



Economic Community  
of West African States

# ECOWAS Key Energy Facts and Figures

2023 Edition





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# Table of Contents

Foreword .....	6
Total Energy Supply (TES) .....	7
Energy Transformation .....	10
Final Consumption .....	14
Energy Trade .....	16
Sustainable Energy Indicators .....	17
Environmental Indicators .....	19
Simplified ECOWAS Energy Balances (ktoe) in 2021 .....	21
ECOWAS Energy Flow Diagram (ktoe) of 2021 .....	23
Evolution of the Main Energy Indicators in the ECOWAS Region between 2018 and 2021 .....	24
Key Definitions and Terminologies .....	27

## Figures

Figure 1: ECOWAS total energy supply in 2021 .....	7
Figure 2: Evolution of total energy supply in ECOWAS .....	8
Figure 3: Evolution of electricity generation (GWh) in the region .....	10
Figure 4: Evolution of the production of oil products (ktoe) in the region.....	11
Figure 5: Evolution of the production of charcoal products (ktoe) in the region .....	12
Figure 6: Total final consumption by energy source in 2021 .....	14
Figure 7: Total final consumption by sector of activity in 2021 .....	15
Figure 8: Final energy consumption by sector of activity and by type of energy in 2021 .....	15
Figure 9: Energy trade in 2021 .....	16
Figure 10: Household access to electricity in ECOWAS.....	18
Figure 11: CO <sub>2</sub> emissions by sector of activity and by type of energy in 2021 .....	20
Figure 12: Energy flow diagram for ECOWAS in 2021 .....	23
Figure 13: Atlas of electricity consumption per capita of ECOWAS in 2021 .....	25
Figure 14: Atlas of energy consumption per capita of ECOWAS in 2021.....	26
Figure 15: Regional household access to electricity (%) .....	28

## Tables

Table 1: Total energy supply by country (ktoe) .....	9
Table 2: Energy sources for electricity generation (ktoe) in 2021 .....	10
Table 3: Efficiency of ECOWAS refineries in 2021.....	11
Table 4: Average charcoal production by country (kg) .....	13
Table 5: Some sustainable energy indicators in ECOWAS .....	17
Table 6: Environmental indicators in ECOWAS.....	19
Table 7: Evolution of CO <sub>2</sub> emissions per sector (Gg CO <sub>2</sub> ).....	20
Table 8: 2021 ECOWAS energy balance.....	21-22
Table 9: ECOWAS main energy indicators 2018-2021.....	24

# Foreword



This publication from the ECOWAS Directorate of Energy and Mines provides readers with key figures of the energy sector within the ECOWAS region. The 2023 edition provides data on energy supply, transformation, energy consumption, trade and key environmental and sustainable development indicators up to the year 2021, based on data made available by the Member States. The entire ECOWAS energy system is summarised in the energy flow diagram.

The methodology used follows the international recommendations on energy statistics which are universally recognised and adopted by African countries through the African Energy Commission (AFREC). Obviously, the methodology considers the specificities of ECOWAS region throughout the data collection and processing.

ECOWAS KEY ENERGY FACTS and FIGURES is a summary of the statistics published by the ECOWAS EIS via its website [www.eis.ecowas.int](http://www.eis.ecowas.int).

The Directorate of Energy and Mines of ECOWAS hopes that this publication will be useful for decision-makers, analysts, planners, private promoters, researchers, academics and other stakeholders interested in the energy sector in West Africa and beyond.

**Bayaornibè DABIRE**

*Director of Energy and Mines,  
ECOWAS Commission*



# 01 Total Energy Supply (TES)

ECOWAS energy supply includes biomass energy, crude oil and petroleum products, natural gas, hydroelectricity, mineral coal, solar and other renewable energies.

In 2021, the total energy supply in the ECOWAS region is estimated at 145,785 ktoe. This supply is dominated by biomass energy which represents nearly 61% of the supplies. Hydroelectricity contributes to nearly 1.4% of energy supplies to the ECOWAS region and imported electricity only 0.1%.

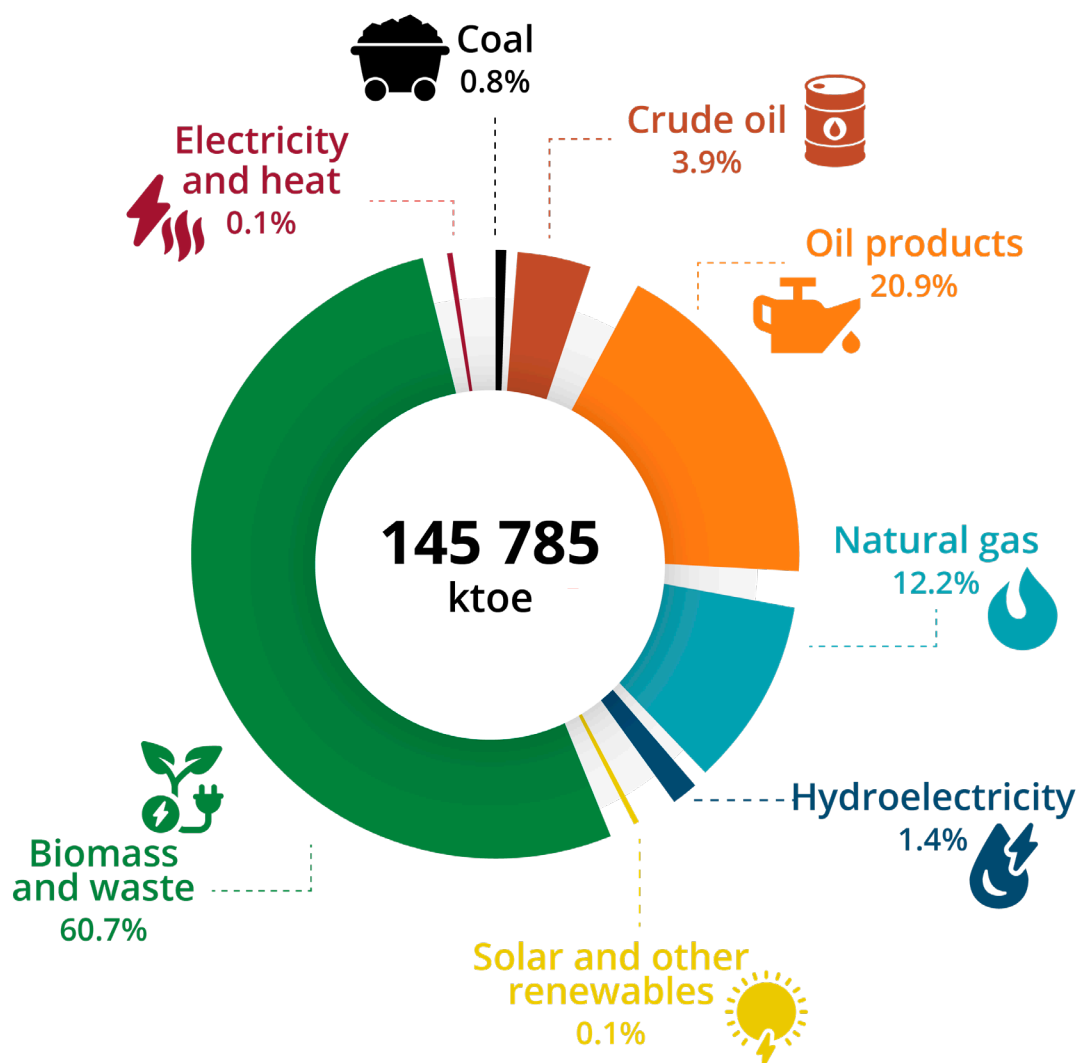


Figure 1: ECOWAS total energy supply in 2021

# 3.2%

Average annual increase in energy procurement between 2010 and 2021.

Between 2010 and 2021, total energy supply passed from 103,199 ktoe to 145,785 ktoe.

The biggest increase has been in photovoltaic solar energy, which has seen an average annual increase of 48%, with electricity production rising from 18 GWh to 1,500 GWh by 2021.

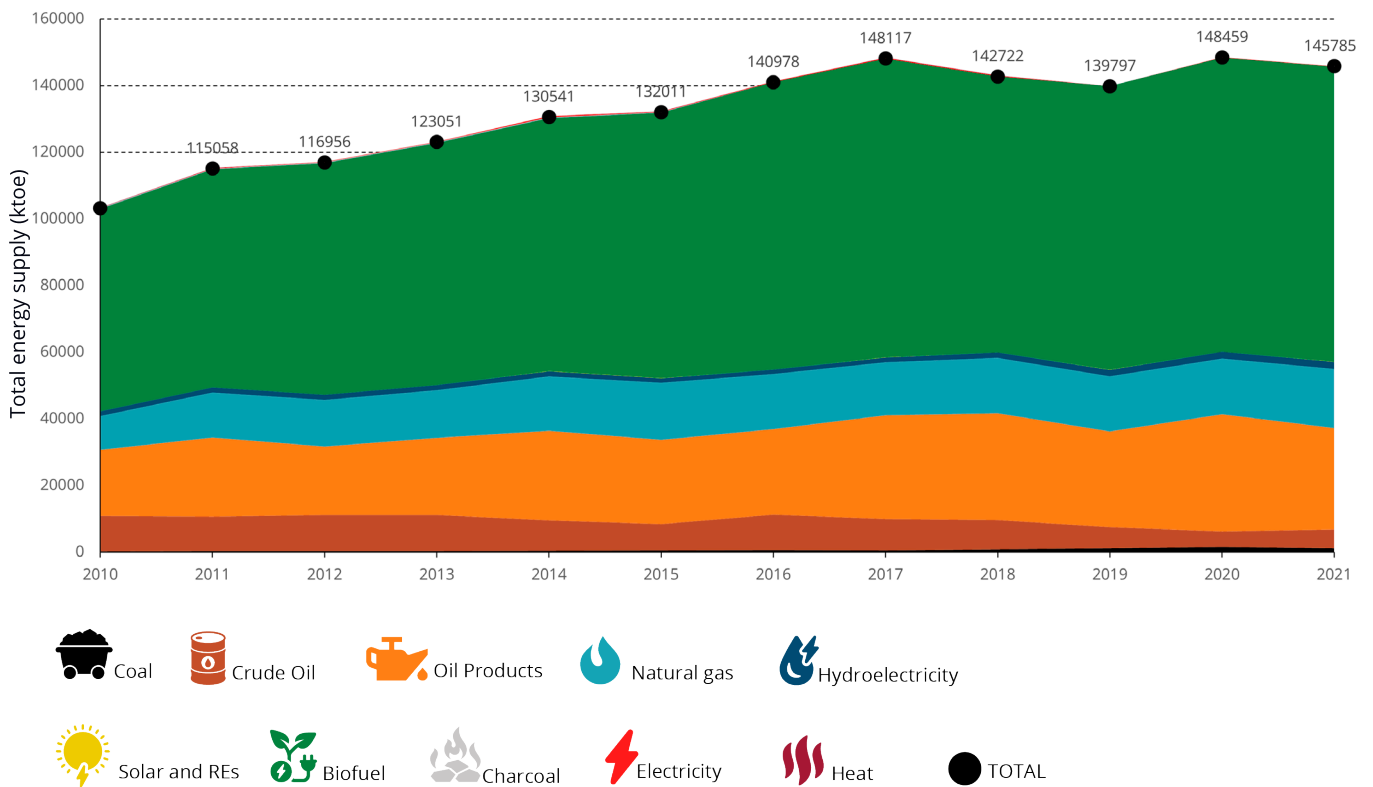


Figure 2: Evolution of total energy supply in ECOWAS



The table below shows the evolution of total energy supply for each Member State between 2018 and 2021. ECOWAS statistics between 2019 and 2021 are estimated based on historical data from the countries and will be automatically updated online as soon as the data is available.

*Table 1: Total energy supply by country (ktoe)*

<b>Member States</b>	2018	2019	2020	2021
<b>BENIN</b>	4 758	4 627	4 810	5 073
<b>BURKINA FASO</b>	6 184	6 390	6 852	-
<b>CAPE VERDE</b>	231	-	-	-
<b>CÔTE D'IVOIRE</b>	10 005	10 529	11 193	-
<b>GAMBIA</b>	643	-	-	-
<b>GHANA</b>	10 586	11 173	12 295	12 224
<b>GUINEA</b>	4 994	-	-	-
<b>GUINEA BISSAU</b>	512	471	498	-
<b>LIBERIA</b>	1 440	-	-	-
<b>MALI</b>	6 918	7 242	7 624	-
<b>NIGER</b>	2 714	2 856	2 953	3 160
<b>NIGERIA</b>	77 813	83 061	-	-
<b>SENEGAL</b>	4 588	4 957	4 466	-
<b>SIERRA LEONE</b>	3 128	-	-	-
<b>TOGO</b>	3 216	3 310	3 647	-
<b>ECOWAS<sup>1</sup></b>	<b>134 939</b>	<b>139 797</b>	<b>148 459</b>	<b>145 785</b>

<sup>1</sup>Exchanges between Member States are not considered as ECOWAS supplies, so the sum of Member States' supplies will be different from that of the region.

## 02 Energy Transformation

Transformation is the process of converting energy from one form to another. Energy transformation generally takes place in energy industries such as power plants, refineries or the artisanal processes of producing charcoal from firewood. The following tables summarise main transformation processes within ECOWAS.

Table 2: Energy sources for electricity generation (ktoe) in 2021

	Mineral Coal	Oil and oil products	Natural gas	Hydro	Other renewables	Total electricity generated
Power Stations	65	3 104	10 912	2 047	168	7 683
Auto-producers	128	6 338	32	0	175	3 277



In 2021, **natural gas** was the **primary source** of electricity production (42%) in the ECOWAS region; it is followed by petroleum products (37%) and hydroelectricity (19%). **Photovoltaic solar** represents **less than 1%** in the production of electrical energy in ECOWAS.

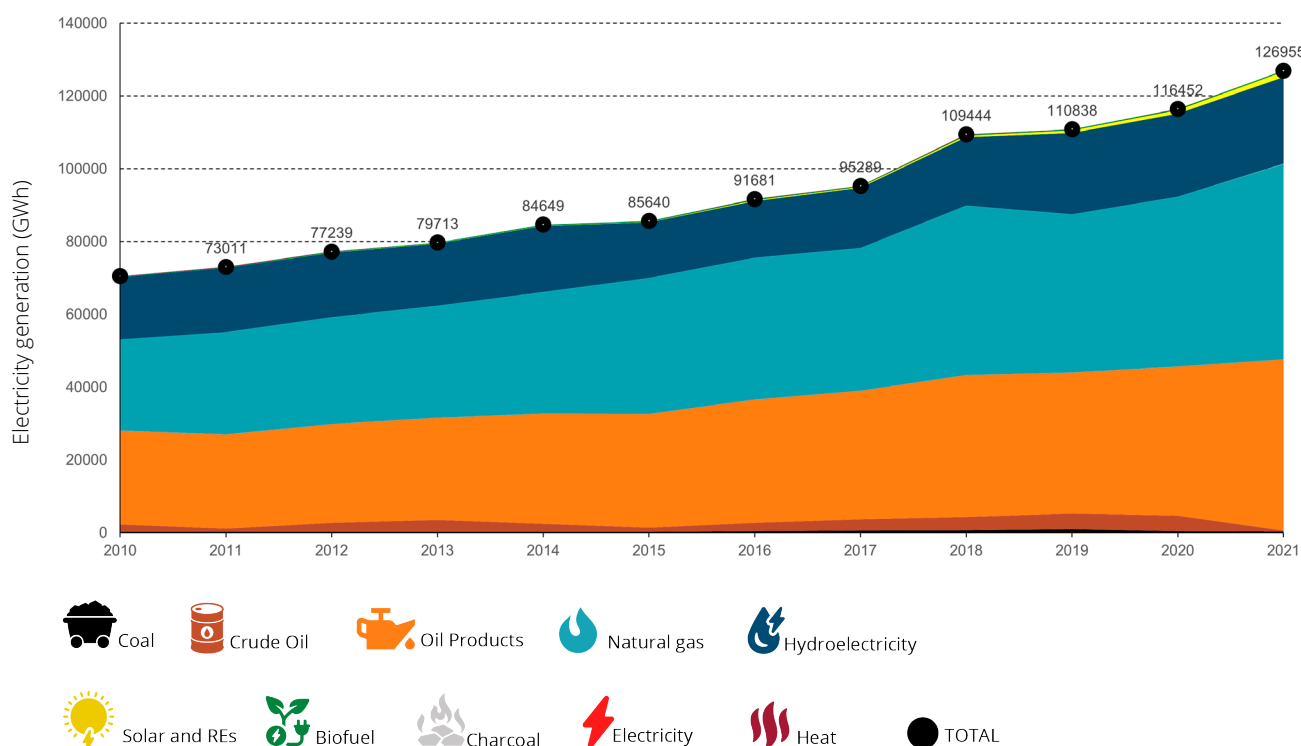


Figure 3: Evolution of electricity generation (GWh) in the region

The Member States producing petroleum products are Côte d'Ivoire (49%), Nigeria (29%), Niger (10%), Senegal (9%) and Ghana (4%). It should be noted that although Côte d'Ivoire ranks third in crude oil production (2% of the region's crude oil production), it ranks first in the refining industry.

Table 3: Efficiency of ECOWAS refineries in 2021

Crude oil input in refineries (ktoe)	Oil products outputs (ktoe)	Efficiency
8 943	8 414	94%

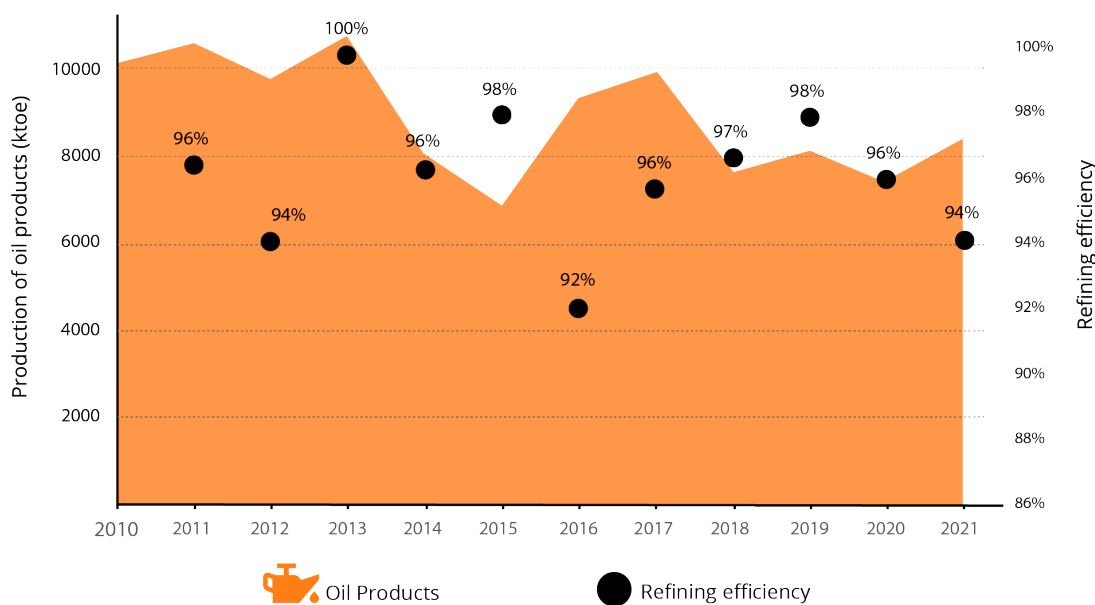


Figure 4: Evolution of the production of oil products (ktoe) in the region

**94%** Overall efficiency of oil refineries in the ECOWAS region in 2021.

In 2021, charcoal production was the main energy industry in the region, despite the use of other cooking methods such as gas stoves.

**19 kg**

In 2021, to produce 19 kg of charcoal 100 kg of wood were used in ECOWAS.

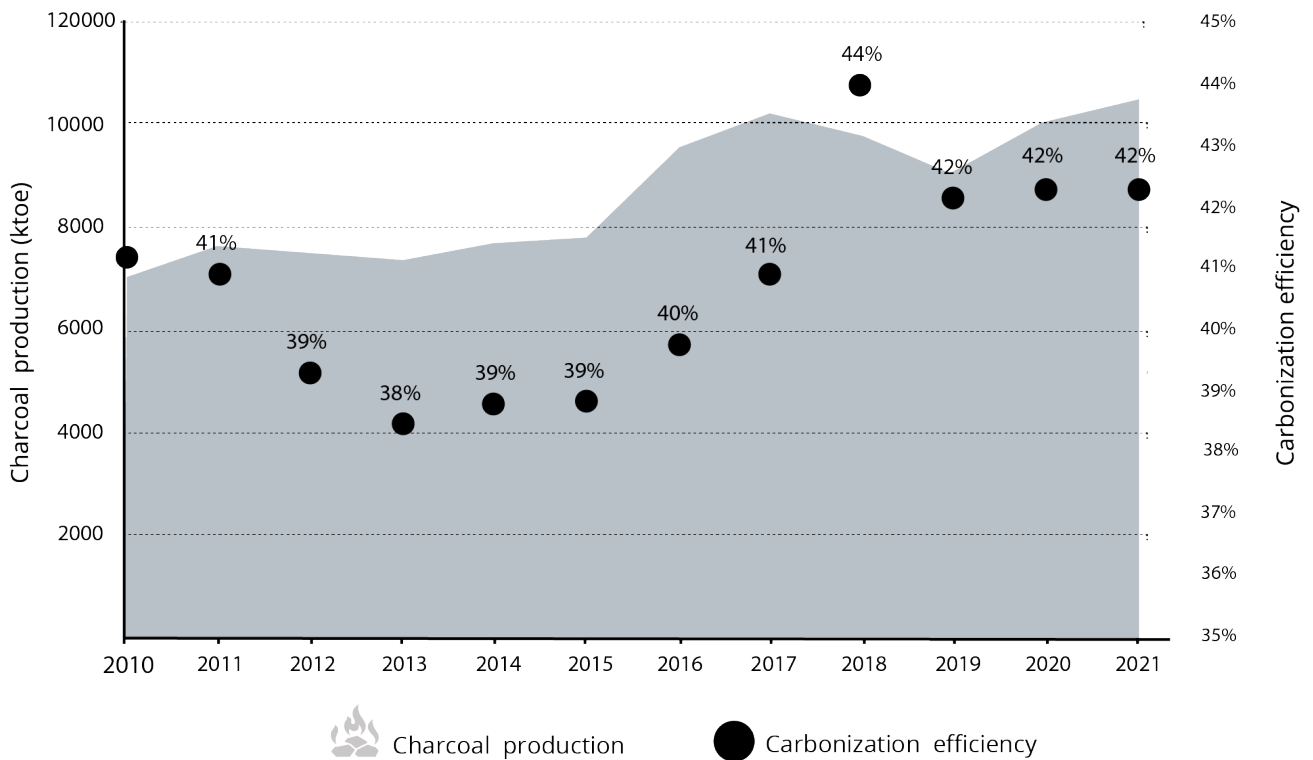


Figure 5: Evolution of charcoal production (ktoe) in the ECOWAS region

The energy efficiency of charcoal production in the ECOWAS region is estimated at around 42% in 2021, while in terms of mass, it is 19%. This means that to produce 19 kg of charcoal, 100 kg of firewood were used.

Table 4: Average charcoal production by country (kg)

Member States	Average annual charcoal production per capita
BENIN	44.72
BURKINA FASO	58.25
CAPE VERDE	1.85
CÔTE D'IVOIRE	56.72
GAMBIA	32.72
GHANA	52.89
GUINEA	159.26
GUINEA BISSAU	19.88
LIBERIA	109.24
MALI	29.65
NIGER	0.00
NIGERIA	12.13
SENEGAL	28.67
SIERRA LEONE	58.57
TOGO	108.30
ECOWAS	51.52

Guinea, Liberia and Togo are the countries with the highest per capita charcoal production. In Niger, carbonisation is not permitted, and in Cape Verde, charcoal production per capita is the lowest in the region. **Average charcoal production per capita in the region is 52 kg.**

## 03 Final Consumption

The final consumption is presented by energy sources and energy activities.

### a) Energy sources

Total final consumption in ECOWAS in 2021 was **140 million** toe of which 59% was biomass (wood, waste, charcoal), 33% petroleum products and only 7% electricity. Natural gas accounted for less than 1% of total final consumption.

**7%** In 2021, electricity represents only 7% of the final energy consumption of ECOWAS.

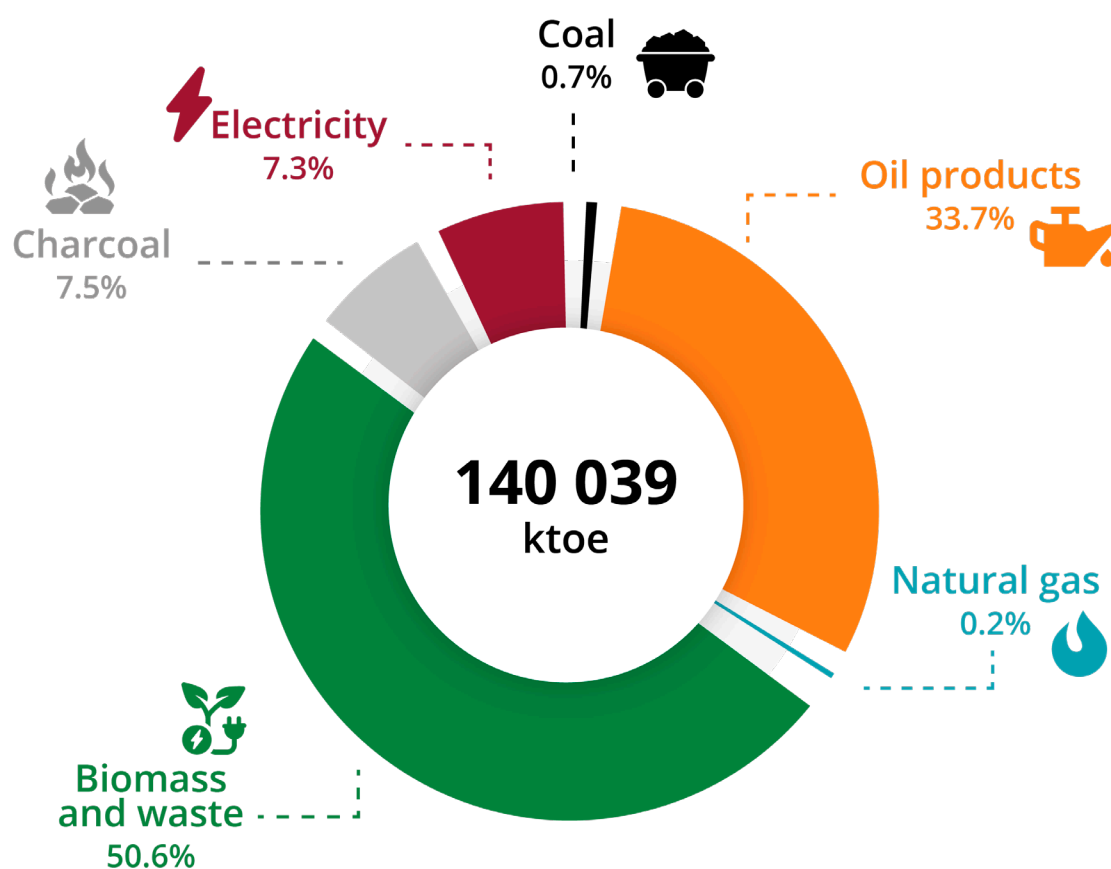


Figure 6: Total final consumption by energy source in 2021

## b) Energy activities

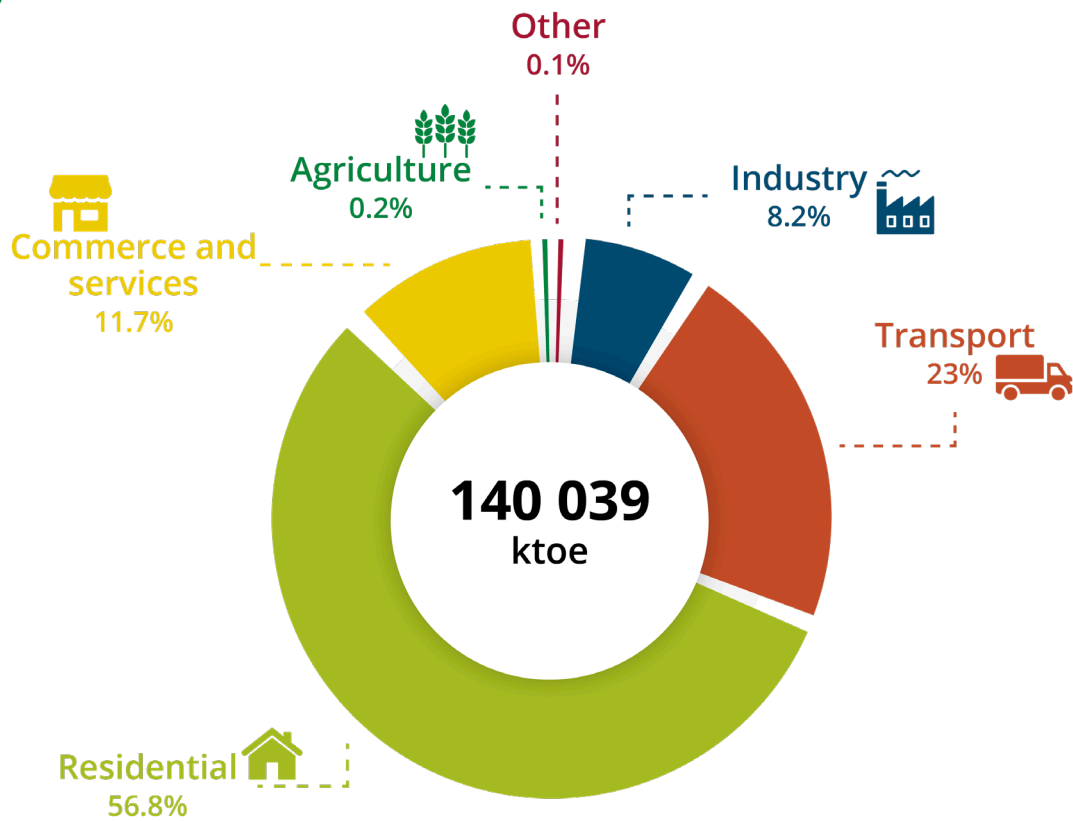


Figure 7: Total final consumption by sector of activity in 2021

Total final consumption in the ECOWAS region is dominated by the residential and transport sector.

Consumption for agriculture is marginal (0.2 %) and reflects the low productivity of agriculture in the region. The share of industry falls below 10%.

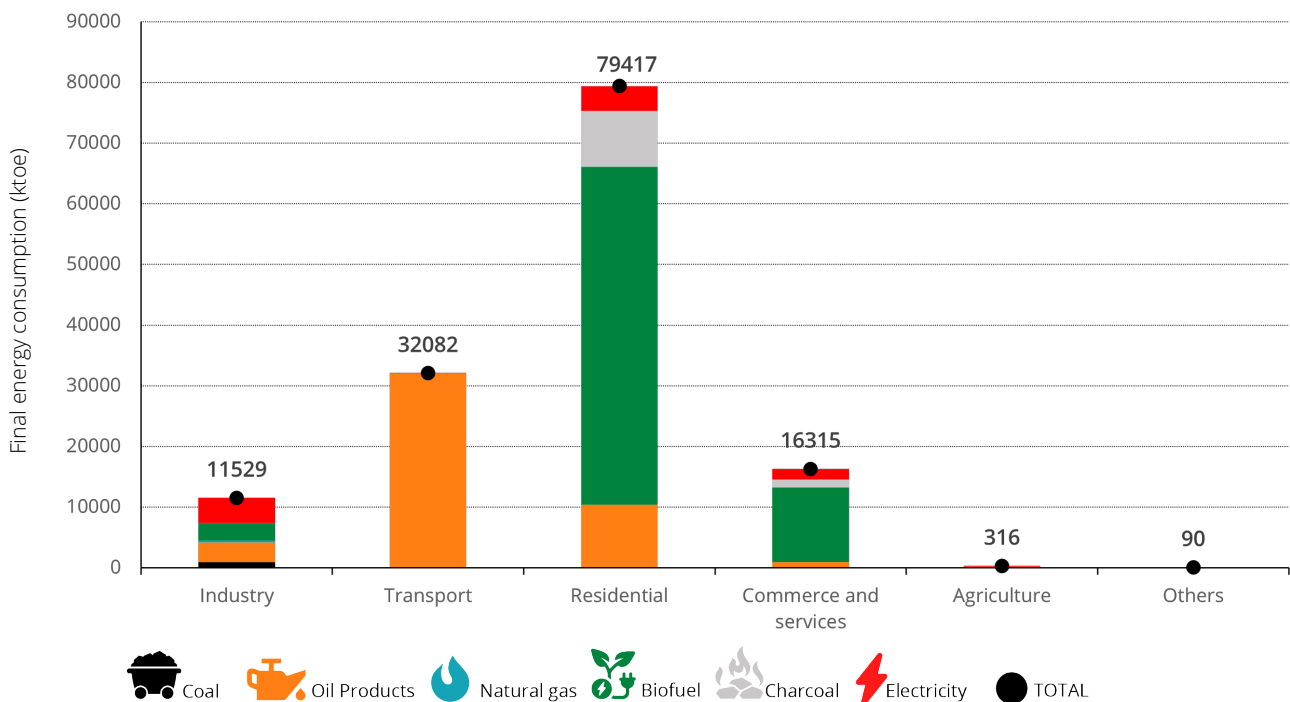


Figure 8: Final energy consumption by sector of activity and by type of energy in 2021



# 04 Energy Trade

Biomass exchanges of the ECOWAS region are quite marginal. Oil products are mainly imported. Crude oil and natural gas mainly exported.

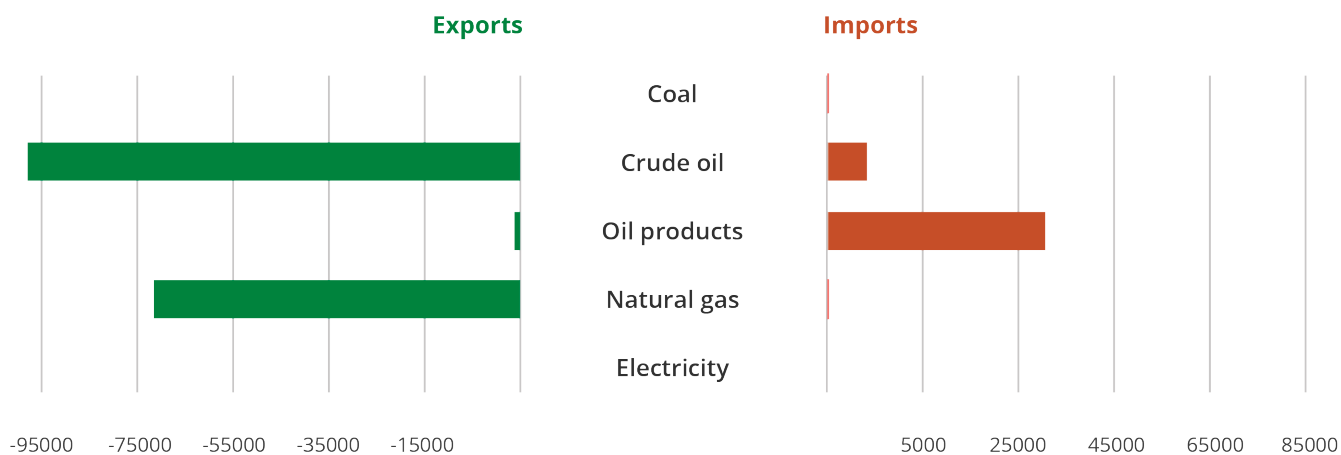


Figure 9: Energy trade between ECOWAS and rest of the World in 2021

## 05 Sustainable Energy Indicators

Table 5: Some sustainable energy indicators in ECOWAS

	2018	2019	2020	2021
Total energy supply per capita (toe / inhabitant)	0.36	0.36	0.38	0.36
Electricity access rate (%)	52.4	54.4	55.8	56.1
Electricity consumption per capita (kWh / inhabitant)	251.8	247.9	255.3	268.6
Average daily consumption of LPG (kg / household)	0.11	0.11	0.20	0.32
Share of renewable energy in electricity generation	18.4 %	21.0 %	20.7 %	20.2 %

**3.3%**

Between 2018 and 2021, the share of renewable energies in the production of electrical energy increased by 3.3% per year.

# Access to electricity in ECOWAS

Proportion of households with access to electricity in 2021\*

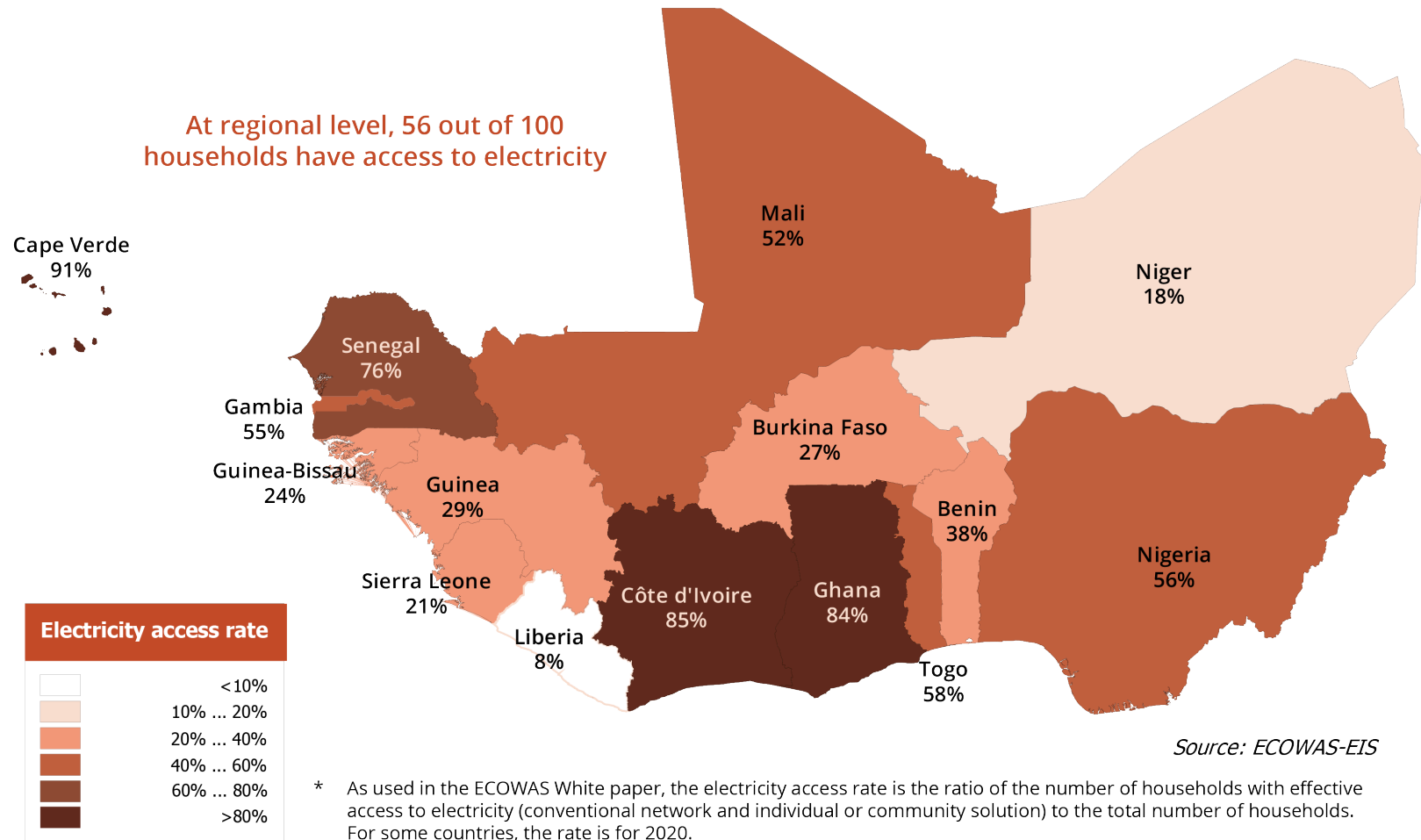


Figure 10: Household access to electricity in ECOWAS

## 06 Environmental Indicators

CO<sub>2</sub> emissions in the ECOWAS region, calculated according to the recommendations of the Intergovernmental Panel on Climate Change (IPCC), increased by **1.1% per year** between 2018 and 2021.

Table 6: Environmental indicators in ECOWAS

	2018	2019	2020	2021
CO <sub>2</sub> emissions from energy sector (Gg CO <sub>2</sub> )	200 099	206 360	225 787	223 149
CO <sub>2</sub> emissions per inhabitant (t CO <sub>2</sub> /cap)	0.53	0.54	0.57	0.55
CO <sub>2</sub> emissions per GBP (t CO <sub>2</sub> /Thousands US\$ 2015)	0.37	0.37	0.39	0.37
CO <sub>2</sub> emissions per energy consumption (t CO <sub>2</sub> /toe)	1.48	1.48	1.52	1.53
CO <sub>2</sub> intensity of electricity production (t CO <sub>2</sub> /GWh)	547.41	534.92	534.58	458.73

The transport sector, particularly road transport, is the main source of CO<sub>2</sub> emissions in ECOWAS. In 2021, the transport sector accounted for 46% of CO<sub>2</sub> emissions.

Table 7: Evolution of CO<sub>2</sub> emissions per sector (Gg CO<sub>2</sub>)

	2018	2019	2020	2021
Electricity generation	58 640	59 440	62 2230	58 239
Production of oil products	24 045	26 712	23 650	27 445
Other industries energy <sup>2</sup>	1 146	8 165	8 978	193
Buildings: Residential and services	11 619	13 016	22 179	30 295
Transport	80 166	79 026	85 522	94 032
Manufacturing industry and construction	21 706	21 036	24 846	14 634
Agriculture and other	754	369	-	656

**46%** In 2021, transport sector accounted for **46%** of ECOWAS CO<sub>2</sub> emissions.

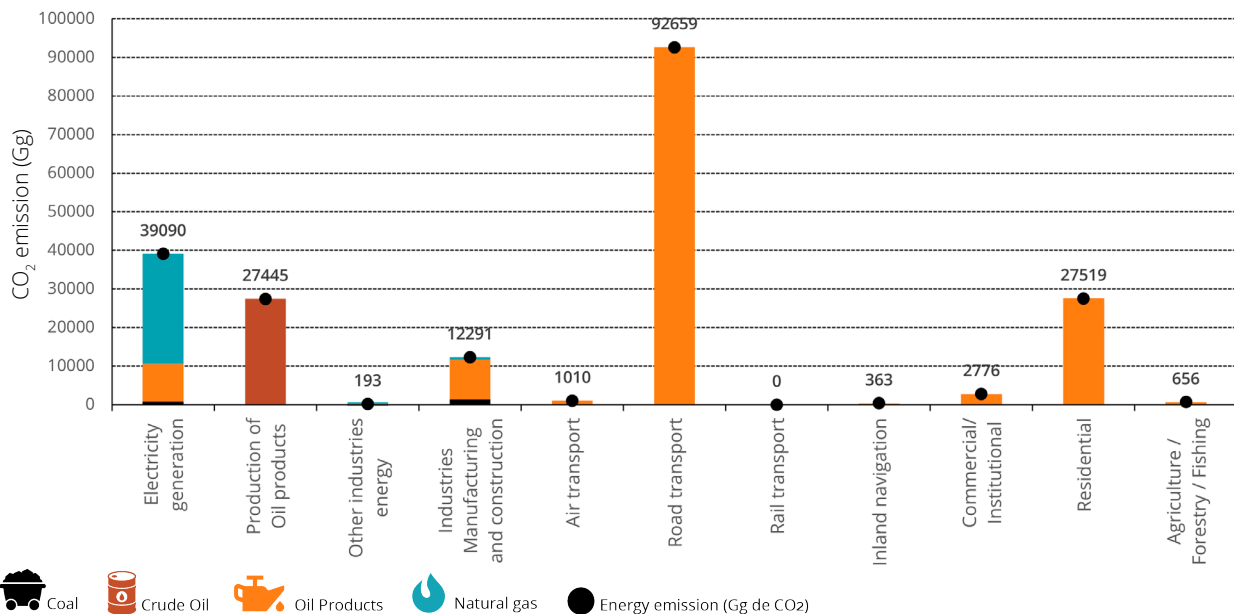


Figure 11: CO<sub>2</sub> emissions by sector of activity and by type of energy in 2021

<sup>2</sup>Exchanges between Member States are not considered as ECOWAS supplies, and as a result the sum of Member States' supplies will be different from that of the region.

# 07 Simplified ECOWAS Energy Balances (ktoe) in 2021

Table 8: 2021 ECOWAS energy balance (part 1)

Balance 2021	Coal	Crude oil	Oil products	Natural Gas	Biomass & waste	Charcoal	Renew. <sup>3</sup> energy	Electricity	Heat	TOTAL
Production	661	104 077	-	8 831	88 442	-	2 171	-	-	283 982
Imports	488	813	32 729	262	-	-	-	335	-	34 627
Exports	-	-99 380	-1 379	-71 046	-	-	-	-168	-	-171 973
International bunkers	-	-	-869	-	-	-	-	-	-	-869
Stock change	-21	118	-80	-	-	-	-	-	-	18
<b>TES<sup>4</sup></b>	<b>1 129</b>	<b>5 629</b>	<b>30 401</b>	<b>17 847</b>	<b>88 442</b>	<b>-</b>	<b>2 171</b>	<b>167</b>	<b>-</b>	<b>145 785</b>
Transfers	-	-	-	-	-	-	-	-	-	-
Statistical difference	-4	3 419	17 889	-6 434	7 433	40	54	978	-	17 091

Continues >

<sup>3</sup> Renewable Energy, solar, hydroelectricity, wind and other renewable energy sources

<sup>4</sup> TES : Total Primary Energy Supply

Table 8: 2021 ECOWAS energy balance (part 2)

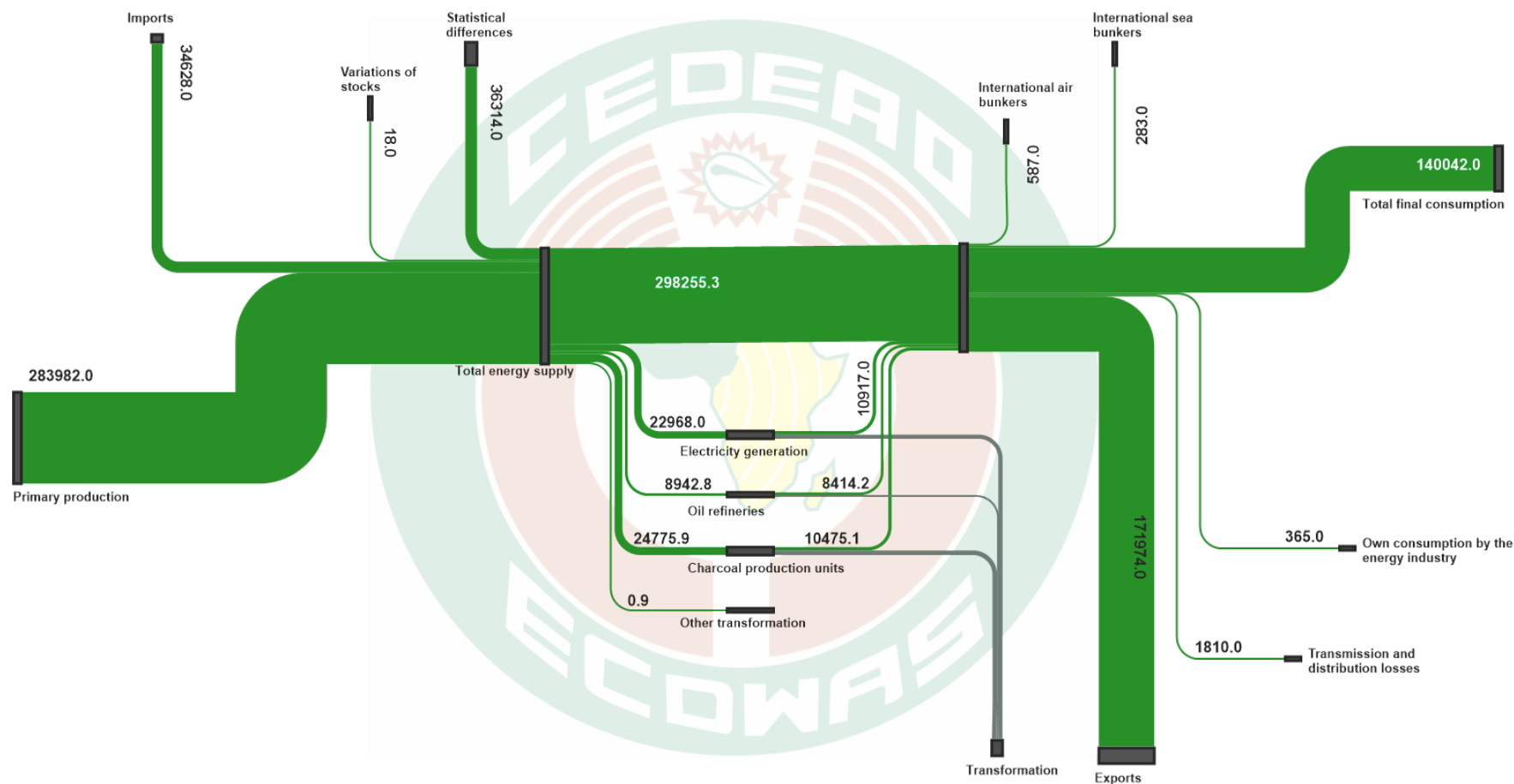
Balance 2021	Coal	Crude oil	Oil products	Natural Gas	Biomass & waste	Charcoal	Renew. <sup>3</sup> energy	Electricity	Heat	TOTAL
<b>Transformation</b>	<b>-194</b>	<b>-8 994</b>	<b>-976</b>	<b>-10 944</b>	<b>-25 016</b>	<b>10 475</b>	<b>-2 224</b>	<b>10 916</b>	-	<b>-26 957</b>
Electricity main producers	-65	-52	-3 053	-10 912	-	-	-2 214	7 683	-	8 613
Electricity auto producers	-128	-	-6 338	-32	-165	-	-10	3 227	-	-3 445
Refineries	-	-8 943	8 414	-	-	-	-	-	-	-529
Charcoal production units	-	-	-	-	-24 776	10 475	-	-	-	-14 301
Other transformation	-2	-	1	-	-75	-	-	6	-	-70
<b>Energy sector own use</b>	-	<b>-24</b>	<b>-59</b>	<b>-167</b>	-	-	-	<b>-115</b>	-	<b>-364</b>
<b>Transport and distribution losses</b>	-	<b>-29</b>	<b>-14</b>	<b>-47</b>	-	-	-	<b>-1 719</b>	-	<b>-1 809</b>
<b>TFC<sup>5</sup></b>	<b>930</b>	-	<b>47 251</b>	<b>256</b>	<b>70 859</b>	<b>10 515</b>	-	<b>10 227</b>	-	<b>140 038</b>
Industry	903	-	3 276	256	2 913	4	-	4 149	-	11 529
Transport	-	-	32 082	-	-	-	-	1	-	32 082
Residential	-	-	10 406	-	55 651	9 234	-	4 126	-	79 417
Services	-	-	970	-	12 281	1 265	-	1 799	-	1 315
Agriculture	-	-	212	-	-	3	-	101	-	316
Others	-	-	1	-	14	8	-	52	-	90
Non-energy uses	0	-	9	-	-	-	-	-	-	289

<sup>3</sup>Renewable Energy, solar, hydroelectricity, wind and other renewable energy sources

<sup>5</sup>TFC : Total Final Consumption



# 08 ECOWAS Energy Flow Diagram of 2021



Source : <https://eis.ecowas.int/>

Figure 12: Energy flow diagram<sup>6</sup> for ECOWAS in 2021

<sup>6</sup> Energy flow diagram is a **visualisation at scale** of the energy system from the supply (upstream) to the final consumption (downstream). It is derived from the energy balance.

## 09 Evolution of the Main Energy Indicators in the ECOWAS Region between 2018 and 2021

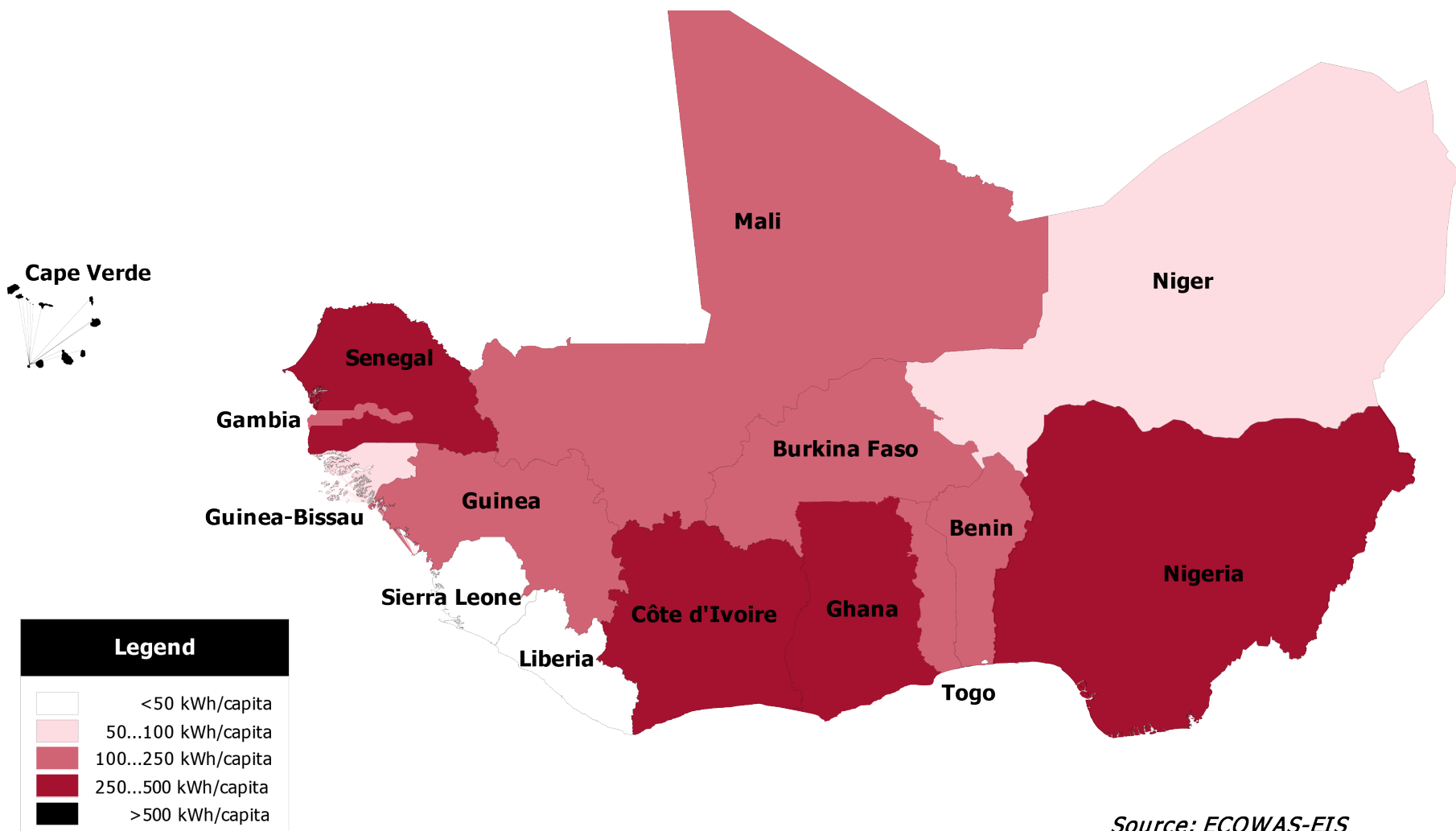
Table 9: ECOWAS Main energy indicators 2018-2021

	2018	2019	2020 <sup>pro*</sup>	2021 <sup>pro*</sup>	Groth 2018-2021
Population (millions)	375.01	385.2	395.8	405.49	2.6% /an
Total primary energy supply /TPES (ktoe)	109 758	111 041	113 240	115 217	1.6% /an
Electrical energy consumption (MWh)	94 536	95 599	101 025	108 902	4.8% /an
Emissions of CO <sub>2</sub> (Gg of CO <sub>2</sub> )	200 099	206 360	225 787	223 149	3.7% /an
TPES/Capita (toe)	0.36	0.36	0.38	0.36	-
TPES/GBP (toe/thousands US\$ 2015)	0.25	0.25	0.25	0.24	-1.1% /an
Electrical energy consumption per capita (kWh/capita)	251.8	247.9	255.3	268.6	2.2% /an
Share of Renewable energy in electricity production	18.4 %	21.0 %	20.7 %	20.2%	3.2% /an
Household access to electricity	52.4 %	54.4 %	55.8 %	56.1 %	2.3% /an
<b>Installed Capacity (MWe)</b>	24 689.58	25 033.66	24 987.66	25 216.41	0.7% /an
Hydroelectricity	5 332.10	5 332.10	5 332.10	5 332.10	-
Solar Photovoltaic	264.96	269.04	274.04	363.79	11.1% /an
Tidal/wave energy, biomass etc.	15.10	15.10	15.10	15.10	-
Wind energy	26.00	26.00	26.00	26.00	-
Conventional and similar fuels	19 051.42	19 391.42	19 340.42 <sup>7</sup>	19 497.42	0.7% /an

Source: ECOWAS-EIS

Pro\*: Provisional

<sup>7</sup> In 2020, some capacities have been demobilized



Source: ECOWAS-EIS

Figure 13: Map of electricity consumption per capita of ECOWAS in 2021

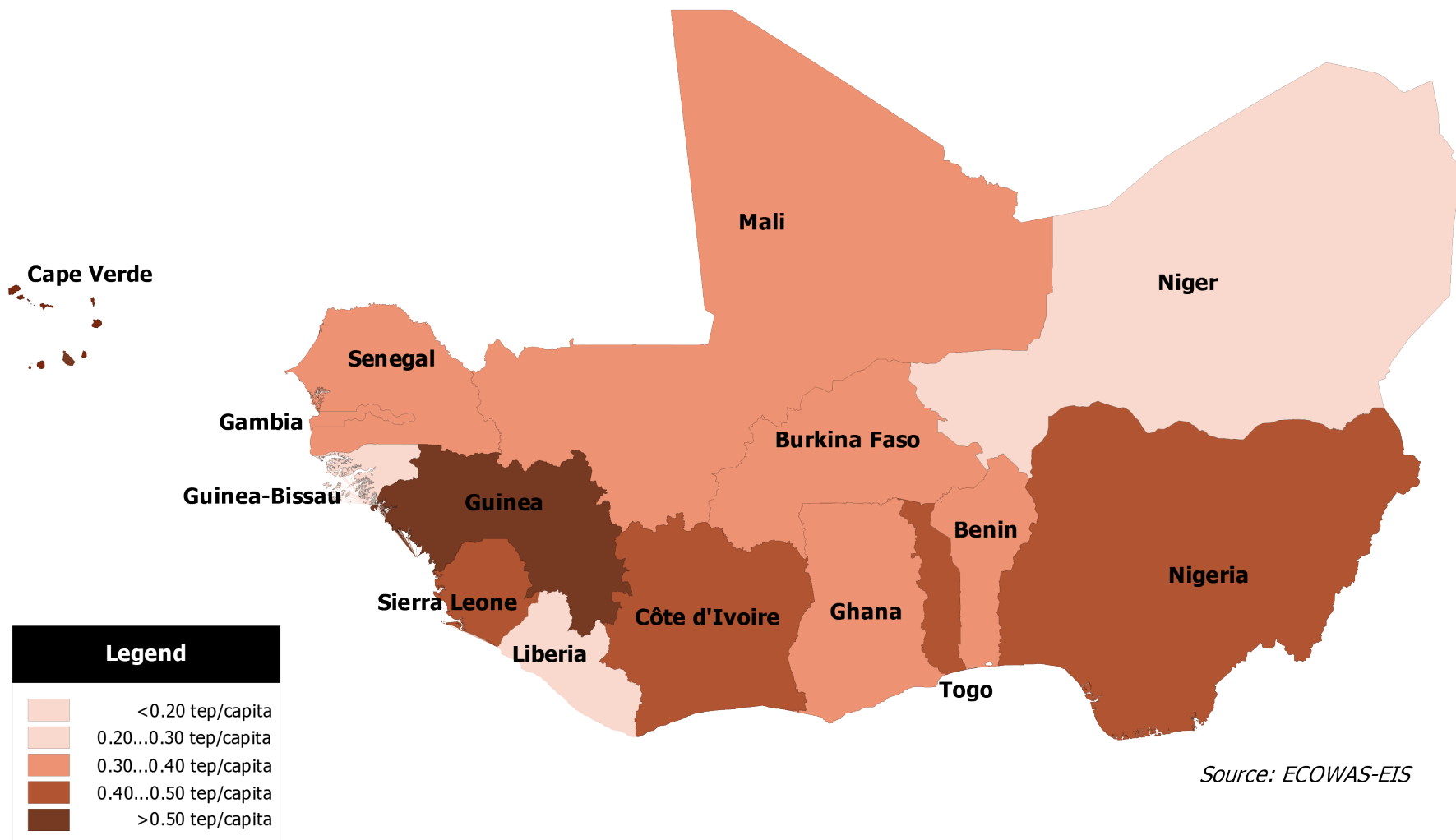


Figure 14: Map of energy consumption per capita of ECOWAS in 2021

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# KEY DEFINITIONS AND TERMINOLOGIES

**Electricity access rate:** Percentage of households/population with access to electricity (conventional network and individual or community solution).

**Final consumption:** Energy available for consumption after removing energy losses.

**Total Energy Supply (TPES):** production + imports – exports + net international bunkers + net stock.

**Transformation:** Transformation output is the result of the transformation process of energy products. This output covers production of derived products (secondary products, sub-products and co-products) for example the conversion of wood into charcoal or crude oil into petroleum products.



Energy is the engine of development and its availability in quality and quantity in all Member States is one of the priorities of the ECOWAS Commission. In 2013, at the 43rd Ordinary Session of the ECOWAS Conference of Heads of State and Government, countries committed themselves to universal access to clean, affordable, and sustainable energy services for all ECOWAS populations by 2030. The decade we have just begun is crucial because it must serve as a compass and allow us to make the necessary efforts to reach the targets set for ourselves and which is getting closer and closer. I trust that this document, which perfectly summarizes the energy situation in the ECOWAS region, will further motivate us to redouble our efforts to achieve Sustainable Development Goal 7 in the ECOWAS region by 2030.

**Mr. Sédiko DOUKA**

Commissioner for Infrastructure, Energy and Digitalization of the ECOWAS Commission

