ECREEE
Towards Sustainable Energy

# REGIONAL PROGRESS REPORT

## ON RENEWABLE ENERGY, ENERGY EFFICIENCY AND ENERGY ACCESS IN ECOWAS REGION

**MONITORING YEAR: 2022**

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**ECOWAS Centre for Renewable Energy and Energy Efficiency (ECREEE)**
Prédio ADS, 3. Andar, Achada Santo António
C.P. 288, Praia, Cabo Verde
info@ecreee.org
www.ecreee.org

**AUTHORS**
Hodonou Alexandre Binazon – ECREEE , Jafaru Abdulrahman – ECREEE

**CONCEPTION AND DESIGN**
Joarel Barros, Mbaye Diouf (ECREEE)

**REVIEWED BY**
Guei G. F. Kouhie, Hyacinth Elayo, Madi Kabore, Juste C.T. Damada, Abdoulaye Ballo, Jihane Bakounoure, Dorriane H. R. D. Lopes, Samuel Dodobatia Wetajega, Edmilson Monteiro (ECREEE)

**MAPS**
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# ABBREVIATIONS

| | |
|---|---|
| **ADEME** | French Environment and Energy Management Agency. |
| **AFREC** | African Energy Commission |
| **BMZ** | Bundesministerium für wirtschaftliche Zusammenarbeit und Entwicklung |
| **CEB** | Benin Electric Community |
| **CEMG** | Clean Energy Mini-Grids |
| **DNE** | Direction Nationale de l'Énergie |
| **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 |
| **EIS** | Energy Information System |
| **EREP** | ECOWAS Renewable Energy Policy |
| **ESEF** | ECOWAS Sustainable Energy Forum |
| **EUR** | EURO |
| **GIZ** | Gesellschaft für Internationale Zusammenarbeit |
| **GOGLA** | Global Off-Grid Lighting Association |
| **GW/ GWh** | Gigawatt / Gigawatt hour |
| **HH** | Household |
| **ICS** | Improved Cook-Stoves |
| **IRENA** | International Renewable Energy Agency |
| **LED** | Light Emitting Diode |
| **LMSH** | Large and Medium Scale Hydropower |
| **LPG** | Liquefied Petroleum Gas |
| **MPEER** | Ministry of Petroleum, Energy and Renewable Energies |
| **MLS** | Multi-Light Systems |
| **MW/ MWh** | Megawatt / Megawatt hour |
| **NEEAPs** | National Energy Efficiency Action Plans |
| **NREAPs** | National Renewable Energy Action Plans |
| **RE** | Renewable Energy |
| **SDG** | Sustainable Development Goals |
| **SECAPs** | Sustainable Energy Country Action Plans |
| **SEforALL** | Sustainable Energy for ALL |
| **SEKs** | Solar energy kits |
| **SHS** | Solar Home Systems |
| **SL** | Solar Lanterns |

| | |
|---|---|
| **SWH** | Solar Water Heaters |
| **WAPP** | West African Power Pool the specialized agency of ECOWAS |
| **SEFORALL** | Energie Durable pour Tous |
| **SEM** | Systèmes d'Eclairage Multiples |
| **SIE** | Système d'Information Energétique |
| **SSD** | Systèmes Solaires Domestiques |
| **TYCCAO** | Typha Combustible Construction Afrique de l'Ouest |
| **WAPP** | West African Power Pool |

# FOREWORD

The collective political will demonstrated by Member States has yielded notable advancements, yet the journey toward achieving the ambitious targets set forth in the regional polices is far from complete. The regional electricity access rate of 57.4% is a testament to these efforts, but it also highlights the need for intensified political commitment to reach universal access by 2030.

The Countries have made significant progress, reflecting the positive impact of well-directed policies. However, the overall share of renewable energy in the region's energy mix remains low, and below targeted levels. This situation calls for renewed political focus and concerted efforts, particularly in countries where progress has lagged.

The impressive growth in the installed capacity of grid-connected solar power plants underscores the critical role of sustained political commitment in driving forward the region's renewable energy agenda. Likewise, the modest yet promising reductions in electricity distribution losses signal the effectiveness of strategic political actions.

Through strategic collaborations and partnerships, ECREEE is dedicated to fostering an inclusive and integrated approach to sustainable energy development. By leveraging the capabilities of the ECOWAS Observatory for Renewable Energy and Energy Efficiency (ECOWREX) and other targeted interventions, ECREEE aims to facilitate the achievement of regional energy targets and contribute to the sustainable and equitable growth of the region.

We express gratitude to our local and international partners for their unwavering commitment and support. Your efforts have been instrumental in driving the progress observed thus far. Together we can overcome the existing challenges and achieve our shared vision of universal access to sustainable energy across the region.

**Mr. Jean Francis SEMPORE**
Executive Director ECREEE

# DEFINITIONS

**Electricity access:** The share of households with electricity supplied by electricity grid (national grid and mini grids) or households with electricity suppliedby 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 considered 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.

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

**Medium and Large-Scale Hydropower:** According to the ECOWAS Hydropower Program, medium scale hydropower has capacities between 30MW-100MW, while large hydropower plants are above 100 MW.

**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.

**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).

**Solar lanterns :** Solar lanterns are typically packaged as a simple, one-light lantern with one LED light, an embedded 0.5–3.0 Watt-peak (Wp) solar panel, and an internal rechargeable lithium-ion (Li-ion) battery. Some models include USB charging for mobile phones.

**Multi-light systems :** Multi-light systems include up to three or four LED lights with a standalone solar panel rated up to 10 Wp and a rechargeable Li-ion battery with most models including USB charging for mobile phones.

**Solar home systems (SHS) :** Solar home systems (SHS) have a solar panel rated from 11 Wp to usually up to 350 Wp and provide multiple electricity functions, such as lighting and powering a wide range of appliances such as TVs and fans. SHS are offered plug-and-play (PnP) or based on open-market components. In this report, SHS refers to both plug-and-play and component-based systems unless specified.

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Finally, we express our profound appreciation to Federal Ministry for Economic Cooperation and Development (BMZ) through Gesellschaft für Internationale Zusammenarbeit (GIZ) for its technical and financial support.

# EXECUTIVE SUMMARY

In 2022, the ECOWAS region achieved an overall electricity access rate of 57.4%, representing 243.5 million people, most of whom reside in urban areas (74%). Cabo Verde, Ghana, and Côte d'Ivoire boast the highest access rates, at 92%, 89%, and 85% respectively, while Liberia, Burkina Faso, Sierra Leone, Guinea-Bissau, and Niger have access rates below 30%.

As of 2022, 23% of households in the ECOWAS region, approximately 98 million people, used modern cooking solutions such as LPG. However, a significant disparity exists among member states. Cabo Verde leads with 81% of households utilizing modern cooking solutions, while Guinea-Bissau, Niger, and Liberia display low rates of 5%, 3%, and 1% respectively.
Between 2021 and 2022, the ECOWAS region saw a 2.2% increase in total grid-connected electricity generation capacity, reaching 28,032 MW, of which 7,059 MW comes from renewable energy sources. The share of renewable energy in the overall electricity mix remained at 25.2% in 2022, with a target of 49% by 2030. Renewable energy sources, including small hydropower, solar photovoltaic energy, wind energy, and bioenergy, contributed 3% to the overall energy mix, against a target of 19% by 2030. Large and Medium Scale Hydropower (LMSH) accounted for 86.8% of the total grid-connected renewable energy capacity, representing 6,128 MW. Nigeria, Ghana, and Guinea hold the largest installed renewable energy capacities, with 2,071 MW, 1,696 MW, and 1,043 MW respectively, accounting for 68.1% of the total installed renewable capacity in the region. Notably, 87% of this capacity is derived from hydropower. Conversely, Niger, Guinea-Bissau, and The Gambia have the lowest installed renewable energy capacities, with 7 MW, 5 MW, and 1 MW respectively.

In 2022, 48 grid-connected solar photovoltaic power plants were identified in the ECOWAS region, with a total installed capacity of 616 MW. Senegal, Burkina Faso, Ghana, Togo, and Mali have the largest installed capacities for grid-connected solar photovoltaic plants, with respective capacities of 273.1 MW, 156.1 MW, 138.3 MW, 50.6 MW, and 50 MW.

Between 2020 and 2022, the installed capacity of solar photovoltaic power plants increased from 418 MW to 616 MW, reflecting a 47.4% rise. The region is witnessing significant growth in grid-connected solar photovoltaic projects. Based on ongoing solar photovoltaic power plant construction projects and those at an advanced stage of development, the projected installed capacity in the ECOWAS region is expected to reach around 1 GW by 2025 and 5 GW by 2030.

In 2022, the ECOWAS region experienced a 2.8% increase in total electricity generation, reaching 87,810 GWh, with 20.5% of this attributed to renewable energy sources. The share of renewable energy generation from small hydropower plants and photovoltaic, wind, and bioenergy power plants was 1,189 GWh, representing 1.4% of the total output of 87,810 GWh. Nigeria (7,613 GWh),

Guinea (2,957 GWh), and Côte d'Ivoire (2,864 GWh) were the largest contributors to renewable energy-based electricity generation, accounting for 75% of the total electricity generated from renewable sources in 2022. It should be noted that Large and Medium Scale Hydropower (LMSH) are the primary sources of renewable energy generation, representing 93% of total renewable electricity production.

In the ECOWAS region, the total number of operational clean energy mini-grids stood at 565 in 2022, with a total installed capacity of 51.9 MW. Between 2018 and 2022, the region experienced significant growth in sales of Solar Home Systems (SHS). From 2018 to 2021, SHS sales in the region saw an 87% increase. In 2022, this dynamic accelerated remarkably, with record growth of 115% compared to the previous year, bringing the total number of SHS units sold to 811,126. Nigeria emerged as the largest sales market, accounting for 77% of all SHS sales in the region, followed by Benin (6.4%), Togo (4%), Côte d'Ivoire (3.4%), and Sierra Leone (2.5%).

Technical and non-technical losses in the region increased from 22.7% to 23.2% between 2020 and 2021. Despite these high rates, Liberia has made significant progress, reducing losses from 62.8% in 2020 to 47.0% in 2021. On the contrary, Cabo Verde, Côte d'Ivoire, and Benin saw an increase in distribution losses, with respective losses of 32.0% (25.0% in 2020), 18.0% (13.1% in 2020), and 27.0% (22.1% in 2020).

Since 2018, the region has witnessed a strong penetration of efficient lamps through solar lanterns (LS) and domestic electrical systems, with sales of these systems increasing by 66% between 2018 and 2022, reaching 727,000 units sold. Nigeria accounted for 77% of total sales volume.
Similarly, energy-efficient appliances have experienced strong penetration in the region over the same period, with sales volume increasing by 144% between 2019 and 2022, reaching 385,000 units. Nigeria dominated the market, representing 72% of the total sales volume during the period.
In the region, only Nigeria has certified industries with energy management systems (ISO 50001). As such, nine Nigerian industries have obtained ISO 50001 certification, and eleven additional companies have started implementing this standard.

Efforts are also being made in several countries such as Benin, Burkina Faso, Ghana, Mali, Senegal, Nigeria, Côte d'Ivoire, and Cabo Verde in the field of constructing energy-efficient buildings. However, the lack of national data remains a major constraint in assessing the penetration of energy-efficient buildings in the region.

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100% ELECTRIC

# INTRODUCTION

The commitment of the ECOWAS energy ministers to advancing the goals of Sustainable Energy for All (SEforALL) has been unwavering and was clearly demonstrated in October 2012 when they mandated the ECOWAS Centre for Renewable Energy and Energy Efficiency (ECREEE) to lead the SEforALL initiative in the region. Subsequently, in July 2013, the ECOWAS Heads of State adopted the ECOWAS Renewable Energy Policy (EREP) and the ECOWAS Energy Efficiency Policy (EEEP), thereby paving the way for achieving key regional objectives, as outlined in Table 1.

Table 1:Main targets for ECOWAS region contained in EREP and EEEP

| RENEWABLE ENERGY | 2020 | 2030 |
|---|---|---|
| Installed renewable energy capacity (excl. medium and large hydropower) | 2,425 MW | 7,606 MW |
| Renewable energy power generation (excl. medium and large hydropower) | 8,350 GWh | 29,229 GWh |
| Renewable energy in electricity mix (excl. medium and large hydropower) | 10% | 19% |
| Renewable energy in electricity mix (incl. medium and large hydropower) | 35% | 48% |
| Share of (rural) population served with off-grid renewable energy systems | 22% | 25% |
| Ethanol as share of petrol consumption | 5% | 15% |
| Biodiesel as share of diesel and fuel-oil consumption | 5% | 10% |
| Improved cook stoves penetration | 100% | 100% |
| Use of modern fuel alternatives for cooking e.g. liquefied petroleum gas (LPG) | 36% | 41% |

| | | |
|---|---|---|
| Solar water heaters<br>• Residential homes – new detached house price exceeding 75,000 Euros (EUR)<br>• Social institutions<br>• Agro-food industries<br>• Hotels<br>• | At least 1 per house<br>25%<br>10%<br>10% | At least 1 per house<br>50%<br>25%<br>25% |
| ENERGY EFFICIENCY | 2020 | 2030 |
| Implement energy efficiency measures that free up 2,000 MW of power generation capacity | Measures implemented | Not specified for 2030 |
| Distribution losses in 2020 | 10% | Not specified for 2030 |
| Penetration rate of efficient bulbs | 100% | 100% |
| Energy efficiency in public buildings larger than 500 square metres (m2) (new or renovation): implement energy efficiency measures and issue energy performance certificate | 100% | 100% |

Source: EREP, EEEP

Following the adoption of these regional sustainable energy policies, ECREEE has played a pivotal role in assisting ECOWAS member states in developing their National Renewable Energy Action Plans (NREAP), National Energy Efficiency Action Plans (NEEAP), and their SEforALL National Action Agendas. These national plans of each member state, are designed to align closely aligned with the regional targets established in the EREP and EEEP. To ensure a cohesive approach, the formulation of the national action plans for sustainable energy follows templates approved by the member states. Furthermore, the regional monitoring and reporting framework, approved during the ECOWAS Sustainable Energy Workshop in Dakar in April 2016, and later adopted during the 11th meeting of the ECOWAS Energy Ministers in Conakry, Guinea, in December 2016, provides a guideline for tracking the progress in sustainable energy initiatives across in the the region.

In line with the resolution, all ECOWAS member states are required to designate national focal points responsible for compiling and submitting annual national monitoring reports to ECREEE. These reports present the progress made towards achieving the goals set out in the NREAPs, NEEAPs, and respective SEforALL action agendas, as well as a they also summarise the key activities undertaken in the previous year to advance these objectives.

This sustainable energy data management framework for the ECOWAS region has been consolidated in ECREEE's 2023-2027 Strategic Plan, which aligns with the ECOWAS Vision 2050 and the ECOWAS 4x4 Management Objectives. The implementation of this Strategic Plan revolves around three regional programs (Renewable Energy, Energy Efficiency, Cross-Cutting initiatives) and three regional initiatives (ECOWAS Renewable Energy and Energy Efficiency Observatories, **Annual Report on Progress in Renewable Energy and Energy Efficiency in West Africa**, ECOWAS Sustainable Energy Forum).

This document is fully aligned with ECREEE's 2023-2027 Strategic Plan and represents a significant contribution to achieving ECOWAS's Sustainable Energy objectives.

# 1 OBJECTIVES

This report aims to provide an assessment of the progress made in the areas of energy access, renewable energy, and energy efficiency in the ECOWAS region during the year 2022.

Specifically, the report focuses on the following points:

- The status of energy access, including access to electricity and clean cooking solutions;
- Distribution losses within the electricity network;
- The contribution of various renewable energy sources to the electricity mix, clean mini-grids, and standalone systems;
- Energy efficiency in lighting, electrical appliances, industry and buildings.
- Renewable energy applications beyond electricity generation;
- The development of renewable energy projects.

# 2 METHODOLOGICAL APPROACH

A participatory approach was used for data collection, processing, and analysis in the preparation of this regional report.

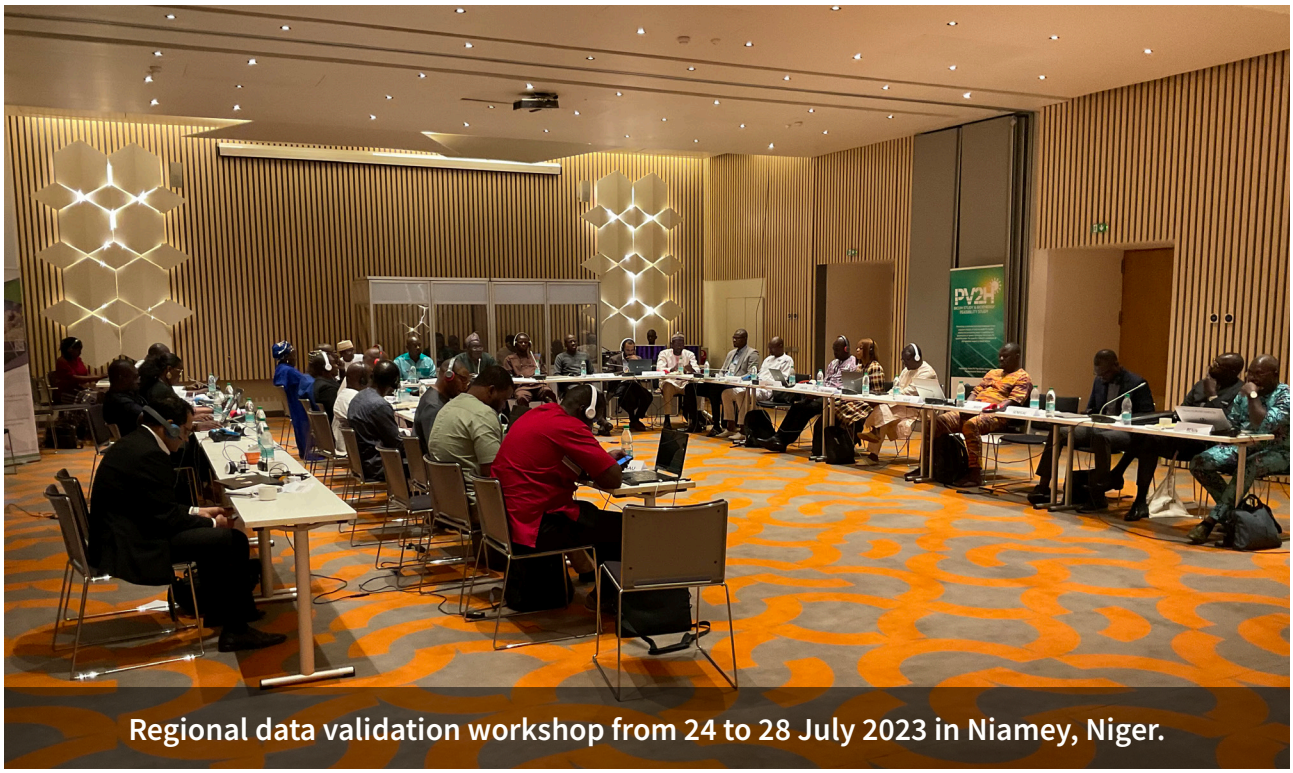
## 2.1. Data Collection and Processing

Data was collected from all 15 ECOWAS member states using the national monitoring report template (Annex 1). The data includes information on grid-connected electricity access, installed renewable energy capacities for electricity generation, Clean Energy Mini-Grids (CEMG), installed solar water heaters, clean cooking solutions, electricity losses, and related energy data, including efficient lighting, efficient electrical appliances, and energy efficiency in buildings and industries. Demographic and economic indicators were sourced from national statistical institutes and/or regional and international institutions.

In each ECOWAS member state, data consolidation was carried out by the national focal institution responsible for energy data management, based on the existing national energy information system. This also includes data provided by the following institutions:

- National Statistical Institutes;
- National Electricity Companies;
- National Agencies responsible for Renewable Energy, Energy Efficiency, and Rural Electrification;
- National Regulatory Authorities for the energy or electricity sector.

> **The annual regional progress report on renewable energy (RE) and energy efficiency (EE) is the result of the compilation of national data through an internal review and quality assurance process by ECREEE. This regional report was validated by all member states during the regional validation workshop held from February 24 to 28, 2023, in Niamey, Niger.**




Regional data validation workshop from 24 to 28 July 2023 in Niamey, Niger.

## 2.2. Data Analysis

The data analysis was based on a descriptive approach, presenting results at both the regional and national levels. Regional indicators were calculated through the aggregation of weighted averages.

At the regional level, a comparison of the 2022 indicator values with the 2030 targets, as defined in the ECOWAS Renewable Energy Policy (EREP) and Energy Efficiency Policy (EEEP), is proposed.

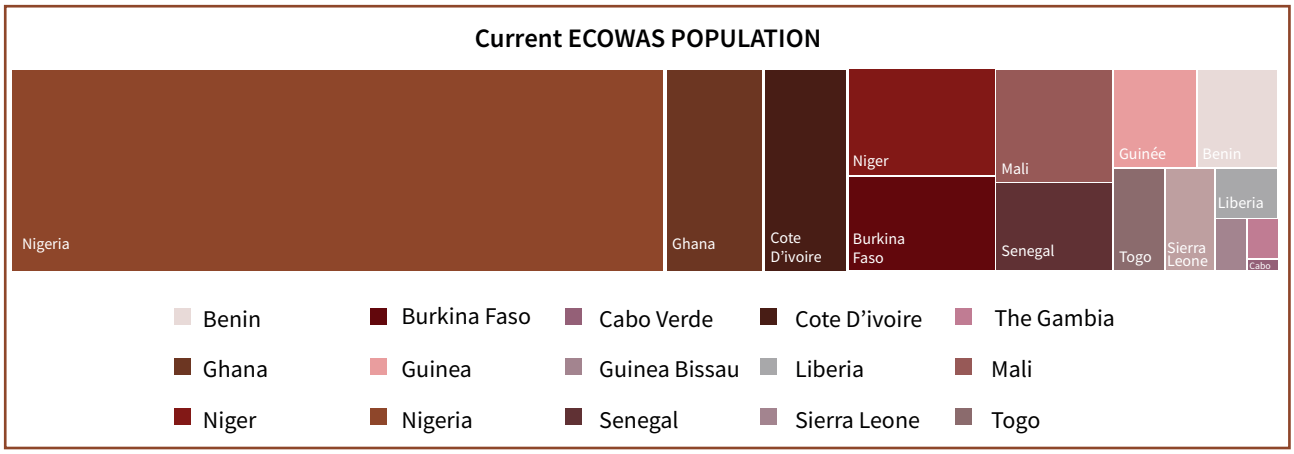
At the national level, the National Renewable Energy Action Plans (NREAP) and National Energy Efficiency Action Plans (NEEAP) serve as reference frameworks where applicable.

In terms of energy efficiency, this report relies on data related to electricity distribution losses for the year 2021. It also includes sales statistics for efficient lighting devices and energy-efficient appliances, regularly published by Global Lighting, a World Bank platform, and GOGLA. For energy efficiency in buildings, in addition to the information provided by various countries, this report integrates construction data supplied by the Nubian Vault. Association. As for energy efficiency in industries, only the available data from the countries were used.

# 3 POPULATION

The total population of the region in 2022 is estimated at 424 million people. Over half of the population in the region resides in Nigeria (approximately 52%). By 2030, the population of the region is projected to exceed half a billion people.

Figure 1: Distribution of the population across ECOWAS countries in 2022.

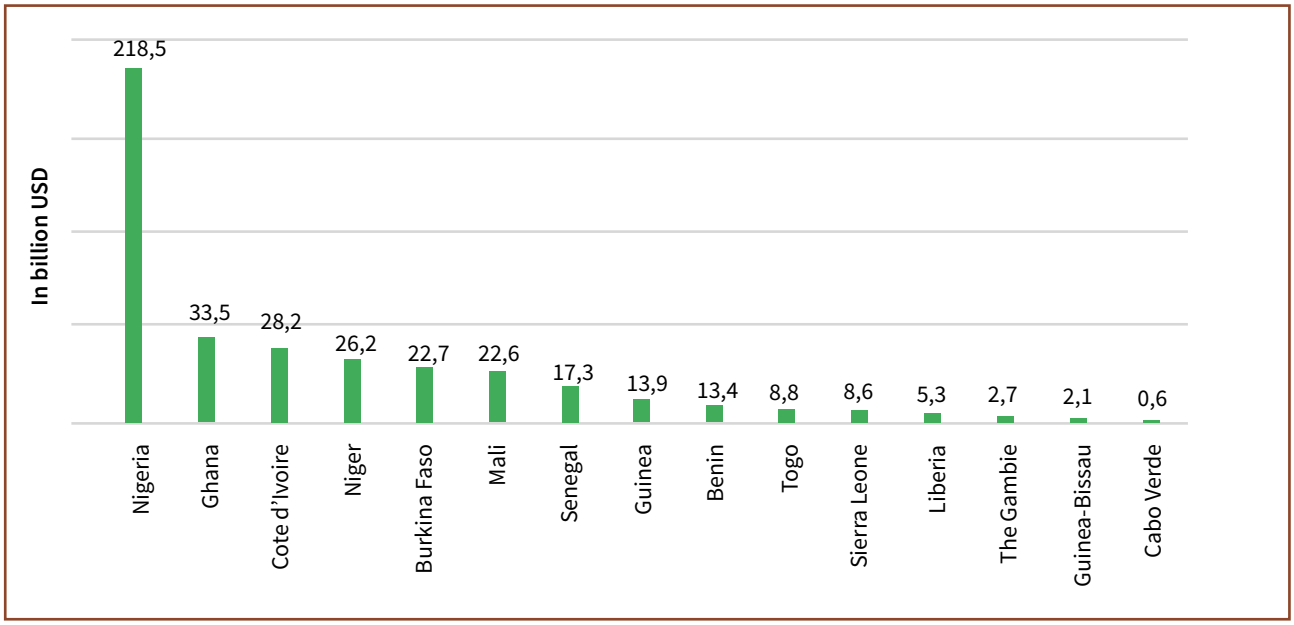



*Source: The WORD BANK Databank 2022 (Use population statistics) Health Nutrition and Population Statistics | DataBank (worldbank.org)*

# 4 THE REGION'S ECONOMIC SITUATION IN 2022

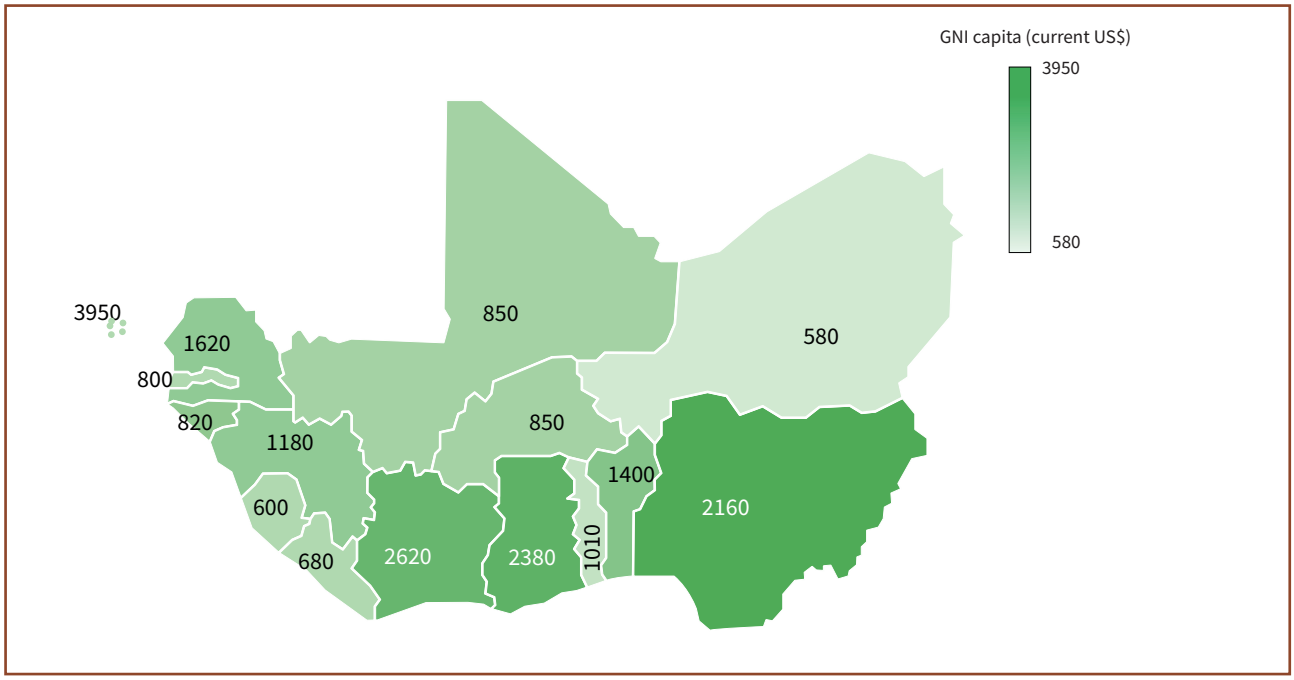
There are significant differences between countries in terms of GDP, but particularly in Gross National Income (GNI) per capita, which ranges from 580 USD per capita in Niger to 3,950 USD in Cabo Verde, with seven (07) countries having a GNI of less than 1,000 USD per capita. Approximately 67% of the regional Gross Domestic Product (GDP) is attributable to Nigeria, which also holds a leading position in terms of Gross National Income (GNI) within the region.

Figure 2: Distribution of ECOWAS countries by GDP (in constant 2015 USD).




*Source: The WORD BANK Databank 2022 (Use population growth rate ) Health Nutrition and Population Statistics | DataBank worldbank.org)*

Figure 3: Gross National Income per capita (GNI per capita in 2015 USD) of ECOWAS countries.




*Source: The WORD BANK Databank 2022 (Use population growth rate ) Health Nutrition and Population Statistics | DataBank worldbank.org)*

# 5 | STATUS OF ENERGY ACCESS, RENEWABLE ENERGY AND ENERGY EFFICIENCY IN THE ECOWAS REGION

## 5.1. Energy access

Access to energy is based on electricity access and use of modern cooking solutions. Electricity access is considered as connections either to the electrical grid (national grid and mini-grids) or to stand-alone renewable energy systems. The indicators used to monitor electricity access includes share of households connected to electrical grid, share of households connected to renewable energy mini-grids and share of households served by stand-alone renewable energy systems. Access to modern cooking solutions is measured according to share of households using efficient cookstoves and alternative cooking fuels.

### 5.1.1. Access to electricity

Access to electricity is calculated as the share of households with electricity supplied by electricity grid (national grid and mini-grids), and the share of households with electricity supplied by renewable energy stand-alone systems . In theory, aggregating all these types of access should provide each country's total rate of access to electricity. Finally, electricity access is also measured in terms of number of connections to the national electricity grid, to CEMGs, and to stand-alone renewable energy systems.

### 5.1.2. Access to the electricity grid

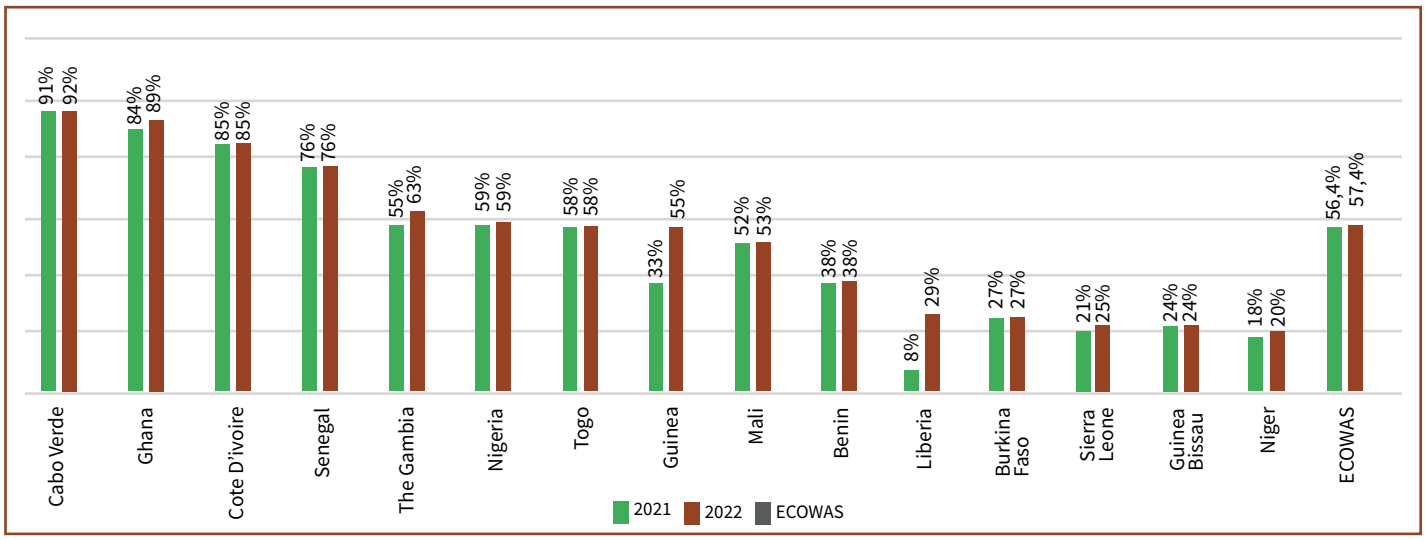
In 2022, the electricity access rate for the ECOWAS region is 57.4%, representing 243.5 million people, the majority of whom live in urban areas (74%). This rate indicates that significant efforts are still required in the region to achieve the regional electricity access target of 90%[2] by 2030, as defined in the SE4ALL[3] agenda.

[2]From Vision to Coordinated Action: Consolidation of the SE4ALL Action Agendas, the National Renewable Energy Action Plans, and the National Energy Efficiency Action Plans in the ECOWAS Region, Page 54

[3]Source: From Vision to Coordinated Action: Consolidation of the SE4ALL Action Agendas, the National Renewable Energy Action Plans, and the National Energy Efficiency Action Plans in the ECOWAS Region, Page 54

Figure 4 illustrates the significant disparities in electricity access rates among ECOWAS countries. Cabo Verde, Ghana, and Côte d'Ivoire have the highest rates, with respective rates of 92%, 89%, and 85%. Liberia, Burkina Faso, Sierra Leone, Guinea-Bissau, and Niger have electricity access rates of less than 30%.

Figure 4: Percentage (%) of households connected to an electricity grid in 2021-2022




*Source: Système d'information Energétique de la CEDEAO (SIE-CEDEAO) 2022*

### 5.1.3. Share of ECOWAS population served by clean energy mini-grids

In 2022, 665,503 rural households were connected to 565 operational Clean Energy Mini-Grids, with a total installed capacity of 51.9 MW. These figures were generated from available data collected from operators and private companies, donors, rural electrification authorities, and other relevant energy institutions.

In 2022, the total number of productive electricity mini-grids (CEMG) in operation was 565, with a total installed capacity of 51.9 MW, which remains significantly below the regional target of 3,115 MW[4] by 2030. Consequently, the region will need to make substantial progress in the coming years to accelerate the deployment of CEMG for rural electrification.

Table 2: Existing and Operational Clean Energy Mini-Grids in 2022

| Country | Existing Clean Energy Mini-Grids 2022 | Capacity of Clean Energy Mini-Grids in MW | Number of Households Connected to CEMG |
|---|---|---|---|
| Benin | 28 | 3 | 10 000 |
| Burkina Faso* | 36 | 1,9 | 9 168 |
| Cabo-Verde | 6 | 0,2 | 411 |
| Cote d'Ivoire | 29 | 1,4 | 5 334 |
| The Gambia* | 1 | 0,1 | 21 746 |
| Ghana | 5 | 0,3 | 5 248 |
| Guinea | 6 | 2 | 12 103 |
| Guinea Bis-sau* | 2 | 1,2 | 13 502 |
| Liberia | 17 | 18,3 | 121 287 |
| Mali | 45 | 12 | 295 114 |
| Niger* | 13 | 0,5 | 20 737 |
| Nigeria | 135 | 6,3 | 120 000 |
| Senegal* | 181 | 3,1 | 1 067 |
| Sierra Leone* | 57 | 1 | 23 250 |
| Togo | 4 | 0,6 | 6 536 |
| ECOWAS | 565 | 51,9 | 665 503 |

*Source: National Monitoring Reports 2022 (based on 2022 reports from public utilities and electricity regulators); data from the Regional Progress Report on Renewable Energy, Energy Efficiency, and Access to Energy in the ECOWAS Region, ECREEE, 2020. Only 2022 data for Benin and Togo are available, as per the Regional Progress Report on Renewable Energy, Energy Efficiency, and Access to Energy in the ECOWAS Region*

[4]From Vision to Coordinated Action, Consolidation Of SE4ALL Action Agenda, National Renewable Energy Action Plans and National Energy Efficiency Action Plans Of the ECOWAS Countries, ECREEE Septembre 2017, 44

### 5.1.4. Access to renewable energy stand-alone systems

Standalone renewable energy systems, such as Solar Home Systems (SHS), are a vital means of providing electricity services to rural populations. The ECOWAS Renewable Energy Policy aims for 8% of the rural population to be served by these standalone systems by 2030. However, the information systems in various countries currently do not allow for a precise estimation of the proportion of the population benefiting from these systems. Consequently, this report relies on sales statistics of SHS regularly published by the Global Lighting platform, a World Bank initiative in collaboration with GOGLA to illustrate the dynamism of the adoption of these systems in the region.

Table 3: Types of Domestic Solar Systems Sold in the West African Market

| Product Category | Définition | Power Range (Wc) | Indicative Price Range ($) | Multi-Tier Framework Level | Example |
|---|---|---|---|---|---|
| Entry-level SHS | Three to four lights, phone charging and powering a radio | 11-20,99 | $33-333 | Enables Tier 1 Electricity Access for a household |  |
| Basic capacity SHS | As above, plus power for a television, more lights, appliances & extended capacity | 21-49,99 | $40-686 | Enables Tier 2 Electricity Access for a household when coupled with higheffi-ciency appliance |  |
| Medium capacity SHS | As above, but with extended capacities | 50-99,99 | $50-1100 | Enables Tier 2 Electricity Access for a household even using conventional appliances |  |

[5]Politique d'énergies renouvelables de la CEDEAO, CEREEC, Page 77

| | | | | | |
|---|---|---|---|---|---|
| Higher capacity SHS | As above, but with extended capacities | 100+ | $248-2862 | Enables Tier 2 Electricity Access for a household, even using conventional appliances |  |

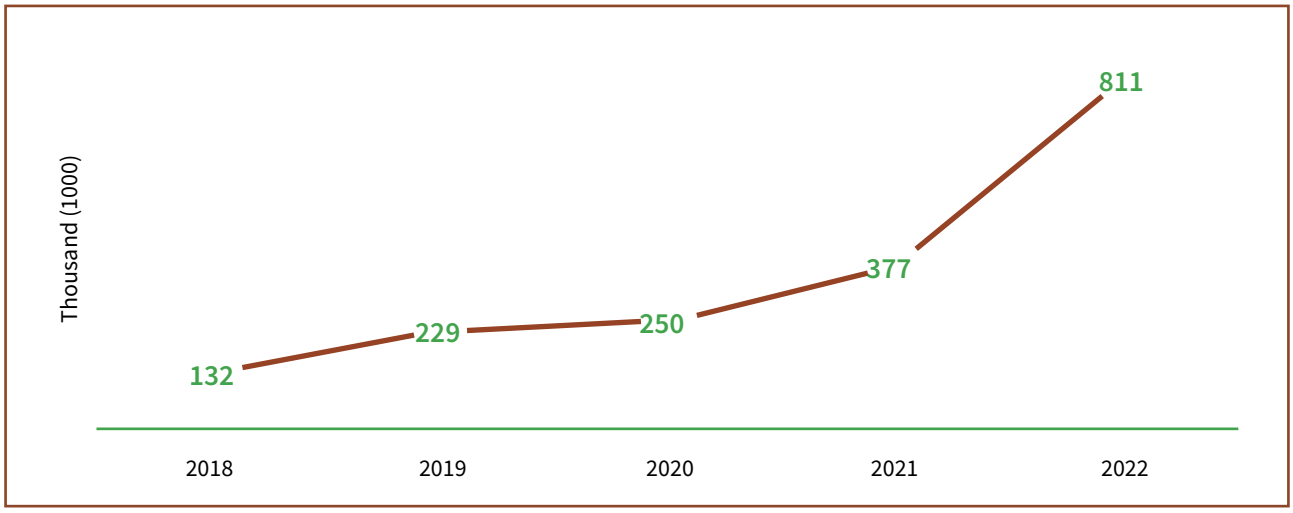
*Source : Off-Grid Solar Market Trends Report 2022 : Outlook, World Bank, Page 59, World Bank Document*

West Africa, particularly Nigeria, has emerged as a new growth engine for Solar Home Systems (SHS). Between 2018 and 2021, SHS sales in this region recorded an 87% increase. In 2022, this momentum accelerated significantly, with a record growth of 115% compared to the previous year, bringing the total number of SHS sold to 811,126 units (Figure 5).

Nigeria accounts for 77% of SHS sales in West Africa in 2022 (Table 4). The strong growth in sales in Nigeria can be attributed to several factors, including a vast, still untapped market, rising diesel prices in a market where generators are often used as a backup power solution, and the implementation of the Nigeria Electrification Programme, which is being carried out by the Rural Electrification Agency with funding from the World Bank and the African Development Bank.

> **In addition to Nigeria, Benin, Togo, Côte d'Ivoire, and Sierra Leone are leading in SHS sales with respective shares of 6.4%, 4%, 3.1%, and 2.5%.**

Figure 5: Volumes of Solar Lighting Kit Sales in West Africa (2018 to 2022)[6]




*Source: Off-Grid Solar Market Trends Report 2022: State of the Sector, Global Lighting, World Bank, Page 41 World Bank Document*

Table 4: Volumes of Solar Lighting Kit Sales by Country in West Africa (2018 à 2022)[7]

| Country | Solar Home Systems | |
|---|---|---|
| Nigeria | 627 831 | 77,4% |
| Benin | 51 656 | 6,4% |
| Togo | 32 425 | 4% |
| Cote d'Ivoire | 25 550 | 3,1% |
| Sierra Leone | 20 272 | 2,5% |
| Senegal | 13 348 | 1,6% |
| Guinea | 11 555 | 1,5% |
| Liberia | 11 792 | 1,4% |
| Mali | 6 335 | 0,8% |
| Ghana | 5 991 | 0,7% |
| Burkina Faso | 4 370 | 0,5% |

*Source: Analysis of Data Collected by GOGLA for the Global Off-Grid Solar Sales and Impact Reports (2016 to 2022)*

[6] Analysis of Data Collected by GOGLA for the Global Reports on Off-Grid Solar Sales and Impact (2016 to 2021)
[7] World Bank Document.

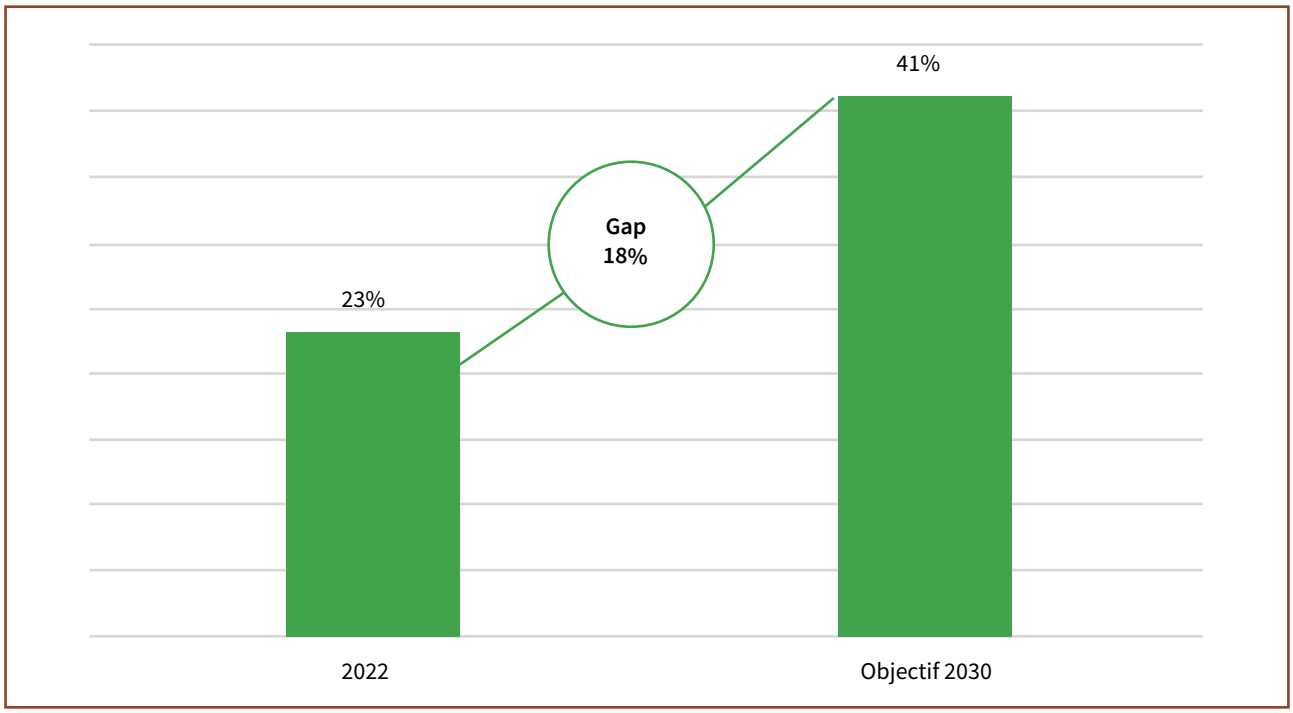
## 5.1.5. Access to Modern Cooking Energy

Access to modern cooking is assessed in terms of household penetration rates for modern cooking fuels and integrated storage systems. These indicators reflect the prevailing living conditions in a typical household.

### 5.1.5.1. Share of Households Using Modern Cooking Fuels

Clean cooking solutions, such as LPG, are presented as a cleaner and more efficient means of cooking. In 2022, 23% of households in the ECOWAS region used clean cooking solutions (Figure 6), corresponding to an estimated population of 98 million people. Indeed, significant efforts remain to achieve the regional[8] target of 41% by 2030. Cabo Verde leads with 81% in terms of households using clean cooking solutions, followed by Senegal (44%) and Ghana (30%). Guinea-Bissau (5%), Niger (3%), and Liberia (1%) have the lowest rates (Figure 7).

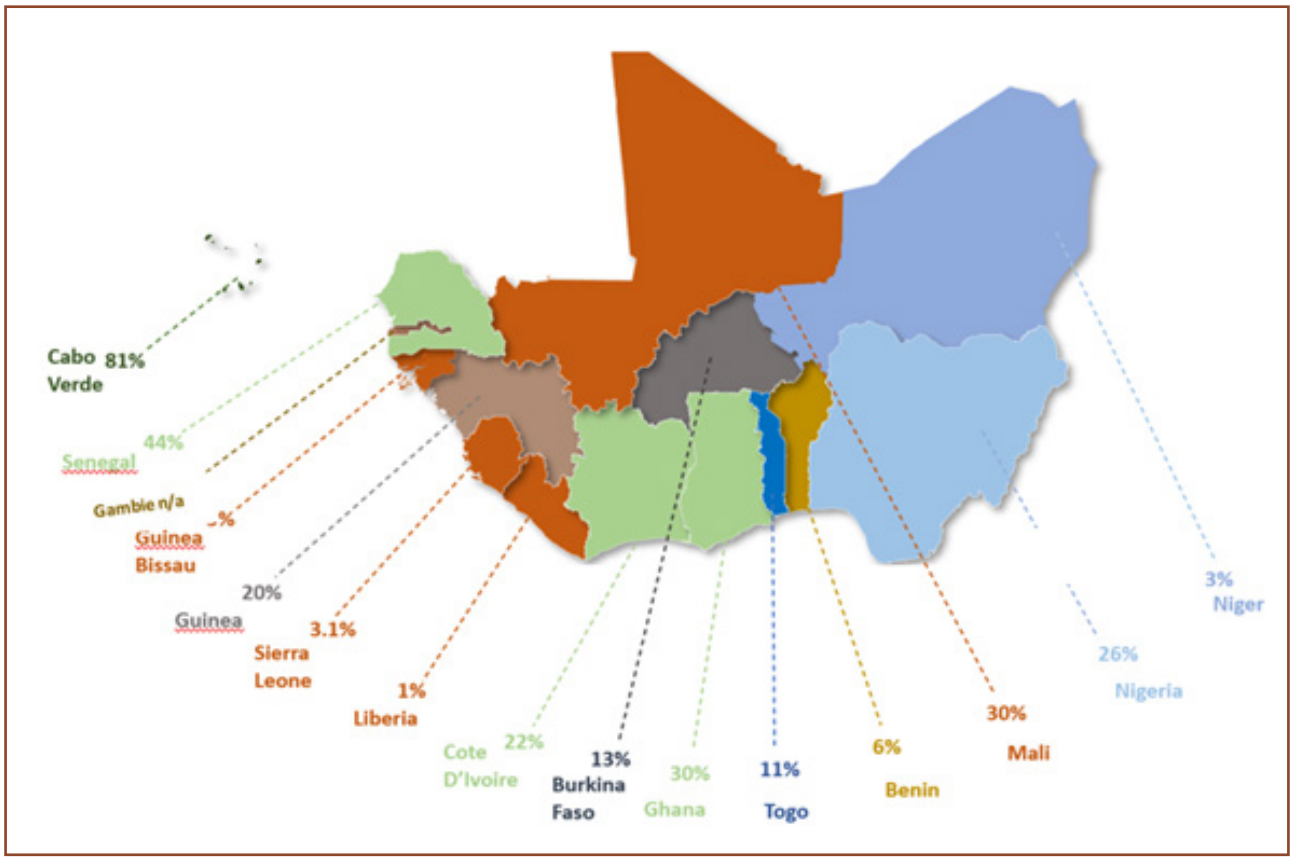
Figure 6: Percentage of ECOWAS Households Using Modern Cooking Fuels




*Source: ECOWAS countries' NREAP & NEEAP and national monitoring reports 2022 (based on the 2022 reports from utilities and electricity regulators)*

[8] Source : From Vision to Coordinated Action: Consolidation of SE4ALL Action Agendas, National Renewable Energy Action Plan, and National Energy Efficiency Action Plan in ECOWAS countries, Page 42 & AA/PANER/PANEE

Figure 7: Share (%) of households using clean cooking solutions in ECOWAS countries

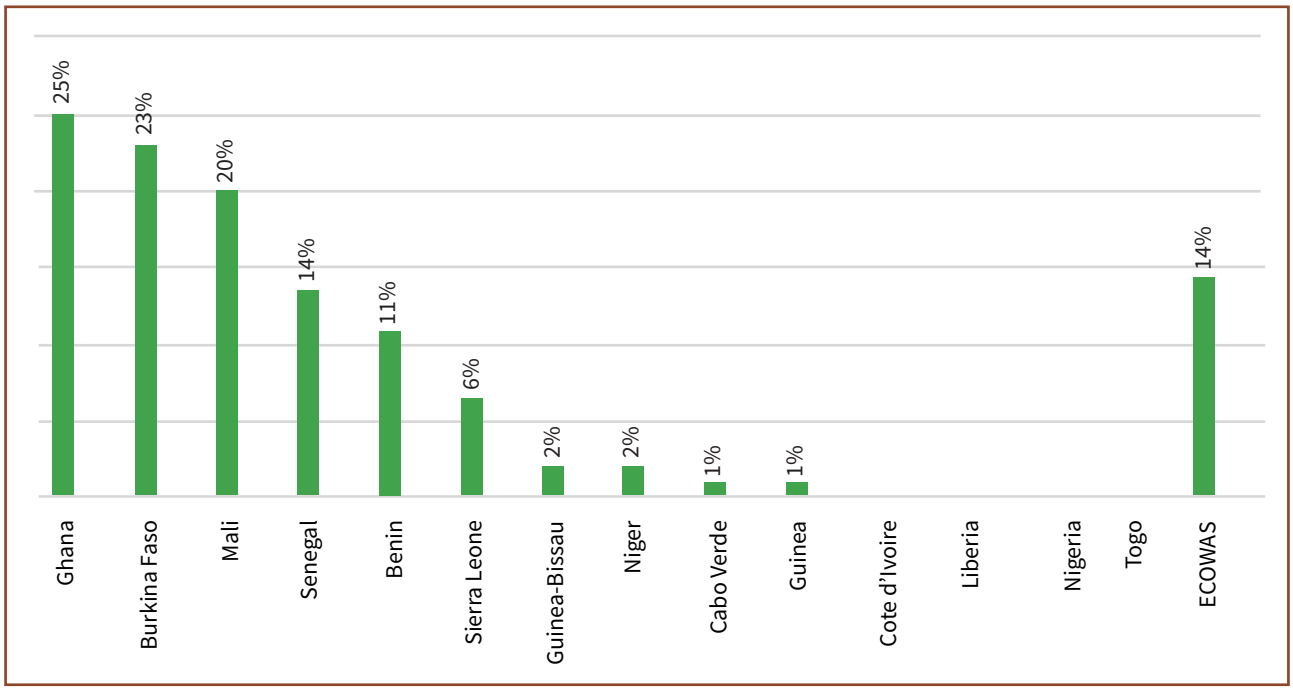



*Source : 2022 National Monitoring Reports of ECOWAS countries (based on 2022 reports from utilities and electricity regulators)*

### 5.1.5.2. Share of ECOWAS households using improved cookstoves

**On average, 14% of households use improved cookstoves, corresponding to an estimated population of 56 million people. Ghana leads with a share of 25%, followed by Burkina Faso (23%) (Figure 8).**

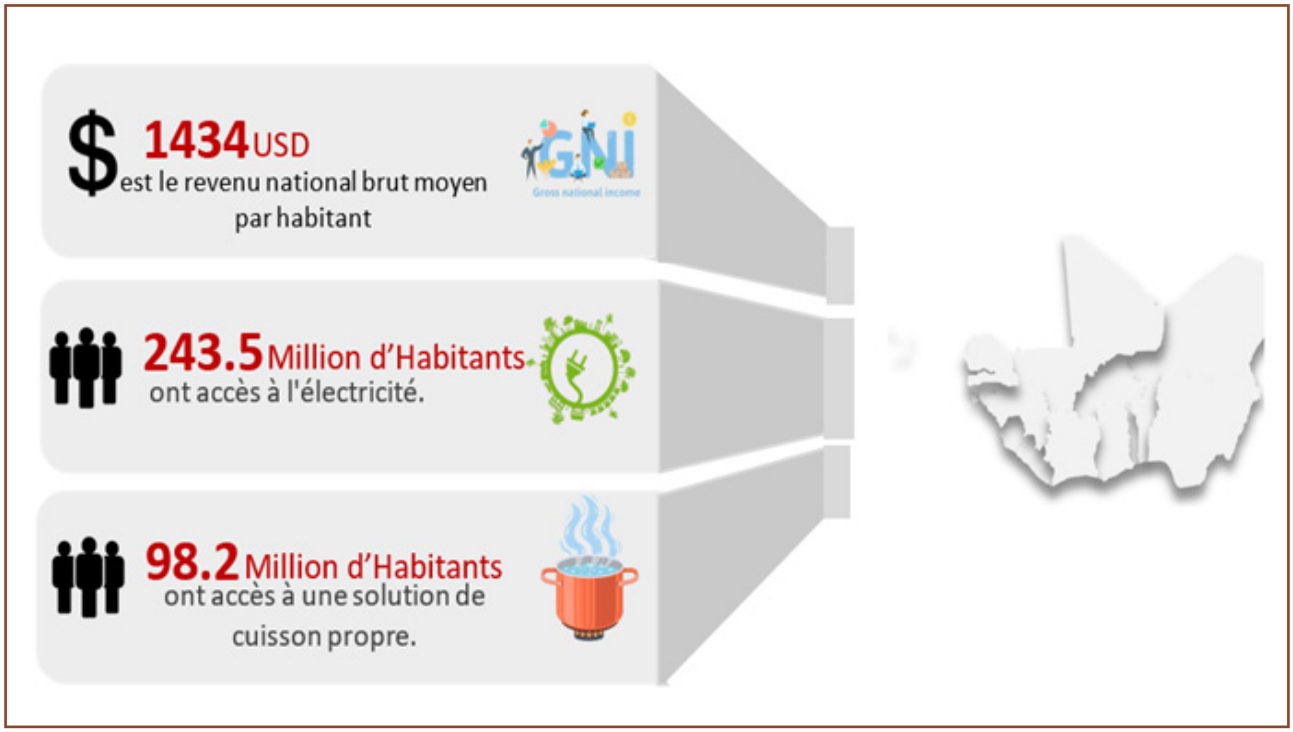
Figure 8: Percentage of households in ECOWAS using improved cookstoves




*Source : ECOWAS countries NREAP & NEEAP and national monitoring reports 2022 (based on 2022 reports from utilities and electricity regulators)*

# POINTS KEY POINTS OF ENERGY ACCESS INDICATORS IN THE ECOWAS REGION

Figure 8_A : Some Key points of Energy Access Indicators in the ECOWAS Region




*Sources*

- *The Gross National Income per capita is calculated through a weighted average of the GNIs of the 15 ECOWAS countries.*
- *The Number Of People with access to Electricity is calculated based on 2022 Electricity access rate in ECOWAS and 2022 ECOWAS population estimation with World Bank databank 2022.*
- *3- The Number Of People with Acces to modern Cooking solution is calculated based on 2022 Modern cooking solution access rate in ECOWAS and 2022 ECOWAS population estimation with World Bank databank 2022*

## 5.2. Renewable Energies

### 5.2.1. Installed Capacities

The ECOWAS Renewable Energy Policy (EREP), adopted in 2013, advocates for universal access to sustainable energy services in the region by 2030.

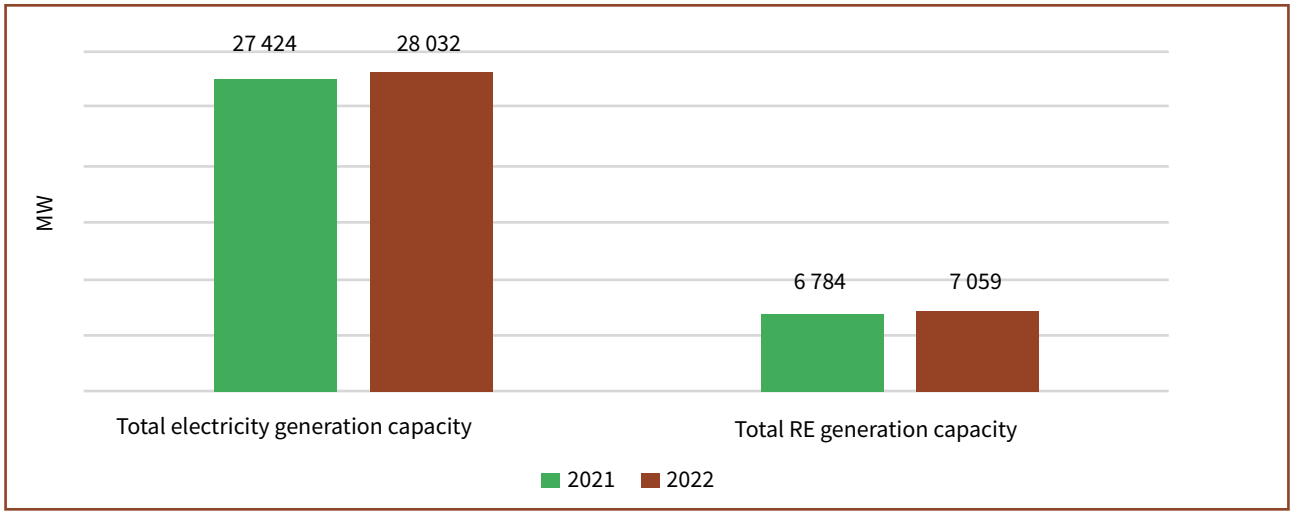
The ECOWAS Renewable Energy Policy (EREP), adopted in 2013, advocates for universal access to sustainable energy services in the region by 2030.

- **Increase the share of renewable energy in the overall electricity mix, including Large and Medium Hydropower Plants, to 35% by 2020 and 48% by 2030;**
- **Increase the share of renewable energy in the overall energy mix, excluding Large and Medium Hydropower Plants, to 10% by 2020 and 19% by 2030.**

These objectives translate into installed capacities of renewable energy based on solar energy, wind energy, bioenergy, and small hydropower of 2,424 MW by 2020 and 7,606 MW by 2030.

Between 2021 and 2022, the total grid-connected electricity generation capacity in the region increased by 2.2%, from 27,424 MW to 28,032 MW (figure 9), with an increase in renewable energy generation capacity, rising from 6,784 MW to 7,059 MW in 2022, representing a 4% increase. It should be noted that nearly half (45.2%) of the increase in grid-connected electricity generation capacity between 2021 and 2022 is attributed to renewable energy sources.

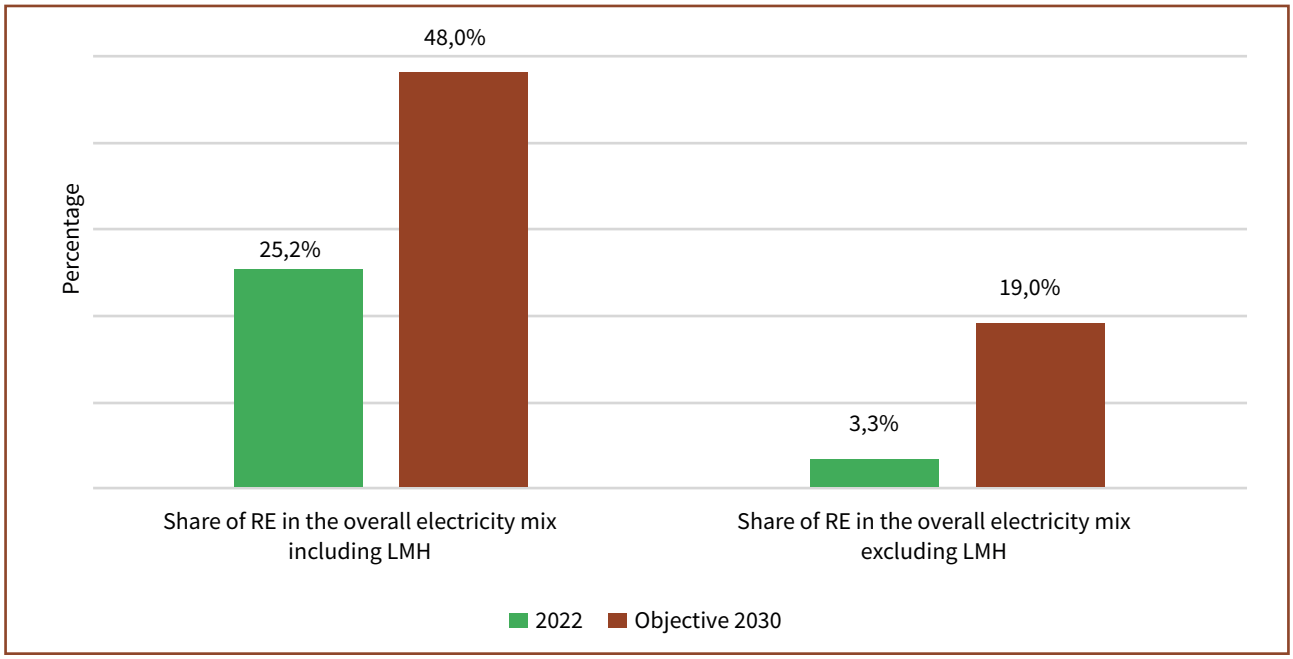
Figure 9: Total on-grid installed renewable energy generation capacity




*Source: ECOWAS Countries national monitoring reports 2022 (based on the 2022 utility and electricity regulator reports), EREP. LMH = Large and Medium Hydropower*

In 2022, the share of installed renewable energy capacity in the overall electricity mix of the region amounted to 25.2%, with the target set in the EREP being 48% by 2030 (figure 10). Specifically, the share of renewable energy sources, including small hydropower, solar photovoltaic energy, wind energy, and bioenergy, in the overall electricity mix is 3.3% in 2022, whereas the target set in the EREP for 2020 was 19%.

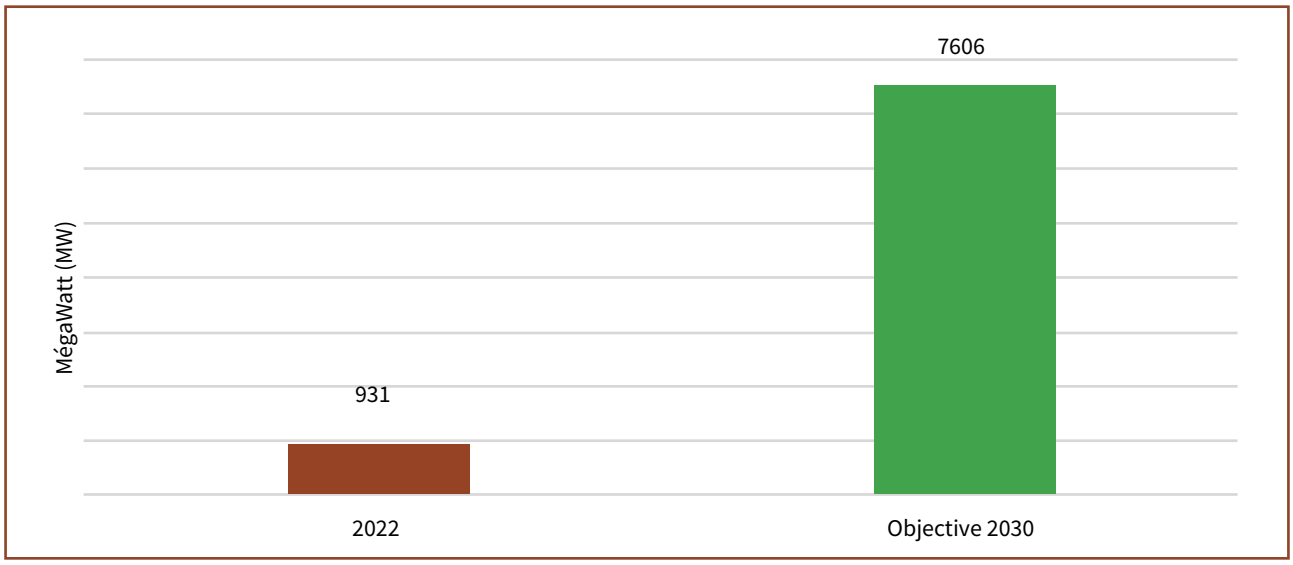
Figure 10: Share of on grid RE installed capacity in the overall Electricity Mix




*Source: ECOWAS Countries national monitoring reports 2022 (based on the 2022 utility and electricity regulator reports), EREP. LMH = Large and Medium Hydropower*

**The installed capacity related to Large and Medium Scale Hydropower (LMSH) represents 86.8% (6,128 MW) of the total installed renewable energy capacity, which stands at 7,059 MW. Other renewable energy sources (solar, wind, bioenergy, small hydropower) account for 931 MW (figure 11). With a 3% share in the overall electricity mix in 2022, ECOWAS Member States will need to intensify their efforts to develop renewable energy solutions from small hydropower, photovoltaic energy, wind energy, and bioenergy in order to reach the target of 19% by 2030.**

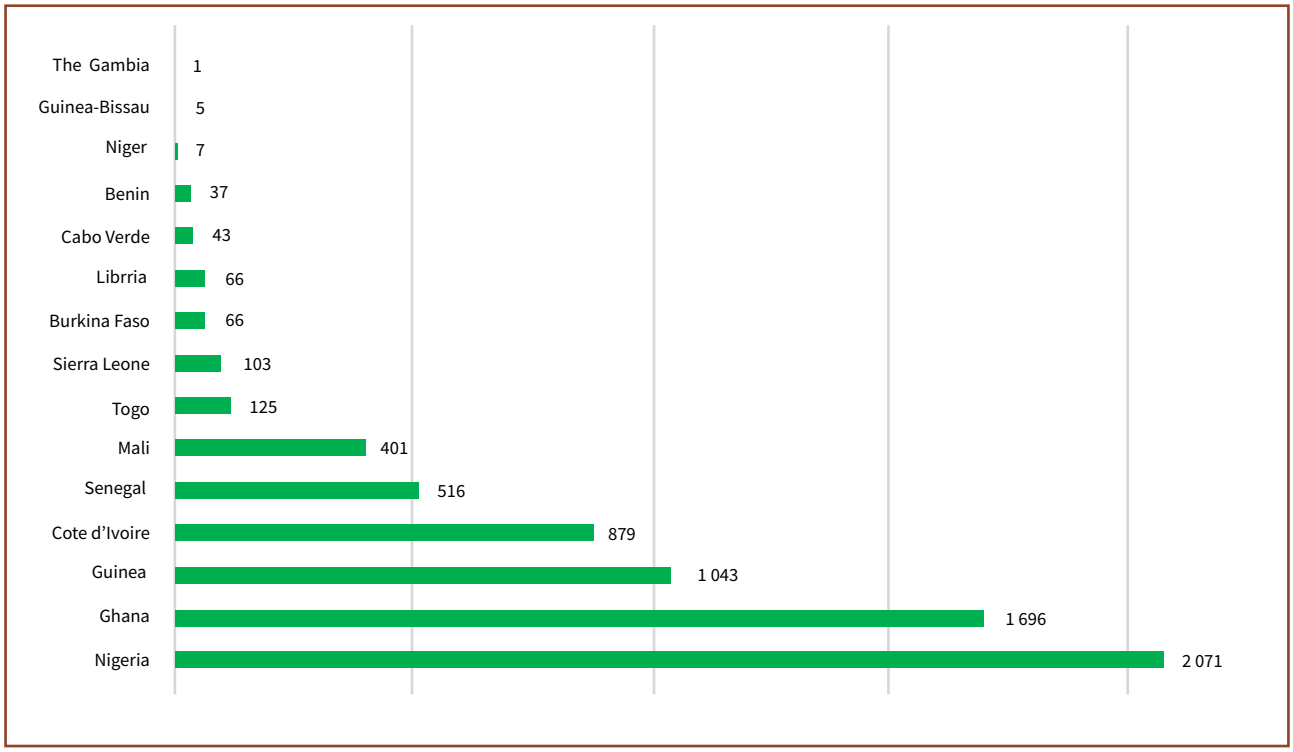
Figure 11: On-grid installed renewable energy capacity including and excluding LMSH




*Source: ECOWAS Countries national monitoring reports 2022 (based on the 2022 utility and electricity regulator reports), EREP. LMH = Large and Medium Hydropower*

**"At the level of Member States, Nigeria, Ghana, and Guinea have the largest installed renewable energy capacities, with 2,071 MW, 1,696 MW, and 1,043 MW respectively (figure 12). Collectively, these three countries account for more than two-thirds (68.1%) of the total installed renewable energy capacity in the region.**

Figure 12: On-grid installed renewable energy capacity including LMSH by ECOWAS Countries




*Source: ECOWAS Countries national monitoring reports 2022 (based on the 2022 utility and electricity regulator reports), EREP. LMH = Large and Medium Hydropower*

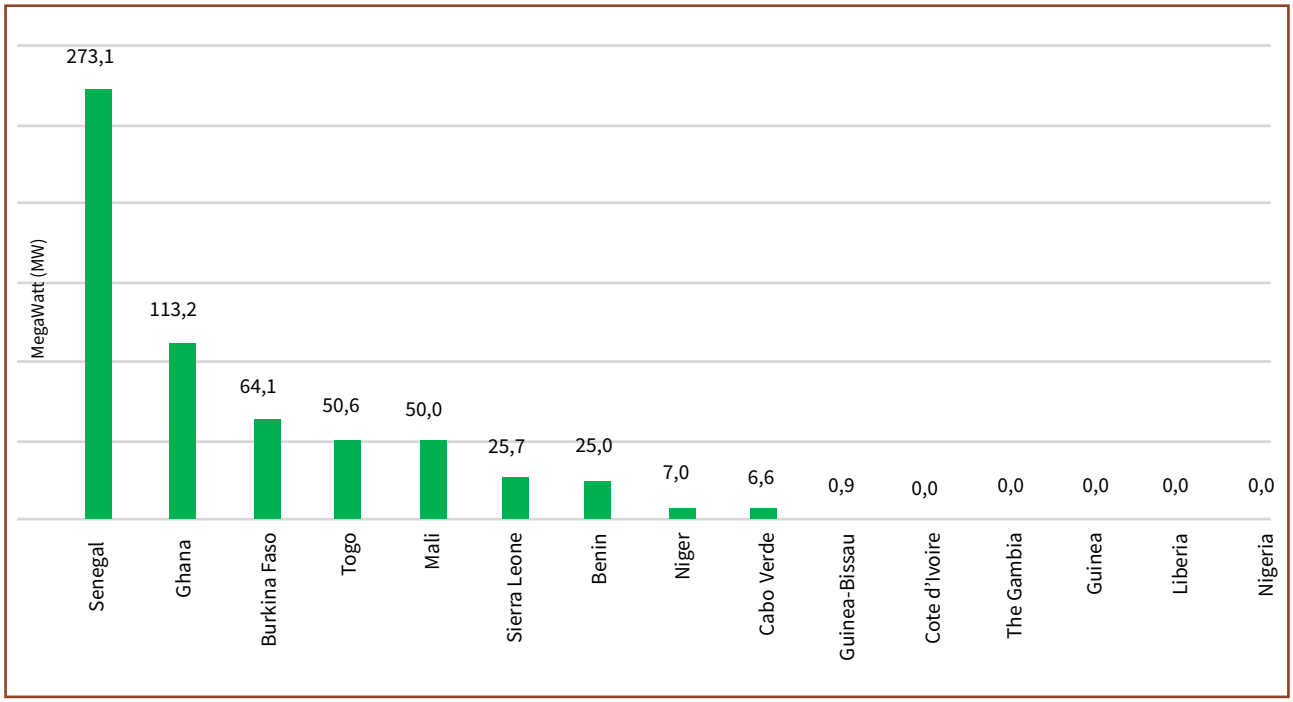
## 5.2.2. Installed Capacity of Grid-Connected Solar Power Plants

In 2022, forty-eight (48) grid-connected solar photovoltaic power plants were recorded in the ECOWAS region, with a total installed capacity of 616 MW. Senegal, Ghana, Burkina Faso, Mali, and Togo have the largest installed capacities, with 273.1 MW, 113.2 MW, 64 MW, 50.6 MW, and 50 MW respectively (figure 13).

Between 2020 and 2022, grid-connected solar power plants experienced significant growth, with installed capacity increasing from 418 MW to 616 MW, representing a growth rate of 47.4%. Additionally, these solar power plants contributed 25% to the overall increase in installed renewable energy capacity during this period.

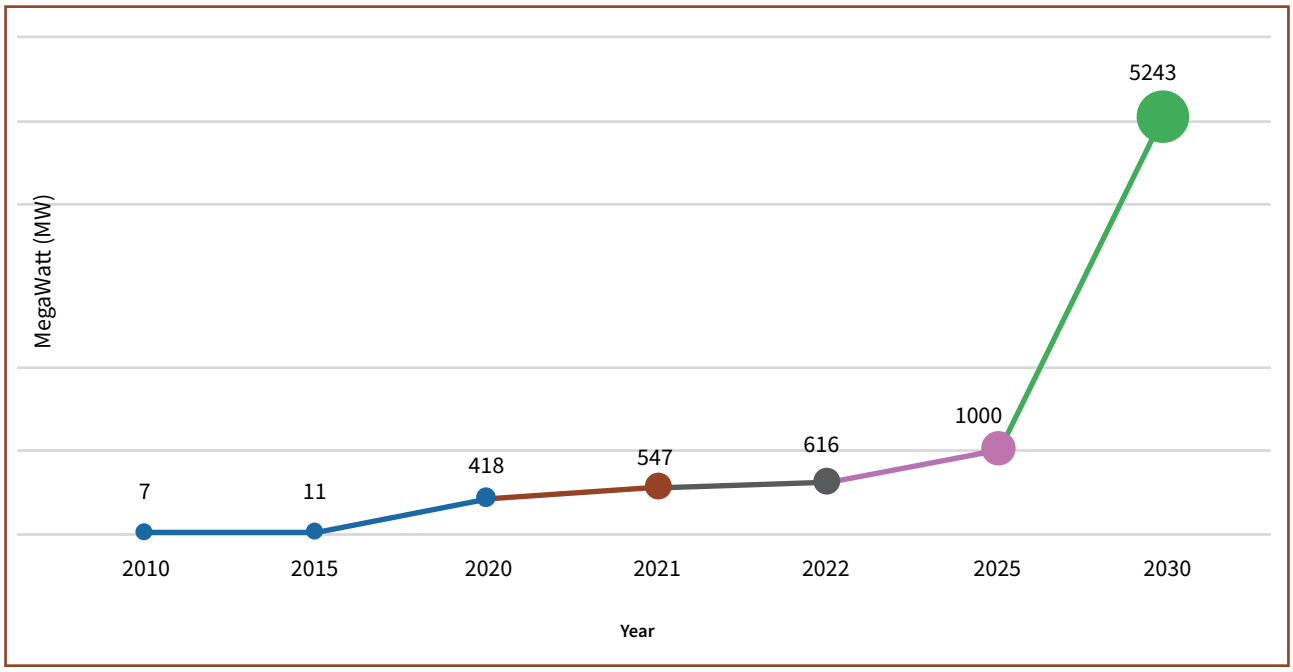
The region is witnessing significant development in solar power plant projects, with an installed capacity projection of approximately 1 GW by 2025 and 5 GW by 2030 (figure 14).

Figure 13: Installed Capacity of Grid-Connected Solar Power Plants in 2022 by ECOWAS Country




*Source: ECOWAS Countries national monitoring reports 2022*

Figure 14: Installed Capacity of Grid-Connected Solar Power Plants in 2022 and Projection for 2030 in ECOWAS Region

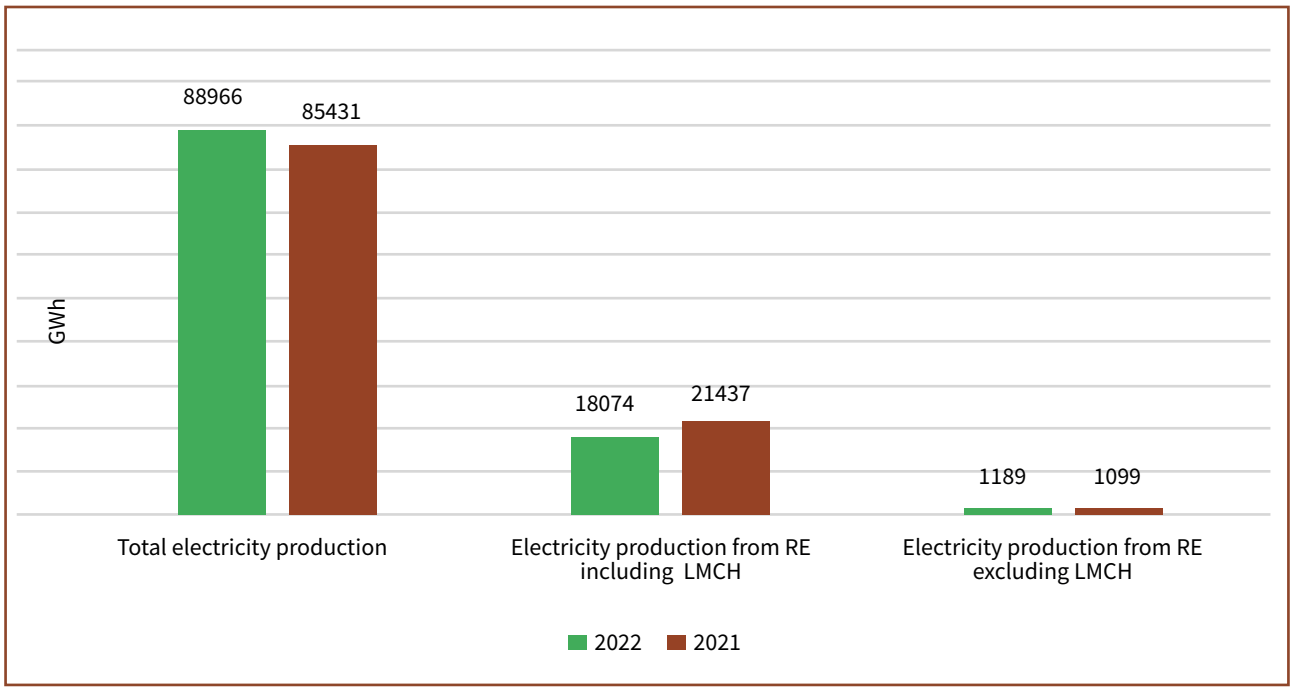



*Source: ECOWAS Countries national monitoring reports 2022*

### 5.2.3. Electricity generation from Renewable Energies

At the regional level, total electricity production reached 88,966 GWh in 2022, compared to 85,431 GWh in 2021, reflecting an increase of 4.1% (Figure 15). Total electricity generation from renewable energy sources amounted to 18,074 GWh, representing 20.3% of the total electricity produced in 2022. The contribution of small hydropower, photovoltaic energy, wind energy, and bioenergy to renewable electricity generation was 1,189 GWh (1.4%).

Figure 15: On grid Renewable Energy Power Generation




*Source: ECOWAS Countries national monitoring reports 2022 (based on the 2022 utility and electricity regulator reports), EREP. LMH = Large and Medium Hydropower*

At the Member State level, Nigeria, Guinea, and Côte d'Ivoire recorded the highest renewable energy-based electricity production in 2022, with 7,613 GWh, 2,957 GWh, and 2,864 GWh, respectively.

> **Collectively, these three countries accounted for 75% of the region's total electricity production from renewable sources (Table 5), with large and medium-scale hydropower contributing 98.6% of this production.**

Table 5: On grid Renewable Energy Power Generation by ECOWAS Countries

| Electricity Production | | | |
|---|---|---|---|
| Country | From RE Excluding LMSH | From RE Excluding LMSH | From all sources |
| Benin | 33 | 33 | 955 |
| Burkina Faso | 64 | 146 | 997 |
| Cabo Verde | 96 | 96 | 538 |
| Cote d'Ivoire | 177 | 2 864 | 12 148 |
| The Gambia | 0 | 0 | 433 |
| Ghana | 162 | 835 | 23 163 |
| Guinea | 8 | 2 957 | 3 263 |
| Guinea Bissau | 0 | 0 | 1 156 |
| Liberia | 0 | 304 | 288 |
| Mali | 0 | 1 289 | 5 134 |
| Niger | 11 | 11 | 1 138 |
| Nigeria | 0 | 7 613 | 31 291 |
| Senegal | 381 | 867 | 5 908 |
| Sierra Leone | 237 | 901 | 1 768 |
| Togo | 22 | 158 | 786 |
| ECOWAS | 1 189 | 18 074 | 88 966 |

*Source: ECOWAS Countries national monitoring reports 2022 (based on the 2022 utility and electricity regulator reports),*

### 5.2.4. Solar Water Heaters

Solar water heaters, used to meet domestic, commercial, and industrial needs, represent a critical tool for reducing electricity demand in West Africa. However, statistics on solar water heaters are lacking in many countries, making it difficult to conduct a comprehensive analysis of their penetration in the region. Countries such as Benin, Burkina Faso, Guinea-Bissau, Mali, and Senegal have provided data on solar water heaters installed in public institutions. The International Energy Agency (IEA), through its «Solar Heating and Cooling Programme» (SHC), has published information on solar water heaters used in households in Burkina Faso, Ghana, Nigeria, and Senegal.

Nigeria and Senegal lead the region in terms of solar water heaters installed in households, with 4,836 and 2,447 units, respectively. They are followed by Cabo Verde (984), Ghana (342), and Burkina Faso (296). Regarding solar water heaters in public institutions, Senegal has 200, followed by Burkina Faso with 181 units, Guinea-Bissau with 25 units, Benin with 20 units, and Mali with 17 units. Additionally, 45 solar water heaters are installed in SMEs, hotels, and industries in Liberia.

Table 6: Number of Existing Solar Water Heaters in 2021

| Pays | Number of SWH in HH[10] | Number of SWH in Public Institution | Number of SWH in Private Sector |
|---|---|---|---|
| Benin | n/a | 20 | 1 |
| Burkina Faso | 296 | 181 | n/a |
| Cabo Verde | 984 | n/a | n/a |
| Cote d'Ivoire | n/a | n/a | n/a |
| The Gambia | n/a | n/a | 1 |
| Ghana | 342 | n/a | n/a |
| Guinea | n/a | n/a | n/a |
| Guinea Bissau | n/a | 25 | n/a |
| Liberia | n/a | n/a | 45 |

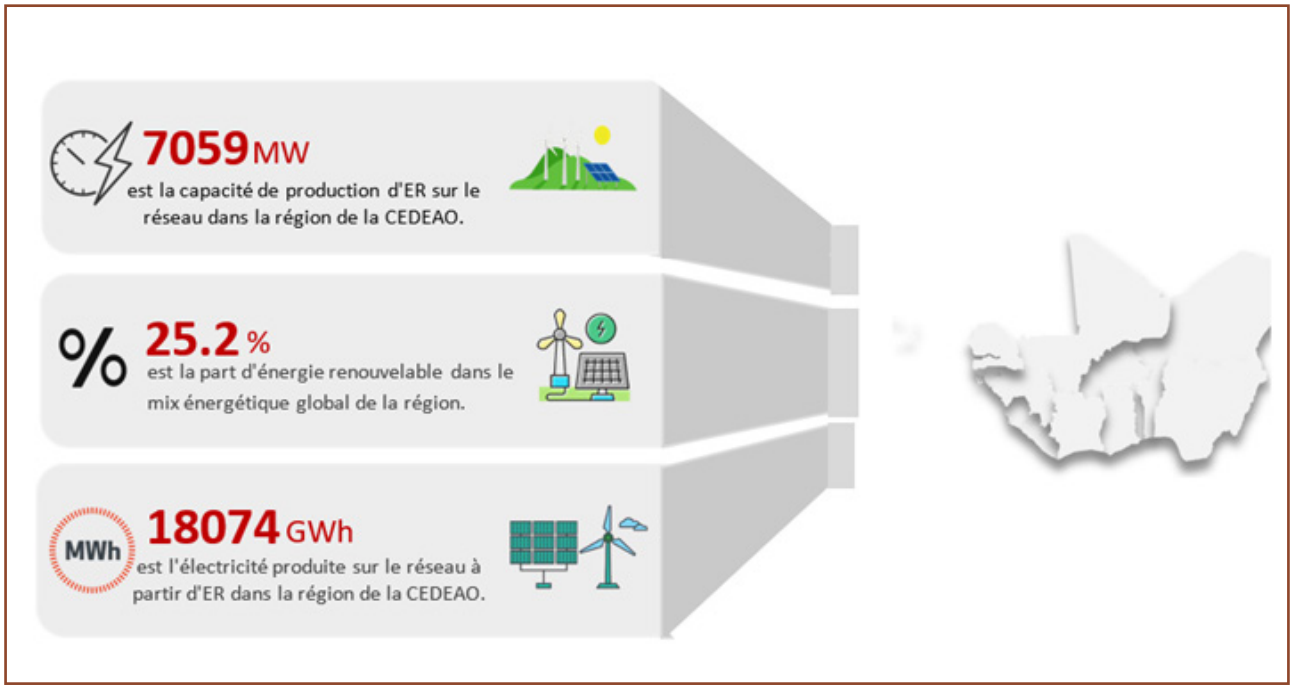
[10]Solar Heat World Wide, edition 2023, page 66 à 71, Solar-Heat-Worldwide-20231.pdf (iea-shc.org)

| | | | |
|---|---|---|---|
| Liberia | n/a | 17 | n/a |
| Mali | n/a | n/a | n/a |
| Niger | 4836 | n/a | n/a |
| Nigeria | 2447 | 200 | n/a |
| Senegal | n/a | n/a | n/a |

*Source: Rapports nationaux de suivi 2022 des pays de la CEDEAO (basés sur les rapports 2022 des services publics et des régulateurs de l'électricité), Solar Heat World Wide, edition 2023, page 66 à 71, Solar-Heat-Worldwide-20231.pdf (iea-shc.org)*

# KEY POINTS ON RENEWABLE ENERGY IN THE REGION[11]

Figure 16: Some key points on Renewable Energy in the Region




[11]The on-grid generation capacity in the ECOWAS region is the total on-grid generation capacity of the 15 ECOWAS countries based on their 2022 national monitoring reports. For countries where 2022 data was not submitted, 2021 data was used.

## 5.3. Energy Efficiency in the Region

Energy efficiency is a cornerstone of both regional and national energy policies. Efficiency measures aim to free up 2,000 MW[12] of electricity production capacity, thereby reducing the need for additional investments in production infrastructure and mitigating the environmental impact of current energy practices. Each country has set specific energy efficiency targets in its National Energy Efficiency Action Plan for (NEEAP), aligned with regional ambitions, to promote a sustainable environment and empower member states. The following section provides information on the state of indicators, measures, and actions related to energy efficiency in the region. It addresses the following issues: electricity distribution losses, high-efficiency lighting, efficient refrigerators, effective air conditioning systems, energy-efficient buildings, and energy efficiency in the industrial sector.

### 5.3.1. Commercial, Technical, and Total Distribution Losses in the Region

This section presents the technical and non-technical losses in the electricity distribution network. As in previous years, it has not been possible to present data for all countries, as some electricity companies reported either overall losses or only technical losses in the distribution network, without differentiating between technical and non-technical or commercial losses.

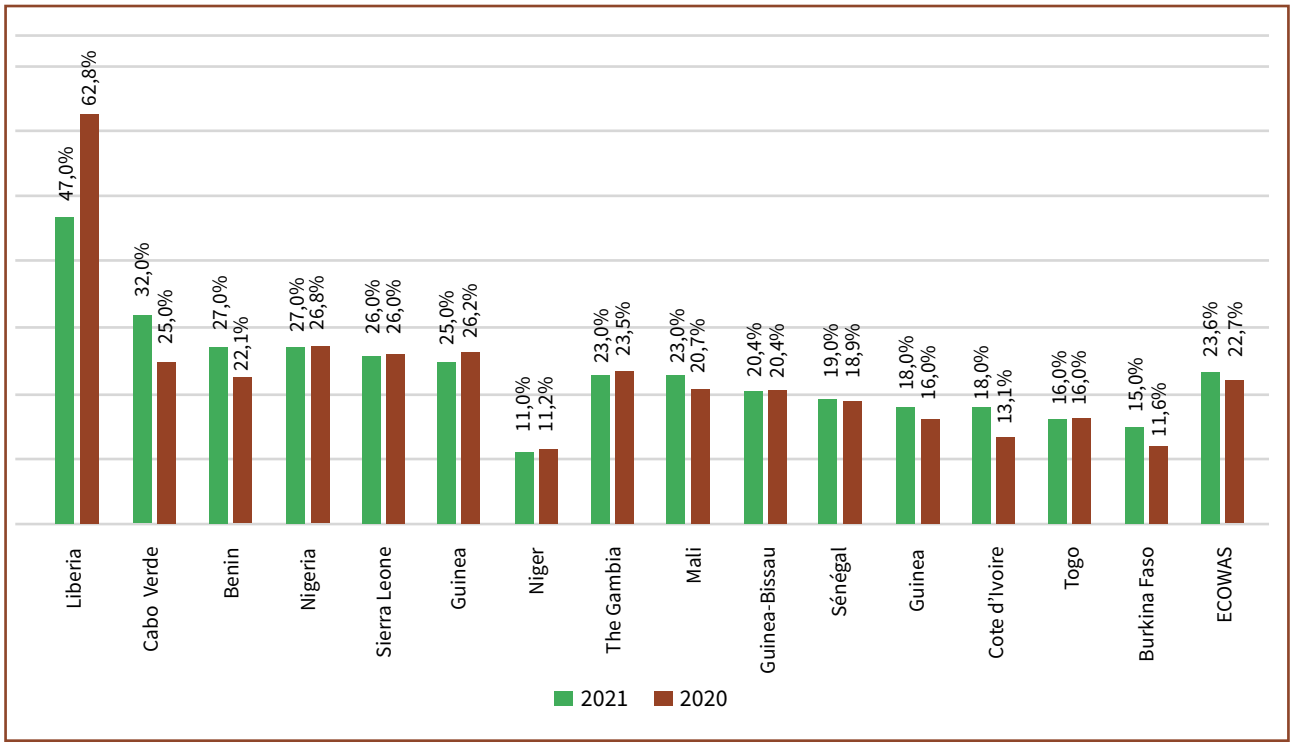
Liberia, as in 2020 (63%), again recorded the highest losses in 2021 (47%), which is twice as high as in some countries (Figure 17).

Between 2020 and 2021, the average total losses in the ECOWAS region increased from 22.7% to 23.2%. Excluding Liberia, the average total electricity loss in the region for 2020 and 2021 is 19.8% and 21.5%, respectively.

Despite its high losses, Liberia is the only country to have experienced a significant decrease between 2020 and 2021 (a decrease of 16%). In contrast, Cabo Verde, Côte d'Ivoire, and Benin saw the largest increases in their losses, with respective increases of 7.0%, 5.1%, and 4.9%.

[12]ECOWAS Energy Efficiency Policy, ECREEE, Page 5

Figure 17: Cumulative Electricity Losses




*(Source: National monitoring reports 2021 & WAPP 2020 report)*

## 5.3.2. Energy-Efficient Lighting

One of the strategic goals of the ECOWAS Energy Efficiency Policy (EEEP) is to phase out incandescent lamps by 2030 in order to promote the adoption of more efficient lighting solutions, such as LEDs[13], in the region. This report aims to assess the penetration rate of efficient lighting, both in the private and public sectors, within the member countries. However, national energy information systems currently do not allow for a precise assessment of LED lamp penetration, making it challenging to evaluate this EEEP objective. Therefore, sales statistics of Solar Lanterns (SL) and Multi-Light Systems (MLS) regularly published by «GLOGLA[14] ,"Global lighting [15]", an initiative of the World Bank, «Clean Lighting Coalition[16] «, «Efficiency For Access[17] will be used to analyze the dynamics of LED adoption in the relevant countries.

West Africa has recently witnessed remarkable growth in the sales of Solar Energy Kits for domestic use. These kits consist of solar lanterns, MLS, and Solar Home Systems (SHS).

[13]ECOWAS Energy Efficiency Policy, ECREEE, Page 40
[14]Reports & Publications | GOGLA
[15]http://www.lightingglobal.org/
[16]https://efficiencyforaccess.org
[17]https://efficiencyforaccess.org

**Solar Lanterns typically come as a single lantern equipped with an LED light, an integrated solar panel with a capacity of 0.5 to 3.0 watts peak (Wp), and a rechargeable lithium-ion (Li-ion) battery. Some models also offer USB charging functionality for mobile phones.**

**Multi-Light Systems include up to three or four LED lights, an independent solar panel with a capacity of up to 10 Wp, and a rechargeable Li-ion battery. Most models also feature a USB charging option for mobile phones.**

Table 7: Types of Solar Lanterns (SL) and Multi-light Systems (MLS) Sold in the West African Market in 2022 [18]

| Product Category | Définition | Power Range (Wc) | Indicative Price Range ($) | Multi-Tier Framework Level | Example |
|---|---|---|---|---|---|
| Solar Lanterns | Single light only | 0-1,49 | $4 - 40 | Enables Tier 0 (or partial Tier 1) Electricity Access for an individual person |  |
| | Single light & mobile charging | 1,5-2,99 | $6 - 51 | | |
| Mul-ti-light systems | Multiple light & mobile charging | 3-10.99 | $37 - 208 | Enables Tier 1 Electricity Access for at least one person and up to a full household |  |

*Source : Off-Grid Solar Market Trends Report 2022 : Outlook, World Bank, Page 59, World Bank Document*

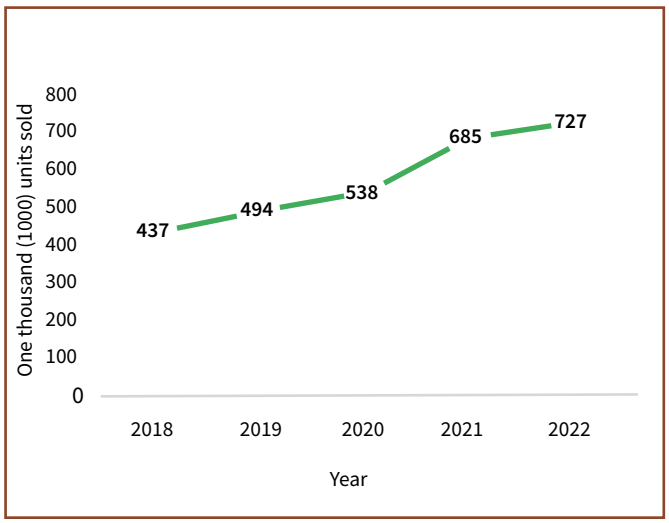
Between 2018 and 2022, sales of Solar Lanterns (LS) and Solar Home Systems (SEM) in the region saw a significant increase, with sales volumes multiplying by 1.66, rising from 437,000 units in 2018 to 727,000 in 2022. Nigeria stands out in this trend, accounting for 77% of total LS and SEM sales in West Africa in 2022, which is approximately 570,000 units. With the exception of Niger, Guinea-Bissau, Gambia, and Cabo Verde, for which we could not obtain statistics, the LS and SEM market is well established across other ECOWAS countries.

It should be noted that these figures only refer to LS and SEM sales by companies affiliated with GOGLA that provided their sales statistics. Additionally, given the presence of the informal sector in ECOWAS economies, it is likely that data on LS and SEM sales by companies operating informally are not included.

**"These elements collectively indicate the growth in the use of efficient household lighting in the region (Figures 18 & 19).**

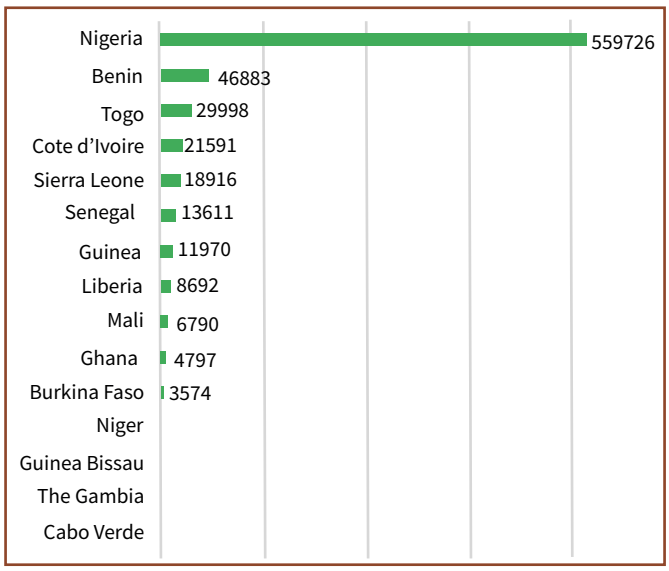
[18] World Bank Document

Figure 18: Sales Volumes of Solar Lanterns and Solar Energy Systems in West Africa (2018 to 2022)




*Source: Off-Grid Solar Market Trends Report 2022: State of the Sector, Global Lighting, World Bank, Page 41 World Bank Document*

Figure 19: Sales Volumes of Solar Lanterns and Solar Energy Systems by Country in 2022




*Source: Off-Grid Solar Market Trends Report 2022: State of the Sector, Global Lighting, World Bank, Page 41 World Bank Document*

The market for solar lamps (SL) and solar home systems (SHS) is experiencing remarkable growth within the ECOWAS region. However, with the exception of Burkina Faso and Nigeria, which each host one and two SL and SHS[19] assembly companies respectively, the other countries in the region rely entirely on imports to source these products. Implementing a policy to encourage the establishment of local companies dedicated to the manufacturing of SL and SHS could not only enhance industrial autonomy but also stimulate job creation within the member states.

**"Regarding installed efficient public lighting, Côte d'Ivoire stands out with a fleet of 61,700 units, followed by Ghana with 20,330 units, Cabo Verde with 10,067 units, Guinea with 6,659 units, and Burkina Faso with 2,400 units. In contrast, only Senegal and Togo have provided specific data on installed solar street lights. In 2022, Senegal had 57,076, while Togo had 30,004.**

[19]https://efficiencyforaccess.org/publications

Table 8: Current Number of Efficient Public Lights and Solar Street Lights

| Country | Number of Installed Efficient Public Lights | Number of Installed Solar Street Lights |
|---|---|---|
| Burkina Faso | 2 400 | |
| Cote d'Ivoire | 61 700 | |
| Cabo Verde | 100 067 | |
| Ghana | 20 330 | |
| Guinea | 6 659 | 2 400 |
| Senegal | | 61 700 |
| Togo | | 100 067 |

*Source: 2022 National Monitoring Reports of ECOWAS Countries (based on 2022 reports from public utilities and electricity regulators)*

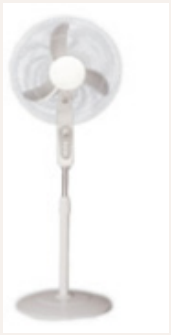
### 5.3.3. Energy-Efficiency Appliances

The promotion of high-efficiency electrical appliances, such as refrigerators and air conditioners, has been addressed at the regional level. However, penetration rates for these appliances, particularly air conditioners and refrigerators, were not reported by most countries in 2022. This gap may be attributed to the lack of baseline data or insufficient data collection and reporting by national customs agencies, both for imports and exports. Furthermore, national household surveys generally include few or no questions regarding the use of energy-efficient appliances.

Similar to the approach taken for efficient lighting, we will examine the penetration of household appliances through sales statistics provided by companies affiliated with GOGLA and published by Global Lighting.

Indeed, the various high-efficiency household appliances available on the market in Africa in general, and West Africa in particular, are segmented as follows:

Table 9: Main Segments of Appliances for Domestic and Productive Use

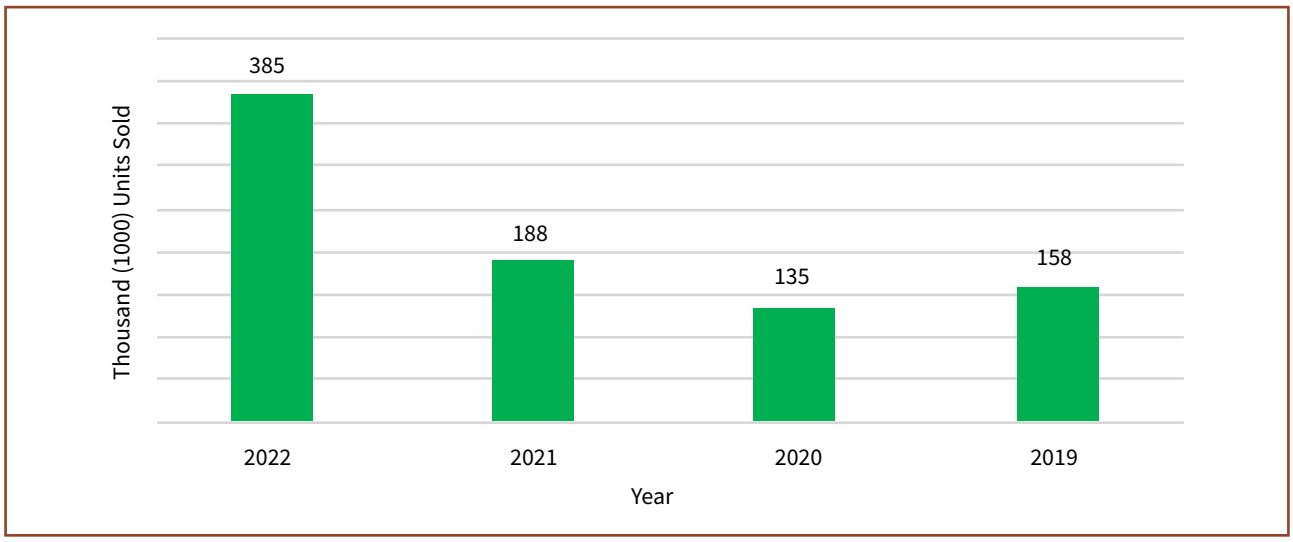
| Catategories | Indicative Price Range (in $) | Examples | Comments |
|---|---|---|---|
| Televisions | $34 - 325 |  | The majority of televisions sold as part of solar lighting system kits operate on direct current (DC), although models that run on alternating current (AC) can also be used with DC-AC solar inverters. |
| Fans | $14 - 65 |  | Fans improve household comfort, especially during hot seasons. |
| Refrigeration units (up to 300L capacity) | $72 - 1817 |  | They are used not only by households but also by small businesses in rural and isolated communities. |
| Radios f | Variable |  | Other, smaller appliances include radios for households and multi-port phone chargers for small businesses |
| Solar Water Pumps (up to 2 kW) | $107 - 7630 |  | Solar water pumps improve irrigation and extend the growing season for smallholder farmers in rural areas. |

| | | | |
|---|---|---|---|
| Refrigeration Storage Solutions (capacity greater than 300 L) | $3,456 - 150K+ |  | Solar-powered refrigeration storage solutions enable large-scale preservation of agricultural products, meats, and dairy products, and are primarily intended for small businesses. |
| Agri-food Processing Equipment | $660 - 1,310 |  | The most common application in agri-food processing is the solar-powered grain mill, due to the significance of the maize value chain in sub-Saharan African markets. |

*Source : Off-Grid Solar Market Trends Report 2022 : Outlook, World Bank, Page 59, World Bank Document*

Similar to the sales of efficient lighting products, the analysis of the evolution of sales of high-efficiency appliances in the region shows an increasing trend from 2019 to 2022. Sales of these appliances rose from 158,000 units in 2019 to 188,000 units in 2021. In 2022, sales more than doubled, reaching 385,000 units compared to 188,000 units in 2021 (see Figure 8). This significant increase in sales is attributed to the economic recovery in the region following the COVID-19 pandemic. Nigeria has emerged as the leading contributor, accounting for 72% of the total sales of high-efficiency appliances in the region.

Figure 20: Sales of High-Efficiency Appliances in ECOWAS Countries




*Source: Off-Grid Solar Market Trends Report 2022: State of the Sector, Global Lighting, World Bank, Page 41 World Bank Document*

Ghana is the only country to have provided information on air conditioners, refrigerators, and other inefficient electrical appliances that have been removed and replaced in the country. In 2022, a total of 2,374 inefficient air conditioners were withdrawn from both the public and private sectors. As for refrigerators and other inefficient electrical appliances, 716 and 3,498 units, respectively, were removed and replaced during the same year.

Tableau 10: Air Conditioners, Refrigerators, and Other Inefficient Electrical Appliances Removed in 2022

| | Ghana | |
|---|---|---|
| | 2021 | 2022 |
| Number of Inefficient Air Conditioners Removed from the Public Sector | 747 | 1813 |
| Number of Inefficient Air Conditioners Removed from the Private Sector | 660 | 561 |
| Number of Inefficient Refrigerators Removed | 677 | 716 |
| Number of Other Inefficient Electrical Appliances Removed | 3098 | 3498 |

*Source: 2022 National Monitoring Reports of ECOWAS Countries (based on 2022 reports from public utilities and electricity regulators)*

### 5.3.4. Energy Efficiency in Buildings

The adoption of regional standards and labels and the development of energy-efficient building codes are two major objectives of the ECOWAS Energy Efficiency Program (PEEC). The ECOWAS Ministers of Energy approved the Regional Directive on Building Energy Efficiency (EEB) during their eleventh meeting in Guinea in 2016. Some ECOWAS member states are already implementing activities aimed at promoting energy efficiency in buildings.

**In Côte d'Ivoire**, a decree was approved in 2016 that sets out the terms, conditions, and obligations for implementing energy controls in buildings. This introduced mandatory and periodic energy audits for facilities that consume large amounts of electricity, including public buildings and institutions.

**Nigeria** adopted a Building Energy Efficiency Guideline and a Building Energy Efficiency Code in June 2016. This was commissioned by the Federal Ministry of Power, Works and Housing in collaboration with the Nigerian Energy Support Programme (NESP). The objective is to provide practical advice to professionals on how to design, construct, and operate energy-efficient buildings. It also aims to raise public awareness of energy efficiency measures and provide

information for identifying energy efficiency measures in buildings.

**In Senegal**, a Franco-Senegalese ministerial agreement on low-carbon buildings was signed in December 2016 between the French Environment and Energy Management Agency (ADEME) and the Senegalese Ministry of Environment. As a result, the green building industry has developed, evidenced by the emergence of local actors and the creation of new jobs. To further promote sustainable practices, ADEME is participating in the Typha Combustible Construction West Africa (TyCCAO) project. Typha Australis, an invasive plant from West Africa with thermal insulation and combustion properties, will be used both as a building material and for biomass. The project aims to use Typha on a large scale to combat climate change by providing renewable fuel and developing energy-efficient buildings.

**In Cabo Verde**, the implementation of energy efficiency measures in the building sector is supported by the Building and Equipment Energy Efficiency Project. The country has already developed a framework for the energy management system to measure energy savings, water consumption, and emission reductions from buildings. The Energy Conservation Code for Buildings will set minimum energy efficiency requirements for the design and construction of buildings. It will also define the requirements necessary to achieve energy efficiency levels above the minimum standards and provide intervention guidelines for existing buildings to meet the minimum energy efficiency requirements. With the approval and implementation of the energy management system and the Energy Conservation Code for Buildings, the country plans to increase the number of energy-efficient buildings. In 2022, Cabo Verde reported 56 energy-efficient buildings constructed in the country.

According to the 2022-2023 annual report published by Voûte Nubienne[20] , 6 250 constructions[21] were completed in Benin, Burkina Faso, Ghana, Mali, and Senegal in 2022. Voûte Nubienne is a non-profit organization focused on energy efficiency in buildings. The Nubian Vault technical concept is an ancient architectural method primarily made from raw earth. It is an adaptable housing solution that meets both private and community needs in rural areas and cities. The need for fans or air conditioning in Nubian Vault constructions seems minimal or absent, making them a potentially energy-efficient option[22].

[20]Association la Voûte Nubienne (2023)
[21]final-web_rapport-d_activite__22-23_compressed.pdf *(lavoutenubienne.org)*
[22]Madiana Hazoume (2013).

### 5.3.5. Energy Efficiency in Industry

National Energy Efficiency Programs (NEEPs) have highlighted that improving energy efficiency in the industrial sector is a means to release energy production capacity and create a more competitive industrial sector by reducing operational costs. Action plans have also reported and quantified efforts and objectives related to energy efficiency in this sector. This progress report aims to monitor the number of industries, companies, etc., that have implemented energy efficiency measures.

In 2022, in Nigeria, nine industries obtained ISO 50001 certification, and 11 companies began applying this standard. Additionally, 30 companies reported implementing energy efficiency measures, such as energy audits and upgrading some equipment to achieve energy savings.

In Togo, three companies have taken similar actions, including replacing motors and generators with high-efficiency technologies and installing solar panels for energy production. These companies operate in the production of sheet metal, metallurgical products, construction materials, gas, and plastics.

In Guinea, in 2022, two companies also reported implementing energy efficiency measures, including replacing inefficient lamps and other electrical appliances, as well as modernizing some energy-intensive equipment to improve their energy efficiency.

Table 11: Industries Certified ISO 50001 or Implementing Energy Efficiency Measures

| | Guinea | Nigeria | Togo |
|---|---|---|---|
| Number of Industries Implementing ISO 50001 | 0 | 11 | 0 |
| Number of Industries Certified ISO 50001 | 0 | 9 | 0 |
| Number of Industries with Energy Efficiency Measures | 2 | 30 | 3 |

*Source: 2022 National Monitoring Reports of ECOWAS Countries (based on 2022 reports from public utilities and electricity regulators)*

# 6 KEY HIGHLIGHTS OF 2022


**Benin Launches Its First 25 MWp Solar Photovoltaic Plant:**

Benin made remarkable progress in renewable electricity in 2022 with the commissioning of its first 25 MWp grid-connected solar photovoltaic plant. Located in Illoulofin, in the commune of Pobè, Plateau department, the plant was realized through the DEFISSOL project, which aims to contribute to Benin's economic growth by improving the performance of its electricity operators and the quality of the electricity service provided while respecting environmental standards. A next phase is already planned to increase the plant's capacity to 50 MWp. This plant represents 6% of Benin's total electricity generation capacity, marking a first step for the country toward achieving its renewable energy penetration goals, excluding large and medium-sized hydropower plants, by 2030.

With an overall cost of 39.7 billion CFA francs, the plant consists of 47,212 modules with 113 next-generation HUAWEI 185 inverters, six transformers of 3,515 kVA each, an automated plant management system supported by computer assistance, state-of-the-art intrusion monitoring and security systems, two 20-kilovolt evacuation lines of 25 MWp each stretching 3 kilometers from the solar plant to the CEB station in Onigbolo. A modern HV/MV bay at the CEB station includes a 50,000 kVA step-up transformer that converts the plant's 20-kilovolt output to 161 kilovolts, with the involvement of SBPE, SBEE, and CEB. This infrastructure will supply electricity to approximately 40,000 households during this first phase.

*Source :* *Inauguration de la Centrale solaire photovoltaïque 25 MWc d'Illoulofin : Le Bénin poursuit sa marche vers l'autonomie énergétique | Gouvernement de la République du Bénin*

# 7 STATUS OF RENEWABLE ENERGY IN MEMBER STATES

## 7.1. Status of Renewable Energy in Benin

In 2022, Benin reported an electricity access rate of 38%, significantly below the 2030 target of 100%. The installed renewable energy capacity connected to the grid stands at 37 MW, against a target of 456 MW set for 2030, representing an 8% completion rate.

The grid-connected renewable energy technologies used in Benin are primarily solar photovoltaics, with a capacity of 25 MW, while the rest comes from small hydropower. The share of renewable energy in the electricity mix is 9.3%, compared to the 18.8% target for 2030. Significant grid-connected solar photovoltaic power plant projects are under development in Benin, which will bring the country's installed capacity to 150 MW by 2030.

In 2022, Benin's total electricity generation reached 955 GWh. Electricity production from renewable sources amounted to 32.8 GWh, against a target of 2,412.2 GWh for 2030. The share of renewable energy in electricity production in 2022 was 3.4%, compared to the 35.1% target for 2030.

**"Regarding clean energy mini-grids, Benin has 28 mini-grids with a total installed capacity of 3 MW, supplying electricity to 1,734 rural households. As for stand-alone solar systems, there were 691,926 installations in Benin in 2022.**

Table 12: Indicators on Renewable Energy in Benin

| Theme | NREAPs indicators | Results in 2022 | 2030 Targets |
|---|---|---|---|
| Acces to Electricity | Access rate to electricity | 38,0% | 100,0% |
| Grid-connected renewable energy targets. | **Electricity capacity installed** | | |
| | Renewable energy installed capacity in MW (excluding medium and large hydro) | 37 | 456 |
| | Renewable energy share of the total installed capacity in % (excluding medium and large hydro) | 9,3% | 10,6% |
| | Large and medium scale hydropower capacity installed in MW (more than 30 MW) | 0 | 295,2 |
| | Large and medium scale hydropower (more than 30 MW) share of total electricity generation in % | 0 | 7,6 |
| | Total renewable energy capacity in MW (including large and medium scale hydro) | 37 | 810,2 |
| | Renewable energy capacity installed share of the total installed capacity in % (including medium and large hydro) | 9,3% | 18,8% |
| | **Electricity Generation** | | |
| | Renewable energy electricity generation in GWh (excluding medium and large hydro) | 32,8 | 1282,2 |
| | Renewable energy share in the electricity mix in % (excluding medium and large hydro) | 3,4% | 18,7 |
| | Large and medium scale hydropower generation in GWh (more than 30 MW) | 0 | 988 |
| | Large and medium scale hydropower generation (more than 30 MW) as share of electricity mix in % | 0,0% | 14,4 |
| | Total renewable energy generation in GWh (including medium and large hydro) | 32,8 | 2412,2 |
| | Renewable energy generation share in the electricity mix in % (including medium and large hydro) | 3,4% | 35,1% |

| | | | |
|---|---|---|---|
| Off-grid renewable energy targets | Number of RE mini-grids | 28 | |
| | Total installed off-grid renewable energy capacity (in MW) | 3 | |
| | Number of Rural Households Connected to Mini-Grids | 1 734 | |
| | Number of Standalone Solar Systems | 691 926 | |

*Source: National Renewable Energy Action Plan for Benin, national monitoring reports 2022 (based on the 2022 utility and electricity regulator reports)*

## 7.2. Status of Renewable Energy in Burkina Faso

In 2022, Burkina Faso reported an electricity access rate of 27%, significantly below the 2030 target of 65%. The installed capacity of grid-connected renewable energy in 2022 stood at 66 MW, compared to the goal of 318 MW by 2030, representing a 20.8% completion rate. The share of grid-connected renewable energy in the electricity mix was 15.8% in 2022, with a target of 36.0% by 2030.

In 2022, Burkina Faso had two operational grid-connected photovoltaic solar power plants (Zagtouli 1 and Ziga) with a total capacity of 34.1 MW, as well as three hydroelectric power plants with a total capacity of 31.9 MW. A new 30 MW solar power plant (Nagréongo) was completed and commissioned in 2022, but it was not operational during that year. Several major grid-connected solar power plants are under construction and development in Burkina Faso. These projects will bring the country's total installed capacity to 156.1 MW in 2023, with a projection of 680.1 MW by 2030.

The total electricity production in Burkina Faso in 2022 was 997 GWh, with 146 GWh generated from renewable sources, compared to a target of 685 GWh by 2030. The share of renewable energy in electricity production was 14.6% in 2022.

**"Burkina Faso had 36 clean energy mini-grids in 2022, with a total capacity of 1.9 MW.**

Table 13: Indicators on Renewable Energy in Burkina Faso

| Theme | NREAPs indicators | Results in 2022 | 2030 Targets |
|---|---|---|---|
| Acces to Electri-city | Access rate to electricity | 27% | 65% |
| Grid-connected renewable energy targets. | **Electricity capacity installed** | | |
| | Renewable energy installed capacity in MW (excluding me-dium and large hydro) | 34 | 318 |
| | Renewable energy share of the total installed capacity in % (excluding medium and large hydro) | 8,1% | 36,0% |
| | Large and medium scale hydropower capacity installed in MW (more than 30 MW) | 32 | 0 |
| | Large and medium scale hydropower (more than 30 MW) share of total electricity generation in % | 7,6% | 0 |
| | Total renewable energy capacity in MW (including large and medium scale hydro) | 66 | 318 |
| | Renewable energy capacity installed share of the total ins-talled capacity in % (including medium and large hydro) | 15,8% | 36,0% |
| | **Electricity Generation** | | |
| | Renewable energy electricity generation in GWh (excluding medium and large hydro) | 63,6 | 685,0 |
| | Renewable energy share in the electricity mix in % (exclu-ding medium and large hydro) | 6,4% | 9% |
| | Large and medium scale hydropower generation in GWh (more than 30 MW) | 82,2 | 0 |
| | Large and medium scale hydropower generation (more than 30 MW) as share of electricity mix in % | 8,3% | 0 |
| | Total renewable energy generation in GWh (including me-dium and large hydro) | 146 | 685 |
| | Renewable energy generation share in the electricity mix in % (including medium and large hydro) | 14,6% | 9% |
| Off-grid re-newable energy targets | Number of RE mini-grids | 36 | |
| | Total installed off-grid renewable energy capacity (in MW) | 1,9 | |

*Source: National Renewable Energy Action Plan for Burkina Faso, national monitoring reports 2022 (based on the 2022 utility and electricity regulator reports)*

## 7.3. Status of Renewable Energy in Cabo Verde

In 2022, Cabo Verde reported an electricity access rate of 92%, with a target of 100% by 2030. The installed capacity of grid-connected renewable energy in Cabo Verde was 43 MW, out of a total installed capacity of 208 MW, representing a 20.7% share of renewable energy in the electricity mix for 2022.

The total electricity production in 2022 was 538.2 GWh, of which 95.7 GWh came from renewable energy sources, accounting for 17.8% of the total.
Cabo Verde had six mini-grids in 2022, with a combined installed capacity of 0.2 MW.

Table 14: Indicators on Renewable Energy in Cabo Verde

| Theme | NREAPs indicators | Results in 2022 | 2030 Targets |
|---|---|---|---|
| Acces to Electri-city | Access rate to electricity | 92% | 100% |
| Grid-connected renewable energy targets. | **Electricity capacity installed** | | |
| | Renewable energy installed capacity in MW (excluding me-dium and large hydro) | 43 | |
| | Renewable energy share of the total installed capacity in % (excluding medium and large hydro) | 20,7% | |
| | Large and medium scale hydropower capacity installed in MW (more than 30 MW) | 0 | |
| | Large and medium scale hydropower (more than 30 MW) share of total electricity generation in % | 0,0% | |
| | Total renewable energy capacity in MW (including large and medium scale hydro) | 43 | |
| | Renewable energy capacity installed share of the total ins-talled capacity in % (including medium and large hydro) | 20,7% | |
| | **Electricity Generation** | | |
| | Renewable energy electricity generation in GWh (excluding medium and large hydro) | 95,7 | |
| | Renewable energy share in the electricity mix in % (exclu-ding medium and large hydro) | 17,8% | |

| | | | |
|---|---|---|---|
| | Large and medium scale hydropower generation in GWh (more than 30 MW) | 0 | |
| | Large and medium scale hydropower generation (more than 30 MW) as share of electricity mix in % | 0,0% | |
| | Total renewable energy generation in GWh (including medium and large hydro) | 95,7 | |
| | Renewable energy generation share in the electricity mix in % (including medium and large hydro) | 17,8% | |
| Off-grid renewable energy targets | Number of RE mini-grids | 6 | |
| | Total installed off-grid renewable energy capacity (in MW) | 0,2 | |

*Source: National Renewable Energy Action Plan for Cabo Verde, national monitoring reports 2022 (based on the 2022 utility and electricity regulator reports)*

## 7.4. Status of Renewable Energy in Cote d'Ivoire

In 2022, Côte d'Ivoire had an electricity access rate of 85%, compared to a target of 100% by 2030.

The installed capacity of grid-connected renewable energy in 2022 stood at 879 MW, against the 2030 target of 3,259 MW, reflecting a completion rate of 27%. The share of grid-connected renewable energy in the electricity mix was 34.5% in 2022, with a goal of reaching 57.0% by 2030.

As of 2022, Côte d'Ivoire had no grid-connected solar photovoltaic plants. However, significant solar photovoltaic projects are under construction and development, which are expected to bring the country's total installed capacity for grid-connected solar photovoltaics to 626 MW by 2030.

The total electricity production in Côte d'Ivoire in 2022 was 12,148 GWh. Of this, 2,864 GWh came from renewable energy sources, compared to a target of 11,293 GWh by 2030. The share of renewable energy in electricity production in 2022 was 23.6%, with a target of 42% by 2030.

**"Côte d'Ivoire had 29 clean energy mini-grids in 2022, with a total capacity of 1.4 MW, providing power to 3,182 households.**

Table 15: Indicators on Renewable Energy in Côte d'Ivoire

| Theme | NREAPs indicators | Results in 2022 | 2030 Targets |
|---|---|---|---|
| Acces to Electricity | Access rate to electricity | 85% | 100% |
| Grid-connected renewable energy targets. | **Electricity capacity installed** | | |
| | Renewable energy installed capacity in MW (excluding medium and large hydro) | 55 | 1 063 |
| | Renewable energy share of the total installed capacity in % (excluding medium and large hydro) | 2,2% | 19,0% |
| | Large and medium scale hydropower capacity installed in MW (more than 30 MW) | 824 | 1592 |
| | Large and medium scale hydropower (more than 30 MW) share of total electricity generation in % | 32,3% | 28% |
| | Total renewable energy capacity in MW (including large and medium scale hydro) | 879 | 3259 |
| | Renewable energy capacity installed share of the total installed capacity in % (including medium and large hydro) | 34,5% | 57,0% |
| | **Electricity Generation** | | |
| | Renewable energy electricity generation in GWh (excluding medium and large hydro) | 176,8 | 5354,0 |
| | Renewable energy share in the electricity mix in % (excluding medium and large hydro) | 1,5% | 16% |
| | Large and medium scale hydropower generation in GWh (more than 30 MW) | 2 687,10 | 6 380,00 |
| | Large and medium scale hydropower generation (more than 30 MW) as share of electricity mix in % | 22,1% | 26% |
| | Total renewable energy generation in GWh (including medium and large hydro) | 2 863,9 | 11 293,0 |
| | Renewable energy generation share in the electricity mix in % (including medium and large hydro) | 23,6% | 42% |
| Off-grid renewable energy targets | Number of RE mini-grids | 29 | |
| | Total installed off-grid renewable energy capacity (in MW) | 1,4 | |

*Source: National Renewable Energy Action Plan for Cote d'Ivoire, national monitoring reports 2022 (based on the 2022 utility and electricity regulator reports)*

## 7.5. Status of Renewable Energy in The Gambia

In 2022, The Gambia's electricity access rate stood at 63%, compared to a target of 100% by 2030. The country's total electricity generation capacity was 147 MW, with renewable energy sources contributing 1 MW. This represented less than 1% of the country's overall energy mix.

In 2022, The Gambia's total electricity production was 433 GWh, with 3 GWh generated from renewable sources. The country had one clean energy mini-grid in 2022, with an installed capacity of 0.1 MW.

Table 16: Indicators on Renewable Energy in Gambia

| Theme | NREAPs indicators | Results in 2022 | 2030 Targets |
|---|---|---|---|
| Acces to Electricity | Access rate to electricity | 63,0% | 100% |
| Grid-connected renewable energy targets. | **Electricity capacity installed** | | |
| | Renewable energy installed capacity in MW (excluding medium and large hydro) | 1 | 931 |
| | Renewable energy share of the total installed capacity in % (excluding medium and large hydro) | 0,7% | 3,3% |
| | Large and medium scale hydropower capacity installed in MW (more than 30 MW) | 0 | 6128 |
| | Large and medium scale hydropower (more than 30 MW) share of total electricity generation in % | 0,0% | 22% |
| | Total renewable energy capacity in MW (including large and medium scale hydro) | 1 | 7059 |
| | Renewable energy capacity installed share of the total installed capacity in % (including medium and large hydro) | 0,7% | 25,2% |
| | **Electricity Generation** | | |
| | Renewable energy electricity generation in GWh (excluding medium and large hydro) | 3,0 | 1189,1 |
| | Renewable energy share in the electricity mix in % (excluding medium and large hydro) | 0,7% | 1% |

| | | | |
|---|---|---|---|
| | Large and medium scale hydropower generation in GWh (more than 30 MW) | 0,0 | 16 885,1 |
| | Large and medium scale hydropower generation (more than 30 MW) as share of electricity mix in % | 0,0% | 19% |
| | Total renewable energy generation in GWh (including medium and large hydro) | 3,0 | 18 074,2 |
| | Renewable energy generation share in the electricity mix in % (including medium and large hydro) | 0,7% | 21% |
| Off-grid renewable energy targets | Number of RE mini-grids | 1 | |
| | Total installed off-grid renewable energy capacity (in MW) | 0,1 | |

*Source: National Renewable Energy Action Plan for The Gambia, national monitoring reports 2022 (based on the 2022 utility and electricity regulator reports)*

## 7.6. Status of Renewable Energy in Ghana

In 2022, Ghana recorded an electricity access rate of 89%, against a target of 100% by 2030.
The country's total installed capacity amounted to 5,454 MW, with 1,696 MW sourced from renewable energy. This represents a renewable energy share of 31.1% in Ghana's electricity mix.

In 2022, Ghana had nine grid-connected solar power plants with a total installed capacity of 112.3 MW. Several large-scale grid-connected solar photovoltaic projects are under construction and development in the country.

These projects will enable Ghana to reach a total installed capacity of 138.3 MW by 2023, with projections of 780.5 MW by 2030.

The total electricity generation in Ghana in 2022 was 23,163 GWh, with 835.3 GWh generated from renewable energy sources. The share of renewable energy in electricity production in 2022 was 3.6%.

**"Ghana had three clean energy mini-grids in 2022, with a total installed capacity of 0.3 MW, providing power to 600 rural households.**

Table 17: Indicators on Renewable Energy in Ghana

| Theme | NREAPs indicators | Results in 2022 | 2030 Targets |
|---|---|---|---|
| Acces to Electricity | Access rate to electricity | 89% | 100% |
| Grid-connected renewable energy targets. | **Electricity capacity installed** | | |
| | Renewable energy installed capacity in MW (excluding medium and large hydro) | 112 | |
| | Renewable energy share of the total installed capacity in % (excluding medium and large hydro) | 2,1% | |
| | Large and medium scale hydropower capacity installed in MW (more than 30 MW) | 1584 | |
| | Large and medium scale hydropower (more than 30 MW) share of total electricity generation in % | 5,7% | |
| | Total renewable energy capacity in MW (including large and medium scale hydro) | 1696 | |
| | Renewable energy capacity installed share of the total installed capacity in % (including medium and large hydro) | 31,1% | |
| | **Electricity Generation** | | |
| | Renewable energy electricity generation in GWh (excluding medium and large hydro) | 161,7 | |
| | Renewable energy share in the electricity mix in % (excluding medium and large hydro) | 0,7% | |
| | Large and medium scale hydropower generation in GWh (more than 30 MW) | 673,7 | |
| | Large and medium scale hydropower generation (more than 30 MW) as share of electricity mix in % | 0,8% | |
| | Total renewable energy generation in GWh (including medium and large hydro) | 835,3 | |
| | Renewable energy generation share in the electricity mix in % (including medium and large hydro) | 3,6% | |
| Off-grid renewable energy targets | Number of RE mini-grids | 5 | |
| | Total installed off-grid renewable energy capacity (in MW) | 0,3 | |

*Source: National Renewable Energy Action Plan for Ghana, national monitoring reports 2022 (based on the 2022 utility and electricity regulator reports)*

## 7.7. Status of Renewable Energy in Guinea

In 2022, Guinea recorded an electricity access rate of 55%, compared to a target of 100% by 2030. The total electricity generation capacity in Guinea was 1,321 MW, with 1,043 MW derived from renewable sources.

This represents 79.0% of the country's overall electricity mix, a significant advancement compared to the regional average of 25.2%. It is worth noting that the majority (99.7%) of the renewable energy capacity comes from large and medium-sized hydroelectric power plants.

In 2022, Guinea did not have any grid-connected solar photovoltaic power plants. However, substantial projects for grid-connected solar photovoltaic power plants are underway in Guinea. These projects are expected to enable the country to reach a total installed capacity of 323 MW of grid-connected solar photovoltaic power by 2030.

The total electricity production in Guinea in 2022 was 3,263 GWh, with 2,957 GWh generated from renewable sources, against a target of 18,074.2 GWh by 2030. The share of renewable energy in electricity production in 2022 was 90.6%.

**"Guinea had six clean energy mini-grids in 2022, with a total installed capacity of 2 MW, supplying power to 12,255 households.**

Table 18: Indicators on Renewable Energy in Guinea

| Theme | NREAPs indicators | Results in 2022 | 2030 Targets |
|---|---|---|---|
| Acces to Electricity | Access rate to electricity | 55,0% | 57,4% |
| Grid-connected renewable energy targets. | **Electricity capacity installed** | | |
| | Renewable energy installed capacity in MW (excluding medium and large hydro) | 2 | 931 |
| | Renewable energy share of the total installed capacity in % (excluding medium and large hydro) | 0,2% | 3,3% |
| | Large and medium scale hydropower capacity installed in MW (more than 30 MW) | 1041 | 6128 |
| | Large and medium scale hydropower (more than 30 MW) share of total electricity generation in % | 78,8% | 22% |
| | Total renewable energy capacity in MW (including large and medium scale hydro) | 1043 | 7059 |
| | Renewable energy capacity installed share of the total installed capacity in % (including medium and large hydro) | 79,0% | 25,2% |
| | **Electricity Generation** | | |
| | Renewable energy electricity generation in GWh (excluding medium and large hydro) | 7,6 | 1189,1 |
| | Renewable energy share in the electricity mix in % (excluding medium and large hydro) | 0,2% | 1% |
| | Large and medium scale hydropower generation in GWh (more than 30 MW) | 2 949,44 | 16 885,12 |
| | Large and medium scale hydropower generation (more than 30 MW) as share of electricity mix in % | 90,4% | 19% |
| | Total renewable energy generation in GWh (including medium and large hydro) | 2 957,00 | 18 074,17 |
| | Renewable energy generation share in the electricity mix in % (including medium and large hydro) | 90,6% | 21% |
| Off-grid renewable energy targets | Number of RE mini-grids | 6 | 434 |
| | Total installed off-grid renewable energy capacity (in MW) | 2 | 48,4 |

*Source: National Renewable Energy Action Plan for Guinea, national monitoring reports 2022 (based on the 2022 utility and electricity regulator reports)*

## 7.8. Status of Renewable Energy in Guinea-Bissau

In 2022, Guinea-Bissau had an electricity access rate of 24%, compared to a target of 100% by 2030.

The installed capacity of grid-connected renewable energy in 2022 was 5 MW, against a target of 7,059 MW by 2030. The share of renewable energy in the grid-connected electricity mix was 19.2% in 2022.

Guinea-Bissau had three grid-connected solar photovoltaic power plants with a total installed capacity of 1 MW in 2022. There is a planned project to build a solar photovoltaic power plant with a total installed capacity of 23 MW by 2030.

The total electricity production in Guinea-Bissau in 2022 was 1,156 GWh, with 100 GWh coming from renewable sources, compared to a target of 1,189.1 GWh by 2030. The share of renewable energy in electricity production in 2022 was 8.7%.

**"Guinea-Bissau had two clean energy mini-grids in 2022, with a total installed capacity of 1.2 MW.**

Table 19: Indicators on Renewable Energy in Guinea Bissau

| Theme | NREAPs indicators | Results in 2022 | 2030 Targets |
|---|---|---|---|
| Acces to Electricity | Access rate to electricity | 24% | 100% |
| Grid-connected renewable energy targets. | **Electricity capacity installed** | | |
| | Renewable energy installed capacity in MW (excluding medium and large hydro) | 5 | 931 |
| | Renewable energy share of the total installed capacity in % (excluding medium and large hydro) | 19,2% | 3,3% |
| | Large and medium scale hydropower capacity installed in MW (more than 30 MW) | 0 | 6128 |
| | Large and medium scale hydropower (more than 30 MW) share of total electricity generation in % | 0,0% | 22% |
| | Total renewable energy capacity in MW (including large and medium scale hydro) | 5 | 7059 |
| | Renewable energy capacity installed share of the total installed capacity in % (including medium and large hydro) | 19,2% | 25,2% |
| | **Electricity Generation** | | |
| | Renewable energy electricity generation in GWh (excluding medium and large hydro) | 100,0 | 1189,1 |
| | Renewable energy share in the electricity mix in % (excluding medium and large hydro) | 8,7% | 1% |
| | Large and medium scale hydropower generation in GWh (more than 30 MW) | 0,0 | 16 885,1 |
| | Large and medium scale hydropower generation (more than 30 MW) as share of electricity mix in % | 0,0% | 19% |
| | Total renewable energy generation in GWh (including medium and large hydro) | 100,0 | 18 074,2 |
| | Renewable energy generation share in the electricity mix in % (including medium and large hydro) | 8,7% | 21% |
| Off-grid renewable energy targets | Number of RE mini-grids | 2 | |
| | Total installed off-grid renewable energy capacity (in MW) | 1,2 | |

*Source: National Renewable Energy Action Plan for Guinea Bissau, national monitoring reports 2022 (based on the 2022 utility and electricity regulator reports)*

## 7.9. Status of Renewable Energy in Liberia

In 2022, Liberia had an electricity access rate of 29%, compared to a target of 100% by 2030.

The total electricity production capacity in Liberia was 126.4 MW in 2022, of which 66 MW came from renewable sources, primarily from medium-sized hydroelectric plants. The share of renewable energy in the energy mix was 52.2% in 2022.

In 2022, Liberia did not have any grid-connected solar photovoltaic power plants. However, there is a planned project to build two solar photovoltaic power plants with a total installed capacity of 31 MW by 2030.

The total electricity production in Liberia in 2022 was 288.4 GWh. The production of electricity from renewable sources amounted to 30.5 GWh, compared to a target of 8,700.6 GWh by 2030. The share of renewable energy in electricity production in 2022 was 10.6%.

**"In 2022, Liberia had a total of 17 mini-grids, with a total installed capacity of 18.3 MW, exceeding the 8.6 MW target by 2030. These mini-grids served 54,376 households.**

Table 20: Indicators on Renewable Energy in Liberia

| Theme | NREAPs indicators | Results in 2022 | 2030 Targets |
|---|---|---|---|
| Acces to Electri-city | Access rate to electricity | 29% | 100% |
| Grid-connected renewable energy targets. | **Electricity capacity installed** | | |
| | Renewable energy installed capacity in MW (excluding me-dium and large hydro) | 0 | |
| | Renewable energy share of the total installed capacity in % (excluding medium and large hydro) | 0,0% | |
| | Large and medium scale hydropower capacity installed in MW (more than 30 MW) | 66 | 555,6 |
| | Large and medium scale hydropower (more than 30 MW) share of total electricity generation in % | 52,2% | 95% |
| | Total renewable energy capacity in MW (including large and medium scale hydro) | 66 | 555,6 |
| | Renewable energy capacity installed share of the total ins-talled capacity in % (including medium and large hydro) | 52,2% | 95,0% |
| | **Electricity Generation** | | |
| | Renewable energy electricity generation in GWh (excluding medium and large hydro) | 0,0 | |
| | Renewable energy share in the electricity mix in % (exclu-ding medium and large hydro) | 0,0% | |
| | Large and medium scale hydropower generation in GWh (more than 30 MW) | 30,5 | 8 700,6 |
| | Large and medium scale hydropower generation (more than 30 MW) as share of electricity mix in % | 10,6% | |
| | Total renewable energy generation in GWh (including me-dium and large hydro) | 30,5 | 8 700,6 |
| | Renewable energy generation share in the electricity mix in % (including medium and large hydro) | 10,6% | 95% |
| Off-grid re-newable energy targets | Number of RE mini-grids | 17 | |
| | Total installed off-grid renewable energy capacity (in MW) | 18,3 | |

*Source: National Renewable Energy Action Plan for Liberia, national monitoring reports 2022 (based on the 2022 utility and electricity regulator reports)*

## 7.10. Status of Renewable Energy in Mali

In 2022, Mali had an electricity access rate of 53.4%, significantly below the 87% target set for 2030.

The installed capacity of grid-connected renewable energy in 2022 was 401 MW, compared to the target of 1,416 MW by 2030, representing an achievement rate of 28.31%. The share of renewable energy in the grid electricity mix was 33.1% in 2022, with a target of 58.3% for 2030.

In 2022, Mali had one operational grid-connected solar photovoltaic power plant (Kita) with a total capacity of 50 MW. Major projects for grid-connected solar photovoltaic power plants are underway in Mali, which are expected to increase the country's total installed capacity to 741 MW by 2030.

The total electricity production in Mali in 2022 was 5,134 GWh. Electricity production from renewable sources was 1,289 GWh, compared to a target of 3,528 GWh by 2030. The share of renewable energy in electricity production in 2022 was 25.10%.

**"In 2022, Mali had 45 clean energy mini-grids with a total installed capacity of 12 MW. These mini-grids produced 18 GWh of electricity, serving 295,139 households.**

Table 21: Indicators on Renewable Energy in Mali

| Theme | NREAPs indicators | Results in 2022 | 2030 Targets |
|---|---|---|---|
| Acces to Electricity | Access rate to electricity | 53,4% | 87,0% |
| Grid-connected renewable energy targets. | **Electricity capacity installed** | | |
| | Renewable energy installed capacity in MW (excluding medium and large hydro) | 120 | 201,8 |
| | Renewable energy share of the total installed capacity in % (excluding medium and large hydro) | 9,9% | 8,3% |
| | Large and medium scale hydropower capacity installed in MW (more than 30 MW) | 281 | 1214 |
| | Large and medium scale hydropower (more than 30 MW) share of total electricity generation in % | 23,2% | 50% |
| | Total renewable energy capacity in MW (including large and medium scale hydro) | 401 | 1416 |
| | Renewable energy capacity installed share of the total installed capacity in % (including medium and large hydro) | 33,1% | 58,3% |
| | **Electricity Generation** | | |
| | Renewable energy electricity generation in GWh (excluding medium and large hydro) | 196,0 | 825,4 |
| | Renewable energy share in the electricity mix in % (excluding medium and large hydro) | 3,8% | 9% |
| | Large and medium scale hydropower generation in GWh (more than 30 MW) | 1 093,0 | 2 703,0 |
| | Large and medium scale hydropower generation (more than 30 MW) as share of electricity mix in % | 21,3% | 28% |
| | Total renewable energy generation in GWh (including medium and large hydro) | 1 289,0 | 3 528,0 |
| | Renewable energy generation share in the electricity mix in % (including medium and large hydro) | 25,1% | 37% |
| Off-grid renewable energy targets | Number of RE mini-grids | 45 | |
| | Total installed off-grid renewable energy capacity (in MW) | 12 | |

*Source: National Renewable Energy Action Plan for Mali, national monitoring reports 2022 (based on the 2022 utility and electricity regulator reports)*

## 7.11. Status of Renewable Energy in Niger

In 2022, Niger had an electricity access rate of 20%, significantly below the 65% target set for 2030.

The installed capacity of grid-connected renewable energy in 2022 was 7 MW, compared to the target of 280 MW by 2030, representing an achievement rate of 2.5%. The share of renewable energy in the grid electricity mix was 3.1% in 2022, with a target of 58% for 2030.

In 2022, Niger had one operational grid-connected solar photovoltaic power plant (Malbaza) with a total capacity of 7 MW. Significant projects for grid-connected solar photovoltaic power plants are under construction and development in Niger. These projects are expected to increase the country's total installed capacity to 37 MW in 2023, with a projection of 300 MW by 2030.

The total electricity production in Niger in 2022 was 1,138.3 GWh. Electricity production from renewable sources was 11.24 GWh, compared to a target of 324 GWh by 2030. The share of renewable energy in electricity production in 2022 was 3.5%.

**"In 2022, Niger had 13 clean energy mini-grids with a total installed capacity of 0.5 MW.**

Table 22: Indicators on Renewable Energy in Niger

| Theme | NREAPs indicators | Results in 2022 | 2030 Targets |
|---|---|---|---|
| Acces to Electricity | Access rate to electricity | 20% | 65% |
| Grid-connected renewable energy targets. | **Electricity capacity installed** | | |
| | Renewable energy installed capacity in MW (excluding medium and large hydro) | 7 | 150 |
| | Renewable energy share of the total installed capacity in % (excluding medium and large hydro) | 3,1% | 31,0% |
| | Large and medium scale hydropower capacity installed in MW (more than 30 MW) | 0 | 130 |
| | Large and medium scale hydropower (more than 30 MW) share of total electricity generation in % | 0,0% | 27% |
| | Total renewable energy capacity in MW (including large and medium scale hydro) | 7 | 280 |
| | Renewable energy capacity installed share of the total installed capacity in % (including medium and large hydro) | 3,1% | 58,0% |
| | **Electricity Generation** | | |
| | Renewable energy electricity generation in GWh (excluding medium and large hydro) | 11,2 | 324,0 |
| | Renewable energy share in the electricity mix in % (excluding medium and large hydro) | 1,0% | 45% |
| | Large and medium scale hydropower generation in GWh (more than 30 MW) | 0,00 | 639,00 |
| | Large and medium scale hydropower generation (more than 30 MW) as share of electricity mix in % | 0,0% | 27% |
| | Total renewable energy generation in GWh (including medium and large hydro) | 11,24 | 963,00 |
| | Renewable energy generation share in the electricity mix in % (including medium and large hydro) | 1,0% | 15% |
| Off-grid renewable energy targets | Number of renewable/hybrid energy mini-grids | 13 | |
| | Total installed capacity of off-grid renewable energy (MW) | 0,5 | |

*Source: National Renewable Energy Action Plan for Niger, national monitoring reports 2022 (based on the 2022 utility and electricity regulator reports)*

## 7.12. Status of Renewable Energy in Nigeria

In 2022, Nigeria had an electricity access rate of 59%, compared to the 90% target set for 2030.

The installed capacity of grid-connected renewable energy in 2022 was 2,071.2 MW, against a target of 13,800 MW by 2030, representing an achievement rate of 15.0%. The share of renewable energy in the grid electricity mix was 14.5% in 2022.

The grid-connected renewable energy technologies in Nigeria include small hydroelectricity with a capacity of 94.8 MW, and medium and large hydroelectricity with a combined capacity of 1,976.4 MW. In 2022, Nigeria had no grid-connected solar photovoltaic plants. However, there are ongoing projects for the construction and development of solar photovoltaic power plants, which are expected to provide a total installed capacity of 275 MW by 2030.

The total electricity production in Nigeria in 2022 was 31,291.5 GWh. Electricity production from renewable sources amounted to 7,612.7 GWh, against a target of 49,766 GWh for 2030. The share of renewable energy in electricity production in 2022 was 24.3%.

**"In 2022, Nigeria had 135 clean energy mini-grids with a total installed capacity of 6.3 MW. These mini-grids produced 0.3 GWh of electricity, serving 31,474 households.**

Table 23: Indicators on Renewable Energy in Nigeria

| Theme | NREAPs indicators | Results in 2022 | 2030 Targets |
|---|---|---|---|
| Acces to Electri-city | Access rate to electricity | 59% | 90% |
| Grid-connected renewable energy targets. | **Electricity capacity installed** | | |
| | Renewable energy installed capacity in MW (excluding me-dium and large hydro) | 94,8 | 9100 |
| | Renewable energy share of the total installed capacity in % (excluding medium and large hydro) | 0,7% | 28,0% |
| | Large and medium scale hydropower capacity installed in MW (more than 30 MW) | 1976,4 | 4700 |
| | Large and medium scale hydropower (more than 30 MW) share of total electricity generation in % | 14,5% | 15% |
| | Total renewable energy capacity in MW (including large and medium scale hydro) | 2071,2 | 13800 |
| | Renewable energy capacity installed share of the total ins-talled capacity in % (including medium and large hydro) | 15,2% | 45,0% |
| | **Electricity Generation** | | |
| | Renewable energy electricity generation in GWh (excluding medium and large hydro) | 0,0 | 25402,0 |
| | Renewable energy share in the electricity mix in % (exclu-ding medium and large hydro) | 0,0% | 15% |
| | Large and medium scale hydropower generation in GWh (more than 30 MW) | 7 612,7 | 24 365,0 |
| | Large and medium scale hydropower generation (more than 30 MW) as share of electricity mix in % | 24,3% | 14% |
| | Total renewable energy generation in GWh (including me-dium and large hydro) | 7 612,7 | 49 766,0 |
| | Renewable energy generation share in the electricity mix in % (including medium and large hydro) | 24,3% | 31% |
| Off-grid re-newable energy targets | Number of RE mini-grids | 135 | |
| | Total installed off-grid renewable energy capacity (in MW) | 6,3 | |

*Source: National Renewable Energy Action Plan for Nigeria, national monitoring reports 2022 (based on the 2022 utility and electricity regulator reports)*

## 7.13. Status of Renewable Energy in Senegal

In 2022, Senegal had an electricity access rate of 76%, compared to the 100% target set for 2030.

The installed capacity of grid-connected renewable energy in 2022 was 515.7 MW, against a target of 632 MW by 2030, representing an achievement rate of 81.5%. The share of renewable energy in the grid electricity mix was 28.4% in 2022, compared to the 31.8% target for 2030.

The grid-connected renewable energy technologies in Senegal include the large-scale hydroelectricity of Sambangalou, the wind power from the Taiba N'Diaye Wind Farm, and 17 solar photovoltaic plants. Significant projects for the construction and development of grid-connected solar photovoltaic power plants are underway in Senegal, which will enable the country to achieve a total installed solar photovoltaic capacity of 604.1 MW by 2030.

The total electricity production in Senegal in 2022 was 5,908.3 GWh. Electricity production from renewable sources amounted to 867 GWh, against a target of 1,501 GWh for 2030. The share of renewable energy in electricity production in 2022 was 14.7%, compared to the 23% target for 2030.

> **"In 2022, Senegal had 181 clean energy mini-grids with a total installed capacity of 3.1 MW.**

Table 24: Indicators on Renewable Energy in Senegal

| Theme | NREAPs indicators | Results in 2022 | 2030 Targets |
|---|---|---|---|
| Acces to Electricity | Access rate to electricity | 76% | 100% |
| Grid-connected renewable energy targets | **Electricity capacity installed** | | |
| | Renewable energy installed capacity in MW (excluding medium and large hydro) | 399,7 | 407 |
| | Renewable energy share of the total installed capacity in % (excluding medium and large hydro) | 22,0% | 20,5% |
| | Large and medium scale hydropower capacity installed in MW (more than 30 MW) | 116 | 225 |
| | Large and medium scale hydropower (more than 30 MW) share of total electricity generation in % | 6,4% | 11% |
| | Total renewable energy capacity in MW (including large and medium scale hydro) | 515,7 | 632 |
| | Renewable energy capacity installed share of the total installed capacity in % (including medium and large hydro) | 28,4% | 31,8% |
| | **Electricity Generation** | | |
| | Renewable energy electricity generation in GWh (excluding medium and large hydro) | 381,0 | 709,0 |
| | Renewable energy share in the electricity mix in % (excluding medium and large hydro) | 6,4% | 5% |
| | Large and medium scale hydropower generation in GWh (more than 30 MW) | 486,0 | 792,0 |
| | Large and medium scale hydropower generation (more than 30 MW) as share of electricity mix in % | 8,2% | 8% |
| | Total renewable energy generation in GWh (including medium and large hydro) | 867,0 | 1 501,0 |
| | Renewable energy generation share in the electricity mix in % (including medium and large hydro) | 14,7% | 23% |
| Off-grid renewable energy targets | Number of RE mini-grids | 181 | |
| | Total installed off-grid renewable energy capacity (in MW) | 3,1 | |

*Source: National Renewable Energy Action Plan for Senegal, national monitoring reports 2022 (based on the 2022 utility and electricity regulator reports)*

## 7.14. Status of Renewable Energy in Sierra Leone

In 2022, Sierra Leone had an electricity access rate of 25%, significantly below the 92% target set for 2030. The installed capacity of grid-connected renewable energy in 2022 was 103 MW, compared to the target of 1,229 MW by 2030, representing an achievement rate of 8.4%. The share of renewable energy in the grid electricity mix was 51.0% in 2022, with a target of 65.3% for 2030.

In 2022, Sierra Leone did not have any grid-connected solar photovoltaic power plants. However, there are ongoing projects for the construction and development of solar photovoltaic plants, which will enable Sierra Leone to achieve an installed capacity of 25.7 MW of grid-connected solar photovoltaic by 2023, with a projected capacity of 156.6 MW by 2030.

The total electricity production in Sierra Leone in 2022 was 1,768 GWh. Electricity production from renewable sources amounted to 900.5 GWh, against a target of 6,686.7 GWh for 2030. The share of renewable energy in electricity production in 2022 was 51%.

**"In 2022, Sierra Leone had 6 clean energy mini-grids with a total installed capacity of 0.1 MW.**

Table 25: Indicators on Renewable Energy in Sierra Leone

| Theme | NREAPs indicators | Results in 2022 | 2030 Targets |
|---|---|---|---|
| Acces to Electricity | Access rate to electricity | 25% | 92% |
| Grid-connected renewable energy targets. | **Electricity capacity installed** | | |
| | Renewable energy installed capacity in MW (excluding medium and large hydro) | 10 | 293 |
| | Renewable energy share of the total installed capacity in % (excluding medium and large hydro) | 5,0% | 13,3% |
| | Large and medium scale hydropower capacity installed in MW (more than 30 MW) | 93 | 935 |
| | Large and medium scale hydropower (more than 30 MW) share of total electricity generation in % | 46,0% | 43% |
| | Total renewable energy capacity in MW (including large and medium scale hydro) | 103 | 1229 |
| | Renewable energy capacity installed share of the total installed capacity in % (including medium and large hydro) | 51,0% | 65,3% |
| | **Electricity Generation** | | |
| | Renewable energy electricity generation in GWh (excluding medium and large hydro) | 236,5 | 1265,8 |
| | Renewable energy share in the electricity mix in % (excluding medium and large hydro) | 13,4% | 10% |
| | Large and medium scale hydropower generation in GWh (more than 30 MW) | 664,0 | 5 371,0 |
| | Large and medium scale hydropower generation (more than 30 MW) as share of electricity mix in % | 37,6% | 44% |
| | Total renewable energy generation in GWh (including medium and large hydro) | 900,5 | 6 686,7 |
| | Renewable energy generation share in the electricity mix in % (including medium and large hydro) | 50,9% | 65% |
| Off-grid renewable energy targets | Number of RE mini-grids | 6 | |
| | Total installed off-grid renewable energy capacity (in MW) | 0,1 | |

*Source: National Renewable Energy Action Plan for Sierra Leone, national monitoring reports 2022 (based on the 2022 utility and electricity regulator reports)*

## 7.15. Status of Renewable Energy in Togo

In 2022, Togo had an electricity access rate of 58%, significantly below the 100% target set for 2030.

The installed capacity of grid-connected renewable energy in 2022 was 124.7 MW, compared to the target of 276.1 MW by 2030, representing an achievement rate of 45.2%. The share of renewable energy in the grid electricity mix was 37.6% in 2022, with a target of 45.3% for 2030.

Togo has 5 operational solar photovoltaic power plants with a total installed capacity of 50.6 MW, the largest of which is the Blitta 1 plant with a capacity of 50 MW. Significant projects for the construction and development of additional grid-connected solar photovoltaic plants are underway in Togo. These projects will enable the country to achieve a total installed capacity of 250.6 MW of solar photovoltaic power by 2030.

The total electricity production in Togo in 2022 was 786 GWh. Electricity production from renewable sources amounted to 158.5 GWh, against a target of 645.4 GWh for 2030. The share of renewable energy in electricity production in 2022 was 20.2%.

**"In 2022, Togo had 4 clean energy mini-grids with a total installed capacity of 0.6 MW.**

Table 26: Indicators on Renewable Energy in Togo

| Theme | NREAPs indicators | Results in 2022 | 2030 Targets |
|---|---|---|---|
| Acces to Electricity | Access rate to electricity | 58% | 100% |
| Grid-connected renewable energy targets. | **Electricity capacity installed** | | |
| | Renewable energy installed capacity in MW (excluding medium and large hydro) | 10 | 161,1 |
| | Renewable energy share of the total installed capacity in % (excluding medium and large hydro) | 3,0% | 26,5% |
| | Large and medium scale hydropower capacity installed in MW (more than 30 MW) | 114,7 | 115 |
| | Large and medium scale hydropower (more than 30 MW) share of total electricity generation in % | 34,6% | 19% |
| | Total renewable energy capacity in MW (including large and medium scale hydro) | 124,7 | 276,1 |
| | Renewable energy capacity installed share of the total installed capacity in % (including medium and large hydro) | 37,6% | 45,3% |
| | **Electricity Generation** | | |
| | Renewable energy electricity generation in GWh (excluding medium and large hydro) | 21,9 | 327,4 |
| | Renewable energy share in the electricity mix in % (excluding medium and large hydro) | 2,8% | 10% |
| | Large and medium scale hydropower generation in GWh (more than 30 MW) | 136,6 | 318,0 |
| | Large and medium scale hydropower generation (more than 30 MW) as share of electricity mix in % | 17,4% | 10% |
| | Total renewable energy generation in GWh (including medium and large hydro) | 158,5 | 645,4 |
| | Renewable energy generation share in the electricity mix in % (including medium and large hydro) | 20,2% | 20% |
| Off-grid renewable energy targets | Number of RE mini-grids | 4 | |
| | Total installed off-grid renewable energy capacity (in MW) | 0,6 | |

*Source: National Renewable Energy Action Plan for Togo, national monitoring reports 2022 (based on the 2022 utility and electricity regulator reports)*

# CONCLUSION

Despite significant progress in expanding access to sustainable energy, ECOWAS member states face substantial challenges in achieving the targets set forth in the ECOWAS Renewable Energy Policy (EREP) and the ECOWAS Energy Efficiency Policy (EEEP). The current electricity access rate stands at 57.4%, highlighting the need for considerable efforts to achieve universal access by 2030. In 2022, Niger, Guinea-Bissau, Sierra Leone, Burkina Faso, and Liberia recorded electricity access rates below 30%. Benin's access rate is below 50%. Mali, Guinea, Togo, Nigeria, Gambia, and Senegal have electricity access rates under 80%. In contrast, Côte d'Ivoire, Ghana, and Cabo Verde stand out with electricity access rates exceeding 80%.

Despite an increase in renewable energy capacity, its share in the overall electricity mix remains stagnant at 25.2%, far from the 48% target set for 2030 as outlined in the ECOWAS Renewable Energy Action Plan (EREP. Excluding large and medium hydroelectric plants, renewable sources contributed only 3%, well below the 19% target in EREP. Continued efforts are crucial in countries such as Guinea, Liberia, and Sierra Leone, which have made progress, while Benin, Niger, and Gambia need to accelerate their initiatives in this critical area.

From 2020 to 2022, the installed capacity of operational grid-connected solar power plants saw a notable growth of 47.4%, reaching 616 MW. Senegal (273.1 MW), Ghana (113.2 MW), Burkina Faso (64.1 MW), Togo (50.6 MW), and Mali (50.0 MW) stand out in this sector, holding 90% of the total installed capacity. The ongoing development of 140 new grid-connected solar power plants is projected to increase capacity to 5,243 MW by 2030, reflecting a growing ambition in deploying renewable energy in the region.

Regarding energy efficiency, although the 10% electricity distribution loss target was not achieved in 2020, it was observed that between 2020 and 2021, overall regional electricity loss improved from 31% to 27%. Liberia, in particular, made a substantial reduction from 56% to 47%, demonstrating significant efforts to enhance the efficiency of its distribution system.

Since 2018, there has been a strong penetration of efficient lighting through Solar Lanterns and Domestic Electrical Systems, with sales of these systems increasing by 66% between 2018 and 2022, reaching 727,000 units, with Nigeria accounting for 77% of the total sales volume.

Similar to efficient lighting, high-efficiency appliances have also seen substantial penetration in the region over the same period, with sales volumes increasing by 144% between 2019 and 2022, reaching 385,000 units, with Nigeria dominating the market with 72% of the total volume sold during the period.

In the region, only Nigeria has ISO 50001 certified industries. Nine Nigerian industries have obtained ISO 50001 certification, and an additional 11 companies have started applying this standard.

Moreover, 30 Nigerian companies, 3 Togolese companies, and 2 Guinean companies have reported implementing energy efficiency measures, such as energy audits and the modernization of certain equipment to achieve energy savings.

Efforts are also underway in countries such as Benin, Burkina Faso, Ghana, Mali, Senegal, Nigeria, Côte d'Ivoire, and Cabo Verde in the field of energy-efficient building construction. However, the lack of comprehensive national data remains a major constraint in assessing the penetration of energy-efficient buildings in the region.

> **"The lack of comprehensive national data on energy efficiency remains a major obstacle hindering progress, necessitating increased efforts for data collection and analysis throughout the region.**

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# ANNEX 1 : QUESTIONNAIRE

## Policy Tracking Information for «Country Name»

| 1a. General Information | | | | | |
|---|---|---|---|---|---|
| National Stats | Description | Units | 2021 | 2022 | Source |
| 1a.1 | Population | million | | | |
| 1a.2 | Rural Population | # | | | |
| 1a.3 | Urban Population | # | | | |
| 1a.4 | Number of Households | # | | | |
| 1a.5 | Number of Rural Households | # | | | |
| 1a.6 | Number of Urban Households | # | | | |
| 1a.7 | GDP | million US$ | | | |

| 1b. Electricity | | | | | |
|---|---|---|---|---|---|
| Capacities, Generation, Transfers | Description | Units | 2021 | 2022 | Source |
| 1b.1 | Total electricity generation capacity | MW | | | |
| 1b.2 | Total electricity generation | MWh | | | |
| 1b.3 | Imports | MWh | | | |
| 1b.4 | Exports | MWh | | | |
| Renewable Energy (RE) | Description | Units | | | |
| 1b.5 | RE capacity excl. Medium and large hydro | MW | | | |
| 1b.6 | RE capacity incl. Medium and large hydro | MW | | | |
| 1b.7 | RE generation excl. Medium and large hydro | MWh | | | |
| 1b.8 | RE generation incl. Medium and large hydro | MWh | | | |
| Solar Water Heaters (SWH) | Description | Units | | | |
| 1b.9 | Total Number of SWH | # | | | |
| 1b.10 | Number of Household SWH | # | | | |
| 1b.11 | Number of SWH in Public Institutions | # | | | |

| | | | | | |
|---|---|---|---|---|---|
| 1b.12 | Number of SWH in SMEs, Hotels, and Industries | # | | | |
| **Access to Grid** | **Description** | **Units** | | | |
| 1b.13 | Number of Connections to Grid | # | | | |
| 1b.14 | Connected Households | # | | | |
| 1b.15 | Connected Urban Households | # | | | |
| 1b.16 | Connected Rural Households | # | | | |
| **Losses** | **Description** | **Units** | | | |
| 1b.17 | Technical losses | % | | | |
| 1b.18 | Technical Losses (Transmission) | % | | | |
| 1b.19 | Technical Losses (Distribution) | % | | | |
| 1b.20 | Non-Technical losses | % | | | |
| 1b.21 | Commercial Lossess | % | | | |
| 1b.22 | Collection Losses | % | | | |
| **Minigrids** | **Description** | **Units** | | | |
| 1b.23 | Total Number of Minigrids | # | | | |
| 1b.24 | Number of Households Connected to Minigrids | # | | | |
| 1b.25 | Number of Rural Connections to Minigrids | # | | | |
| 1b.26 | Number of Urban Connections to Minigrids | # | | | |
| 1b.27 | Number of Standalone Systems | # | | | |
| 1b.28 | Capacity of Minigrids | MW | | | |
| 1b.29 | Energy from Minigrids | MWh | | | |
| 1b.29 | Energy from Minigrids | MWh | | | |

| 1c. BioEnergy | | | | | |
|---|---|---|---|---|---|
| **Cooking** | **Description** | **Units** | **2021** | **2022** | **Source** |
| 1c.1 | Households with Improved Cookstoves | # | | | |
| 1c.2 | Households with LPG Cooking Solutions | # | | | |
| 1c.3 | Households with Alternative Modern Fuels (Electricity) for Cooking | # | | | |
| **Production and Consumption of BioEnergy** | **Description** | **Units** | | | |
| 1c.4 | Total Charcoal Production | tons | | | |
| 1c.5 | Efficient Charcoal Production | tons | | | |
| 1c.6 | Fossil Fuel Production | tons | | | |
| 1c.7 | Biodesel Production | tons | | | |
| 1c.8 | Bioethanol Production | tons | | | |
| 1c.9 | Fossil Fuel Consumption | tons | 4 641 000 | 4 318 000 | Energy Commission. It does not include lean gas (natural gas) used in transformation. E.g. natural gas used for electricity generation |
| 1c.10 | Biodesel Consumption | tons | | | |
| 1c.11 | Bioethanol Consumption | tons | | | |

| 1d. Energy Efficiency | | | | | |
|---|---|---|---|---|---|
| **Efficiency Efficiency (EE)** | **Description** | **Units** | **2021** | **2022** | **Source** |
| **Lighting** | | | | | |
| 1d.1 | Total Number of Lamps | # | | | |
| 1d.2 | Number of Efficient Lamps | # | | | |
| 1d.3 | Number of Efficient Public Lamps Installed | # | | | |
| 1d.4 | Number of Efficient Lamps in the Private Sector | # | | | |

| | | | | | |
|---|---|---|---|---|---|
| 1d.5 | Number of Solar Street Lights Installed | # | | | |
| 1d.6 | Number of Policy Documents Related to EE Lighting | # | | | |
| 1d.7 | Total Number of Buildings | # | | | |
| 1d.8 | Number of Energy Efficient Buildings | # | | | |
| 1d.9 | Number of Energy Efficient Buildings in the Public Sector | # | | | |
| 1d.10 | Number of Energy Efficient Buildings in the Private Sector | # | | | |
| 1d.11 | Number of Certified EE Buildings | # | | | |
| 1d.12 | Number of Policy Documents Related to EE | # | | | |
| **Industries** | | | | | |
| 1d.13 | Total Number of Industries | # | | | |
| 1d.14 | Number of industries implementting ISO 50,001 | # | | | |
| 1d.15 | Number of certified Industries in ISO 50,001 | # | | | |
| 1d.16 | Number of Industries with EE Measures | # | | | |
| **Cooling** | | | | | |
| 1d.17 | Number of Air Conditioners | # | | | |
| 1d.18 | Number of Energy Efficient Air Conditioners Installed | # | | | |
| 1d.19 | Number of Inefficient ACs removed in the Public Sector | # | | | |
| 1d.20 | Number of Inefficient ACs removed in the Private Sector | # | | | |
| 1d.21 | Number of Policy Documents related to EE Air Conditioning | # | | | |
| 1d.22 | Number of Refrigerators | # | | | |

| | | | | | |
|---|---|---|---|---|---|
| 1d.23 | Number of Energy Efficient Refrigerators Installed | # | | | |
| 1d.24 | Number of Inefficient Refrigerators Removed | # | | | |
| 1d.25 | Number of other Inefficient Electrical Appliances Removed | # | | | |
| 1d.26 | Number of Policy Documents related to EE Cooling/Refrigeration | # | | | |
| **MEPS and Labels** | | | | | |
| 1d.27 | Number of MEPS for Electrical Appliances | # | | | |
| 1d.28 | Number of Electrical Appliances with EE Labels | # | | | |
| **Testing Facilties** | | | | | |
| 1d.29 | Number of Testing Facilities for Lighting | # | | | |
| 1d.30 | Number of Testing Facilities for Refrigeration | # | | | |
| 1d.31 | Number of Testing Facilities for Air Conditioning | # | | | |
| 1d.32 | Number of Testing Facilities for other Electrical Appliances | # | | | |
| 1d.33 | Number of Policy Documents related to Efficient ACs | # | | | |
| **E-Mobility** | | | | | |
| 1d.34 | Number of Electric Vehicles | # | | | |
| 1d.35 | Number of Electric Cars | # | | | |
| 1d.36 | Number of Electric Motor Cycles | # | | | |
| 1d.37 | Number of Electric Bicycles | # | | | |

# ANNEX 2 : QUESTIONNAIRE 2

**Renewable Energy Technology in «Country Name»**

| Name | Type | Capacity (MW) | Status | Conne-ction | Lon | Lat | Ownership | Year Com-mis sioned | Source |
|---|---|---|---|---|---|---|---|---|---|
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# ANNEX 3: QUESTIONNAIRE GUIDE

**Annual Report on the Implementation of NREAP, NEEAP and SE4ALL Action Agenda in Ghana**

This note guides how data in the templates on Sheets **Policy Tracker** and **Renewable Energy Info** should be filled. Each required information is hyperlinked to and from its relevant description in this guide.

**Notes on Inputs**

Input type are colour-coded as shown below

Type Inputs: decimals and percentages greater than or equal to zero.

Type Inputs: descriptions and sources

Select Inputs: laccepted range of inputs selectable from a drop-down list

The source of data may be supplied by the user and is common to all inputs.

Additional rows may be added to Sheet Renewable Energy Info if necessary.

Some cell validations have been added to each sheet, but care should be taken to enter accurate data with sources for additional validations.

**Sheet Policy Tracker**

*Relates with more information required to track the status of regional and national policies and actions on renewable energy, energy efficiency, and bioenergy in Ghana*

| 1a. | General Information | General information on national population, households and GDP |
|---|---|---|
| | National Stats | |
| | 1a.1 Population | The total number of people in the country, as cumulated in the respective year. |
| | 1a.2 Rural Population | The total number of people in the rural parts of the country, as cumulated in the respective year. |
| | 1a.3 Urban Population | The total number of people in the urban parts of the country, as cumulated in the respective year. |
| | 1a.4 Number of Households | The total number of households in the country, as cumulated in the respective year. |
| | 1a.5 Number of Rural Households | The total number of households in the rural parts of the country, as cumulated in the respective year. |
| | 1a.6 Number of Urban Households | The total number of households in the urban parts of the country, as cumulated in the respective year. |
| | 1a.7 GDP | The Gross Domestic Product of the country in the respective year. |

| 1b. | Electricity | Information relating with Electricity and the Renewable Energy Policy and Action Plans |
|---|---|---|
| | Capacities, Generation, Transfers | |
| | 1b.1 Total electricity generation capacity | The total electricity generation capacity, irrespective of source, in the respective year. |
| | 1b.2 Total electricity generation | The total energy output, irrespective of source, in the respective year. |
| | 1b.3 Imports | The total energy transferred *from* other countries in the respective year. |
| | 1b.4 Exports | The total energy transferred *to* other countries in the respective year. |
| | Renewable Energy (RE) | |
| | 1b.5 RE capacity excl. medium and large hydro | The MW renewable energy capacity without hydropower plants with capacities greater than 30MW, as cumulated in the respective year. |
| | 1b.6 RE capacity incl. medium and large hydro | The total MW renewable energy capacity, as cumulated in the respective year. |
| | 1b.7 RE generation excl. medium and large hydro | The MWh renewable energy generated without hydropower plants with capacities greater than 30MW, as cumulated in the respective year. |
| | 1b.8 RE generation incl. medium and large hydro | The total MWh renewable energy generated, , as cumulated in the respective year. |
| | Solar Water Heaters (SWH) | |
| | 1b.9 Total Number of SWH | The total number of solar water heaters in the respective year. |
| | 1b.10 Number of Household SWH | The total number of solar water heaters owned by households in the respective year. |
| | 1b.11 Number of SWH in Public Institutions | The total number of solar water heaters in public institutions, such as hospitals, in the respective year. |
| | 1b.12 Number of SWH in SMEs, Hotels, and Industries | The total number of solar water heaters in SMES, hotels, and industries in the respective year. |
| | Access to Grid | |
| | 1b.13 Number of Grid Connections | The cumulative number of grid connections in the respective year. |
| | 1b.14 Connected Households | The cumulative number of households connected to the grid in the respective year. |
| | 1b.15 Connected Urban Households | The total number of *urban* households connected to the grid in the respective year. |
| | 1b.16 Connected Rural Households | The total number of *rural* households connected to the grid in the respective year. |
| | **Losses** | **The technical and non-technical lossess in the electric grid.** |
| | 1b.17 Technical losses | The percentage of energy, delivered to the grid, that is lost when transferred across system components such as transmission and distribution lines, transformers and measurement systems. |
| | 1b.18 Technical Losses (Transmission) | The technical losses in the electricity transmission grid as a percentage of the total technical losses. |
| | 1b.19 Technical Losses (Distribution) | The technical losses in the electricity distribution grid as a percentage of the total technical losses. |
| | 1b.20 Non-Technical losses | The commercial and collection losses in the system. |
| | 1b.21 Commercial Lossess | The percentage of energy consumed but not billed. |
| | 1b.22 Collection Losses | The percentage of energy billed but not collected. |
| | **Minigrids** | **Minigrid information** |
| | 1b.23 Total Number of Minigrids | The total number of minigrids in the country, as cumulated in the respective year. |
| | 1b.24 Number of Households Connected to Minigrids | The total number of households connected to minigrids in the country, as cumulated in the respective year. |
| | 1b.25 Number of Rural Connections to Minigrids | The total number of connections to minigrids in the rural parts of the country, as cumulated in the respective year. |
| | 1b.26 Number of Urban Connections to Minigrids | The total number of connections to minigrids in the urban parts of the country, as cumulated in the respective year. |
| | 1b.27 Number of Standalone Systems | The total number of minigrids in the country, as cumulated in the respective year. |
| | 1b.28 Capacity of Minigrids | The MW capacity of the minigrids in the country, as cumulated in the respective year. |
| | 1b.29 Energy from Minigrids | The total MWh energy generation from minigrids in the country, in the respective year. |

| 1c. | BioEnergy | Information relating with the Bioenergy Policy and Action Plans |
|---|---|---|
| | Cooking | |
| A:1 | Households with Improved Cookstoves | The number of households using improved cookstoves (e.g. charcoal, wood, briquettes, pellets, biochar, etc), as cumulated in the respective ye |
| A:2 | Households with LPG Cooking Solutions | The number of households using Liquefied Petroleum Gas (LPG) for cooking, as cumulated in the respective year. |
| A:3 | Households with Alternative Modern Fuels for Cooking | The number of households using other modern solutions for cooking (e.g. solar, ethanol, electricity, etc.), as cumulated in the respective year. |
| | Production and Consumption of BioEnergy | |
| A:4 | Total Charcoal Production | The total charcoal produced in the country, espressed in tons, as cumulated in the respective year. |
| A:5 | Efficient Charcoal Production | The charcoal, in tons, produced with a kiln efficiency of at least 20%, , as cumulated in the respective year. |
| A:6 | Fossil Fuel Production | The annual fossil fuel produced in the respective year, espressed in tons. |
| A:7 | Biodesel Production | The annual biodiesel produced in the respective year, espressed in tons. |
| A:8 | Bioethanol Production | The annual bioethanolproduced in the respective year, espressed in tons. |
| A:9 | Fossil Fuel Consumption | The annual fossil fuel consumed in the respective year, espressed in tons. |
| A:10 | Biodesel Consumption | The annual biodiesel consumed in the respective year, espressed in tons. |
| A:11 | Bioethanol Consumption | The annual bioethanol consumed in the respective year, espressed in tons. |

| 1d. | Energy Efficiency | Information relating with the Energy Efficiency Policy and Action Plans |
|---|---|---|
| | Energy Efficiency Information | |
| Af:1 | Number of Lamps | The total number of efficient and inefficient lamps, as cumulated in the respective year. |
| Af:2 | Number of Efficient Lamps | The total number of efficient lamps, as cumulated in the respective year. |
| Af:3 | Number of Efficient Public Lamps | The total number of efficient public lamps, as cumulated in the respective year. |
| Af:4 | Number of Solar Street Lights Installed | The total number of solar street lights, as cumulated in the respective year. |
| Af:5 | Number of Buildings | The total number of buildings, as cumulated in the respective year. |
| Af:6 | Number of Energy Efficient Buildings | The number of Energy Efficient buildings (with ratings A or B), as cumulated in the respective year. |
| Af:7 | Number of Industries | The total number of industries, as cumulated in the respective year. |
| Af:8 | Number of Industries with EE Measures | The number of industries with energy efficiency measures, as cumulated in the respective year. |
| Af:9 | Number of Air Conditioners | The total number of refrigerators, as cumulated in the respective year. |
| Af:10 | Number of Energy Efficient Air Conditioners | The total number of energy-efficient refrigerators, as cumulated in the respective year. |
| Af:11 | Number of Refrigerators | The total number of air conditioners, as cumulated in the respective year. |
| Af:12 | Number of Energy Efficient Refrigerators | The total number of energy-efficient air conditioners, as cumulated in the respective year. |

| 1d. | Energy Efficiency | Information relating with the Energy Efficiency Policy and Action Plans |
|---|---|---|
| | Lighting | |
| 1d.1 | Total Number of Lamps | The total number of installed efficient and inefficient lamps, as cumulated in the respective year. |
| 1d.2 | Number of Efficient Lamps Installed | The total number of efficient and installed lamps, as cumulated in the respective year. |
| 1d.3 | Number of Efficient Public Lamps Installed | The total number of efficient and installed lamps in the private sector, as cumulated in the respective year. |
| 1d.4 | Number of Efficient Lamps Installed in the Private Sector | The total number of efficient and installed lamps in the public sector, as cumulated in the respective year. |
| 1d.5 | Number of Solar Street Lights Installed | The total number of solar street lights installed, as cumulated in the respective year. |
| 1d.6 | Number of Policy Documents Related to EE Lighting | |
| 1d.7 | Total Number of Buildings | The total number of buildings, as cumulated in the respective year. |
| 1d.8 | Total Number of Energy-Efficient Buildings | The number of energy-efficient buildings (with ratings A or B), as cumulated in the respective year. |
| 1d.9 | Number of Energy Efficient Buildings in the Public Sector | The number of energy-efficient buildings (with ratings A or B) in the public sector, as cumulated in the respective year. |
| 1d.10 | Number of Energy Efficient Buildings in the Private Sector | The number of energy-efficient buildings (with ratings A or B) in the private sector, as cumulated in the respective year. |
| 1d.11 | Number of Certified EE Buildings | The number of buildings certified to be enegy efficient by an appropriate licensing authority, as cumulated in the respective year. |
| 1d.12 | Number of Policy Documents Related to EE | The number of policies on energy efficiency, published and made available, as cumulated in the respective year. |
| | Industries | |
| 1d.13 | Total Number of Industries | The total number of industries, as cumulated in the respective year. |
| 1d.14 | Number of industries implementting ISO 50,001 | The total number of ISO50,001-compliant industries, as cumulated in the respective year. |
| 1d.15 | Number of certified Industries in ISO 50,001 | The total number of industries certified to be ISO50,001-compliant by an appropriate licensing authority in the respective year. |
| 1d.16 | Number of Industries with EE Measures | The total number of ISO50,001-compliant industries, as cumulated in the respective year. |
| | Cooling | |
| 1d.17 | Number of Air Conditioners | The total number of refrigerators installed, as cumulated in the respective year. |
| 1d.18 | Number of Energy Efficient Air Conditioners Installed | The total number of energy-efficient air-conditioners installed, as cumulated in the respective year. |
| 1d.19 | Number of Inefficient ACs removed in the Public Sector | The total number of inefficient air-conditioners that were uninstalled in the public sector, as cumulated in the respective year. |
| 1d.20 | Number of Inefficient ACs removed in the Private Sector | The total number of inefficient air-conditioners that were uninstalled in the private sector, as cumulated in the respective year. |
| 1d.21 | Number of Policy Documents related to EE Air Conditioning | The number of policies on energy efficiency for air conditioners, published and made available, as cumulated in the respective year. |
| 1d.22 | Number of Refrigerators | The total number of air-conditioners installed, as cumulated in the respective year. |
| 1d.23 | Number of Energy Efficient Refrigerators Installed | The total number of refrigerators installed, as cumulated in the respective year. |
| 1d.24 | Number of Inefficient Refrigerators Removed | The total number of energy-efficient refrigerators installed, as cumulated in the respective year. |
| 1d.25 | Number of other Inefficient Electrical Appliances Removed | The total number of energy-efficient refrigerators uninstalled, as cumulated in the respective year. |
| 1d.26 | Number of Policy Documents related to EE Cooling/Refrigeration | The number of policies on energy efficiency for cooling and air-conditioners, published and made available, as cumulated in the respective year. |
| | MEPS and Labels | Minimum Energy Performance Standards (MEPS) and Labels |
| 1d.27 | Number of MEPS for Electrical Appliances | The number of minimum energy performance standards that were made for electrical appliances, as cumulated in the respective year. |
| 1d.28 | Number of Electrical Appliances with EE Labels | The number of electrical appliances that have labels denoting their energy efficiciency ratings, as cumulated in the respective year. |
| | Testing Facilities | |
| 1d.29 | Number of Testing Facilities for Lighting | The number of facilities that have been set up for testing the energy efficiency of appliances relating to lighting, as cumulated in the respective ye |
| 1d.30 | Number of Testing Facilities for Refrigeration | The number of facilities that have been set up for testing the energy efficiency of appliances relating to refrigeration, as cumulated in the respecti |
| 1d.31 | Number of Testing Facilities for Air Conditioning | The number of facilities that have been set up for testing the energy efficiency of appliances relating to air-conditioning, as cumulated in the resp |
| 1d.32 | Number of Testing Facilities for other Electrical Appliances | The number of facilities that have been set up for testing the energy efficiency of appliances relating to electrical applicances with the exception c |
| 1d.33 | Number of Policy Documents related to Efficient ACs | The number of policies on energy efficiency for air conditioners, published and made available, as cumulated in the respective year. |
| | E-Mobility | |
| 1d.35 | Number of Electric Vehicles | The total number of electric mobility/vehicles, as cumulated in the respective year. |
| 1d.36 | Number of Electric Cars | The total number of electric cars in the country, as cumulated in the respective year. |
| 1d.37 | Number of Electric Motor Cycles | The total number of electric motorcycles in the country, as cumulated in the respective year. |
| 1d.38 | Number of Electric Bicycles | The total number of electric biocycles in the country, as cumulated in the respective year. |

# ANNEX 4 : LIST OF PARTICIPANTS

| N° | Country | Full Name | Institution | Focal Point |
|---|---|---|---|---|
| 1 | Algeria | Yagouba Traore | AFREC | Head of Energy Policy, Planning and Strategy |
| 2 | Benin | Mawufemo MODJINOU | WAPP | Project Coordinator |
| 3 | Benin | Pascal Sourougnon DEGBE-GNON | General Directorate of Energy Resources / Ministry of Energy | Data Focal Point |
| 4 | Burkina Faso | Boubakar Thierry OUE-DRAOGO | Ministry of Environment, Energy, Water, and Sanitation | Data Focal Point |
| 5 | Cabo Verde | Jaqueline Marizia Amado de Pina | National Directorate of Industry, Commerce and Energy | Data Focal Point |
| 6 | Cote D'Ivoire | Angui Sylvain KOBENAN | Ministry of Petroleum, Energy, and Renewable Energies | Data Focal Point |
| 7 | The Gambia | Samba JALLOW | Ministry of and Petroleum | Data Focal Point |
| 8 | Ghana | Salifu Addo | Energy Commission of Nigeria | Data Focal Point |
| 9 | Guinea Bissau | Kassimo Cunha BORIS | | Data Focal Point |
| 10 | Guinea | Alpha Ibrahim DIALLO | Ministry of Energy, Hydraulics, and Hydrocarbons | Data Focal Point |
| 11 | Liberia | Monyan K. FLOMO | Ministry of Mines and Energy | Data Focal Point |
| 12 | Mali | Oumar Alassane MAIGA | National Directorate of Energy | Data Focal Point |
| 13 | Niger | Mamoudou Mory | Ministry of Energy and Renewable Energies | Data Focal Point |
| 14 | Nigeria | Arkadius Koumoin | ECOWAS Commission | PO Energy |
| 15 | Nigeria | Salim Chitou | ECOWAS Commission | ECOWAS SIE EXPERT |
| 16 | Nigeria | Temitope Olusegun DINA | Federal Ministry of Power | Data Focal Point |
| 17 | Senegal | Fatou Thiam Sow | Ministry of Petroleum and Energies | Data Focal Point |
| 18 | Sierra Leone | Benjamin Kamara | Ministry of Energy | Data Focal Point |
| 19 | Togo | Hodabalo ASSIH | General Directorate of Energy | Data Focal Point |

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ECOWAS Centre for Renewable Energy and Energy Efficiency (ECREEE)
Address: Achada Sto António C.P 288, Praia - Cabo Verde
Tel: (+238) 260 4630
mail: info@ecreee.org

www.ecreee.org

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