Chad

Figure 1: Energy profile of Chad

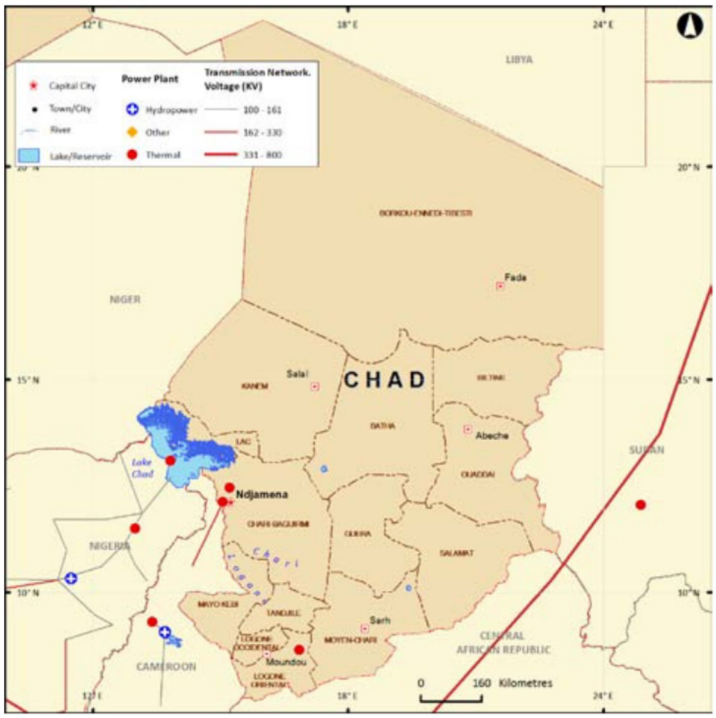
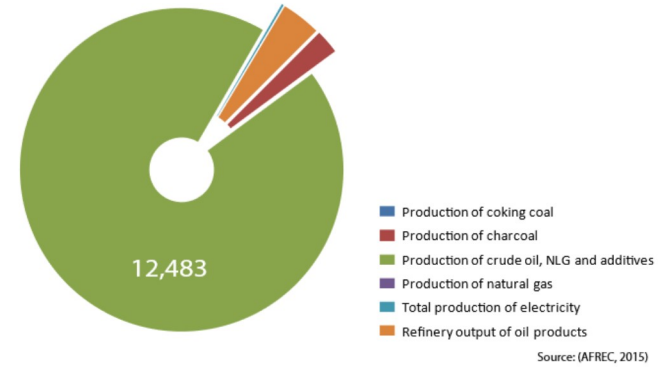
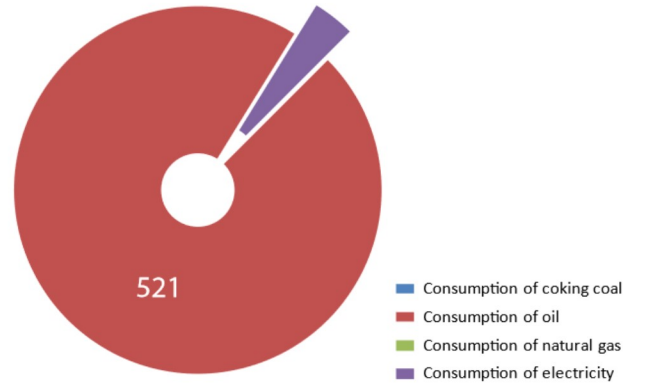


Figure 2: Total energy production, (ktoe)



Source: (AFREC, 2015)

Figure 3: Total energy consumption, (ktoe)



Source: (AFREC, 2015)

Energy Consumption and Production

In 2013, Chad had a population of 13.14 million (Table 1). Although crude oil has become the country's primary source of export earnings, energy access for the population is very low. Electricity production in 2015 was 28 ktoe with 96.4 per cent of it generated from fossil fuels. Final electricity consumption in 2015 was 20 ktoe (AFREC, 2015). Key consumption and production statistics are shown in Figures 2 and 3 while key energy statistics are shown in Table 2.

Table 1: Chad's key indicators

Key indicators	Amount
Population (million)	13.14
GDP (billion 2005 USD)	9.70
CO_2 emission (Mt of CO_2)	0.53

Source: (World Bank, 2015)

Energy Resources

Oil

Chad has the 10th largest oil reserves in Africa, estimated at 1.5 billion barrels of oil in 2013 (Table 3) (EIA, 2013). Chad started commercial oil production in 2003, when the 1,070 km Chad-Cameroon pipeline (CCP) was finished, allowing exports from the oil fields in the Doba Basin of southern Chad

Oil well, Chad

Table 2: Total energy statistics (ktoe)

Category	2000	2005	2010	2015 P
Production of coking coal	-	-	-	-
Production of charcoal	412	497	296	319
Production of crude oil, NLG and additives	-	8164	5721	12483
Production of natural gas	-	-	-	-
Production of electricity from biofuels and waste	0	0	0	0
Production of electricity from fossil fuels	8	9	9	27
Production of nuclear electricity	-	-	-	-
Production of hydro electricity	-	-	-	-
Production of geothermal electricity	-	-	-	-
Production of electricity from solar, wind, Etc.	0	0	0	0
Total production of electricity	8	9	9	28
Refinery output of oil products	-	-	0	525
Final Consumption of coking coal	-	-	-	-
Final consumption of oil	72	126	252	521
Final consumption of natural gas	0	1	0	0
Final consumption of electricity	7	7	8	20
Consumption of oil in industry	0	0	0	0
Consumption of natural gas in industry	-	-	-	-
Consumption of electricity in industry	0	0	0	0
Consumption of coking coal in industry	-	-	-	-
Consumption of oil in transport	0	0	0	0
Consumption of electricity in transport	-	-	-	-
Net imports of coking coal	-	-	-	-
Net imports of crude oil, NGL, Etc.	-	-8206	-5871	-11814
Net imports of oil product	72	126	252	28
Net imports of natural gas	-	-	-	-
Net imports of electricity	-	-	-	-

(AFREC, 2015)

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

through Cameroon to a new terminal at Kribi at the Atlantic coast. The 20,000 bbl/d N'Djamena refinery began supplying the local market with petroleum products in 2011. Output peaked at around 170 kb/d in 2004, but stood at 130 kb/d in 2013 (OECD/IEA, 2014). Chad exports more than 85 per cent of her oil production via the Chad-Cameroon Pipeline (WEC, 2013).

Natural gas

There are no known reserves of natural gas.

Peat

There are 10 km^2 of peatland (WEC, 2013).

Wind

Chad is thought to have large on-shore wind potential (Buys, Deichmann, Meisner, Ton-That, & Wheeler, 2007). This is unusual for a land-locked country, but in this case, Chad's topography gives rise to high-speed winds at certain high altitudes, thus enabling the potential for wind energy generation (Mukasa, Mutambatsere, Arvani, & Triki , 2013)

Solar

There is also the potential for solar energy generation in Chad, especially in the north. The private sector is just beginning to get involved. For example, Starsol Solar PV has invested in a plant near N'Djamena to generate about 40 MW.

Table 3: Chad oil resources and reserves, (billion barrels)

Region	Proven reserves end 2013	Ultimately recoverable resources	Cumulative production end 2013	Remaining recoverable resources	Remaining per cent of ultimately recoverable resources
Sub Saharan Africa	65	258	55	203	79
Central Africa	7	47	10	37	78
Chad	1.5	3.4	0.5	2.9	84

Source: (OECD/IEA, 2014)

Tracking progress towards sustainable energy for all (SE4All)

Chad has one of the lowest electrification rates in Africa, as shown in Table 4 and Figure 4. In 1990, there were no electricity connections; by 2012, 6.4 per cent of the population had access. When disaggregated by location, 3.1 per cent of rural areas were electrified compared with 18.3 per cent of urban areas (World Bank, 2016). Access to non-solid fuels is also very low, with only 4.79 per cent using modern fuels —2 per cent in rural areas and 10 per cent in urban areas (World Bank, 2016).

The energy intensity (the ratio of the quantity of energy consumption per unit of economic output) of the Chad economy was 3.6 MJ per US dollar (2005 dollars at PPP) in 2012, down only slightly from 3.6 MJ per US dollar in 2010. The compound annual growth rate (CAGR) between 2010 and 2012 was -2.26 (World Bank, 2015).

Renewables almost totally dominate the energy mix, with a 90.4 per cent share in the total final energy consumption (TFEC), which decreased slightly from 94.5 to 93.5 per cent between 2010 and 2012. Traditional solid biofuels form the biggest share of renewable sources at 89.1 per cent of TFEC in 2012, while the modern solid biofuels contributed just 1.3 per cent (World Bank, 2015).

Table 4: Chad'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	2	4	6.4		
	7.1.2 Per cent of population with primary reliance on non-solid fuels	2	5	5	4.79		
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	95.1	97.9	92.3	90.4		
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)	7.9		3.7	3.6	3.80	3.56

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
6.4%	4.79%	NA	90.61%

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Table 5: Chad's key aspects/key mitigation measures to meet its energy Intended Nationally Determined Contributions (INDCs)

INDC
*Develop renewable energies for the agriculture and pastoral sectors
*Execute the project of Interconnection of Chad-Cameroon power grids to supply Chad with hydro-generated energy of 500 GWh
*Increase the production of solar energy to 200 GWh/year, i.e. : 140 MW/year
*Increase the production of wind energy up to 50 GWh/year
*Execute the construction of a national 225 KV line to interconnect all cities
*Build cross-country power grid (between adjacent cities)
*Promote the use of butane gas and efficient domestic energy

Source: (ROC, 2015)

Table 6: Chad'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 Petroleum • Agency for Renewable Energy Development (ADER)
Presence of a Functional Energy Regulator	Electric Energy Authority
Ownership of sectoral resources and markets (Electricity/ power market; liquid fuels and gas market)	• Société Nationale d'Electicité (SNE) • Société des Hydrocarbures du Tchad • National Commission for the Negotiation of Petroleum Agreements (CNRCP)
Level of participation in regional energy infrastructure (Power Pools) and institutional arrangements	Central Africa Power Pool (CAPP)
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)	Société des Hydrocarbures du Tchad (Chad Hydrocarbons Company) was created in 2006 (for exploration, production and marketing of hydrocarbons and petroleum products, and the negotiation of oil contracts).
Extent to which Downstream services and operations are privatized or state-owned, or a mixture (extent)	Major players include ExxonMobil, Chevron, Petronas, Total, Shell, and Perenco.
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	Energy Master Plan
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	Act No. 014/PR/99 establishes the regulatory authority

This table was prepared with material from (MMEH, 2013); (REEEP, 2012) and (WTO, 2013)

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

Chad has published its INDC targets, which include activities to improve environmental management through tree planting and pursuing a low carbon development pathway to reduce greenhouse gas emissions and contribute to addressing climate change. The activities are all targeted on moving away from an oil-based economy to one based on more sustainable models of renewable energy. The targets are highlighted in Table 5.

Institutional and Legal Framework

The Ministry of Energy and Petroleum is in charge of the energy sector. The energy regulator is the Electric Energy Authority. The Société Nationale d'Electicité (SNE) is the sole generator, transmitter and distributor of electric energy. On a regional level, the country is a member of the Central African Power Pool. The legal framework is provided by Act No. 014/PR/99 (Table 6).

The energy sector is guided by a strategic framework on the improved management and governance of the energy sector. It aims to meet the energy needs of the population and expand access for industrial and agricultural production.