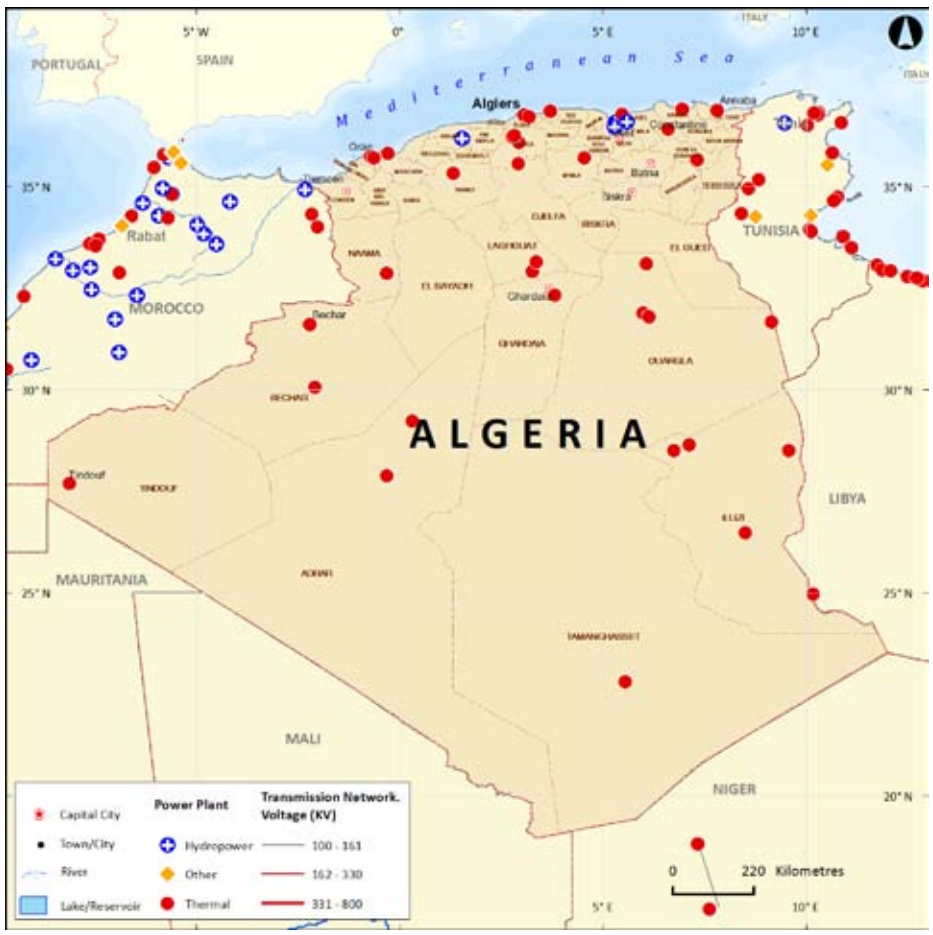
Algeria

Figure 1: Energy profile of Algeria



Energy Consumption and Production

The population of Algeria in 2013 was just over 39 million (Table 1). In 2015, total production of electricity in the country was 65,588 ktoe with most (99.3 per cent) produced from fossil fuels. Generation from renewable sources is almost negligible. Final consumption of electricity has been increasing over the years from a low of 18,595 ktoe in 2009 to 54,313 ktoe in 2015 (Table 2) (AFREC, 2015). Key consumption and production statistics are shown in Figures 2 and 3.

Table 1: Algeria's Key Indicators

Key indicators	Amount
Population (2013 million)	39.21
GDP (billion 2005 USD)	127.19
CO_2 emission (Mt of CO_2)	113.87

IEA, 2016

Energy Resources

Hydropower

About 50 dams are currently operational and the combined capacity of the largest 13 dams is roughly 269 MW (REEEP, 2012). Installed capacity and production in 2011 was 278 MW (WEC, 2013). Environmental factors that restrict the uptake of hydropower are poor rainfall, high levels of evapouration and quick evacuation to the sea.

Oil

Algeria's indigenous oil reserves are the third largest in Africa, after Libya and Nigeria (WEC, 2013). In 2014, Algeria was the world's seventh top oil-products exporter (WEC, 2013) and ranked 17th globally in 2014 with a total of 1.721 million barrels a day. Much of its crude oil is exported to Western Europe and North America (IEA 2014). The principal oil provinces are located in the central and southeastern parts of the country. Hassi Messaoud, discovered in 1956, is the largest oil field. Others include Ourhoud oil field

Figure 2: Total energy production, (ktoe)

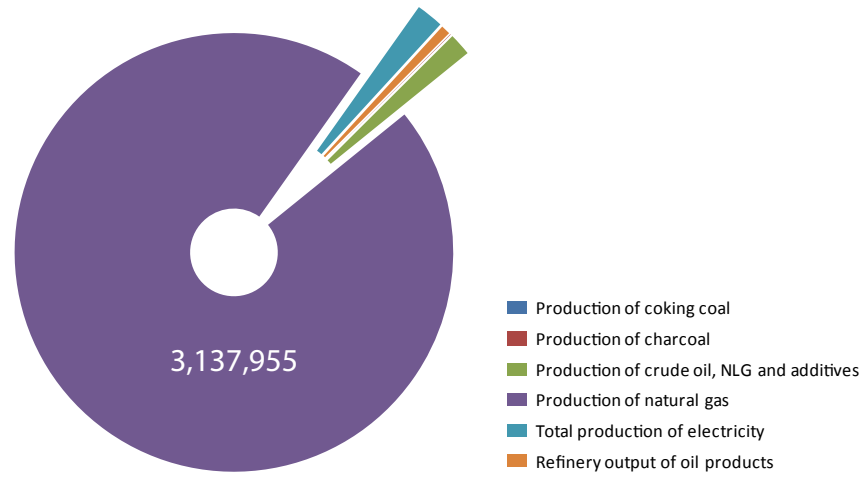


Figure 3: Total energy consumption, (ktoe)

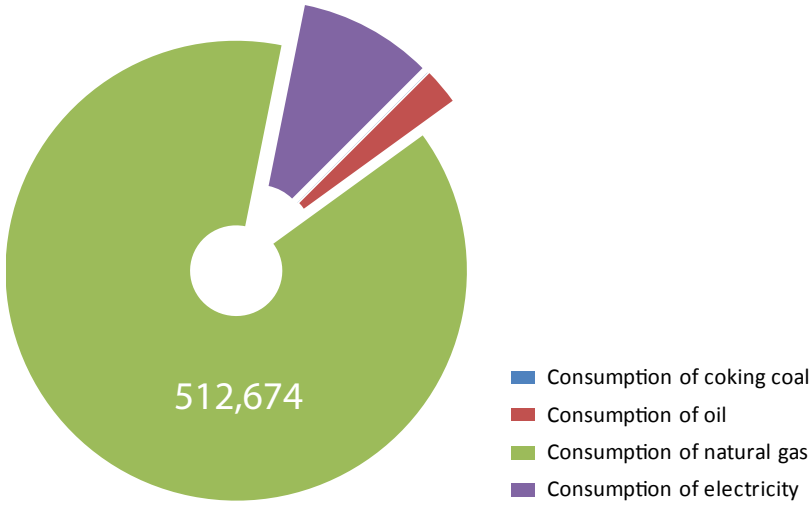
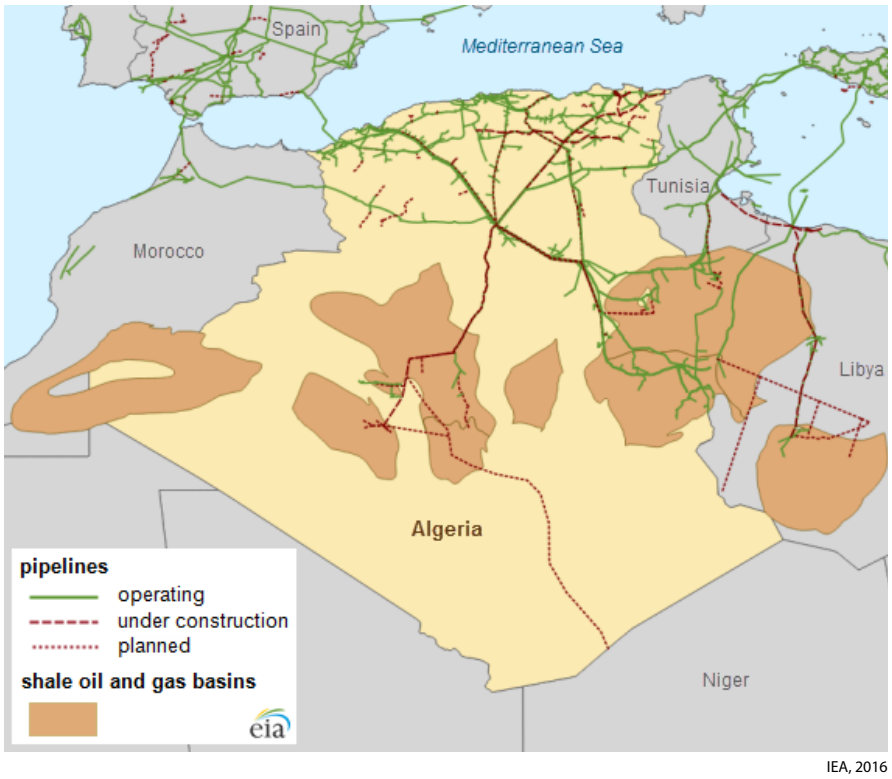


Figure 4: Algeria's oil and gas fields



IEA, 2016

Table 2: Total Energy Statistics (ktoe)

Category	2000	2005	2010	2015 P
Production of coking coal	-	-	-	-
Production of charcoal	0	0	682	715
Production of crude oil, NLG and additives	68,008	86,133	78,120	54,209
Production of natural gas	3,611,288	3,908,975	3,376,884	3,137,955
Production of electricity from biofuels and waste	0	0	0	0
Production of electricity from fossil fuels	25,358	33,360	42,663	65,170
Production of nuclear electricity	-	-	-	-
Production of hydro electricity	54	555	171	43
Production of geothermal electricity	-	-	-	-
Production of electricity from solar, wind, etc.	0	0	0	375
Total production of electricity	25,412	33,915	42,834	65,588
Refinery output of oil products	20,033	18,321	26,402	22,613
Final consumption of coking coal	856	1,120	434	66
Final consumption of oil	7,852	10,123	13,558	14,545
Final consumption of natural gas	246,993	358,386	424,028	512,674
Final consumption of electricity	18,595	29,524	36,576	54,313
Consumption of oil in industry	1,203	1,564	1,842	1 592
Consumption of natural gas in industry	63,245	82,704	139,342	152,171
Consumption of electricity in industry	6,907	8,855	12,700	14,987
Consumption of coking coal in industry	33	172	111	75
Consumption of oil in transport	2,388	5,064	9,525	11,956
Consumption of electricity in transport	354	451	618	792
Net imports of coking coal	593	840	501	429
Net imports of crude oil, NGL, etc.	-37,023	-58,497	-38,734	-29,456
Net imports of oil product	-21,384	-16,367	-21,708	-13,261
Net imports of natural gas	-2,465,007	-2,841,927	-2,312,772	-1,902,106
Net imports of electricity	223	84	-67	-46

- : Data not applicable
0 : Data not available
(P): Projected
Source: AFREC, 2015

and Rhourde El Baguel oil field. Substantial volumes of Natural Gas Liquids (NGLs) — condensate and LPG — are produced at Hassi R'mel and other gas fields. Algerian crudes are of high quality, with low sulphur content. Algeria is estimated to have oil reserves of 12.2 billion barrels (WEC, 2013).

Natural gas

Algeria's largest natural gas field is located at Hassi R'Mel in the east of the country. Algeria has the tenth largest reserves of natural gas worldwide and second largest in Africa after Nigeria (WEC, 2013). It is thought to have proven reserves of 2,405 bcm (WEC, 2013) with more recent government estimates put at 2,745 (Aissaoui, 2016). Other natural gas reserves occur alongside crude oil reserves and non-associated fields in the southeast and southern parts of the country (Figure 4). Algeria is a major natural gas supplier to Europe; with the establishment of the liquefied natural gas (LNG) plant at Arzew in 1964, it was the world's first supplier of LNG. A new LNG plant at Gassi Touil with capacity of 218 bcf/y began operation in late 2013 (WEC, 2013).

Peat

Algeria has 10 km^2 of peatland (WEC, 2013).

Coal

At the end of 2011, Algeria had 59 million tonnes of proven coal (bituminous, including anthracite) recoverable reserves (WEC, 2013).

Wind

Studies indicate that high average wind speeds occur over half the country's surface. The best wind energy potential is in the south, especially the southwestern region where wind velocity is higher than 6m/s (REEEP, 2012). Six pilot projects for electrification and telecommunication are on-going at Adrar, Tindouf, Bordj Badji Mokhtar, Bechar, Tamanrassat and Djanet (REEEP, 2012).

Geothermal

The geothermal sector is underdeveloped even though there are numerous hot springs with geothermic energy potential. Temperatures in geothermal sources in the western part of the country are as high as 98˚C and 118˚C in Hamam El Maskhoutin and Biskra, respectively (REEEP, 2012). The geothermal potential is estimated at 700 MW (REEEP, 2012). Other geothermal resources exist north of the Tellian Atlas Mountains and to the south in the Saharan platform (WEC, 2013). The hot springs are used mainly for therapeutic purposes and for limited greenhouse heating. Recently, alternative uses for this energy have included geothermal aquaculture projects, such as in the fish farms in Ghardaia and Ouargla, which use the Albian geothermal water of the Sahara to produce about 1,500 tonnes/year of tilapia. Aquaculture is also being carried out at another site (Ain Skhouna) near Saida. A small geothermal reverse-heat pump project has also been started in this region in a primary school to heat and cool 12 classrooms, the library and the restaurant using Hammam Sidi Aissa geothermal water (46°C) with similar projects expected to be implemented around the country (Fekraoui, 2010). These various applications of geothermal water are as follows: 1.4 MWt and 45.1 TJ/yr for individual space heating; 9.8 MWt and 308 TJ/yr for fish farming; 44.27 MWt and 1,368.65 TJ/yr for bathing and swimming; and 0.17 MWT and 1.38 TJ/yr for geothermal heat pumps (WEC, 2013).

Solar

The average annual solar radiation ranges between 2,000 and 3,900 hours giving an average solar energy of 6.57 kWh/m^2/day. Of the available renewable energies, solar is thought to have the greatest potential in Algeria (REEEP, 2012).

By 2015, the combined energy from solar and wind was 375 ktoe (AFREC, 2015). The Ministry of Energy and Mines supports the development of solar energy plants and Sonelgaz and other private companies implement them. The IEA suggests that as it becomes increasingly connected to European energy networks, Algeria could one day be an exporter of solar energy to Europe. The IEA also indicates that within two decades, solar power could provide the same amount of electricity as 72 coal-fired power stations, which is enough to supply almost three times the current population of Algeria. (REEEP, 2012).

Tracking progress towards sustainable energy for all (SE4All)

Access to electricity is high in Algeria. In 2010, 100 per cent of people in urban areas were served; in rural areas, the proportion was 98 per cent , leaving about 240,000 people with no access to electricity at that time (World Bank, 2015). Since then, however, new data show that by 2012, all Algerians had access to electricity Table 3 and Figure 5.

In 2000, about 1.85 million people did not have access to non-solid fuels, but by 2012, these fuels were available to everyone (World Bank, 2013). Algeria is one of the top 20 countries in the world that registered the greatest annual increases in access to non-solid fuels between 1990 and 2010 (World Bank, 2015). Annual incremental access is 0.7 million people (World Bank, 2015).

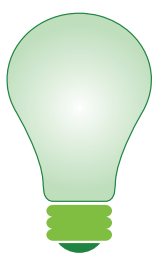
Algeria's energy intensity increased at a compound annual growth rate (CAGR) of 0.18 per cent over the 20 years between 1990 and 2010; and at 4.28 CAGR from 2010 to 2012. The rate of increase decreased slightly by 0.06 per cent during the period 2000-2010 compared to 0.29 per cent from 1990 to 2000 (World Bank, 2015).

Table 3: Algeria'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	94	98	99	100		
	7.1.2 Per cent of population with primary reliance on non-solid fuels	86	96	100	99.99		
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	0.2	0.6	0.3	0.19		
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)	-	-	11.5	11.4 (2011)		
	Level of primary energy intensity(MJ/$2005 PPP)	3.5	-	3.6	3.9	3.68	4

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

Figure 5: 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
100% 	99.99% 	**11.02** 	0.19%

Between 2010 and 2012, the Algerian economy's energy intensity (the ratio of the quantity of energy consumption per unit of economic output) increased from 3.6 MJ to 3.9 MJ per US dollar (2005 dollars at PPP) (World Bank, 2015). The residential and service sectors may have driven this rise. For example, in the Algiers area, annual housing consumption is 632 MJ/m^2, with heating constituting the largest share (46 per cent), followed by cooking (22 per cent), hot water (13 per cent) and electrical appliances (19 per cent). There is significant potential to reduce residential consumption, by substituting traditional fuels with more efficient fuels and appliances, for example (REEEP, 2012).

The share of renewable energy in total final energy consumption (TFEC) grew from 0.2 to 0.6 per cent between 1990 and 2000 before declining back to about 0.2 per cent in 2012. Biomass forms the biggest share of renewable sources at 0.3 per cent of TFEC in 2010 (World Bank, 2015). Renewable sources contributed only 0.4 per cent of the share of electricity generation in 2010, increasing to 1.1 per cent in 2012 (World Bank, 2015). Over the 2010-12 period, Algeria was one of the top 20 fastest-moving countries in the annual growth in modern renewable energy consumption (World Bank, 2015).

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

Algeria is doing its part to combat climate change and limit future climate risks. The energy-related Intended Nationally Determined Contributions (INDC) that were articulated in October 2015 are highlighted in Table 4. One of the renewable energy policy goals is to produce 27 per cent of its electricity for domestic consumption from renewable energy sources by 2030, to reduce hydrocarbon dependence by increasingly exploiting renewable energy resources, especially solar power.

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Kechba gas plant, Algeria

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

*Reach 27 per cent of electricity generated from renewable sources of energy by 2030;
*Generalize high-performance lighting; implement thermal insulation of buildings between 2021 and 2030;
*Increase the share of liquefied petroleum and natural gas in the consumption of fuels between 2021 and 2030.

Source: (PDRA, 2015)

Institutional and Legal Framework

The Ministry of Energy and Mines is in charge of the energy sector. The energy regulator is the Algerian Electricity and Gas Regulation Commission (CREG). SONELGAZ — the National Society for Electricity and Gas — is in charge of electricity and natural gas distribution in the country. The sector is vertically organized and there are other companies that handle generation, transmission and distribution. On a regional level, the country is a member of Comité Maghrébin de l'Electricité (COMELEC) Power Pool. The legal framework is provided by the Law on Electricity and Distribution of Gas No. 02-01. Table 5 highlights the key energy laws and policies in the country.

Table 5: Algeria'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 Mines • Ministry of Environment • The Renewable Energy Development Centre (Centre de Développement des Energies Renouvelables (CDER) • New Energy Algeria (NEAL) • National Agency for Promotion and Rationalization of Energy Use (APRUE)
Presence of a Functional Energy Regulator	Algerian Electricity and Gas Regulation Commission (CREG)
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	
Environment for Private Sector Participation	
Whether the Power Utility(ies) is/are vertically integrated or there is unbundling (list the Companies)	SONELGAZ has been restructured as a holding company along with: • Société Algérienne de Production de l'Electricité - (SPE) • Opérateur Système Electrique - (OS) • Société Algérienne du Gestion du Réseau de Transport de L'Electricité - (GRTE) • Société Algérienne du Gestion du Réseau de Transport du Gaz - (GRTG) • Société de Distribution de l'Electricité et du Gaz d'Alger - (SDA) • Société de Distribution de l'Electricité et du Gaz du Centre - (SDC) • Société de Distribution de l'Electricité et du Gaz de l'Est - (SDE) • Société de Distribution de l'Electricité et du Gaz de l'Ouest - (SDO)
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)	Hydrocarbons Regulatory Agency responsible for all technical regulation in the hydrocarbons sub-sector, including transportation tariffs, third-party access to pipelines and construction standards for health, safety and environmental protection
Extent to which Downstream services and operations are privatized or state-owned, or a mixture (extent)	Ministry of Energy and Mines. But contractual matters are the responsibility of the National Agency for the Efficient Exploitation of Hydrocarbon Resources (ALNAFT)
Presence of Functional (Feed in Tariffs) FIT systems	CREG sets specific feed-in tariffs for Integrated Solar Combined Cycle (ISCC) power plants
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 Sector Policy • National Energy Efficiency Programme (PNME) • National Rural Electrification Programme • National Programme for the promotion of RE until 2020 • National Energy Efficiency Fund of Algeria (FNME)
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	• Law No. 02-01 establishing the Algerian Electricity and Gas Regulation Commission (CREG) as the national energy regulator • Decree no. 2000-116) establishing National Energy Efficiency Fund of Algeria (FNME) • Energy Efficiency Law of July, 1999 • Law on Renewable Energy of August 2004 • Decree on the Diversification of Power Generating Costs adopted in January 2004 • Electricity re-structuring Law enacted in 2002 • Hydrocarbons Law of March 2005

This table was prepared with material from (REEEP, 2012), (MINEA, 2016) and (MINEA and UNDP, 2015)