



Figure 1: Energy profile of Tanzania



Figure 2: Total energy production, (ktoe)

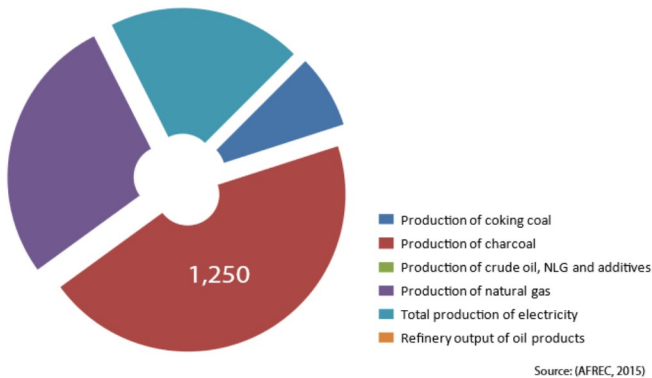
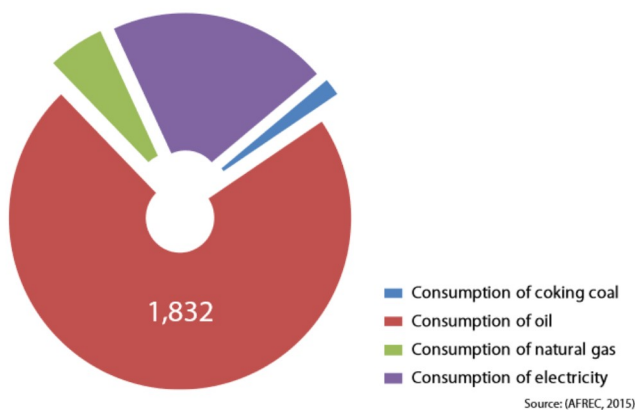


Figure 3: Total energy consumption, (ktoe)



Energy Consumption and Production

In 2013, Tanzania had a population of 49.25 million (Table 1). Total electricity production in 2015 was 555 ktoe, with 70.9 per cent from fossil fuels and 27.2 per cent from hydro sources, as shown in Table 2. Final consumption of electricity was 526 ktoe in 2015 (AFREC, 2015). Figures 2 and 3 show the main energy statistics.

Table 1: Tanzania's key indicators

Key indicators	Amount
Population (million)	49.25
GDP (billion 2005 USD)	23.30
CO ₂ emission (Mt of CO ₂)	9.70

Source: (IEA, 2016)

Energy Resources

Biomass

Only 10 per cent of total energy consumption is provided by petroleum and hydroelectricity with the balance coming from biomass (REEEP, 2014). These proportions are a direct indicator of the country's level of development. Tanzania has a forested area of about 35.5 million hectares and this feeds a huge commercial charcoal industry placing the forests under growing pressure (REEEP, 2014). Commercial firewood and charcoal are both big revenue earners especially in the rural areas and demand has grown over the past 15 years. For instance, in 2000, the production of charcoal was 699 ktoe increasing to 1,154 in 2010 and 1,250 in 2015 (AFREC, 2015). In 2012, demand for charcoal outside the urban domestic sector was about 300,000 tonnes of charcoal (Camco Clean Energy (Tanzania) Ltd, 2014).

Hydropower

Tanzania's hydropower potential is estimated at 4.7 GW, but so far only 705 MW of the potential installed capacity has been developed (REEEP, 2014). Of the 555 ktoe of electricity produced in 2015, 151 ktoe was produced from hydro sources in the same year (AFREC, 2015). The installed capacity in 2011 was 561 MW with most of this power is generated at Mtera and Kidatu dams on the Great Ruaha River in south-central Tanzania (WEC, 2013). Other power stations include Kihansi, Pangani, Hale and Nyumba ya Mungu with installed capacities of 180, 68, 21 and 8 MW respectively.

Planned developments include Ruhudji (360 MW) on the Ruhudji River in the south, Rumakali (220 MW) on the Rumakali River that drains into Lake Nyasa, and Stieglers Gorge (2,100 MW) on River Rufiji (REEEP, 2014).

Table 2: Total energy statistics (ktoe)

Category	2000	2005	2010	2015 P
Production of coking coal	44	42	54	210
Production of charcoal	699	1,066	1,154	1,250
Production of crude oil, NLG and additives	-	-	-	-
Production of natural gas	0	127	715	766
Production of electricity from biofuels and waste	0	0	0	9
Production of electricity from fossil fuels	29	108	218	394
Production of nuclear electricity	-	-	-	-
Production of hydro electricity	184	153	219	151
Production of geothermal electricity	-	-	-	-
Production of electricity from solar, wind, Etc.	0	0	0	1
Total production of electricity	213	261	437	555
Refinery output of oil products	-	-	-	-
Final Consumption of coking coal	25	6	0	41
Final consumption of oil	693	705	1,453	1,832
Final consumption of natural gas	0	127	111	135
Final consumption of electricity	170	202	293	526
Consumption of oil in industry	114	94	67	89
Consumption of natural gas in industry	0	127	111	151
Consumption of electricity in industry	33	62	89	95
Consumption of coking coal in industry	25	6	0	41
Consumption of oil in transport	460	851	1,106	1,565
Consumption of electricity in transport	-	-	-	-
Net imports of coking coal	-	-	-	-
Net imports of crude oil, NGL, Etc.	-	-	-	-
Net imports of oil product	757	1,275	1,652	2,371
Net imports of natural gas	-	-	-	-
Net imports of electricity	5	12	5	5

- : Data not applicable

0 : Data not available

(P): Projected

(AFREC, 2015)

Oil and natural gas

Total production of electricity in 2015 was 555 ktoe. The electricity produced from fossil fuels in the same year was 394 ktoe or 70.9 per cent (AFREC, 2015). Net imports of petroleum products increased from 1,652 ktoe in 2010 to 2,371 ktoe in 2015 (AFREC, 2015). Development of natural gas for electricity is ongoing at the Songo Songo and Mnazi Bay gas fields. Two other fields, Mkuranga and Kiliwani, are under appraisal. The proven recoverable reserves of natural gas at the end of 2011 were 6.5 bcm (WEC, 2013); by 2013, the total natural gas reserves discovered amounted to 46.5 trillion cubic feet, of which about 8 trillion cubic feet were in onshore fields (URT, 2014).

Petroleum exploration activities have led to the following gas discoveries listed verbatim from (URT, 2014):

- Songo Songo in Kilwa District, Lindi
- Mnazi Bay in Mtwara
- Mkuranga, coast region
- Kiliwani/East Songo Songo area

- Deep-sea Blocks 1, 3 and 4 by Ophir/BG southeast of Mafia Island and east of Mnazi Bay (some fields under exploration and partly under appraisal)
- Deep-sea Block 2 east of Lindi town by Statoil/ExxonMobil (some fields under exploration and partly under appraisal)
- Ntorya in Mtwara by Ndovu Resources/Aminex (planned for appraisal).

Wind

Tanzania is estimated to have good wind power potential, but research is still being carried out. The Indian Ocean coastline and areas in the Rift Valley shows promising wind speeds.

The government plans to build a 50 MW wind farm at Singida in the central part of the country (GWEC, 2014). In support of the renewable energy sector, work started on a new renewable energy policy in 2014, including a feed-in tariff for wind power and other renewable energy sources (GWEC, 2014).

Geothermal

Tanzania's location in the Rift Valley suggests a high potential for geothermal power generation; surveys indicate a potential of 450 MWe (Mnjokava, 2012). Investigations of hot springs in Rufigi district, Morogoro and Mara regions are promising (Mnjokava, 2012). But environmental issues need to be considered since geothermal exploitation might affect groundwater flows.

Solar

Tanzania is seeking to utilize its solar power beyond the traditional lighting and phone charging functions, by investigating large PV projects. The mean solar energy density is about 4.5kW/m²/day (REEEP, 2014).

Tracking progress towards sustainable energy for all (SE4All)

Tanzania's national electrification rate lies at just 15.3 per cent — with less than 4 per cent in rural areas and 46.4 per cent in urban areas (World Bank, 2016). Energy demand is growing at the rate of 9-10 per cent each year (Muema & Shabbir, 2011). By 2012, only 4.24 per cent of Tanzanians had access to modern fuels, with 2 per cent in rural areas and 15 per cent in urban Tanzania (Table 4 and Figure 4) (World Bank, 2015).

The energy intensity (the ratio of the quantity of energy consumption per unit of economic output) of the Tanzanian economy was 12.1 MJ per US dollar (2005 dollars at PPP) in 2012, showing almost no change from the 12.6 MJ per US dollar in 2010. The compound annual growth rate (CAGR) between 2010 and 2012 was -1.90 (World Bank, 2015).

The share of renewable energy in the total final energy consumption (TFEC) was 88.2 per cent in 2012. Traditional solid biofuels form the biggest share of renewable sources at 68.4 per cent of TFEC in 2012, while modern solid biofuels contributed 19.2 per cent and hydro only 0.6 per cent (World Bank, 2015).

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

Tanzania aims to put its economy on a climate resilient development pathway and its Intended Nationally Determined Contributions (INDCs) articulates actions to that end. Those related to energy are listed in Table 4.

Table 3: Tanzania'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	7	9	15	15.3		
	7.1.2 per cent of population with primary reliance on non-solid fuels	2	5	4	4.24		
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	94.8	94.3	90.7	88.17		
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)			4.7	4.9 (2011)	4.83 (2013)	
	Level of primary energy intensity (MJ/\$2005 PPP)	16.0		12.6	12.1	12.29	

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
15.3%	4.24%	4.99	88.17%
			

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

INDC
*Explore and invest in energy diversification system.
*Promote the use of energy efficient technologies and behavior.
*Enhance integrated basin catchment and upstream land management for hydro sources.
*Enhance the use of renewable energy potential across the country (hydro, solar, wind, biomass and geothermal).

Source: (MEM, 2015)

Table 5: Tanzania'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	<ul style="list-style-type: none"> • Ministry of Energy and Minerals • Ministry for Petroleum Affairs • Rural Energy Agency
Presence of a Functional Energy Regulator	
Ownership of sectoral resources and markets (Electricity/ power market; liquid fuels and gas market)	
Level of participation in regional energy infrastructure (Power Pools) and institutional arrangements	<ul style="list-style-type: none"> • East African Power Pool (EAPP) • Southern Africa Power Pool (SAPP)
Environment for Private Sector Participation	
Whether the Power Utility(ies) is/are vertically integrated or there is unbundling (list the Companies)	
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)	Tanzania Petroleum Development Corporation (TPDC)
Extent to which Downstream services and operations are privatized or state-owned, or a mixture (extent)	
Presence of Functional (Feed in Tariffs) FIT systems	<ul style="list-style-type: none"> • Energy and Water Utilities Regulatory Authority (EWURA) • Petroleum Importation Coordinator Ltd.
Presence Functional IPPs and their contribution	
Legal, Policy and Strategy Frameworks	
Current enabling policies (including: RE; EE; private sector participation; & PPPs facilitation) (list 5 max) most critical ones	<ul style="list-style-type: none"> • The draft National Energy Policy of 2015 • Petroleum Policy 2015 • Natural Gas Policy 2015 • Local Content Policy 2014 • Rural Energy Fund
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	Electricity Act (2008) Petroleum (Exploration and Production) Act 1980 Petroleum Act 2008 Rural Energy Act 2005

This table was compiled with material from (REEEP, 2014) and (URT, 2014)

Institutional and Legal Framework

The Ministry of Energy and Minerals is in charge of laying the policy foundation for the country (Table 5). In the upstream petroleum sector, the Ministry for Petroleum Affairs

regulates the Tanzania Petroleum Development Corporation (TPDC), while in the downstream sector, regulatory oversight is provided by the Energy and Water Utilities Regulatory Authority (EWURA) as well as the Petroleum Importation Coordinator Ltd. The main law is the Electricity

Act (2008). In 2015, a National Energy Policy was drafted, which proposes improving energy security and efficiency and the legal framework and unbundling the energy sector, among other actions (GWEC, 2014).

DFID / Flickr.com / CC BY 2.0



A boy stands under an electricity pylon in rural Tanzania