



Figure 1: Energy profile of South Sudan



Energy Consumption and Production

The total population of South Sudan in 2013 was 11.3 million people (Table 1). Total production of electricity in 2015 was 28 ktOE, with 92.8 per cent from fossil fuels and 7.1 per cent from hydro sources. Final electricity consumption in 2015 was 16 ktOE (Table 2) (AFREC, 2015). Figures 2 and 3 show the energy production and consumption statistics.

Table 1: South Sudan's key indicators

Key indicators	Amount
Population	11.30
GDP (billion 2005 USD)	10.95
CO ₂ emission (Mt of CO ₂)	1.47

Source: (World Bank, 2015)

Energy Resources

The power infrastructure in the country is under-developed following long years of civil strife.

Biomass

The electricity sector is so undeveloped that about 70 per cent of South Sudan's populace depend on traditional biomass fuels such as woodfuel, charcoal, crop residue and animal dung to provide their cooking and heating energy needs (REEEP, 2012). In 2015, 8 ktOE of charcoal were produced (AFREC, 2015). The country is rich in forest and other woody biomass with just over 70 million hectares existing. The allowable cut is estimated at 29.3 million cubic metres but allowances need to be made for changes in demand in light of population growth (REEEP, 2012).

Hydropower

As the River Nile flows through South Sudan, it presents many opportunities for hydropower generation from large plants to small hydro. Existing plants include: Fula (1,080 MW), Bedden (720 MW), Lekki (420 MW), Shukoli (250 MW) and Juba barrage (120 MW) (ROSS, 2014). The government is also investing in small hydro as a more efficient means of enabling access to electricity to the many communities scattered around the country. Small hydro plants may generate up to 40 MW of electricity and so far about 18 potential locations have been identified (ROSS, 2014). The Fula Small Hydropower plant is currently being developed and it is estimated that it will be able to provide Juba between 40 and 60 MW of power (AfDB, 2013).

Figure 2: Total energy production, (ktOE)

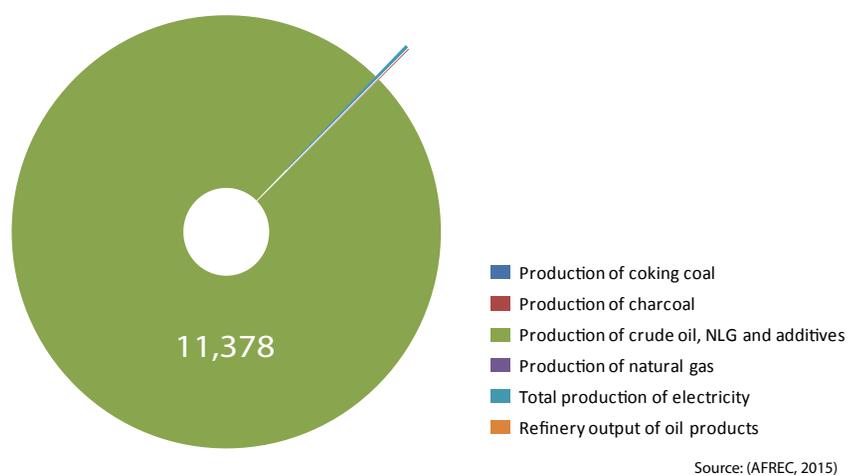


Figure 3: Total energy consumption, (ktOE)

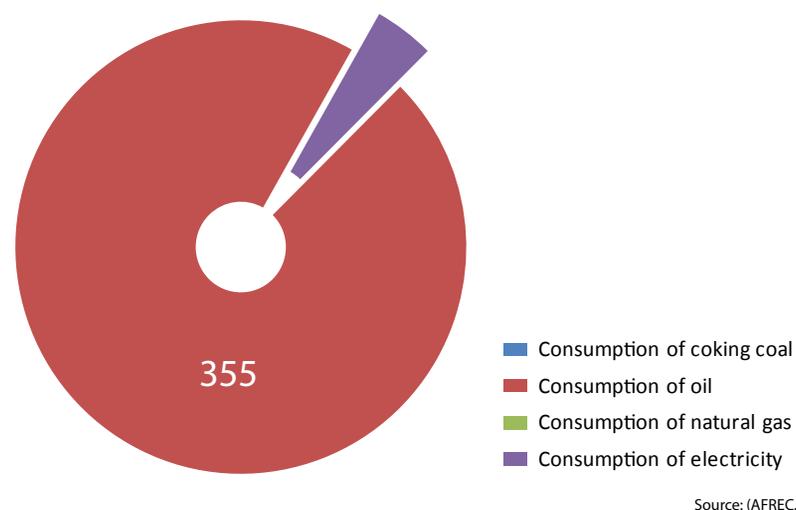


Table 2: Total energy statistics (ktoe)

Category	2000	2005	2010	2015 P
Production of coking coal	-	-	-	-
Production of charcoal	-	-	-	8
Production of crude oil, NLG and additives	-	-	-	11,378
Production of natural gas	-	-	-	-
Production of electricity from biofuels and waste	-	-	-	-
Production of electricity from fossil fuels	-	-	-	26
Production of nuclear electricity	-	-	-	-
Production of hydro electricity	-	-	-	2
Production of geothermal electricity	-	-	-	-
Production of electricity from solar, wind, Etc.	-	-	-	-
Total production of electricity	-	-	-	28
Refinery output of oil products	-	-	-	-
Final Consumption of coking coal	-	-	-	-
Final consumption of oil	-	-	-	355
Final consumption of natural gas	-	-	-	-
Final consumption of electricity	-	-	-	16
Consumption of oil in industry	-	-	-	0
Consumption of natural gas in industry	-	-	-	-
Consumption of electricity in industry	-	-	-	-
Consumption of coking coal in industry	-	-	-	-
Consumption of oil in transport	-	-	-	328
Consumption of electricity in transport	-	-	-	-
Net imports of coking coal	-	-	-	-
Net imports of crude oil, NGL, Etc.	-	-	-	0
Net imports of oil product	-	-	-	456
Net imports of natural gas	-	-	-	-
Net imports of electricity	-	-	-	-

- : Data not applicable
0 : Data not available
(P): Projected

(AFREC, 2015)

Oil and natural gas

South Sudan became independent in 2011 and this was a turning point in its history as an oil producing country. The oil infrastructure and refining capacity is all located in the Republic of Sudan in the north and political instability has greatly affected the mining and export of the petroleum resource. Oil is the cornerstone of the South Sudanese economy earning about 60 per cent of GDP in 2010 down from 98 per cent in 2008, and this has had significant impacts at the national level (AfDB, 2013) (REEEP, 2012). The data indicates that 11,378 ktoe of crude oil in 2015 (AFREC, 2015) and the proven reserves by the beginning of 2014 were 3.5 billion barrels of oil (US Energy Information Administration, 2014). With the splitting of the two countries most of the oil producing blocks are located in South Sudan—about 70 per cent of the deposits (US Energy Administration, 2014). There are also some deposits in Abeyi, a disputed area on their common border (AfDB, 2013). South Sudan

The natural gas industry is underdeveloped and any gas that is produced along with the oil is flared or re-injected (WEC, 2013).

Wind

The potential for wind energy lies in rural electrification where distributed systems can easily be utilized. According to REEEP (2012) the wind power density is between 285 and 380 W/m² which implies good resources for wind power generation. There will be need to attract private investment to develop this sector (REEEP, 2012).

Geothermal

The location of South Sudan in the vicinity of the East African Rift System is a high indicator of geothermal potential which the government would be keen to exploit. The country has partnered with the Kenyan Geothermal Development Company (GDC) to carry out an assessment of its geothermal resource (REEEP, 2012).

Solar

South Sudan has about 8 hours of sunshine per day with a solar potential 436 W/m²/year (REEEP, 2012). This can be successfully used to support electrification in the rural areas. Currently, solar energy is being used to supply more than 40,000 households to power a variety of devices that run on solar power such as electricity lighting, phone charging and radios. There are plans to increase the use of the country's high potential for solar energy to meet energy demand.

Tracking progress towards sustainable energy for all (SE4All)

The energy situation is a direct reflection of the state of conflict from which this country has recently emerged. It has rich hydropower potential, but most of electricity is generated from thermal sources and the supply is limited to a few towns. The existing electricity network is a trio of decentralised plants that transmit power to Juba (the capital), Malakal (capital of Eastern Nile State) and Wau (capital of Wau State). Electrification rates in South Sudan are the lowest in Africa. Local statistics indicate that South Sudan's Electricity Corporation has an installed capacity of 25 MW with approximately 15,000 consumers having access to an electricity network (ROSS, 2014). The World Bank (2015) indicates that only 5.1 per cent of people countrywide have access to electricity, with 3 per cent in rural areas and 12 per cent in urban areas (Table 3 and Figure 4). The Infrastructure Action Plan aims to expand generation capacity from the present 50 MW to about 580 MW by 2025 (AfDB, 2013).

Biomass meets the majority of the country's energy needs and indeed access to modern fuels is very low. In 2012, only 2 per cent of South Sudanese in both rural and urban areas were using non-solid fuels (World Bank, 2016). But under the Intended Nationally Determined Contributions (INDCs), South Sudan has indicated its intentions to increase the efficiency of biomass use, especially fuelwood and charcoal in the traditional energy sector.

There are no data on energy intensity or on the share of renewable energy in total final energy consumption.

Table 3: South Sudan'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	0	0	2	5.1		
	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						
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)						

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
5.1%	NA	NA	NA

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

INDC
*Increase the use of clean and carbon-neutral energy.
*Construction of a hydroelectricity plant at the Fulla rapids.
*Increase the use of the country's high potential for solar and wind energy to meet energy demand.
*Increase the efficiency of biomass use (particularly fuel wood and charcoal) in the traditional energy sector.
*Increase efficiency of electricity usage in the formal energy sector and ensuring the best use of hydropower by a careful management of the water resources.

Source: (MEM, 2015)

Table 5: South Sudan'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 Electricity and Dams (MoED) • Ministry of Petroleum and Mining (MoPM) • Planned reforms: Electricity Regulatory Agency, Petroleum Regulatory Agency and a Rural Electrification Agency are also proposed.
Presence of a Functional Energy Regulator	South Sudan Electricity Regulation Authority
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	East African Power Pool
Environment for Private Sector Participation	
Whether the Power Utility(ies) is/are vertically integrated or there is unbundling (list the Companies)	South Sudan Electricity Corporation (SSEC) is in charge of generation and transmission and sale of electricity to distributors.
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)	The National Petroleum and Gas Corporation (NPGC) is the main policymaking and supervisory body in the upstream, midstream, and downstream segments of the hydrocarbon sector and is authorized to approve petroleum agreements on the government's behalf.
Extent to which Downstream services and operations are privatized or state-owned, or a mixture (extent)	The Nile Petroleum Corporation (Nilepet), the national oil company is active in oil and gas exploration and production as a minority shareholder with foreign oil companies due to limited technical expertise and financial resource.
Presence of Functional (Feed in Tariffs) FIT systems	
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"> • National Electricity Sector Policy 2007 • Draft South Sudan Petroleum Policy Paper (December 2010)
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"> • Council of Ministers Order No.30/2006 • National Electricity Bill 2015 • Petroleum Act 2012

This table was prepared with material from (REEEP, 2012) and (ROSS, 2014)

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

South Sudan's vulnerability to the impacts of climate change is compounded by the range of developmental challenges resulting from over half a century of conflict. However, the country is committed to its international obligations and published its Intended Nationally Determined Contributions (INDC). Those related to energy are listed in Table 4.

Institutional and Legal Framework

The Ministry of Electricity and Dams is in charge of the energy sector (Table 5). The energy regulator is the South Sudan Electricity Regulation Authority. The South Sudan Electricity Corporation (SSEC) is in charge of generation and transmission and the sale of electricity to distributors. On a regional level, the country is a targeted member of the Eastern Africa Power Pool. The legal framework is provided by the National Electricity Bill 2015, which has just been approved by Parliament. The main sector policy is the 2007 National Electricity

Sector Policy. Much of the energy infrastructure in South Sudan is wanting and the government intends to develop clean energy options as much as possible.