



Figure 1: Energy profile of Cape Verde



Figure 2: Total energy production, (ktoe)

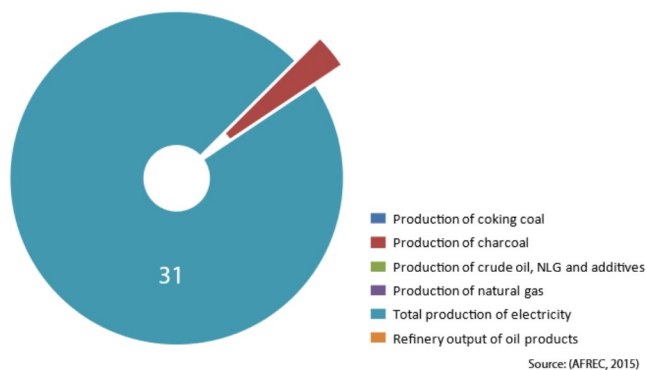
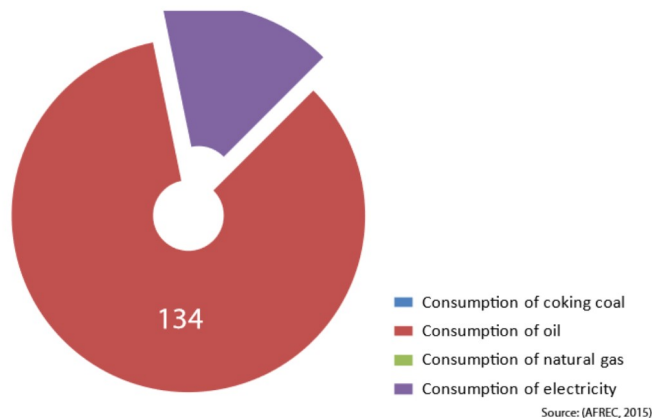


Figure 3: Total energy consumption, (ktoe)



## Energy Consumption and Production

Cape Verde had a population of just over half a million people in 2013 (Table 1) (World Bank, 2015). Total electricity produced in 2015 was 31 ktoe, 87 per cent of which was generated from fossil fuels (AFREC, 2015). Table 2 shows the main energy statistics. Key consumption and production statistics are shown in Figures 2 and 3.

Table 1: Cape Verde's key indicators

Key indicators	Amount
Population (million)	0.507
GDP (billion 2005 USD)	1.37
CO <sub>2</sub> emission (Mt of CO <sub>2</sub> )	0.42

Source: (World Bank, 2015)

## Energy Resources

### Biomass

The biomass potential is low, with total production in 2004 estimated at 22,264 toe. This presents a challenge for rural households where the need for biomass energy for domestic purposes is urgent (REEEP, 2012).

### Hydropower

Water resources are limited and this precludes the availability of economically viable hydropower potential. The possibility of harnessing wave power has been considered, with studies indicating a potential of approximately 17 kW/m, mostly around the islands of Sal and Santo Antão (REEEP, 2012).

### Oil and natural gas

There are no known crude oil reserves nor oil refining capacity on Cape Verde and all petroleum products have to be imported. There are also no known reserves of natural gas. The Empresa Nacional de Combustíveis (ENACOL) and Shell Cape Verde are responsible for the commercial supply of petroleum products (REEEP, 2012).

**Table 2: Total energy statistics (ktoe)**

Category	2000	2005	2010	2015 P
Production of coking coal	-	-	-	-
Production of charcoal	0	0	0	1
Production of crude oil, NLG and additives	-	-	-	-
Production of natural gas	-	-	-	-
Production of electricity from biofuels and waste	0	0	0	0
Production of electricity from fossil fuels	11	19	24	27
Production of nuclear electricity	-	-	-	-
Production of hydro electricity	-	-	-	-
Production of geothermal electricity	-	-	-	-
Production of electricity from solar, wind, Etc.	1	1	1	4
Total production of electricity	12	19	25	31
Refinery output of oil products	-	-	-	-
Final Consumption of coking coal	-	-	-	-
Final consumption of oil	75	90	133	134
Final consumption of natural gas	-	-	-	-
Final consumption of electricity	11	18	23	25
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.	-	-	-	-
Net imports of oil product	75	90	133	195
Net imports of natural gas	-	-	-	-
Net imports of electricity	-	-	-	-

- : Data not applicable

0 : Data not available

(P): Projected

(AFREC, 2015)

## Wind

Cape Verde has great wind potential, with average wind speeds of 7.5 m/s (REEEP, 2012). According to the Global Wind Energy Council (GWEC, Various years), by the end of 2013, installed wind energy capacity amounted to 24 MW (Table 3). The landscape for investment in the sector shows promise and there is also potential for small scale projects for small electrical grids in remote locations, given the demand for electricity and the electrical grid. A favourable investment climate for potential developers is needed (REEEP, 2012).

## Nuclear

The National Energy Policy (2008) indicates that the government will explore the introduction of micro-nuclear plants for electricity generation.

## Geothermal

Data on geothermal potential is limited. Any geothermal investigations have been carried out mainly on Fogo Island where there have been favourable findings of a high-temperature reservoir with a possible 3 MW of geothermal capacity (REEEP, 2012).

## Solar

Solar energy potential is very high, estimated at 6 kWh/m<sup>2</sup>/day. Based on this, the energy policy target was to use solar to cover 2 per cent of the total energy consumption by 2010, however implementation of this target has been slow. PV is currently used for lighting, water pumping and telecommunication systems (REEEP, undated).

**Table 3: Installed wind power capacity in Cape Verde (MW)**

Region	Year						
	End 2007	End 2008	End 2009	End 2010	End 2011	End 2012	End 2013
Cape Verde		12	12	2	24	24	24
Africa	539	635	866	1,065	1,033	1,165	1,602

(GWEC, Various years)

## Tracking progress towards sustainable energy for all (SE4All)

National access to electricity in Cape Verde stands at 70.6 per cent : 46.8 per cent in rural areas and 84.4 per cent in urban areas (World Bank, 2016) (Table 4 and Figure 4). Access to modern fuels is 33 and 88 per cent in rural and urban areas, respectively (World Bank, 2015).

The energy intensity (the ratio of the quantity of energy consumption per unit of economic output) of the Cape Verde economy was 3.5 MJ per US dollar (2005 dollars at PPP) in 2012. The compound annual growth rate (CAGR) between 2010 and 2012 was 11.77 (World Bank, 2015).

The share of renewable energy in the total final energy consumption (TFEC) is very low. In 2000, it was 1.7 per cent of total final energy consumption, increasing to 18.2 per cent in 2012. Traditional solid biofuels form the biggest share of renewable sources at 17.5 per cent of TFEC in 2012, while wind contributed 0.7 per cent . Renewable sources contributed 5.5 per cent share of electricity generation in 2012 (World Bank, 2015).

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





Cape Verde's energy-related Intended Nationally Determined Contributions (INDCs) targets stated in September 2015 are shown in Table 5. The government is aiming for a Low Carbon Development Strategy.

**Table 4: Cape Verde'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	58	59	67	70.6		
	7.1.2 Per cent of population with primary reliance on non-solid fuels	46	59	67	68.65		
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		1.7	1.5	18.2		
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)	19.5		26.61 (2007)			
	Level of primary energy intensity(MJ/\$2005 PPP)	4.8		2.8	3.5	3.28	3.49

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
70.6% 	68.65% 	<b>25.07</b> 	21.2% 

**Table 5: Cape Verde's Key aspects/key mitigation measures to meet its energy Intended Nationally Determine Contributions (INDCs)**

INDC
*Enhance smart-grid installation for the country's nine independent networks with state-of-the-art power conditioning, production and distribution control;
*Built-up of energy storage facilities (including through batteries and flywheels);
*Design renewable micro-grids;
*Design individual energy systems (home solar systems); and
*Systematically deploy solar-water-heaters across all islands.
*Find ways to reduce the proportion of technical and non-technical losses in energy distribution from about 25 per cent in 2010 to less than 8 per cent by 2030 or before;
*Improve energy efficiency of large consumers, with particular focus on hotels, hospitals and public administration offices by 2030 or before, including through mandatory installation of solar-water-heater components;
*Achieve 30 per cent of efficiency improvement in the use of electric power (15 per cent residential, 15 per cent commercial);
*Improve by at least 10 per cent fuel-usage across sectors and modes of application (except butane usage) by 2030 or before;
*Improve energy performance of the building envelop and implement a green building code, with the goal to cover all new (public or private) buildings by 2030 or before;
*Enhance energy efficiency of street lighting and creating energy rating labels for domestic appliances and air conditioners by 2030 or before;
*Further promote the use of smaller distributed energy solutions (e.g. solar pumps) for water pumping, distribution and irrigation;
*Promote the built-up of a comprehensive network of energy services companies (ESCOs) and clean-energy business incubators.

**Table 6: Cape Verde'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"> <li>• The Ministry of Tourism, Industry and Energy (MTIE)</li> <li>• Directorate General of Energy</li> <li>• Economic Regulatory Agency (ARE)</li> <li>• National Water and Electricity Company (ELECTRA)</li> <li>• Renewable Energy Research Group (NER)</li> </ul>
Presence of a Functional Energy Regulator	Economic Regulatory Agency (ARE)
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	ECOWAS Centre for Renewable Energy and Energy Efficiency (ECREEE)
Environment for Private Sector Participation	
Whether the Power Utility(ies) is/are vertically integrated or there is unbundling (list the Companies)	Electricity production is liberalised
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)	<ul style="list-style-type: none"> <li>• Empresa Nacional de Combustíveis (ENACOL)</li> <li>• Shell Cape Verde</li> </ul>
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"> <li>• Renewable Energy Master Plan</li> <li>• Sectoral Renewable Energy Plan</li> <li>• National Energy Policy of 2008</li> <li>• National Energy Plan for 2003-2012</li> <li>• Energy Security Fund</li> <li>• ECOWAS Regional Renewable Energy Policy</li> </ul>
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"> <li>• Decree-Law (DL) No.26/2003 creating Economic Regulator Agency (ERA)</li> <li>• DL No. 14/2006 (which revises the DL No. 54/99 sets the foundation for the electricity system in Cape Verde.</li> <li>• Decree-law No.30/2006 on Independent Producer licensing</li> <li>• Ordinance No.18/2006 on Power Producers Guarantees</li> <li>• Ordinance No.21/2006 on tariff and payment procedure of the fees for Independent Producers</li> <li>• DL No. 41/2006 defining the Electric Energy Crisis and specifying corrective measures</li> <li>• DL No. 4/VII/2007 (in Art. 54) allows for free customs duties on imports of equipment and accessories for renewable energy</li> <li>• DL No.1/2011 on Promotion and Incentive for the Use of Renewable Energy</li> </ul>

This table was prepared with material from (REEEP, 2012); (UNIDO and ECREEE, Undated) and (Fonseca, 2014)

## Institutional and Legal Framework

The Ministry of Tourism, Industry and Energy (MTIE) is in charge of the energy sector (Table 6). The energy regulator is Economic Regulatory Authority (ARE). ELECTRA (Empresa de Electricidad e Agua) is the national power utility company, the sole generator, transmitter and distributor of

electric energy. On a regional level, the country is a member of the West African Power Pool. The legal framework is provided by the Decree-Law No. 14/2006 (which revises the DL No. 54/99) that sets the foundation for the electricity system in Cape Verde. The main sector policy is the National Energy Policy of 2008. There is also a National Energy Plan for 2003-2012.