The College Lecturers Association of Zimbabwe (COLAZ), which represents lecturers in collective bargaining
- The National Economic Consultative Forum, which is responsible for the identification of economic priority programmes (Kotecha, Wilsom-Strydom, & N Fongwa, A Profile of Higher Education in Southern Africa - Volume 2: National Perspective, 2012).

3.2.3 Quality assurance

The Zimbabwe Council for Higher Education (ZIMCHE) regulates standards of teaching and research in higher education. Quality assurance has now an important role in Zimbabwe’s higher education policy. The aim is to further improve the higher education system to ensure that graduates can compete at an international level. Individual institutions have established institutional mechanisms to ensure quality education. These include students’, peer and external evaluations as well as departmental platforms (Kotecha, Wilsom-Strydom, & N Fongwa, A Profile of Higher Education in Southern Africa - Volume 2: National Perspective, 2012).

3.2.4 Higher education staff

A high share of the academic and research staff in Zimbabwe is currently under-qualified. The data presented in Table 12 shows that less than twenty per cent have doctoral degrees, while the majority holds masters’ degrees. These junior lecturers often do not have sufficient research skills which hampers the research output. In order to overcome this

limitation, the Minister for Higher Education and Training established a new policy which defines that all academic staff needs a doctoral degree by 2015 (University World News, 2012).

Table 12: Highest level of qualification for academic and research staff (SARUA, 2012a)

	Undergraduate	Postgraduate < Masters	Masters	Doctoral
Agriculture	73	0	132	26
Business, management and law	79	26	289	19
Education	15	2	174	24
Health sciences	36	11	120	41
Humanities and social sciences	105	11	384	124
Science, engineering and technology	146	75	303	63
Other	14	0	13	3
Total	468	125	1,415	300

3.2.5 Funding of higher education

In 2010 19% of national budget was allocated to education, following 16% in 2009 and 15% in 2008, but 24% in 2007. Thus the budget for education rises since 2008 but lost several points before. For the tertiary education sector the budget allocation grew enormously from 3% of the total education budget in 2008 to 27% in 2010. There it can be seen, that the tertiary education is to be strengthened. The funding for the higher education institutions is covered by 60% from the education budget and 40% from the student fees. For example the fee for science, engineering and technology stands at 669 US\$ for local students, 1,719 US\$ for other SADC students and 5,000 US\$ for other foreign students (Kotecha, Wilsom-Strydom, & N Fongwa, A Profile of Higher Education in Southern Africa - Volume 2: National Perspective, 2012).

3.2.6 Research output

Table 13 provides a brief overview of the research output over the years 2008 to 2010. Although the Great Zimbabwe University and the University of Zimbabwe (which is the oldest and one of the better-resourced public institutions in the country) provided no data, the remaining data indicates moderate increase in research.

Table 13: Research output (SARUA, 2012a)

Category of research output	2008	2009	2010
Peer-reviewed journal articles	100	116	146
Peer-reviewed books	9	17	22
Peer-reviewed book chapters	12	45	50
Patents	1	0	1

In terms of publications South Africa, Egypt, Nigeria, Tunisia, Algeria and Kenya are the academically most productive countries in Africa. This corresponds with their relative high GDP, with exceptions from Tunisia and Kenya. Nevertheless, Zimbabwe still retains its legacy as the academically most active country in Africa in terms of publication per GDP (Adams, King, & Hook, 2010).

3.3 Renewable Energy Higher Education

In August 1996, the Renewable Energy Programme (REP) started at the University of Zimbabwe (UZ) with support from German Academic Exchange Service (DAAD) and the German Agency for Technical Cooperation (GTZ; now GIZ) and facilitated by the University of Oldenburg. Although this combined support came to an end in 2002 due to political reasons, the programme continued until 2012 educating 86 graduates in total. Similarly to other master's programmes at the UZ, the REP was closed down because the minimum share of 60% PhD holders in the permanent teaching staff could not be met. A number of REP alumni returned to Zimbabwe in the last years and are now working in various government and private institutions (Golba, Cattelaens, & Hayek, 2014).

The Chinhoyi University of Technology offers bachelor courses in fuels and energy. Moreover, various universities offer bachelor courses in electrical engineering.

The Centre for Development Studies offers diploma, certificates and short courses in Renewable Energy Technology at its Renewable Energy Department. It is registered with the Ministry of Higher Education.

At the Harare Institute of Technology, the Environmental Management, Renewable Energy and Climate Change Research Centre was established in 2012. It focuses on research and teaching in sustainable development. The Centre is responsible for the following services (Harare Institute of Technology, 2014):

- Research and Development
- Education and Training
- Environmental and Technological Consultancy
- Networking
- Community outreach

3.4 Conclusions and Recommendations

In the last two decades higher education in Zimbabwe has expanded significantly. There has been an increase in the number of public and private higher education institutions and in the number of students enrolled in post-secondary institutions.

With this rapid growth there was a lack of qualified personnel for research and lecturing. As a consequence academic staff was manned mainly with masters. "This affects particularly science, engineering and medicine. Whereas the other faculties can rely on sufficient PhD holders" (Shonhiwa, 2014). The establishment of the Zimbabwe Council for Higher Education (ZIMCHE), the body that regulates standards of teaching, examinations, academic qualifications and research in higher education, indicates that the quality of the tertiary education should be increased to be capable to compete at an international level. To support these goals the Minister for Higher Education and Training has developed a turnaround policy to address the limitation of high qualified academics by calling on all academic staff to be in possession of a doctoral qualification by 2015.

The size of the tertiary education sector is expected to grow steadily in the next years. On the one hand the existing universities seem to try to affiliate more students and on the other hand the establishment of three additional universities is on the way (SARUA, 2012).

Up to today no market study has been undertaken for Zimbabwe, neither for the market needs nor for the demands for a RE programme at Master's level. Nevertheless, stakeholder consultations during a scoping mission by a EUEI PDF team have revealed clear evidence for needs from the Zimbabwean market. A workshop with 38 Zimbabwean stakeholders, organised by UZ Engineering Faculty, as well as individual interviews with relevant businesses and institutions during the 104th Harare Agricultural Show have indicated strong interest, especially from private sector and NGOs for graduates (Golba, Cattelaens, & Hayek, 2014).

Acknowledging this interest, resuscitation of the renewable energy masters' programme at the University of Zimbabwe should be a priority. Under the RECP it is envisaged to support this process by providing technical assistance in order to rework the masters' programme, establish a sustainable business and staff model, as well as work towards more international academic cooperation.

4 References

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