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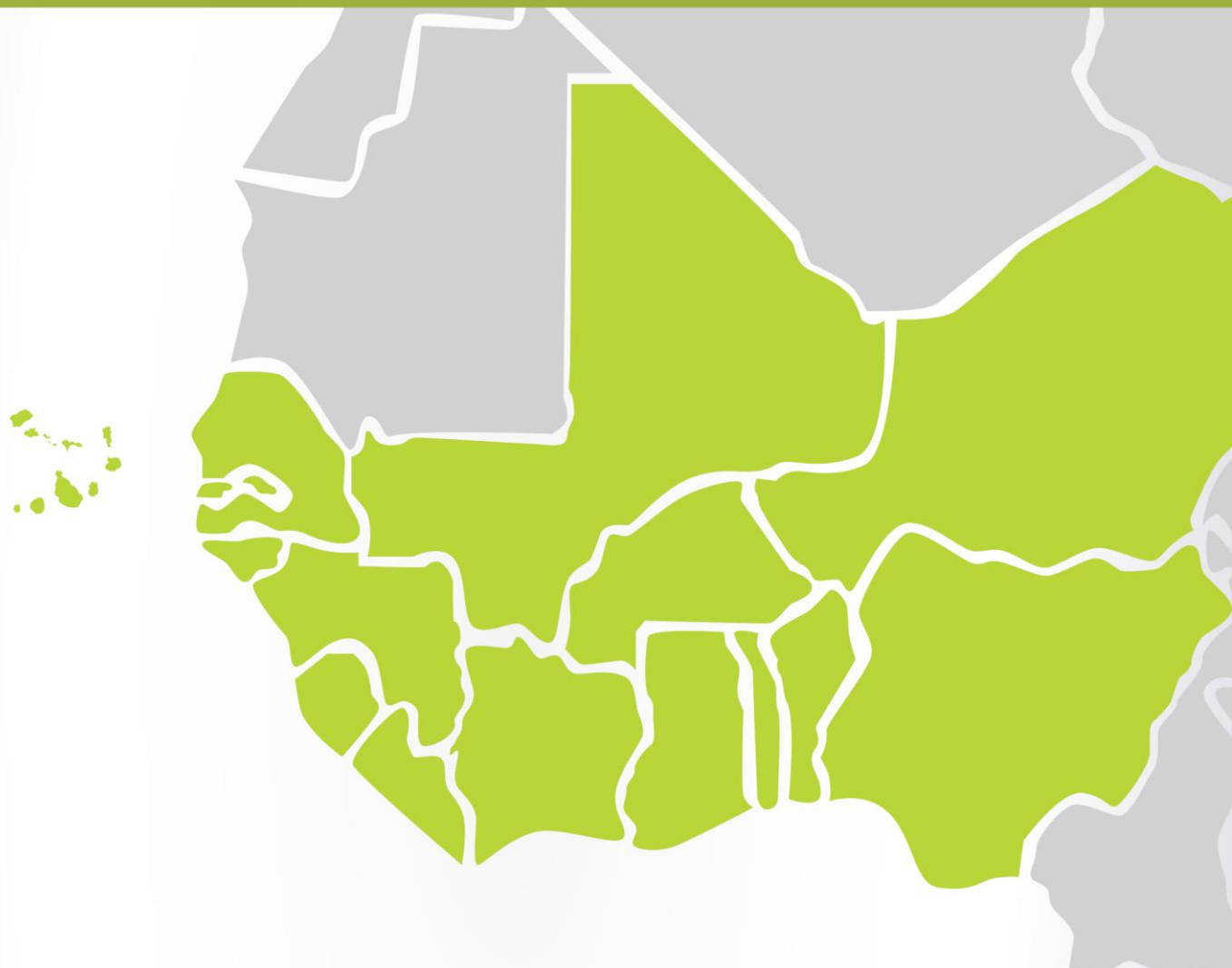
REGIONAL PROGRESS REPORT ON RENEWABLE ENERGY, ENERGY EFFICIENCY AND ENERGY ACCESS IN ECOWAS REGION

MONITORING YEAR: 2019



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ECOWAS CENTRE FOR RENEWABLE ENERGY AND ENERGY EFFICIENCY
CENTRO PARA AS ENERGIAS RENOVÁVEIS E EFICIÊNCIA ENERGÉTICA DA CEDEAO
CENTRE POUR LES ENERGIES RENOUVELABLES ET L'EFFICACITÉ ENERGÉTIQUE DE LA CEDEAO

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ABBREVIATIONS

AEME	Agence pour l'Économie et la maîtrise de l'énergie du Sénégal
AfDB	African Development Bank
AFREC	African Energy Commission
AMADER	Agence Malienne pour le Développement de l'Energie Domestique et l'Electrification Rurale (Mali)
CEMG	Clean Energy Mini-Grid
CFL	Compact Fluorescent Light (bulbs)
ECOSHAM	ECOWAS Standards Harmonization Model
ECOWAS	Economic Community of West African States
ECOWREX	ECOWAS Observatory for Renewable Energy and Energy Efficiency
ECREEE	ECOWAS Centre for Renewable Energy and Energy Efficiency
EE	Energy Efficiency
EEEP	ECOWAS Energy Efficiency Policy
ELECTRA	Empresa de Electricidade e Água, SA
EREP	ECOWAS Renewable Energy Policy
EU	EU
GIZ	Deutsche Gesellschaft für Internationale Zusammenarbeit (Germany)
GOGLA	The Global Off-Grid Lighting Association
GW / GWh	Gigawatt / Gigawatt hour
HV	High Voltage
ICS	Improved Cook-Stoves
IEA	International Energy Agency
IPP	Independent Power Producer
IRENA	International Renewable Energy Agency
kW / kWh	Kilowatt / Kilowatt Hour
LBC	Lampes de Basse Consommation
LCL	Low Consumption Lights
LED	Light Emitting Diode
LMSH	Large and Medium Scale Hydropower
LPG	Liquefied Petroleum Gas
LV	Low Voltage
MCA-Benin II	Millennium Challenge Account - Benin II
MEPS	Minimum Energy Performance Standards
MoE	Ministry of Energy
MV	Medium Voltage
MW / MWh	Megawatt / Megawatt hour
NEEAP	National Energy Efficiency Action Plan

NERC	Nigerian Electricity Regulatory Commission
NESP	Nigerian Energy Support Program
NIGELEC	Société Nigerienne d'Electricité
NREAP	National Renewable Energy Action Plan
PERACOD	Program for the promotion of renewable energy, energy efficiency and access to energy services
PPA	Power Purchase Agreement
PRODERE	Programme Régional de Développement des Energies Renouvelables et de l'Efficacité Energétique
PV	Photovoltaic
RE	Renewable Energy
REAs	Rural Electrification Authorities
SEforALL	Sustainable Energy for All
SENELEC	Société Nationale d'Électricité du Sénégal
SHS	Solar Home System
SHP	Small Hydro Power
SME	Small and Medium sized Enterprise
SWH	Solar Water Heaters
ToR	Terms of Reference
UEMOA	Union Economique et Monétaire des Etats de l'Afrique de L'Ouest
UNDP	United Nations Development Program
WAPP	West African Power Pool
WB	World Bank

DEFINITIONS

Electricity access: Access to electricity is the share of households with electricity supplied by electricity grid (national grid and mini-grids), and the share of households with electricity supplied by stand-alone renewable energy systems. Conventional stand-alone systems such as diesel or petrol generators contribute also to provide access to electricity, but these are not taken into in this report.

Energy-efficient building: An energy-efficient building is defined as a building that is designed and built in a way that minimizes demand for and consumption of energy/electricity for cooling. Buildings considered are old and new public buildings with a total useful area over 500 m2 having at least one energy audit conducted.

Household: A household is defined as a person or group of persons who normally live and feed together and recognize a particular person as the head.

Improved cook-stove: An improved cook-stove is characterized by having a particular feature that reduces the amount of wood, charcoal, animal, or crop residue used by the cook-stove. Their use in developing countries is been promoted based on two main advantages: reducing the negative health impacts associated with exposure to toxic smoke from traditional stoves (women and children are generally more affected) and reducing the pressure placed on local forests.

Losses in electricity supply: losses during electricity supply refers to the amounts of electricity injected into the transmission and distribution grids that are not paid by users. Total losses have two components: technical and non-technical. Technical losses occur naturally and consist mainly of power dissipation in electricity system components such as transmission and distribution lines, transformers, and measurement systems. Non-technical losses are caused by actions external to the power system and consist primarily of electricity theft, non-payment by customers, and errors in accounting and record keeping. These three categories of losses are sometimes referred to as commercial, non-payment and administrative losses respectively, although their definitions vary in the literature.

Medium and large hydro: According to the ECOWAS Small Scale Hydropower Program, medium and large hydropower plants are defined as hydropower plants with a capacity exceeding 30MW.

On-grid lights: On-grid lights are defined as lights connected to the national grid or mini-grids.

Penetration rate of efficient lights: penetration rate of efficient light is defined as the number of efficient lights sold or installed as a share of the total number of lights (efficient + inefficient) sold or installed.

RE mini-grid, hybrid mini-grid (or Clean Energy Mini Grid - CEMG): it is defined as a mini-grid where at least 10% of the total installed capacity is RE-based.

Small Hydropower Plants: according to the ECOWAS Small Scale Hydropower Program, small hydro plants are defined as hydropower plants with installed capacity between 1 and 30MW.

Stand-alone renewable energy systems: they are defined as off-grid RE systems for lighting and powering electric appliances. These should provide at the minimum, electricity services such as lighting and phone charging (tier 1 of the SEforALL multi-tier framework for access to electricity).[1] This excludes solar lamps that are for lighting only.

[1] Further information: World Bank/IEA (2014): SEforALL Global Tracking Framework.

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EXECUTIVE SUMMARY

This report represents the fourth regional progress update under the framework of the Regional Monitoring and Reporting for the ECOWAS Renewable Energy and Energy Efficiency policies, as well as the Sustainable Energy Country Action Plans (referred to as the Regional Monitoring Framework). It serves as a vital tool for policymakers and other stakeholders, offering annual snapshots and trends across the three covered axes.

In 2019, approximately half of the population (51.5% of households) had access to the national electrical grid. Renewable energy generation, including large, medium, and small hydro, saw a slight increase to 21 GWh, constituting 24.8% of the total generation in 2019. However, this figure still falls short of the regional target of 35%. Medium and large hydropower plants continue to play a significant role in the region's electricity supply. The number of installed CEMGs stood at 370, significantly below the target of 60,000 by 2020.

Transmission and distribution losses remain well above the regional target of 10% by 2020, with an aggregate loss of 32% in 2019, a marginal decrease of 4% from the previous years. Energy efficiency improvements in other sectors, such as building and industry, as well as the adoption of efficient lighting and electrical appliances, are still minimal, leaving a substantial gap to be addressed.

Some of the countries could not provide quantitative data for specific indicators, making it difficult to precisely estimate metrics like the penetration rate of improved cookstoves (ICS) in the region. This gap stems from the absence of relevant frameworks and processes in these states to facilitate the collection and access of such data.

1 STATUS OF ENERGY ACCESS, RENEWABLE ENERGY AND ENERGY EFFICIENCY IN THE ECOWAS REGION

1.1 Access to electricity grid

In 2019, the overall population of the ECOWAS region was approximately 383 million people living in 73 million households, and just about half of its population (51.5% of households) had access to the national electrical grid, which represents a slight decrease compared to 2018. Though, there were increase in some countries such as Côte d'Ivoire, Gambia, Ghana, Senegal, Sierra Leone and Togo, the overall decrease could be attributed to the rapid growth in population compared to the slow increase in electricity access rate.

In view of above, the region is not likely to attain the regional target of 65% by 2020. The population's electrification rate across the region in 2019 is displayed in Figure 1. below

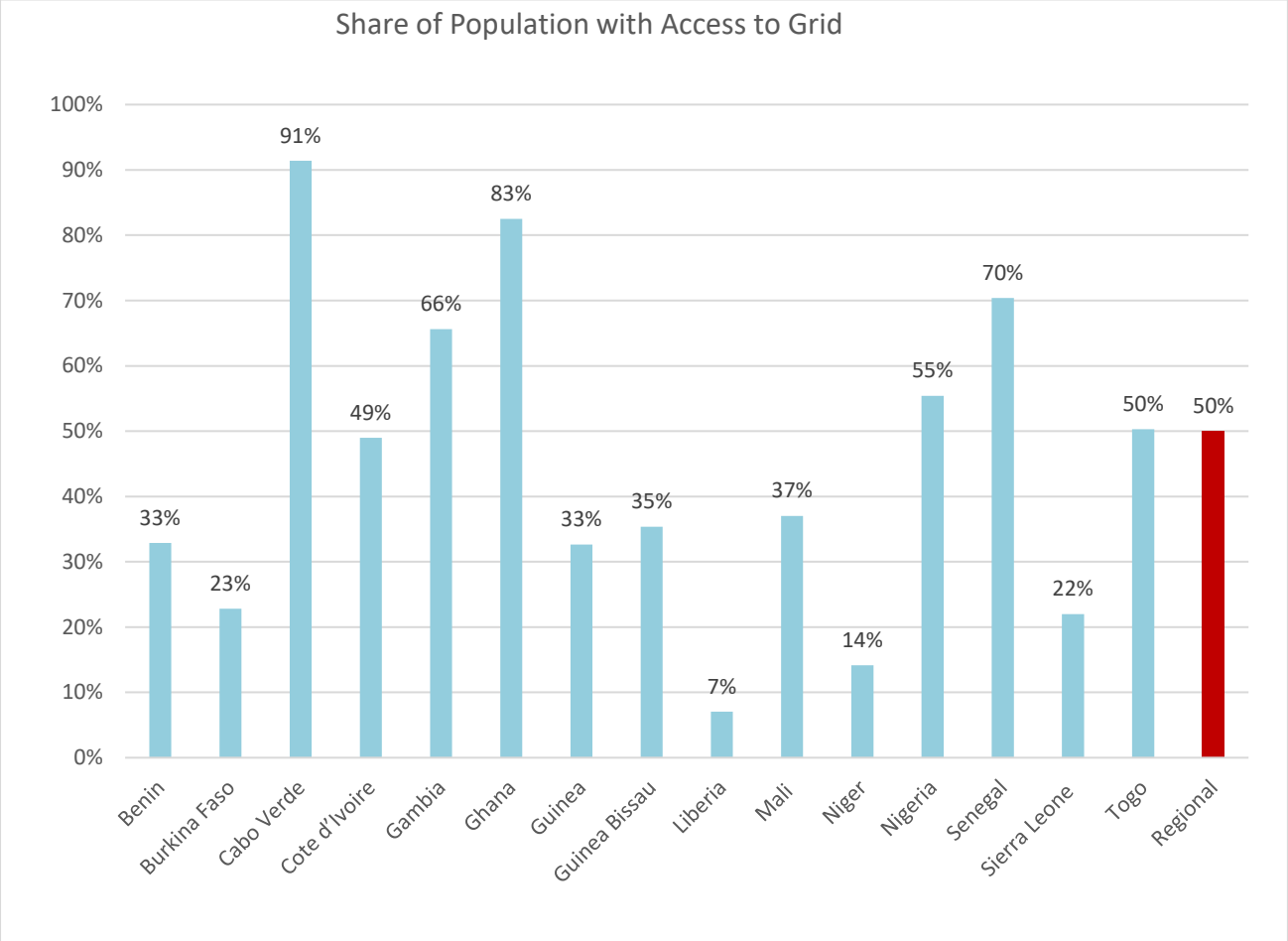


Figure 1: Share (%) of population connected to an electricity grid in 2019[2]

The national utilities reported approximately 20.2 million of residential customers in 2019. This represents a regional share of 29.5% of households connected to the grid, which differs of the mentioned rate of 50.0%. This difference could be explained by the fact that a single connection does not necessarily equate to an individual household.

[2] *Source: national monitoring reports 2019 (based on data reported by the national directorates of energy and national energy information services, national statistics services and annual utility and electricity regulator reports for 2019.*

1.2 Share of households served by clean energy mini-grids

In 2019, just over 500,000 households were connected to 370 existing Clean Energy Minigrids (CEMs). The numbers given in the table below is far below the regional target of 60,000 CEMGs by 2020. The regional target seems to be unattainable by 2020, given the period of his report.

Table 1: Existing CEMGs in 2019

Country	Operational CEMGs 2019
Benin	66
Burkina Faso	31
Cabo Verde	7
Côte d'Ivoire	7
Gambia	1
Ghana	13
Guinea	3
Guinea-Bissau	4
Liberia	11
Mali	47
Niger	14
Nigeria	44
Senegal	133
Sierra Leone	14
Togo	4
Regional	**370**

1.3 Share of households served by renewable energy stand-alone systems

In 2019, some member states reported the share of households with electricity access through stand-alone renewable energy systems. However, not all the countries shared the same reference year. And as in previous years, the unavailability of penetration rate in some countries make it impossible to quantify the penetration rate at regional level. Still, stand-alone renewable energy systems represent a small contribution to the electricity access at regional level.

Table 3 gives the share of households connected to renewable energy stand-alone systems.[3]

	Share HH stand-alone system	Number of stand-alone systems
Benin	0.1%	220600
Burkina Faso	n/a	175
Cape Verde	0.1%	79.2155
Cote d'Ivoire	2.0%	54604
Gambia	13.6%	583
Ghana	n/a	185258
Guinea	n/a	
Guinea Bissau	3.0%	3126
Liberia	5.1%	54000
Mali	2.0%	131918

[3] *Source: national monitoring reports 2019 (based on data provided by national directorates of energy, national Energy Information Systems)*

Niger	1.3%	39643
Nigeria	n/a	
Senegal	7.0%	56072
Sierra Leone	2.3%	61944
Togo	1.7%	25604
Regional	---	**833,606**

1.4 Share of ECOWAS households using improved cookstoves and modern fuel alternatives for cooking (e.g. LPG, biogas, solar cookers, kerosene, ethanol gel fuel)

Table 4: Share (%) of households using Improved cookstoves and modern cooking solutions in ECOWAS countries[4]

	Share of HH with ICS	Share of HH using modern cooking solutions
Benin	10.70%	8.10%
Burkina Faso (2016)	23.00%	
Cabo Verde (2017)	0.009%	81.90%
Cote d'Ivoire		22.00%
Gambia	63.00%	59.00%
Ghana	24.80%	24.80%
Guinea	0.50%	0.05%
Guinea Bissau (2010)	2.00%	5.00%
Liberia		
Mali (2017)	20.00%	28.90%
Niger (2016)	2.00%	2.90%
Nigeria		26.00%
Senegal (2014)	13.50%	43.50%
Sierra Leone	6.30%	3.10%
Togo		
		24.80%

Clearly, the reference year was not the same in every country. In Niger, access to clean cooking solutions appears as 2% but technology is not specified. Cabo Verde has the lowest value because most households use LPG for cooking. At regional level.

[4] Source: national statistical services, national directorates of energy and/or national Energy Information Systems

2 RENEWABLE ENERGY

2.1 Installed Capacity

Table 7 presents the total on-grid installed capacity and the installed on-grid renewable energy capacity in 2019 in the ECOWAS region.

The total installed capacity in the region was 25,344 MW. Renewable energy capacity accounts for 23.4% (5,612 MW) including LMSH and the remaining 2% (469 MW) without LMSH. The target is to increase the renewable energy share of the regional electricity mix to 10% by 2020, excluding medium and large hydropower, and 35% including medium and large hydropower.

Even though there are ongoing renewable energy on-grid projects in some countries which will increase the share, the 2020 target is likely to be attainable by 2020.

Table 2: On-grid installed electricity capacity (MW) in the ECOWAS region, 2019[5]

	Total Installed Capacity	RE installed capacity (MW) (including LMSH)	RE installed capacity in MW (excluding LMSH)
Benin	348	2.9	2.4
Burkina Faso	412	67.3	34.9
Cape Verde	168	35.0	35.0
Cote d'Ivoire	2,229	879.0	55.0
Gambia	147	1.3	1.3
Ghana	5,205	1,656.0	75.9
Guinea	617	368.2	53.2
Guinea Bissau	23	1.3	1.3
Liberia	134	88.0	4.0
Mali	862	378.7	72.5
Niger	152	7.0	7.0
Nigeria	13,250	1,981.2	71.4
Senegal	1,368	295.0	220.0
Sierra Leone	202	101.3	25.5
Togo	226	66.6	1.6
Regional	25,344	5,928.8	661.0
Renewable energy share in 2019 (%)		**23.4%**	**2.6%**
Renewable energy share – target 2020 (%)		**35%**	**10%**

Notes: LMSH: Large and Medium Scale Hydropower.

[5] *Source: national monitoring reports 2019 (based on the 2019 utility and electricity regulator reports and the national directorates of energy and energy commissions), ECOWREX and EREP.*

2.2 Renewable energy generation

At regional level, renewable energy generation including Large and Medium Scale Hydropower (LMSH) comprised approximately 24.8% or 21 million MWh of total generation. Renewable energy excluding LMSH accounted for approximately 5.9% or 1.3 million MWh of total generation.

Table 3: Total on-grid energy generation and renewable generation (MWh) in the ECOWAS region in 2019[6]

	Total generation MWh	Renewable energy generation (including LMSH) MWh	Renewable energy generation (excluding LMSH) MWh
Benin	361,178	1,536	1,536
Burkina Faso	932,200	164,100	58,800
Cape Verde	506,552	98,531	98,531
Cote d'Ivoire	10,605,000	3,454,600	226,900
Gambia	433,000	3	3
Ghana	18,188,244	7,303,389	51,826
Guinea	2,588	1,841	266
Guinea Bissau	107,483	113,100	113,100
Liberia	13,204,782	109,900	0
Mali	3,228,273	862,675	113,148
Niger	248,109	12,039	12,039
Nigeria	31,785,751	7,612,736	0
Senegal	4,454,000	671,700	348,880
Sierra Leone	1,768,031	887,388	223,380
Togo	533,488	136,950	16,660
Regional	**86,358,679**	**21,430,488**	**1,265,069**
Share of renewable energy generation 2019		**24.8%**	**5.9%**
Share of renewable energy generation 2018		**28.5%**	**1.1%**

Notes: The share of renewable energy generation (excluding LMSH) is based on the weighted average of the countries for which information was available. Some countries like Liberis and Ghana did not have the information on RE generated excluding LMSH

[6] *Source: national monitoring reports 2019 (based on the 2019 utility and electricity regulator reports and the national directorates of energy and energy commissions).*

2.3 Solar water heaters

Despite the resources and high demand for heat, SWH is still under-utilized. Table 9. Presents the situation in the Member States - Cabo Verde and Sierra Leone have the highest and reported aggregated numbers.

Table 4. Number of existing and/or installed SWH[7]

Country	Number of SWH in households	Number of SWH in public Institutions	Number of SWH in SMEs*, hotels and industries
Burkina Faso	n/a	191	n/a
Cabo Verde	984		
Ghana	1	1	3
Guinea Bissau		25	
Liberia	n/a	n/a	66
Mali	n/a	18	n/a
Nigeria	1	73	3
Senegal	n/a	273	n/a
Sierra Leone	455		

SME = small and medium-sized enterprises*

2.4 Bioethanol production

The Table 11 presents bioethanol and biodiesel production in 2019, only reported in Liberia, Mali, Senegal and Sierra Leone. This are same values reported since 2017. The Senegalese sugar company Compagnie Sucrière Sénégalaise has a nominal production capacity of 60,000 litres per day.

Table 5: Bioethanol and biodiesel production[8]

Country	Bioethanol production (litres)	Biodiesel production (litres)	
Liberia	n/a	8,701	2017
Mali	10,000,000	5,121	2017
Senegal	10,000,000	n/a	2017
Sierra Leone	85,000,000	n/a	2017

[7] *Source: national monitoring reports 2019; ECREEE 2016.*

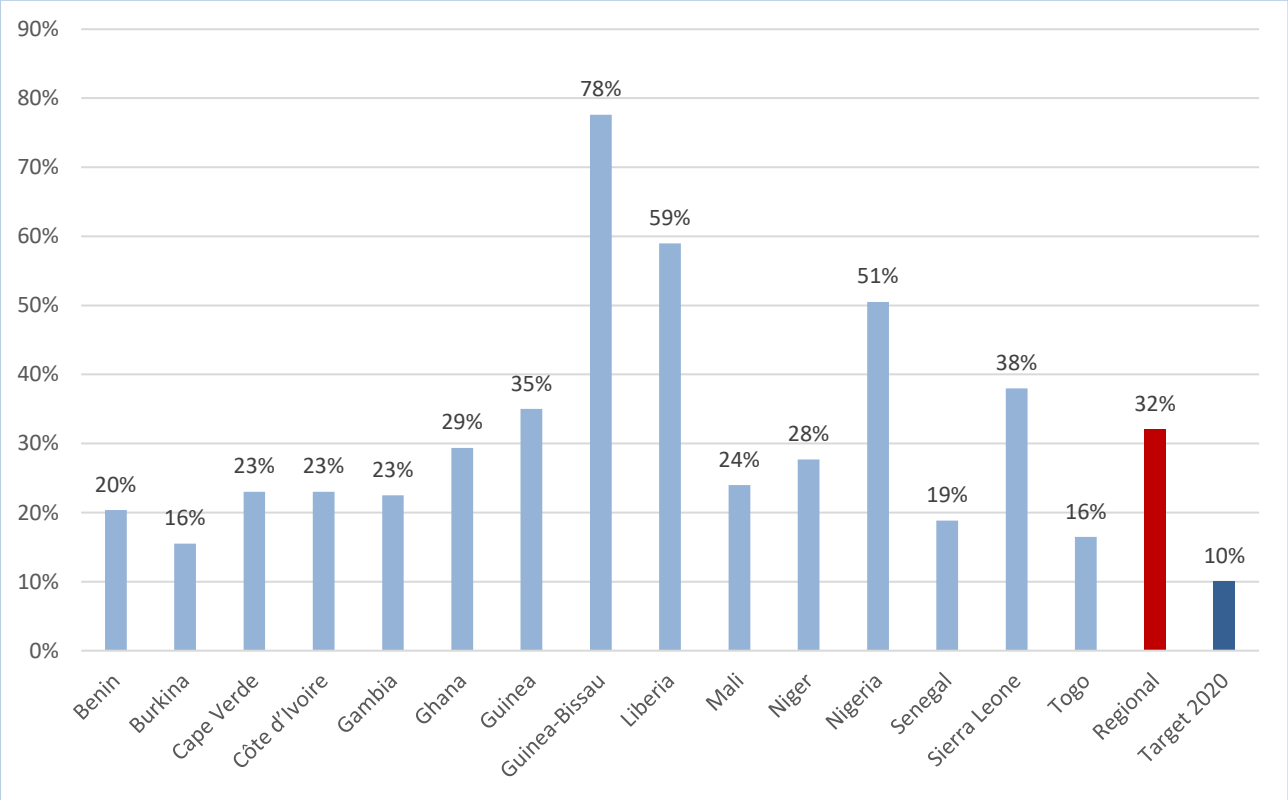
[8] *Source: national monitoring reports 2019, Agence Nationale du Développement des Biocarburants (Mali), Compagnie Sucrière Sénégalaise (Senegal), SUNBIRD (Sierra Leone)*

3 ENERGY EFFICIENCY

3.1 Electricity distribution losses in the region

Country reports and information provided by the utilities shows that 32% of the electricity produced in the region was lost in the ECOWAS region in 2019 (Figure 3), which shows a reduction a compared to 2017, with an aggregated loss of 36%. This is still far from the regional target of 10% by 2020.

Figure 2. Aggregated electricity losses



Source: national monitoring reports 2019 (based on information provided by the 2019 national utility and electricity regulator reports and the national directorates of energy), EEEP.

3.2 Energy-efficient lighting

This constitutes the penetration rate of efficient lighting for both private and public area. Due to incomplete data from the member States, regional assessment of efficient lighting penetration rates was not possible. Only Burkina Faso, Mali and Togo reported penetration rates. But most countries reported the total number of efficient lights totalling 10,508,001, which is an increase from 2018.

Table 6. Existing number of efficient lights in the ECOWAS region[9]

	Number of Efficient lamps	Number of efficent public lamps	Number of Solar Street lights	Penetration rate efficient lamps	Penetration rate efficient public lighting
Benin	832,444	18,062	16,759	n/a	n/a
Burkina Faso	1,500,000	19,810	1,924	5%	18%
Cabo Verde	n/a	10,067	n/a	n/a	n/a
Cote d'Ivoire	4,463,368	n/a	116,942	n/a	n/a
Gambia	5,000	5,000	n/a	n/a	n/a
Ghana	n/a	n/a	n/a	n/a	n/a
Guinea	1,183,900	4,415	31,512	n/a	n/a
Guinea Bissau	n/a	30,730	1,484	n/a	n/a
Liberia	n/a	n/a	n/a	n/a	n/a
Mali	2,065,649	8,000	8,394	18.11%	22.17%
Niger	37,320	3,011	1,541	n/a	n/a
Nigeria	n/a	n/a	20,000	n/a	n/a
Senegal	n/a	38,620	1,835	n/a	n/a
Sierra Leone	n/a	n/a	8,880	n/a	n/a
Togo	420,320	n/a	23,000	n/a	38.18%
Regional	**10,508,001**	**137,715**	**232,271**	-	-
Regional 2018	**9,099,713**	**174,373**	**245,898**	-	-

3.3 Energy-efficient electrical appliances

The adoption rates of energy-efficient appliances, including air conditioners and refrigerators, were only reported by Ghana in 2019 and Niger based on a survey conducted in 2016. This recurring issue is often linked to the absence of baseline data or inadequate data availability, exacerbated by insufficient coordination for data collection.

Cabo Verde has taken significant steps by instituting regulations that stipulate the minimum energy efficiency standards for the importation and sale of various products. Furthermore, the Nigerian Energy Support Program (NESP) has provided support to the Standards Organization of Nigeria (SON) in developing Minimum Energy Performance Standards (MEPS) for air conditioners and refrigerators.

3.4 Energy efficiency in buildings

Countries such as Benin, Burkina Faso, Cape Verde, Gambia Ghana, Mali, Nigeria, and Senegal reported a total number of 1739 Energy Efficient Buildings.

[9] *Source: national monitoring reports 2019 (based on information provided by national directorates in charge of energy, donors, and national utilities)*

4 ENERGY EFFICIENCY IN INDUSTRY

Nigeria, Cabo Verde A slight increase in the number of industries implemented Energy Efficiency measures -, the table below shows a reported a total number of 68 companies implemented energy efficiency measures by 2019.

BFA	CBV	CIV	GIN	NER	NGA	TGO	Total
9	41	1	2	1	11	3	68

5 CONCLUSION

The report conclusively shows that the targets set to be achieved by 2020 is far from the being achieved. Though there are various initiatives and projects ongoing in the member states, it remains unlikely that the targets set could be achieved a year from now.

A multitude of factors contribute to this shortfall, including the absence of robust policy frameworks, regulatory structures, and standardized practices. The lack of clear guidelines and standardization inhibits progress and creates uncertainty within the sector. Additionally, deficient data management frameworks exacerbate the problem by impeding accurate assessment and reporting of progress. Furthermore, the insufficiency of adequate financing mechanisms and the limited engagement from the private sector further constrains progress.

Looking ahead to 2030, member states face a daunting task of achieving the ambitious targets. However, there are promising strategies that could help accelerate progress. For instance, promoting off-grid solutions like clean energy mini-grids (CEMGs) and standalone technologies presents an opportunity to rapidly expand electricity access, particularly in remote rural areas where traditional grid infrastructure is lacking. These decentralized energy solutions not only enhance access but also contribute to energy security and resilience.

Efforts to bridge the substantial gap in the Energy Efficiency sector are underway, with notable advancements observed in areas such as building and industrial efficiency. However, realizing the full potential of these efforts requires effective implementation and scaling across the region. Addressing data gaps is another critical aspect and developing robust baseline data and frameworks for data collection is essential for informed decision-making and tracking progress over time.

In conclusion, while significant challenges persist, there are opportunities for transformative change in the Renewable Energy and Energy Efficiency sectors. By addressing policy gaps, enhancing financing mechanisms, promoting private sector engagement, and improving data management practices, member states can accelerate progress towards achieving their energy targets and fostering sustainable development across the region.

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