



Figure 1: Energy profile of Côte d'Ivoire



Figure 2: Total energy production, (ktoe)

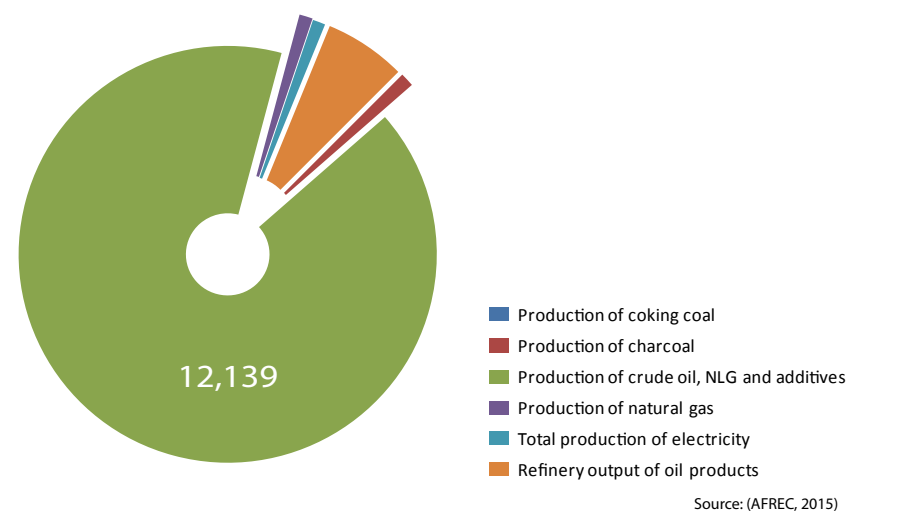
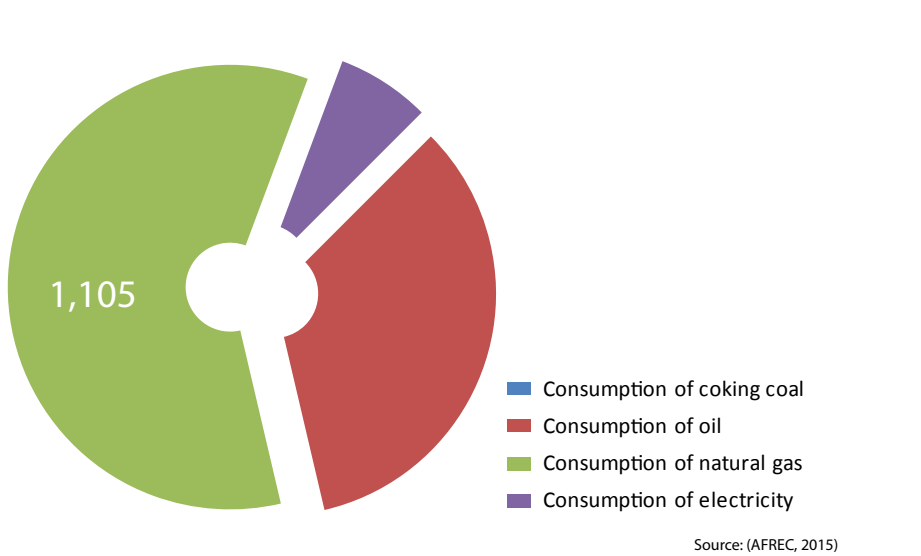


Figure 3: Total energy consumption, (ktoe)



Energy Consumption and Production

In 2013, Côte d'Ivoire had a population of 20.32 million (Table 1) (IEA, 2016). Energy is a growth industry in Côte d'Ivoire. The country is an important supplier of energy to the region due to the excess electricity it generates, and its reserves of natural gas and recent offshore finds of oil and natural gas. Electricity production in 2015 was 648 ktoe with 66.5 per cent produced from fossil fuels and 31 per cent from hydro sources. Final consumption of electricity in the same year was 774 ktoe with industry consuming 19.2 per cent and transport consuming 99 per cent of electricity produced (Table 2) (AFREC, 2015). Key consumption and production statistics are shown in Figures 2 and 3.

Table 1: Côte d'Ivoire's key indicators

| Key indicators | Amount |
|---|--------|
| Population (million) | 20.32 |
| GDP (billion 2005 USD) | 21.93 |
| CO ₂ emission (Mt of CO ₂) | 8.68 |

Source: (World Bank, 2015)

Energy Resources

Biomass

As with most African countries, biomass is the most common energy source and it provides about 75 per cent of energy requirements, especially for domestic purposes and for small businesses. Fuel wood is mainly obtained from natural forests, savannah woodlands, bushland and tree plantations, among others. Forested land covers 32.7 per cent of the country (World Bank, 2015d), an area of about 6.38 million hectares. Agro-industrial residues, crops and plantations represent a readily available form of renewable energy and are already being used in some agro-businesses and sawmills (REEEP, 2012).

Biogas from household waste is being experimented with in Abidjan. The production of bioethanol using feedstock from maize, sugarcane and sweet sorghum is also being explored. It is estimated that in the northern part of Côte d'Ivoire, about 120 ktoe per year is available from bagasse (the fibrous byproducts of extracting sugarcane or sorghum juice) (REEEP, 2012).

Hydropower

Hydro and thermal generating plants provide all of Côte d'Ivoire's electricity, with hydro accounting for less than 50 per cent of the power generated.

By the end of 2011, there was 606 MW of installed hydropower capacity. Buyo, Kossou and Taabo are the main dams in Côte d'Ivoire with 165,174 and 210 MW of generating capacity, respectively. There are four other large sites that are still undeveloped. Their capacities range from 4 to 288 MW and there are various other small potential hydro sites that could also be developed (REEEP, 2012). In general, Côte d'Ivoire has a theoretical capacity of 46 TWh/annum with a technically exploitable potential of about 12.4 TWh (REEEP, 2012).

Table 2: Total energy statistics (ktoe)

| Category | 2000 | 2005 | 2010 | 2015 P |
|---|---------|---------|---------|---------|
| Production of coking coal | - | - | - | - |
| Production of charcoal | 108 | 126 | 132 | 144 |
| Production of crude oil, NLG and additives | 12 757 | 11 294 | 14 264 | 12 139 |
| Production of natural gas | 0 | 50 | 94 | 138 |
| Production of electricity from biofuels and waste | 0 | 0 | 0 | 0 |
| Production of electricity from fossil fuels | 0 | 6 | 31 | 51 |
| Production of nuclear electricity | - | - | - | - |
| Production of hydro electricity | 26 | 31 | 37 | 81 |
| Production of geothermal electricity | - | - | - | - |
| Production of electricity from solar, wind, Etc. | 0 | 0 | 0 | 0 |
| Total production of electricity | 26 | 37 | 67 | 132 |
| Refinery output of oil products | 399 | 431 | 657 | 847 |
| Final Consumption of coking coal | - | - | - | - |
| Final consumption of oil | 213 | 311 | 522 | 630 |
| Final consumption of natural gas | 0 | 112 | 870 | 1 105 |
| Final consumption of electricity | 33 | 50 | 52 | 127 |
| Consumption of oil in industry | 16 | 12 | 34 | 56 |
| Consumption of natural gas in industry | - | - | - | - |
| Consumption of electricity in industry | 12 | 23 | 21 | 27 |
| Consumption of coking coal in industry | - | - | - | - |
| Consumption of oil in transport | 156 | 281 | 452 | 534 |
| Consumption of electricity in transport | 0 | 0 | 0 | 0 |
| Net imports of coking coal | - | - | - | - |
| Net imports of crude oil, NGL, Etc. | -12 047 | -11 294 | -13 428 | -11 680 |
| Net imports of oil product | -465 | -488 | -215 | -147 |
| Net imports of natural gas | 0 | 0 | 0 | 0 |
| Net imports of electricity | 23 | 36 | 24 | 5 |

- : Data not applicable

0 : Data not available

(P): Projected

(AFREC, 2015)

Oil and natural gas

Production of offshore oil started in 1980 and by the end of 2011, oil production was estimated at 11,720 thousand barrels (WEC, 2013). Most (86 per cent) of the oil and gas wells are located in shallow marine areas, 7 per cent are in deep offshore wells and 7 per cent are onshore. The proven petroleum reserves in 2005 were 100 million barrels.

Natural gas was initially discovered in Côte d'Ivoire in the 1980s, but development only started in 2005. The proven recoverable reserves at the end of 2011 was 28.3 bcm and production was 1.6 bcm (WEC, 2013).

Peat

The area of peatland is 725 km² (WEC, 2013).

Wind

The only available data on wind is compiled by the *Société d'Exploitation et de Développement Aéroportuaire, Aéronautique et Météorologique* (SODEXAM) for civil aviation purposes. Along

the coast, San Pedro in the west and Korhogo in the north have wind velocities above 6 m/s, while Bouake in the central region and Tabou on the western coast have wind speeds higher than 4 m/s.

Geothermal

The geological conditions point to some limited potential for geothermal energy, but no study has yet been undertaken (REEEP, 2012).

Solar

There is moderate potential for solar energy, ranging between 2.0 and 4.5 kWh/m²/day with a daily sunshine duration of 6 hours (REEEP, 2012). Many educational and health facilities in urban areas use solar for water heating. It is estimated that about 2 kW is needed to heat 150 litres of water. In rural areas, solar could help reduce or replace the amount of firewood used for water heating (REEEP, 2012).

Tracking progress towards sustainable energy for all (SE4All)

In Côte d'Ivoire, 55.8 per cent of the population has access to electricity: 29 per cent of rural areas are electrified compared with 88.1 per cent of urban areas (Table 3 and Figure 4) (World Bank, 2015); (World Bank, 2016). Access to modern fuels is low. In 2012, only 19.12 per cent were using non-solid fuels; 2 per cent of these are in rural areas and 35 per cent in urban areas (World Bank, 2015); (World Bank, 2016). The strategic plan 2013-2030 for the development of the electricity sector in Côte d'Ivoire aims to expand electricity production capacity, upgrade the way electricity is distributed throughout the country, enhance the use of more renewable energy sources and increase hydroelectric and thermal electricity generation. For instance, a new 275 MW dam is being built at Soubre and the CIRPEL and AZITO thermal power plants are being expanded.

The energy intensity (the ratio of the quantity of energy consumption per unit of economic output) was 9.7 MJ per US dollar (2005 dollars at PPP) in 2012, up from 4.9 MJ per US dollar in 1990. The compound annual growth rate (CAGR) between 2010 and 2012 was 9.56 (World Bank, 2015)





The share of renewable energy in the total final energy consumption (TFEC) has been declining from 80.2 per cent in 1990 to 74.4 in 2012. Traditional solid biofuels form the biggest share of renewable sources at 65.3 per cent of TFEC in 2012, while modern solid biofuels contributed 7.6 per cent and hydro only 1.5 per cent (World Bank, 2015). Renewable sources contributed 26.4 per cent share of electricity generation in 2012 (World Bank, 2015).

Table 3: Côte d'Ivoire's progress towards achieving SDG7 – Ensure access to affordable, reliable, sustainable and modern energy for all

| Target | Indicators | 2010 | 2011 |
|---|--|------|------|
| Ensure universal access to modern energy, including electricity and cooking | Access to electricity (% of population) | 58.9 | |
| | % of population with primary reliance on non-solid fuels | | |
| Double the rate of improvement of energy efficiency | GDP per unit of energy use (constant 2011 PPP \$ per kg of oil equivalent) | 5.6 | 4.7 |
| Double the share of renewable energy in the global energy mix | Percentage of total final consumption of energy from renewable sources | | |

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 |
|--|---|--|--|
| 55.8%  | 19.12%  | 5.0  | 74.4%  |

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Kossou Dam, general view of water inlets, Côte d'Ivoire

Table 4: Cote d'Ivoire'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 Mines, Petroleum and Energy |
| Presence of a Functional Energy Regulator | National Authority for the Regulation of the Electricity Sector (ANARE) |
| Ownership of sectoral resources and markets (Electricity/ power market; liquid fuels and gas market) | Compangnie Ivoirienne d'Electriciti (CIE) |
| Level of participation in regional energy infrastructure (Power Pools) and institutional arrangements | West African Power Pool (WAPP) |
| Environment for Private Sector Participation | |
| Whether the Power Utility(ies) is/are vertically integrated or there is unbundling (list the Companies) | Énergie Électrique de Côte d'Ivoire (EECI) |
| 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) | Petroci Holding, with three subsidiaries: Petroci Exploration-Production which handles upstream gas and oil activities; Petroci Gaz, which is responsible for the natural gas sector; and Petroci Industries-Services which manages all other related services. |
| Extent to which Downstream services and operations are privatized or state-owned, or a mixture (extent) | |
| Presence of Functional (Feed in Tariffs) FIT systems | |
| Presence Functional IPPs and their contribution | IPPs include Azito Énergie, Compagnie Ivoirienne de Production d'Électricité (CIPREL), Aggreko and the natural gas producers (AFREN, Foxtrot, Canadian Natural Resources) |
| 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">• Energy Master Plan 2013-2030• Strategic Action Plan developed by the Ministry of Petroleum and Energy of Côte d'Ivoire. |
| 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 | Electricity Code Law No. 2014-132 of 2014 |

This table was compiled with material from (REEEP, 2012)

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

The government is conscious of its international obligations and in September 2015, submitted its Intended Nationally Determined Contributions (INDC) (Table 4). The INDC focuses on improving the share of renewables in the energy mix.

Institutional and Legal Framework



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