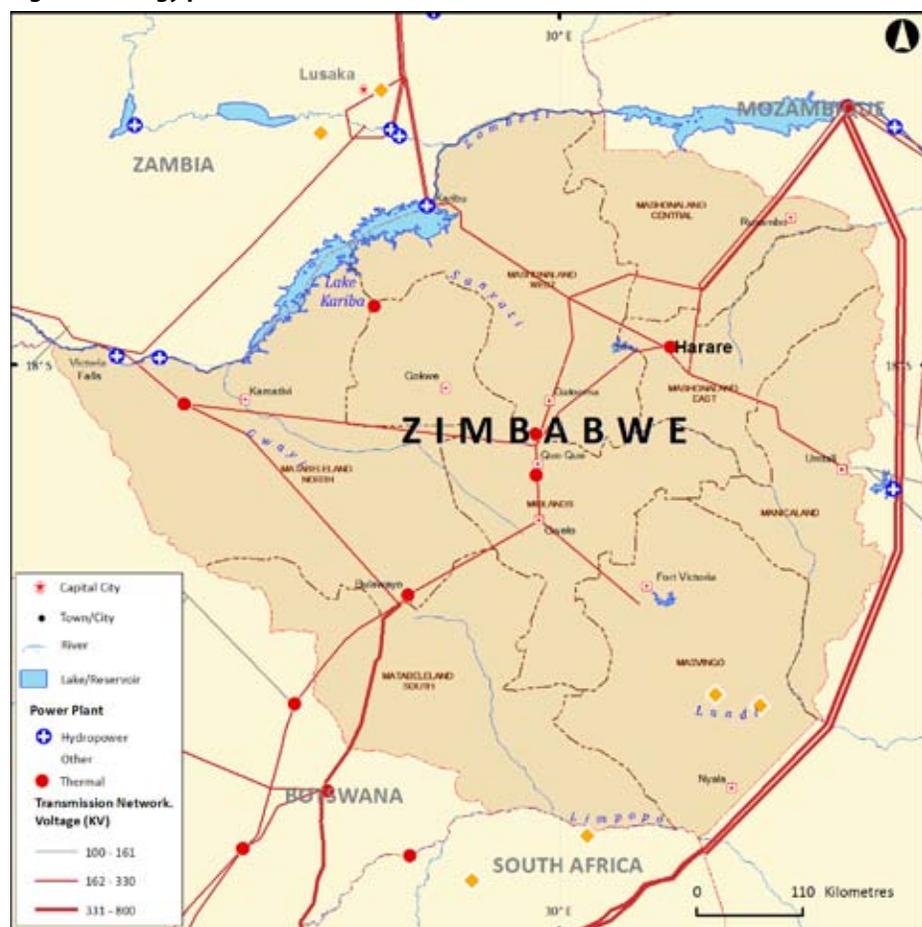




Figure 1: Energy profile of Zimbabwe



Energy Consumption and Production

Zimbabwe's population in 2013 was 14.15 million people, as shown in Table 1. Total production of electricity in 2015 was 762 ktoe, with 32.9 per cent from fossil fuels and 66.2 per cent from hydro sources (Table 2). The final consumption of electricity in 2015 was 761 ktoe (AFREC, 2015). Figures 2 and 3 show the main energy statistics.

Table 1: Zimbabwe's key indicators

Key indicators	Amount
Population (million)	14.15
GDP (billion 2005 USD)	6.73
CO ₂ emission (Mt of CO ₂)	13.46

Source: (IEA, 2016)

Energy Resources

Biomass

In Zimbabwe, fuelwood is an important source of domestic energy for up to 90 per cent of people in the countryside (REEEP, 2012), with demand exceeding supply in some of the heavily populated provinces, such as Manicaland and Mashonaland East among others (MEPD, undated). Demand exceeds the sustainable output of forests by a factor of one and a half (MEPD, undated). The declining forest stock has impacts on food and energy security.

The biofuels industry has much potential. The two sugarcane mills in the southern part of Zimbabwe use over 1.3 million tonnes of bagasse to generate electricity used by the sugar factories (Blyth, 2014); (REEEP, 2012). The Chisumbanje Ethanol Project in Manicaland province has a capacity to generate up to 18 MW of electricity (REEEP, 2012). There is also potential for power generation from wood waste from the wood industry. Plantation timber is expected to generate 140,000 tones of biomass waste per year from 2015 (REEEP, 2012).

Hydropower

According to WEC (2013), the installed capacity of hydropower in Zimbabwe by 2011 was 754 MW. In 2015, 504 ktoe of hydroelectricity was produced out of a total of 762 ktoe of electricity produced (AFREC, 2015). The potential for small hydro power is 120 MW (REEEP, 2012) with some already connected to the grid such as the grid-connected 750 kW privately owned Rusitu Mini hydro plant on the Nyahode river and the 30 MW Gairezi plant located in Nyange district in the east of the country (REEEP, 2012).

Figure 2: Total energy production, (ktoe)

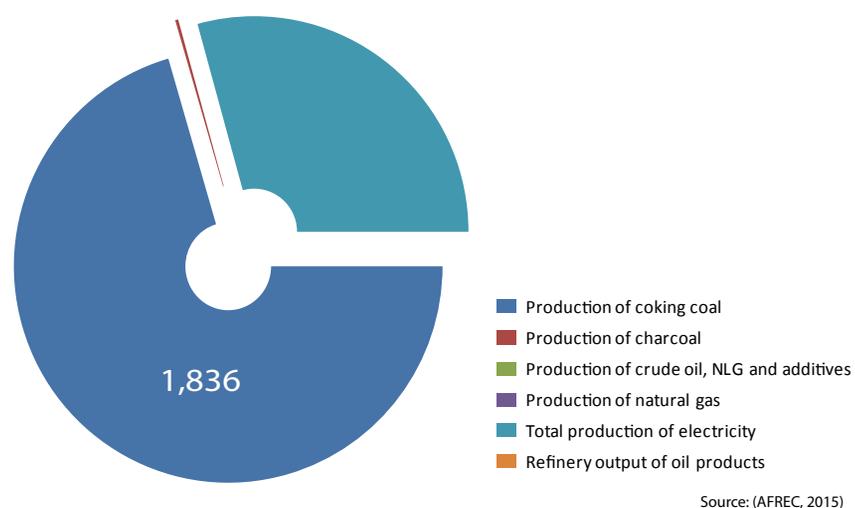


Figure 3: Total energy consumption, (ktoe)

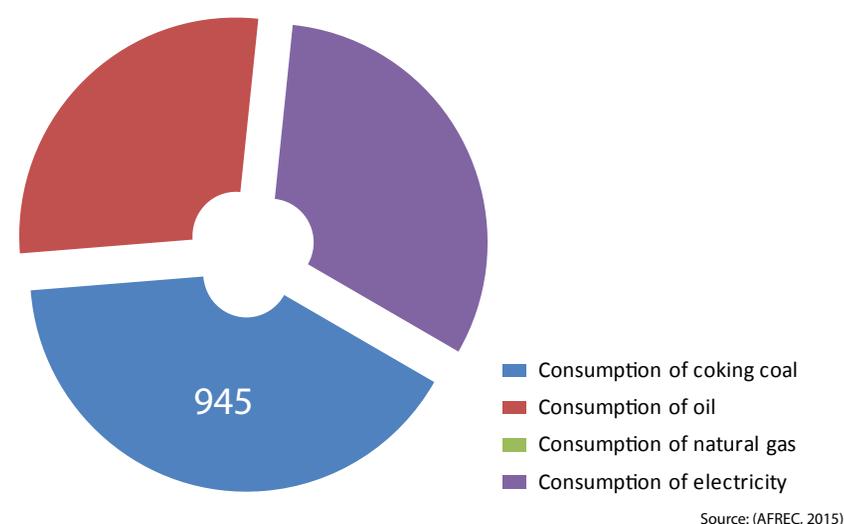


Table 2: Total energy statistics (ktoe)

Category	2000	2005	2010	2015 P
Production of coking coal	429	1,850	1,575	1,836
Production of charcoal	10	11	7	6
Production of crude oil, NLG and additives	-	-	-	-
Production of natural gas	-	-	-	-
Production of electricity from biofuels and waste	0	13	6	6
Production of electricity from fossil fuels	321	371	180	251
Production of nuclear electricity	-	-	-	-
Production of hydro electricity	280	499	516	504
Production of geothermal electricity	-	-	-	-
Production of electricity from solar, wind, Etc.	0	0	0	1
Total production of electricity	602	883	702	762
Refinery output of oil products	-	-	-	-
Final Consumption of coking coal	754	729	766	945
Final consumption of oil	1,151	1,051	587	653
Final consumption of natural gas	-	-	-	-
Final consumption of electricity	917	1,075	1,081	741
Consumption of oil in industry	91	69	62	65
Consumption of natural gas in industry	-	-	-	-
Consumption of electricity in industry	457	399	268	263
Consumption of coking coal in industry	519	272	314	269
Consumption of oil in transport	598	409	364	413
Consumption of electricity in transport	-	-	-	-
Net imports of coking coal	-115	-102	-103	-66
Net imports of crude oil, NGL, Etc.	-	-	-	-
Net imports of oil product	1,034	1,055	627	684
Net imports of natural gas	-	-	-	-
Net imports of electricity	440	256	63	46

- : Data not applicable

0 : Data not available

(P): Projected

(AFREC, 2015)

Oil and natural gas

With no oil resources of its own, Zimbabwe is completely dependent on imports for this source of energy (REEEP, 2012). Net imports of oil product in 2015 was 684 ktoe (AFREC, 2015).

Peat

There are 1,400 km² of peatland (WEC, 2013).

Coal

According to WEC (2013), the proven recoverable reserves of coal at the end of 2011 were 0.5 billion tonnes of bituminous, including anthracite coal. In 2011, 2.7 million tonnes of bituminous coal were produced (WEC, 2013). Coal is important in the production of electricity in Zimbabwe. The coal-fuelled Hwange Thermal Plant has a potential of 750 MW but is only producing 29.3 per cent of that capacity (REEEP, 2012).

Wind

Generally speaking, the relatively low wind speeds of about 3.5 m/s constrain Zimbabwe's efforts at developing wind energy. However, in some areas such as the Eastern highlands, a 300 km stretch of mountains, and in Bulawayo speeds of between 4 and 6 m/s have been recorded (REEEP, 2012). This resource is currently only used for off-grid purposes.

Geothermal

Zimbabwe's location close to the Great Rift Valley points to the potential presence of geothermal energy. However much more research into this area needs to be undertaken (REEEP, 2012).

Solar

Average solar insolation is 5.7 kWh/m²/day (REEEP, 2012), making the solar PV sector a potential growth industry, but one that has not been exploited much. It is estimated that although solar PV has a technical potential of over 300 MW, but only 3 MW is so far being put to use (REEEP, 2012). Much of the solar power is being used in rural areas in schools, hospitals and homes. Exploiting this potential could do much to extend access to electricity to the local populace and contribute to emissions reduction in Zimbabwe.

Tracking progress towards sustainable energy for all (SE4All)

Electric power in Zimbabwe is generated from the Kariba, Hwange, Harare, Bulawayo, Munyati and Harare power stations and other IPPs but it is not sufficient to meet current demand, creating a net deficit of electricity supply (MEPD, 2009). By 2012, national access to electricity stood at 40.5 per cent (Table 3). However, when disaggregated by location, 16.1 per cent of rural areas were electrified compared to 78.5 per cent of urban areas (Table 3 and Figure 4) (World Bank, 2016). Access to modern fuels is low at only 29.65 per cent (World Bank, 2016). In 2012, only 6 per cent of Zimbabweans in rural areas were using non-solid fuels and 80 per cent in urban areas (World Bank, 2015).

The energy intensity (the ratio of the quantity of energy consumption per unit of economic output) of the Zimbabwean economy was 17.5 MJ per US dollar (2005 dollars at PPP) in 2012, down from 19.6 MJ per US dollar in 2010. The compound annual growth rate (CAGR) between 2010 and 2012 was -5.52 (World Bank, 2015).

The share of renewable energy in the total final energy consumption (TFEC) decreased slightly from 80.8 per cent in 2010 to 75.6 per cent in 2012. Traditional solid biofuels form the biggest share of renewable sources at 66 per cent of TFEC in 2012, while modern solid biofuels contributed only 5 per cent and hydro 4.6 per cent. Renewable sources contributed a 60 per cent share of electricity generation in 2012 (World Bank, 2015).

Table 3: Zimbabwe's progress towards achieving SDG7 – Ensure access to affordable, reliable, sustainable and modern energy for all

Target	Indicators	Year					
		1990	2000	2010	2012	2000-2010	2011-2015
7.1 By 2030, ensure universal access to affordable, reliable and modern energy services	7.1.1 Per cent of population with access to electricity	28	34	37	40.5		
	7.1.2 Per cent of population with primary reliance on non-solid fuels	33	34	30	30		
7.2 By 2030, increase substantially the share of renewable energy in the global energy mix	7.2.1 Renewable energy share in the total final energy consumption	64.1	70.2	80.8	75.6		
7.3 By 2030, Double the rate of improvement of energy efficiency	7.3.1 GDP per unit of energy use (constant 2011 PPP \$ per kg of oil equivalent)			2.2	2.3 (2011)	2.22 (2013)	
	Level of primary energy intensity(MJ/\$2005 PPP)	14.7		19.6	17.5	18.00	17.53

Sources: (World Bank, 2015); (World Bank, 2016)

Figure 4: SDG indicators

Percentage of population with access to electricity	Access to non-solid fuel (% of population)	GDP per unit of energy use (PPP \$ per kg of oil equivalent) 2013	Renewable energy consumption (% of total final energy consumption), 2006-2011, 2012
40.5 	29.65% 	2.29 	75.6% 

Table 4: Zimbabwe's key aspects/key mitigation measures to meet its energy Intended Nationally Determined Contributions (INDCs)

INDC
*Promote ethanol blending being avoided emissions of 202 GgCO ₂ e by 2030 for an indicative cost of US \$100 million;
*Promote and disseminate solar water heaters to avoid 179 GgCO ₂ e by 2030, for an indicative cost of US \$1.230 billion;
*Improve energy efficiency to avoid 1, 278 GgCO ₂ eq by 2030, for an indicative cost US \$60 million;
*Increase hydro in our energy mix to avoid 15,316 GgCO ₂ eq by 2030 for an indicative cost of US \$5 billion;
*Refurbish and electrify the rail system to avoid 341 GgCO ₂ eq by 2030 for an indicative cost of US \$7.246 billion;
*Build coal-bed methane (CBM) power plant for an indicative cost of US \$1 billion;
*Install solar powered off-grids of 3,000 MW and 8 Integrated Waste Management units for an indicative cost of US \$500 million;
*Upgrade thermal power station technologies for an indicative cost of US \$5 billion;
*Review and improve the transport system for an indicative cost of US \$37 billion;
*Adopt sustainable energy alternatives of curing tobacco for an indicative cost of US \$1.05 billion.

Source: (MEM, 2015)

Table 5: Zimbabwe's institutional and legal framework

Basic Elements	Response
Presence of an Enabling Institutional Framework for sustainable energy development and services (Max 5 institutions) most critical ones	Ministry of Energy and Power Development Rural Electrification Agency The Zimbabwe Electricity Regulatory Commission (ZERC, www.zerc.co.zw) is a statutory body established under the Electricity Act, (Chapter 13:19) No. 4 of 2002, as amended by the Electricity Amendment Act No. 3 of 2003. It became operational in August 2003. The Petroleum Act, passed in 2006, provided for the establishment of the
Presence of a Functional Energy Regulator	Energy Sector Regulatory Board Zimbabwe Energy Regulatory Authority
Ownership of sectoral resources and markets (Electricity/power market; liquid fuels and gas market)	Petroleum Regulatory Authority (PRA), to licence and regulate the petroleum industry, to promote the development of efficient procurement, sales and distribution of petroleum products, and to safeguard the interests of consumers of petroleum products. The PRA also has an advisory role to the Minister. The PRA is still to be established National Oil Company of Zimbabwe (NOCZIM) has been unbundled into the National Oil Infrastructure Company (NOIC) and Petrotrade to enhance sector efficiency.
Level of participation in regional energy infrastructure (Power Pools) and institutional arrangements	Southern Africa Power Pool
Environment for Private Sector Participation	
Whether the Power Utility(ies) is/are vertically integrated or there is unbundling (list the Companies)	State owned ZESA Holdings and subsidiaries: Zimbabwe Power Company and Zimbabwe Electricity Transmission and Distribution Company.
Where oil and gas production exists, whether upstream services and operations are privatized or state-owned, or a mixture (extent) e.g., licensed private exploration and development companies)	
Extent to which Downstream services and operations are privatized or state-owned, or a mixture (extent)	The petroleum sub-sector has been liberalized. The National Oil Company of Zimbabwe (NOCZIM) has been unbundled into the National Oil Infrastructure Company (NOIC) and Petrotrade.
Presence of Functional (Feed in Tariffs) FIT systems	
Presence Functional IPPs and their contribution	Rusitu Power Corporation
Legal, Policy and Strategy Frameworks	
Current enabling policies (including: RE; EE; private sector participation; & PPPs facilitation) (list 5 max) most critical ones	The National Energy Policy 2012
Renewable Energy Policy (draft)	
Independent Power Producers Policy (draft)	
Current enabling laws/pieces of legislation (including: RE; EE; private sector participation; & PPPs facilitation) – including electricity/grid codes & oil codes (5 max or yes/no) most critical ones	<ul style="list-style-type: none"> • Energy Regulatory Authority Act [Chapter 13:23] of 2011 • Rural Electrification Act 2002 • Rural Electrification Fund Act (Chapter 13:20) of 2002 • Electricity Regulatory Bill

This table was compiled with material from (REEEP, undated)

Intended Nationally Determined Contributions (INDC) within the framework of the Paris climate Agreement

Zimbabwe aims to build resilience to climate change while pursuing its sustainable development agenda. The country articulated its Intended Nationally Determined Contributions (INDC) in September 2015. Those related to energy are listed in Table 4.

Institutional and Legal Framework

The Ministry of Energy and Power Development is in charge of energy policy. The energy sector regulator is the Zimbabwe Energy Regulatory Authority. The state owned ZESA Holdings and subsidiaries, the Zimbabwe Power Company and Zimbabwe Electricity Transmission and Distribution Company handle the generation, transmission and distribution of electric energy. On a regional level, Zimbabwe is a member of the Southern Africa Power Pool. The legal framework is provided by the Energy Regulatory Act of

2011. The Zimbabwe Energy Council is the local representative of the World Energy Council.

The main sector policy is the National Energy Policy 2012. It aims to provide access to electricity for the whole country and to develop alternative sources of electricity as well. A main focus is to explore regional cooperation to develop large hydropower dams and also for oil and gas opportunities. In the medium term, it aims to develop coal and coal-bed methane to contribute to power generation.