



Energy Industry in Gabon



General State of the Economy

Gabon, the official name - Gabonese Republic, with its capital in Libreville, is located in Central Africa and borders Equatorial Guinea and Cameroon (in the north), Republic of the Congo (in the south and east), and the Gulf of Guinea (in the west).

In terms of its size, Gabon is 76th; ahead of many countries in the region, including Uganda, Senegal, and Guinea. However, according to population density Gabon is at the bottom of the list - at 182nd, with an average den-

sity of 8 people per 1 km² [1,2]. The total length of the country's coastline is 885 km[3].

According to 2018 statistics, the country is home to around 2 million people [3]. The administrative map of Gabon is divided into 9 provinces; the official language is French; the political form of government is presidential republic [3].

The economy of Gabon is mainly orientated towards the export of oil, the revenues from which account for about 45% of GDP [3]. Due to its small population and the rather rich resource base, Gabon demonstrates relatively



Sources:

1. GDP (purchasing power parity), 2020 est. / The World Factbook/Library/Central Intelligence Agency *228
 2. GDP - per capita (PPP), 2020 / The World Factbook/Library/Central Intelligence Agency *229
 3. Inflation rate (consumer prices), 2019 est. / The World Factbook/Library/Central Intelligence Agency *228
 4. Charges for the use of intellectual property, receipts (BoP, current US\$), 2020 / International Monetary Fund, Balance of Payments Statistics Yearbook, and data files. / License: CC BY-4.0 *88
 5. The Global Competitiveness Index 2019 / Rankings / Reports / World Economic Forum *141
 6. High-technology exports (current US\$) 2019-2020 / United Nations, Comtrade database through the WITS platform / License: CCBY-4.0 / Data *134
 7. 2021 Index of Economic Freedom / International Economics / The Heritage Foundation *178
 8. Reserves of foreign exchange and gold, 2017 est. / The World Factbook / Library / Central Intelligence Agency *195
 9. Annual average GDP growth in %, for the last 10 years (2011-2020) / World Bank national accounts data, and OECD National Accounts data files / License: CC BY-4.0 *206
 10. Public debt (% of GDP), 2017 est. / The World Factbook / Library / Central Intelligence Agency *210
- * Total number of countries participating in ranking

Figure 1. Economic indices of Gabon

high levels of GDP per capita for an African region. However, for the majority of the selected ratings, Gabon is either not represented or is at the bottom of the diagram (Fig. 1).

Between 2010 and 2017, the country experienced rapid growth in GDP at purchasing power parity, amounting to \$36.66 billion in 2017 [3,4]. For this indicator, Gabon is 123rd in the world [3].

According to GDP at purchasing power parity per capita, Gabon shows a figure above world average - \$18 100 in 2017 [3]. The inflation rate in 2017 was 2.7%, compared to 2.1% in 2016 [3].

According to the Index of Economic Freedom, which is based on freedom of business, freedom from govern-

ment action, property protection, and freedom from corruption, Gabon was 109th in 2018, out of the 180 countries considered, ahead of Egypt. In terms of reserves of foreign exchange and gold Gabon is 132nd out of 176 countries, ahead of the Republic of Congo. According to the indicator for the average GDP growth in percentage over the last 10 years, in 2017 the country was 94th out of 200 countries. In terms of public debt, calculated as a percentage of the country's GDP, Gabon was ranked 136th out of 202 countries considered in 2017.

For more information on the economy of Gabon click [here](#).

Energy resources

The main resource of the country is definitely oil (Table 1).

In terms of tons of oil equivalent, in 2018 proved reserves of conventional hydrocarbons in Gabon were: oil - 91.4%, gas - 8.6% (Fig.5).

According to information presented in [3], as of the beginning of 2018, oil reserves in the country amounted to 2 billion barrels, and gas reserves were 28.32 Tcm. According to the BP report, from 1998 to 2018, the total proved oil reserves decreased from 2.6 to 2.0 billion barrels [6].

Table 1. Fossil energy resources of Gabon

Resource/explanations	Crude oil	Natural gas	Coal	Associated petroleum gas	Oil sands heavy oil
Value	2	28.32	No data	No data	No data
Unit	billion bbl	Tcm	-	-	-
Year	2018	2018	-	-	-
Source	[3]	[3]	-	-	-

Gabon has relatively low potential for the development of clean energy production (Table 2).

The most typical level of global horizontal irradiation is lower around 4.6 kW / m² / day, and it can reach the level of 5.0 kW / m² / day in the northern part of the country and in the east [7].

Wind speed in most parts of Gabon doesn't exceed 4 m / s [8]. More than 90% of Gabon is forested and 20% is

covered by agricultural land [9,10]. Which is a very rich resource for bioenergy production.

Hydropower potential of the country is estimated to be 6 000 MW [11]. Potential for the use of ocean energy and sea wave energy in the south of the country can reach 10 kW/m [12].

Table 2. Renewable energy resources of Gabon

Resource/explanations	Solar Potential (GHI)*	Wind Potential (50 m)*	Hydro energy Potential**	Bio Potential Agricultural area	Bio Potential Forest Area	Municipal Solid Waste
Value	<4.6	<4.0	6 000	20	90	0.45
Unit	kWh/m2/day	m/s	MW	% of land area	% of land area	Kg/per capita/day
Year	2018	2018	2013	2016	2016	2012
Source	[7]	[8]	[11]	[9]	[10]	[13]

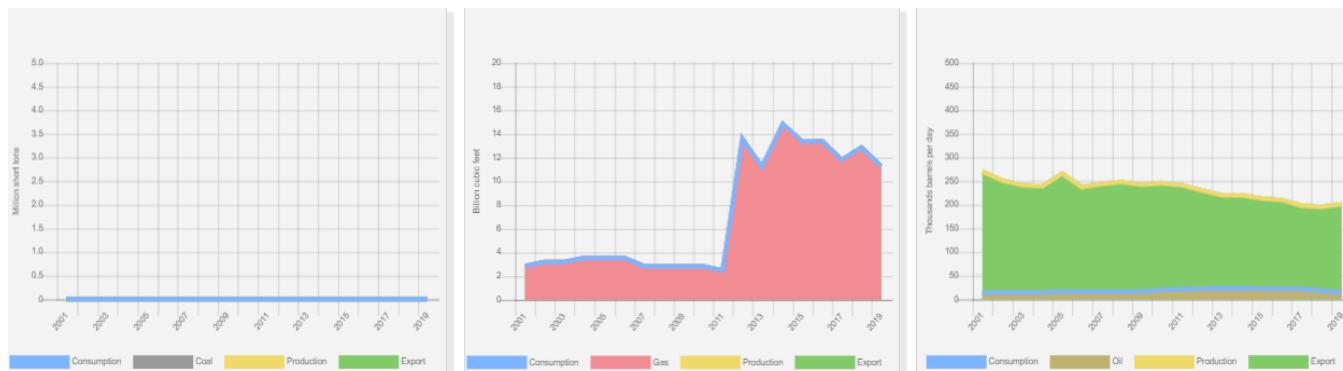
*for most of the territory of the country

This energy review of Gabon would not be complete without mentioning municipal waste (0.45 kg per person per day), the disposal of which is the optimal solution from both an environmental and economic point of view

Energy balance

Gabon is one of the top five oil producers in Sub-Saharan Africa [14]. The production of oil remained stable since 2006, and in 2017 it was 198 thousand barrels / day [15]. In 2018 it was at the level of 196 000 barrels / day according to [3].

The volume of consumption of this resource also remained stable (Fig. 2), and in 2018 reached the level of 21.3 thousand barrels / day [15]. As reported in [3], the volume of oil exports from Gabon in 2015 amounted to



Source: U.S. Energy Information Administration (Jan 2020) / <https://www.eia.gov/>

Figure 2. The production and consumption of fossil fuels in Gabon (coal-right, gas—in the center, oil-right)

Historically, Gabon has a high share of hydropower in electricity production, but in recent years most of the

[13]. However, the application of these technologies in the country has not received the necessary expansion.

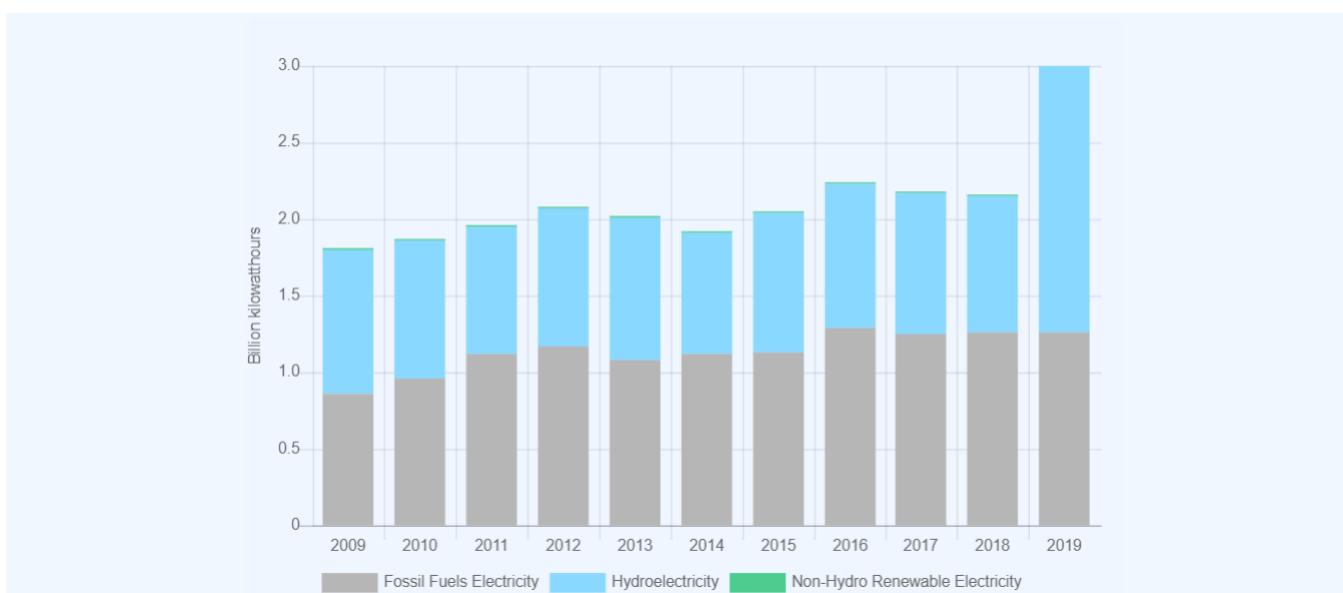
For more information about energy resources in Gabon click [here](#).

214 200 bbl / d. The main importer of oil from Gabon Australia, Malaysia, South Korea, Singapore, and Japan [5].

Up to 2011 production, as well as consumption, of natural gas remained stable around 3 Bcf. However, in 2012 there was a sharp increase to 14 Bcf [15]. In 2017, both indicators were at the level of 14 Bcf [15]. Moreover, 80% to 90% of associated petroleum gas produced is being re-injected into the wells to improve oil production, or being flared [14,16].



electricity has been produced from fossil sources (Fig 3.).



Source: U.S. Energy Information Administration (Jan 2020) / <https://www.eia.gov/>

Figure 3. Electricity production in Gabon

In 2019 Gabon produced about 3.01 TWh of electricity, of which 41.8% was by fossil fuels and 57.8% by hydropower and 0.4% by other renewable sources (Fig. 5).

Gabon's position in the comparative diagram of energy index is shown in Fig. 4.

The indices, which are based on reserves of oil and export opportunities, show Gabon's distinct advantage over most of the world, especially in terms of the production-consumption ratio. However, similar indicators for natural gas look less convincing.



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 2. Natural gas proved reserves 2021 / International Energy Statistic / Geography / U.S. Energy Information Administration (Nov 2021) *99
 3. Total recoverable coal reserves 2019 / International Energy Statistic / Geography / U.S. Energy Information Administration (Nov 2021) *81
 4. Combination production-consumption for Crude oil 2018 / International Energy Statistic / Geography / U.S. Energy Information Administration (Nov 2021) *219
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 12. Combination of electricity production-consumption (kWh)/The World Factbook/Library/Central Intelligence Agency *216
- * Total number of countries participating in ranking

Figure 4. Energy indices of Gabon

GDP per unit of energy use is below the world average – 102nd place out of 130 countries considered, while energy consumption per capita is higher - 44th out of 135 countries.

In terms of electricity consumption per capita, the country is 141st in the world, however, for the indicator of

combination of electricity production-consumption, Gabon is 119th in the ranked list of 216 countries.

Detailed information about energy infrastructure of Gabon can be found [here](#).

Energy Infrastructure

A territorial map of the distribution of the largest infrastructure projects of the fossil fuel sector in Gabon is shown in Figure 5.

As mentioned previously, oil accounts for 91.4%, and natural gas reserves account for 8.6% of the energy potential of fossil resources. The main oil and gas fields are concentrated in the south-west of the country and along the coast (Fig. 5). The largest oil field in Gabon is Rabi

Kounga Oil Field, located in the province of Ogooué-Maritime, produces 150 000 barrels per day. The oil pipeline is 1 639 km long (Fig. 5) and connects the fields to the Sogara oil refinery with an installed capacity of 21 000 barrels/day [17,18].

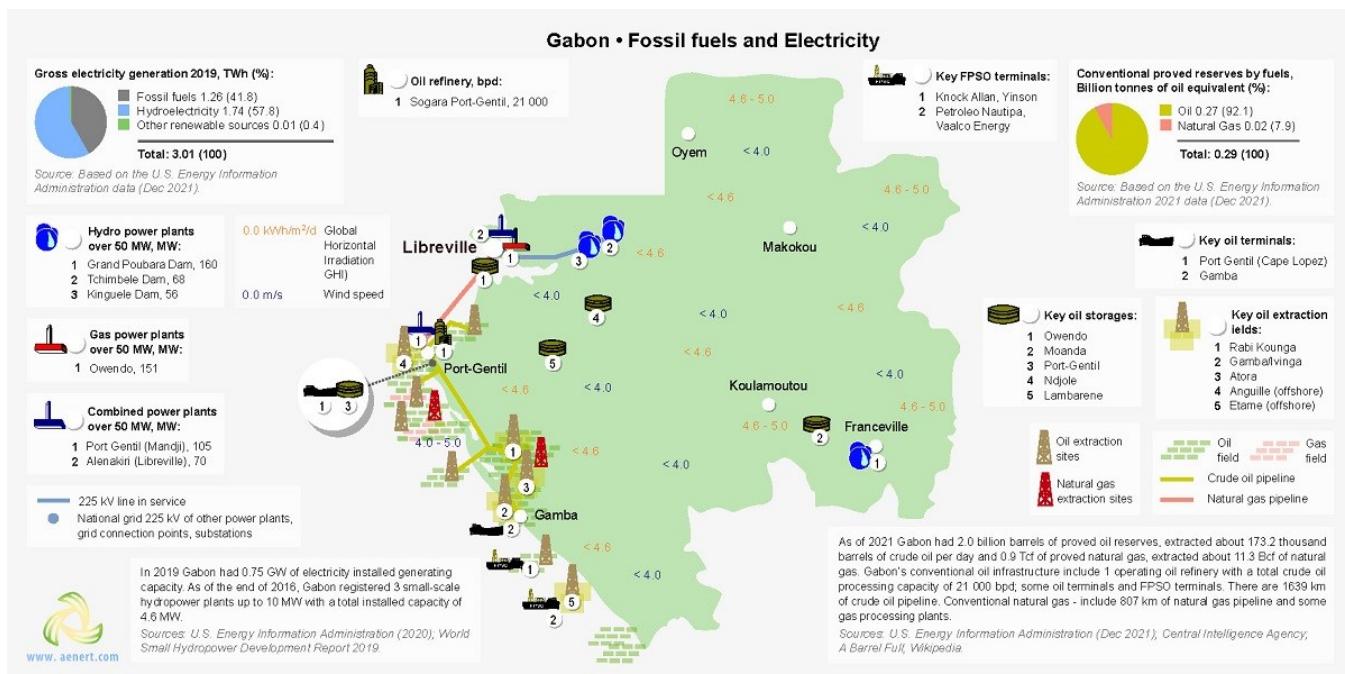


Figure 5. Basic infrastructural facilities of the fossil fuel sector and electricity in Gabon

The most important oil storage facilities are located both in the area of the deposits, the capital, and in the south-east of the country. The main oil terminals are located in the Port-Gentil area and in the west of the country. The largest FPSO (Floating Production, Storage and Offloading) terminal Knock Allan Yinson, has an installed capacity of 35 thousand barrels/day [19].

There are two large combined cycle power plants and one gas power plant with a capacity of more than 50 MW (Fig. 5).

The leading gas power plant is Owendo Natural Gas-fired Power Plant, with a capacity of 151 MW, and the largest combined cycle plant is Port Gentil (Mandji) Combined Power Plant, with a capacity of more than 105 MW [20,21].

The total installed capacity of hydropower in the county amounted to 330.2 MW in 2018 [22]. The largest hydropower plant Grand Poubara Dam Hydroelectric Power Plant has a capacity of 160 MW [23].

The country adopted an Energy Development Strategy - Plan Stratégique Gabon Émergent, which is mainly focused on providing the entire population with access to electricity, increasing the share of renewable energy

sources (mainly hydropower) in electricity generation and diversifying energy sources.

It is planned to increase the share of renewable energy sources in the production of electricity to 80% [24] by 2020.

Detailed information about energy infrastructure of Gabon can be found [here](#).

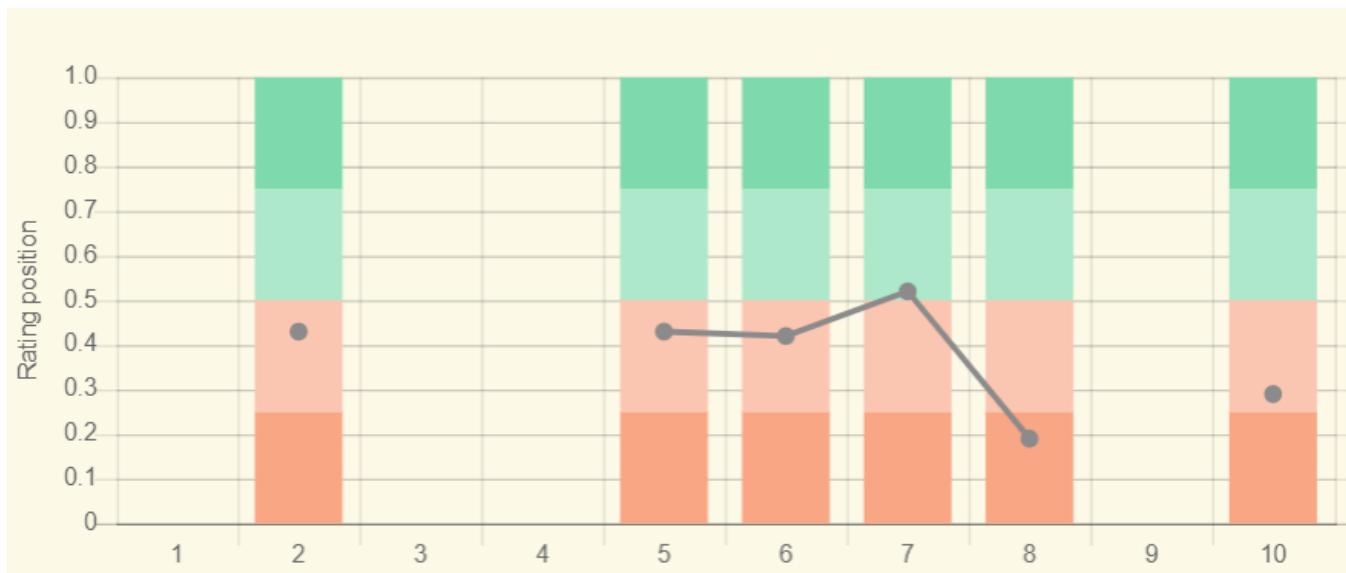
Education and Innovation

The set of indices reflecting the position of Gabon among other countries in the field of education and innovation can be seen in the Figure 6.

Gabon is represented in half of the selected indexes, only one of which demonstrates indicators at the level of the

world average. According to the number of patents granted to the residents of Gabon, both inside the country and abroad, the country ranks 122nd in the world.

Gabon's indices, based on scientific and technological activity and state support of education, seem to be more convincing. In the Scimago ranking, Gabon is 134th out of



Sources:

1. The Global Innovation Index 2021, Rankings / Knowledge / World Intellectual Property Organization / Cornell University, INSEAD, and WIPO (2021); Energizing the World with Innovation. Ithaca, Fontainebleau, and Geneva *132
 2. Patent Grants 2011–2020, resident & abroad / Statistical country profiles / World Intellectual Property Organization *185
 3. Patents in Force 2020 / Statistical country profiles / World Intellectual Property Organization *109
 4. QS World University Rankings 2022 *97
 5. SCImago Country Rankings (1996–2020) / Country rankings / SCImago, (n.d.). SIR-SCImago Journal & Country Rank [Portal]. Retrieved 17 Nov 2021 *240
 6. Internet users in 2018 / The World Factbook / Central Intelligence Agency *229
 7. Internet users in 2018 (% Population) / The World Factbook / Central Intelligence Agency *229
 8. Government expenditure on education, total (% of GDP), 2019 / United Nations Educational, Scientific, and Cultural Organization (UNESCO) Institute for Statistics. License: CCBY-4.0 / Data as of September 2021*177
 9. Research and development expenditure (% of GDP), 2018 / UNESCO Institute for Statistics. License: CCBY-4.0 / Data *119
 10. Scientific and technical journal articles, 2018 / National Science Foundation, Science and Engineering Indicators. License: CCBY-4.0 / Data *197
- * Total number of countries participating in ranking

Figure 6. The indices of education and innovation in Gabon

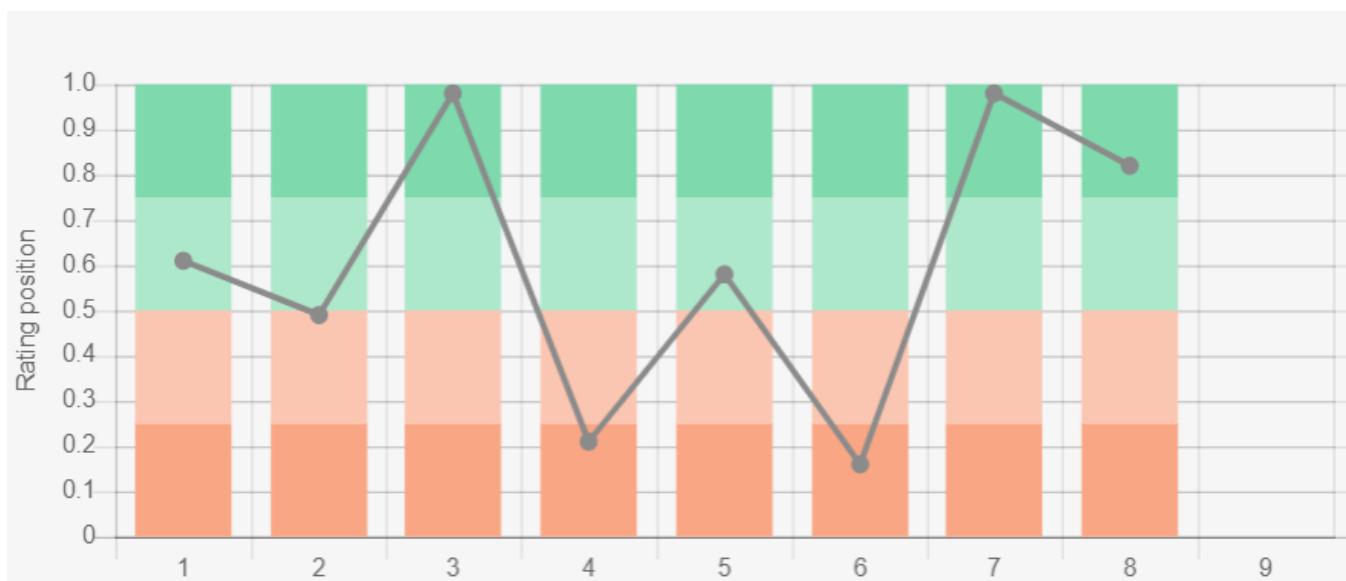
239 participating countries, and in the ranking of Scientific and Journal Activities it is 136th out of 196 countries.

Detailed information about energy education and research in Gabon is to be found [here](#).

Ecology and Environment Protection

A diagram of environmental indices is shown in Figure 7. The ecological situation in Gabon cannot be called favor-

able. Most of the indicators are located in the lower part of the chart.



Sources:

1. CO2 total emission by countries 2020 / European Commission / Joint Research Centre (JRC) / Emission Database for Global Atmospheric Research (EDGAR)*208
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 4. Forest area change 2010-2020 (1000 ha/year) / The Global Forest Resources Assessment 2020 / Food and Agriculture Organization of the United Nations *234
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 8. Methane emissions (kt of CO₂ equivalent), 2018 / Data for up to 1990 are sourced from Carbon Dioxide Information Analysis Center, Environmental Sciences Division, Oak Ridge National Laboratory, Tennessee, United States. Data from 1990 are CAIT data: Climate Watch. 2020. GHG Emissions. Washington, DC: World Resources Institute. Available at: License : Attribution-NonCommercial 4.0 International (CC BY-NC 4.0) *191
 9. The Climate Change Performance Index (CCPI) 2022 / Overall Results / Jan Burck, Thea Uhlich, Christoph Bals, Niklas Höhne, Leonardo Nascimento / Germanwatch, NewClimate Institute & Climate Action Network *60

* Total number of countries participating in ranking

Figure 7. Environmental indices of Gabon

For a number of indices, Gabon demonstrates high results not only for the region, but for the whole world. According to forest area as a percentage of land area, Gabon is among the world leaders – 4th in the world. The trend associated with its change also looks very positive. In this rating, the country is 6th out of 234 countries surveyed. Gabon is not among the 56 countries in the world responsible for more than 90% of the world's energy-related CO₂ emissions, according to the Climate Change Performance Index (CCPI). The country demonstrates moderate levels of CO₂ emissions in general and per capita, and the level of methane emission is also relatively low. According to the Environmental Vulnerability Index , which is based on years of observations and 50 indicators, which include for example, changing climatic characteristics or the quality of water resources, waste vol-

umes, oil spills and other hazardous substances, etc. In this rating Gabon is 12th out of 234 member countries. According to the Ecological Footprint Atlas rating, Gabon is among the environmental creditors.

At the same time Gabon has a relatively low valuation of the Environmental Performance Index 2018 (EPI), which focuses primarily on assessing the environmental performance of national governments. In this rating Gabon is 140th out of 180 member countries and demonstrates a positive trend.

For more information on the energy industry in Gabon, please click [here](#).

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The sources of charts and curves are specified under the images.