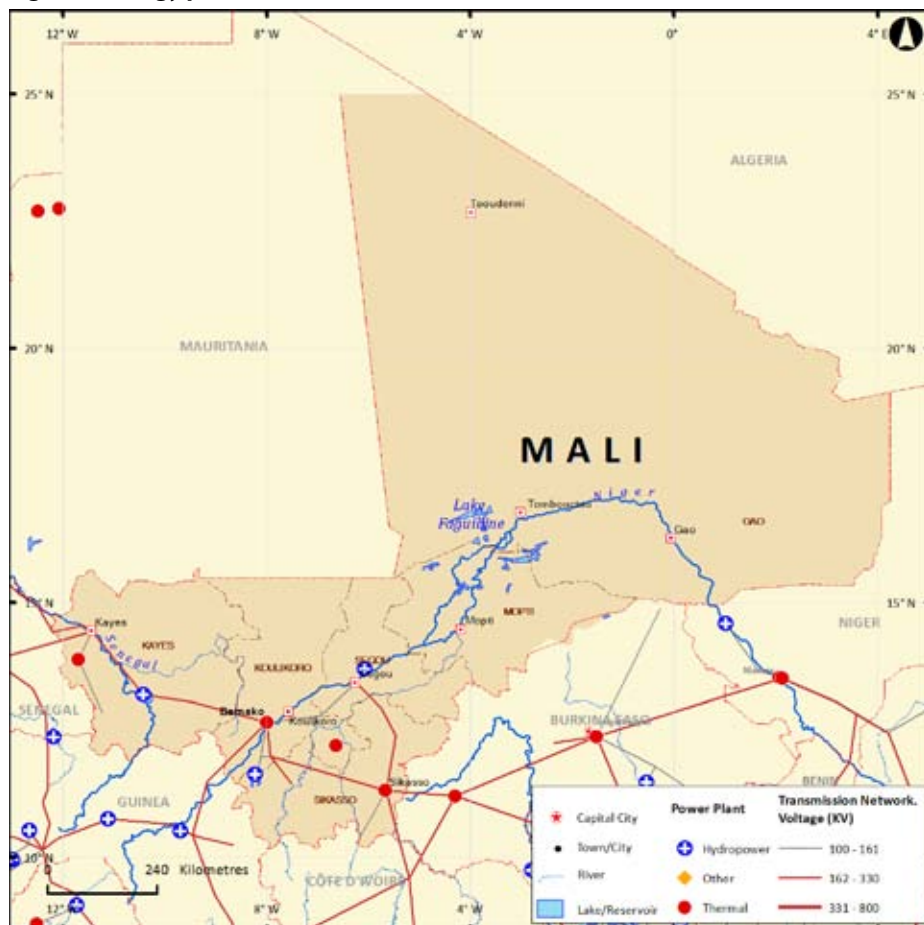




Figure 1: Energy profile of Mali



Energy Consumption and Production

Mali's population in 2013 was 16.59 million, as shown in Table 1 (World Bank, 2016). In 2015, total electricity produced was 225 ktOE, of which 58.2 per cent came from fossil fuels, 38.6 per cent from hydro and 2.6 per cent from biofuels and waste (Table 2). Final consumption of electricity in 2015 was 145 ktOE (AFREC, 2015).

Table 1: Mali's key indicators

Key indicators	Amount
Population (million)	16.59
GDP (billion 2005 USD)	7.28
CO ₂ emission (Mt of CO ₂)	1.25

Source: (World Bank, 2015)

Energy Resources

Biomass

Mali has extensive biomass resources including forests which are under pressure to provide fuel wood to satisfy the domestic energy requirements of the growing population. Eighty per cent of national energy supply is provided by biomass and this contributes to the deforestation rate of 4,000 km² every year (REEEP, 2012). Electricity demand is growing at 10 per cent per year. Other forms of biomass that could be used for energy provision include biofuels from jatropha plantations and agricultural waste such as rice straw, bagasse from sugarcane and cotton stalks. In 2015, production of electricity from biofuels and wastes amounted to 6 ktOE (AFREC, 2015).

Figure 2: Total energy production, (ktOE)

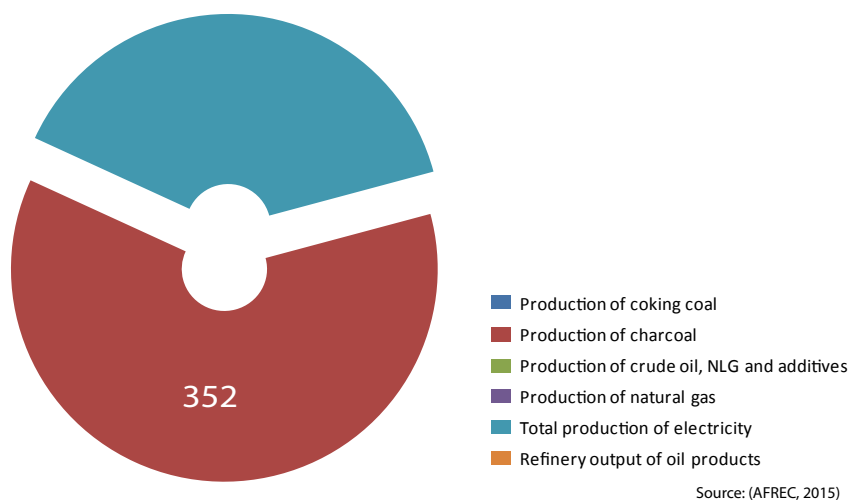
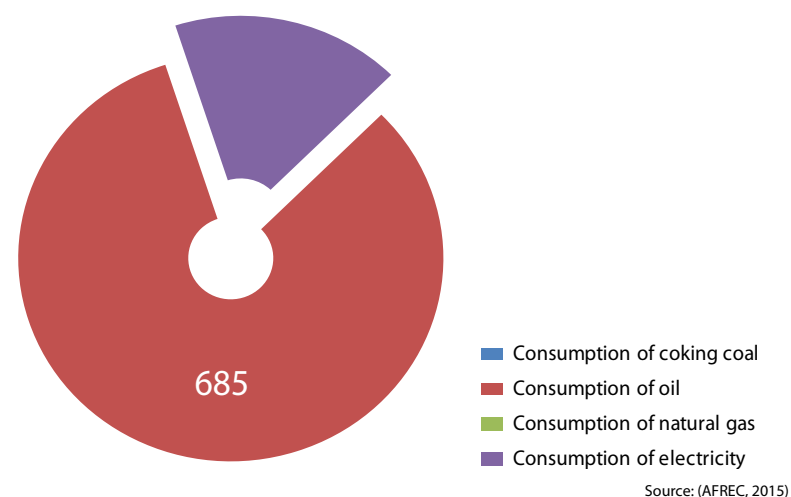


Figure 3: Total energy consumption, (ktOE)



M Poudyal / Flickr.com / CC BY-SA 2.0



A pile of chopped fuelwood in Mali

Table 2: Total energy statistics (ktoe)

Category	2000	2005	2010	2015 P
Production of coking coal	-	-	-	-
Production of charcoal	210	232	316	352
Production of crude oil, NLG and additives	-	-	-	-
Production of natural gas	-	-	-	-
Production of electricity from biofuels and waste	4	4	4	6
Production of electricity from fossil fuels	44	49	81	131
Production of nuclear electricity	-	-	-	-
Production of hydro electricity	21	55	60	87
Production of geothermal electricity	-	-	-	-
Production of electricity from solar, wind, Etc.	0	0	0	1
Total production of electricity	70	109	145	225
Refinery output of oil products	-	-	-	-
Final Consumption of coking coal	-	-	-	-
Final consumption of oil	189	245	563	685
Final consumption of natural gas	-	-	-	-
Final consumption of electricity	60	97	123	145
Consumption of oil in industry	1	2	1	19
Consumption of natural gas in industry	-	-	-	-
Consumption of electricity in industry	35	53	55	57
Consumption of coking coal in industry	-	-	-	-
Consumption of oil in transport	179	222	534	638
Consumption of electricity in transport	-	-	-	-
Net imports of coking coal	-	-	-	-
Net imports of crude oil, NGL, Etc.	-	-	-	-
Net imports of oil product	492	559	792	871
Net imports of natural gas	-	-	-	-
Net imports of electricity	0	0	0	1

- : Data not applicable

0 : Data not available

(P): Projected

(AFREC, 2015)

Hydropower

Mali's hydropower potential is just over 1,000 MW mainly from the Niger and Senegal Rivers. So far, only 22 per cent of this potential has been exploited (REEEP, 2012). Existing power plants include the Sélingué on the Sankarani river, an offshoot of River Niger, and the Manantali, Gouina and Félou plants on the Senegal River. Under the auspices of the Organization for the Development of the Senegal River, the Manantali dam provides electricity for Mali, Senegal and Mauritania. There are also numerous sites suitable for small hydro plants (REEEP, 2012).

Wind

The wind energy potential varies over the country from speeds as low as 3 m/s (not ideal for wind

power generation) to 7 m/s (REEEP, 2012). A wind resource mapping exercise was recently completed for Mali (FRSE, 2016).

Solar

Measurements of solar radiation are over 5 kWh/m²/day and in 2015, about 1 ktoe of electricity generated was from solar or wind (REEEP, 2012), (AFREC, 2015). The uptake of solar PV systems has been increasing, especially with the recent declines in prices as more PV-generated electricity becomes available. The recent mapping of potential solar resources will support decision making for investment in solar energy (FRSE, 2016).

Tracking progress towards sustainable energy for all (SE4All)

The national electrification rate of Mali was 25.6 per cent in 2012 (Table 3 and Figure 4). In rural areas, this falls to 11.9 per cent while in urban areas it is 50.4 per cent (World Bank, 2015); (World Bank, 2016). Grid extension into rural areas is limited and the size, economic situation and sparseness of the population means it is unlikely to occur at any meaningful scale in the near future. What little rural electrification exists is provided by mini-grids or individual systems. National access to non-solid fuels in 2012 was 2 per cent, with 2 per cent in rural areas and 3 per cent in urban areas (World Bank, 2015).

Mali's energy intensity increased at a compound annual growth rate (CAGR) of -2.31 per cent over the 20 years between 1990 and 2010 and at 0.75 per cent CAGR from 2010 to 2012. Between 2010 and 2012, the Mali economy's energy intensity (the ratio of the quantity of energy consumption per unit of economic output) increased from 3.2 MJ to 3.3 MJ per US dollar (2005 dollars at PPP) (World Bank, 2015).

The share of renewable energy in total final energy consumption (TFEC) decreased from 91.6 to 83.54 per cent between 1990 and 2012. In 2012, traditional solid biofuels formed the biggest share of renewable sources at 78.9 per cent, followed by hydro at 3.1 per cent of TFEC and modern biofuels at 1.5 per cent (World Bank, 2015). Renewable sources contributed 51.6 per cent of the share of electricity capacity and 28.2 per cent of the electricity generated in 2012 (World Bank, 2015).

Table 3: Mali'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	12	17	17	25.6		
	7.1.2 Per cent of population with primary reliance on non-solid fuels	2	2	2	2		
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	91.6	88.9	88.3	83.5		
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)						
	Level of primary energy intensity(MJ/\$2005 PPP)	5.2		3.2	3.3	3.20	3.29

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
25.6%	2.0%	NA	83.87%

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

INDC
*Implement a large scale renewable energy recovery plan (SREP) for a total budget of US \$258 million.
*Execute the Manantali II project for a total cost of US \$150 million between 2016 and 2021.
*Implement the rural electrification project using renewable energies between 2015 and 2020 for a total cost of US \$7.2 million.
*Build the Kénié hydroelectric power plant between 2015 and 2020 for a total budget of US \$165 million.

Source: (MEM, 2015)

Table 5: Mali'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 Water • Rural Electrification and Domestic Energy Agency (AMADER) • National Research Center for Solar and Renewable Energy (CNESOLER) • National Agency for the Development of Biofuels (ANADEB)
Presence of a Functional Energy Regulator	Electricity and Water Regulatory Commission (CREE)
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	West African Power Pool
Environment for Private Sector Participation	
Whether the Power Utility(ies) is/are vertically integrated or there is unbundling (list the Companies)	Vertically Energie du Mali SA (EDM)
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)	National Office of Petroleum Products (ONAP)
Presence of Functional (Feed in Tariffs) FIT systems	
Presence Functional IPPs and their contribution	Scatec Solar ASA
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"> • National Energy Policy 2006 • National Strategy for the Development of Renewable Energy 2006 • National Energy Sector Policy Letter 2009 • Rural Electrification Framework • National Strategy for the Development of Biofuels 2008
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	ECOWAS Protocol on Energy 2003

This table was compiled with material from (REEEP, 2012), (MEW, 2011) and (Toure, 2011)

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

Mali articulated its Intended Nationally Determined Contributions (INDC) in 2015, as it is a keen participant in global climate deliberations. Those related to energy are highlighted in Table 4.

Institutional and Legal Framework

The Ministry of Energy and Water is in charge of the energy sector (Table 5). The energy regulator is the Electricity and Water Regulatory Commission (CREE). Energie du Mali SA (EDM)

provides electricity services with the support of local private energy companies, the Rural Electrification and Domestic Energy Agency (AMADER) and the Rural Electrification Fund. On a regional level, Mali is a member of West African Power Pool. The legal framework is provided by the ECOWAS Protocol on Energy 2003, which Mali has ratified. The main sector policy is the National Energy Policy 2006, which aims to meet the energy needs of the populace while ensuring the protection of people, infrastructure and the environment against the risks of inappropriate energy services.