



GENERAL ENERGY ACCESS IN THE ECOWAS REGION

**TOWARDS UNIVERSAL ENERGY ACCESS PARTICULARLY IN
RURAL AND PERI-URBAN AREAS OF THE ECOWAS REGION:
APPROACHES, OPPORTUNITIES AND CONSTRAINTS**

Final Report

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ACRONYMS

UNDP	United Nations Development Programme
MDG	Millennium Development Goal
ECOWAS	Economic Community of West African States
UN	United Nations
ENDA-TM	Environment Development Action in the Third World
UEMOA	Union Économique et Monétaire Ouest Africaine
ECREEE	Regional Centre for Renewable Energy and Energy Efficiency
MDGs	Millennium Development Goals
LPG	Liquefied petroleum gas
BAU	Business as usual
LDC	Least Developed Countries
UN RCs	United Nations Regional Commissions
REC	Regional Economic Community
GEF	Global Environment Facility
PRSP	Poverty Reduction Strategy Paper
SSA	Sub-Saharan Africa
GDP	Gross domestic product
HIPC	Heavily Indebted Poor Country
OECD	Organisation for Economic Co-operation and Development
WEO	World Energy Outlook
DC	Developing countries
NES	National Electricity Scheme
WAMU	West African Monetary Union
ADC	Austrian Development Cooperation
NMC	National Multisectoral Committee
2IE	Institut International d'Ingénierie de l'Eau et de l'Environnement
GIZ	Deutsche Gesellschaft für Internationale Zusammenarbeit
EREF	ECOWAS Renewable Energy Facility
UNIDO	United Nations Industrial Development Organization
RE	Renewable energy
SHEP	Self-Help Electrification Project
RET	Renewable energy technologies
USD	United States dollar
IMF	International Monetary Fund
ZEM	Zones d'électrification multisectorielle
PCASER	Projets de Candidatures Spontanées d'Électrification Rurale

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EXECUTIVE SUMMARY

Energy access situation

Access to clean energy in developing countries is one of overarching goals of the United Nations to eradicate poverty and improve rural infrastructure development to achieve the Millennium Development Goals (MDGs) by 2015. Energy is the source of all life, so modern energy can be the source of a better life for all. Modern energy services are crucial to human well-being and to a country's economic development; and yet globally over 1.3 billion people are without access to electricity and 2.7 billion people are without clean cooking facilities. More than 95% of these people are either in sub-Saharan Africa or developing Asia and 84% are in rural areas.

In the Economic Community of West African States (ECOWAS) region, the energy access situation is alarming, with 13 of its 15 member states currently categorised as Least Developed Countries (LDCs). In 2010, the total population in the ECOWAS region was estimated at 300 million people, two-thirds of which live in three countries, namely Nigeria, Ghana and Côte d'Ivoire, which also are the most advanced economies of the region. In 2009, it was estimated that approximately 70% of the population—approximately 176 million people—lived without access to electricity. In 2005, according to the ECOWAS White Paper for Access to Energy, “energy poverty” was a common characteristic of all member states, and it was estimated that more than 75% of the population was deprived of electricity. With regards to access to modern cooking facilities, the access situation is worse than that of electricity access. In the ECOWAS region, Nigeria only has over 100 million people without access to clean cooking facilities. When extrapolated to the fifteen ECOWAS member countries, where more than 60% of the population relies on traditional fuels to cook, it is estimated that by 2015 more than 200 million people will be deprived of modern cooking facilities. As far as access to mechanical energy is concerned, it had not been given any attention until recently. As a result, less than 1% of rural localities in the region have access to motive power to support their economic activities.

The lack of financing to build appropriate infrastructures to transform the market for modern energy services worsens the energy access situation in the ECOWAS region. This is particularly true when considering the huge number of countries in the region classified as Least Developed Countries (LDCs) by the United Nations. Under a business-as-usual (BAU) scenario with respect to modern energy access and in the absence of innovative and predictable financing mechanisms for energy access by governments and development partners, by 2015 more than 200 million people will still live without access to modern energy services, although proven appropriate technologies exist.

Approaches and constraints

Over the past two decades, at the national level, most ECOWAS member countries made efforts to create an adequate policy environment to improve access to modern energy services to populations, mainly those living in rural and peri-urban areas. Some countries in the region have integrated access to modern energy services into national plans such as the Poverty Reduction Strategy, a national energy policy or a renewable energy policy. Moreover, they have also set clear

national policy targets with regards to access to electricity over a time horizon. However, it is worth noting that almost all ECOWAS member states have not yet set specific targets for access to modern cooking fuels, improved cooking stoves and mechanical power. In addition, no country has set a specific target for reducing the share of the population relying on traditional biomass.

The existing policies are based mainly on national projects/programmes as well as subsidies for electricity, modern fuels and cooking technologies to increase access rate. In addition to national programmes and subsidies, few countries have put in place other mechanisms such as dedicated funds for renewable energy technologies research and development, tax exemptions on imported renewable energy equipment, energy-efficient lighting bulbs and modern off-grid lighting products, or financial support to private developers through rural electrification funds.

As far as technology is concerned at the national level, most countries in the region have shifted their attention from on-grid electrification to renewable energy technologies to provide access to un-electrified households in the short and medium term. As a result, renewable energies (RE) are becoming a more and more important strategic component for many countries' diversification of their national energy supply, particularly in the rural and peri-urban areas.

At a regional level, in an attempt to alleviate the challenges of energy access, especially in the rural and peri-urban populations, the ECOWAS/UEMOA White Paper was initiated as a Regional Policy on Access to Energy Services for Rural and Peri-urban Populations in the ECOWAS Region. The objective of the policy is to ensure access to modern energy services to at least half the population living in rural and peri-urban areas by 2015. As part of the implementation of this decision, this paper intends to contribute to the implementation of the ECOWAS White Paper by reviewing the energy access situation and various available energy access options, especially utilization of renewable energy and energy efficiency technologies; and to define and adopt regional intervention strategies for using renewable energy and energy efficiency to increase access to energy in the region.

To expand modern energy services to populations living without access, international aid agencies such as the United Nations (UN) development agencies and multilateral financing institutions (IFIs) assist ECOWAS member countries, using different approaches which are mainly based on public and private sector involvement to transform the market for modern energy technologies and services.

Despite the efforts mentioned above, mainly at the national level, the pace of access to modern energy services in several countries in the region has been slowed because of constraints such as inappropriate or poor implementation of policies, targets and regulations. The existence of comprehensive policy frameworks for the promotion of modern energy services and incentive instruments such as tax reliefs are needed for favourable market conditions and proper dissemination of modern energy technologies and services in peri-urban and rural areas of the ECOWAS states.

Recommendations and way forward

Based on the prevailing energy access conditions in the ECOWAS member countries and on constraints, some recommendations are made for a sustainable promotion of modern energy services to achieve universal access in the region. The recommendations include the following:

1) Political participation

A strong political participation is a prerequisite for the achievement of universal access to modern energy services by populations in ECOWAS member countries. It is crucial for governments in the region to recognize the urgency of their populations' needs, and set modern energy access as a political priority. Setting targets for electricity, modern cooking facilities and motive power is a necessary step to provide a framework for tracking progress and accountability.

2) Capacity building

The energy access level in the region is low because stakeholders lack the capacity to provide appropriate modern energy technologies and services. Therefore, there is a need to build the capacity of policy makers and planners and relevant government officials in energy access strategy and policy formulation, implementation and monitoring. Also, it will be necessary to inform and build the capacity of local banks and micro-finance institutions in products regarding modern energy services. Another way of building the capacity of relevant stakeholders would be to encourage the exchange, promotion and dissemination of experiences, between member countries, relating to energy services in local production of energy goods and services using renewable resources.

3) Subsidies to low income households

To overcome the barrier of the initial capital cost of gaining access to some types of modern energy services, subsidies for low income and very poor households will be required at a later stage to reach people who live under the poverty line. In fact, subsidizing these households is also a question of social equity as electricity and kerosene are currently cross-subsidised, which benefits rich households in urban areas who can afford the products even without subsidy schemes. ECOWAS can help its member countries by providing them with the appropriate policy advice and technical support to design and implement an adequate subsidy scheme to expand modern energy services to populations, mainly the poorest.

4) Creation of an enabling environment for private sector participation

Private sector investment needs to grow the most. Therefore, it is recommended that national governments adopt strong governance and regulatory frameworks and engage in internal capacity building to support private sector development of commercial markets for modern energy technologies and services.

5) International partnerships

International aid will be crucial to subsidise investments in the production and distribution of both electricity and clean cooking fuels. International aid will also be important to build the capacity and create an institutional system that integrates these different areas over the long term and addresses climate change simultaneously. Therefore, it is recommended to strengthen internal cooperation with international UN agencies such as UNDP, UNEP, other UN RCs as well as international donors such as the GEF and the World Bank, to mention a few.

INTRODUCTION

The Economic Community of West African States (ECOWAS) was created in May 1975 when all West African countries signed the Treaty of Lagos with the aim to promote economic integration. Today, ECOWAS stands as one of the most dynamic Regional Economic Community (REC) of the continent. The ECOWAS member states have been engaged since 2005 in a regional effort to fight poverty and increase access to basic services for rural and peri-urban populations, especially the poor, in order to improve their living conditions and achieve the Millennium Development Goals (MDGs) by 2015. By adopting, in January 2006, the regional policy on access to energy services for populations in rural and peri-urban areas for poverty reduction, ECOWAS member states formally recognized the central role of expanding access to modern energy for development and poverty alleviation.

As part of its efforts to support the implementation of the regional policy, the UNDP Regional Energy Poverty Programme in cooperation with the ECOWAS Regional Centre for Renewable Energy and Energy Efficiency (ECREEE) launched this study to map the energy access situation in the ECOWAS region, with a focus on rural and peri-urban areas, which have the lowest levels of access to modern energy services. This study covers all the member countries—Benin, Burkina Faso, Cape Verde, Côte d'Ivoire, the Gambia, Ghana, Guinea, Guinea-Bissau, Liberia, Mali, Niger, Nigeria, Senegal, Sierra Leone and Togo. It is worth mentioning that the majority of the countries mentioned above are among the poorest nations in the world, with a very low access to modern energy services at a national level.

Data on energy access used in this report were collected for all ECOWAS countries. Information on modern energy access policies, targets and issues was gathered from government publications such as national Poverty Reduction Strategy Papers (PRSPs), MDG reports, national planning documents, sectorial master plans and policy documents, and global and regional review documents.

The current report presents an overall profile of modern energy services in ECOWAS member countries and gives some recommendations of appropriate policies and approaches for promoting sustainable access to modern energy services in the region. The report is structured as described hereafter. First, it presents the general situation and scenarios for energy access in the region. Second, it presents the implementation status of the ECOWAS/UEMOA White Paper for access to energy services, after which it describes energy access approaches and policies and the related successes and constraints in their implementation in the region. Third, the report presents the financing issues and the barriers to the scale-up of modern energy services. Finally, it summarizes the different approaches identified, and provides recommendations for achieving universal access to modern energy services in the region.

1 GENERAL ENERGY ACCESS SITUATION AND SCENARIOS

1.1 GENERAL ENERGY ACCESS SITUATION

1.1.1 Background

The total population of the Economic Community of West African States (ECOWAS) was 300 million in 2010, representing 35% of the total population of sub-Saharan Africa (SSA).¹ Three countries—Nigeria, Ghana and Côte d'Ivoire—alone accounted for two-thirds of this total. Table 1 shows the overview of the National Social and Economic Indicators of the ECOWAS region.

Table 1: Overview of National Social and Economic Indicators of the ECOWAS region

Country	Population ² in millions (2010)	Rural population ³ (% of total population)	Population below poverty line ⁴ (%)	Current GDP ⁵ (US\$ 1,000,000 in 2010)	GDP ⁶ growth (% in 2010)	HDI rank ⁷ (2010 ranking)
Benin	8.8	58	37.4	6,633	3	134
Burkina Faso	16.5	80	46.4	8,820	9.2	161
Cape Verde	0.5	39	30	1,648	5.4	118
Côte d'Ivoire	19.7	50	42	22,780	3	149
The Gambia	1.7	42	39.6	807	5	151
Ghana	24.4	49	29	31,306	6.6	130
Guinea	10.0	65	30.5	4,511	1.9	156
Guinea-Bissau	1.5	70	51.6	879	3.5	164
Liberia	4.0	39	80	986	5.5	162
Mali	15.4	67	25.5	9,251	4.5	160
Niger	15.5	83	63	5,549	8.8	167
Nigeria	158.4	50	43.1	193,669	7.9	142
Senegal	12.4	57	35.1	12,954	4.2	144
Sierra Leone	5.9	62	47	1,905	4.9	158
Togo	6.0	57	36.8	3,153	3.4	139
ECOWAS	300	57.87	42		5.1	
SSA	856	60⁸				
World	6,900	44				

In 2010, the average percentage of the rural population in the region was about 58%, with variations ranging from 39% in Liberia and Cape Verde to 83% in Niger. This reflects the fact that the region's cities are attracting more and more people, since they offer better living conditions and

¹ Estimates based on the United Nations, department of Economic and Social Affairs, 2010 at <http://esa.un.org/unpd/wpp/Excel-Data/population.htm>

² National data taken from <http://esa.un.org/unpd/wpp/Excel-Data/population.htm>

³ Data taken from https://www.cia.gov/library/publications/the-world-factbook/wfbExt/region_afr.html

⁴ <http://data.un.org/Data.aspx?d=MDG&f=seriesRowID%3A582>

⁵ <http://data.worldbank.org/data-catalog/>

⁶ Ibid

⁷ http://hdr.undp.org/en/media/HDR_2010_EN_Table1_reprint.pdf

⁸ Taken from <ftp://ftp.fao.org/docrep/fao/010/i0132e/i0132e03a.pdf>

greater potential for economic activity. According to estimates, 50% of the population will live in urban areas by 2015, compared to around 42% today. Though this is still a lower ratio than in other developing countries (the rate stands at 70% in Latin America), absolute demographic pressure is still high. It is estimated that by 2015, the population of the ECOWAS region will have risen to 320 million, thus experiencing one of the highest annual growth rates in the world, that is, 2.65%, compared to an average of 1.5% in India and 0.5% in China.

The challenges facing ECOWAS will be considerable given that 13 of its 15 nations are currently categorised as Least Developed Countries (LDCs). These nations are also among the Heavily Indebted Poor Countries (HIPC). There are 13 ECOWAS member countries that qualify for support from the HIPC Initiative. All of ECOWAS member countries, except Cape Verde and Ghana, rank below 130 according to the 2010 ranking of the Human Development Index, with Niger ranking 167 out of 169 countries. In 2010, the average GDP growth rate in the ECOWAS region was 5.1%, with variations ranging from 1.9% in Guinea to 9.2% in Burkina Faso. However, more than 40% of the total population in the region is still living below the poverty line and lacks access to energy services to meet their basic human needs.

1.1.2 Energy access situation in the world

Expanding access to modern energy services is an enormous challenge in West Africa, especially for LDCs, which have the lowest levels of access to modern energy. On a global level, more than 95% of the people living without access to modern energy services are either in sub-Saharan Africa or developing Asia, and 84% are in rural areas⁹. Conversely, the near majority of the people living in Organisation for Economic Co-operation and Development (OECD) countries have access to modern energy services.

The International Energy Agency's World Energy Outlook (WEO) 2008 estimated that the total population without access to electricity was 1.456 million out of a total world population of 6.692 million, which represents a percentage of 21.76%. More specifically, in 2008, in OECD and transition economies, the total population without access to electricity was estimated at only 3 million out of a total of 1.507 million in this region, which represents a percentage of 99.8%. Moreover, in developing countries, the total population without electricity was estimated at 1.453 million people out of a total of 5.185 million people, which represents a percentage of 72%. However, in least developed countries (LDCs) and sub-Saharan Africa, where there is a significant number of people without access to electricity, the situation is far worse than what has just been described above for other regions of the world. Table 2 shows an overview of global electricity access in 2008.

⁹ IEA, *World Energy Outlook*, 2011 Edition: *ENERGY FOR ALL – Financing access for the poor*.

Table 2: Electricity Access Overview in the World in 2008¹⁰

Regions	Total population (in millions)	Electrification rates (%)	Total population without electricity access (in millions)	Percentage of people without access to electricity (%)
World	6,692	78.20%	1456	21.76%
OECD and transition economies	1,507	99.80%	3	0.20%
Other developing countries	3,584	92.83%	257	7.17%
Least Developed Countries	824	21.00%	635	77.06%
Sub-Saharan Africa	777	26.00%	561	72.20%

Access to electricity also varies dramatically among regions within the same country especially in SSA. In fact, in rural areas of these countries, access to electricity is significantly lower than in urban areas. In 2008, the WEO estimated that 87% and 89% of rural population lacked access to electricity in LDCs and SSA respectively while the population without access to electricity represents only 41% in DCs.¹¹

Like electricity, access to modern fuels¹² for cooking is very limited in LDCs and SSA, and varies across rural and urban areas within the same country. For example, in 2007, in Developing Countries (DCs) overall, more than 40 per cent of people relied on modern fuels. However, in LDCs and sub-Saharan Africa, only 9% and 17%, respectively, have access to modern fuels.¹³

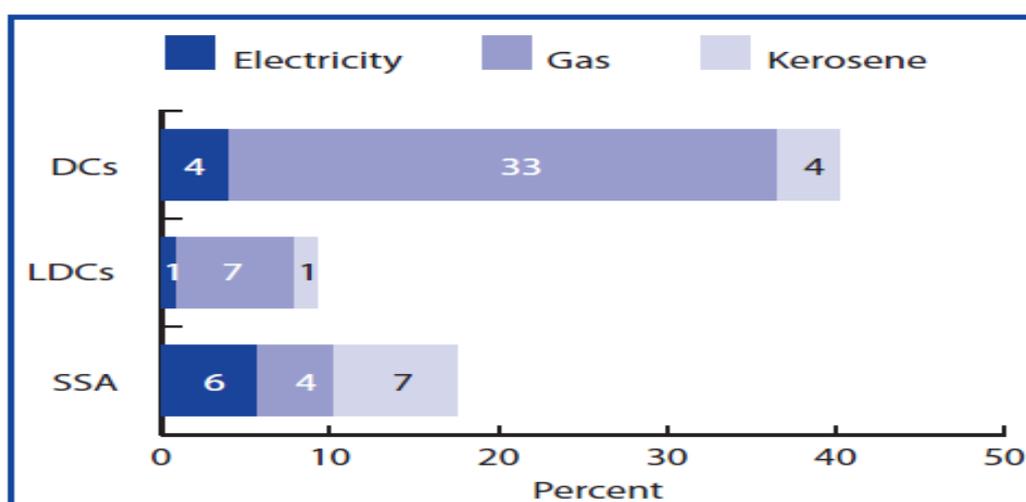


Figure 1: Percentage of Population with Access to Different Types of Modern Fuels in DCs, LDCs and SSA¹⁴ in 2007¹⁵

¹⁰ Adapted from WHO and UNDP, *The Energy Access Situation in Developing Countries*, 2011, at http://content.undp.org/go/cms-service/stream/asset/?asset_id=2205620.

¹¹ *Ibid.*

¹² According to the UNDP, the term *modern fuels* refers to electricity, liquid fuels (such as kerosene), and gaseous fuels (such as liquefied petroleum gas (LPG) and natural gas), and excludes traditional biomass and coal.

¹³ Adapted from WHO and UNDP, *The Energy Access Situation in Developing Countries*, 2011, at http://content.undp.org/go/cms-service/stream/asset/?asset_id=2205620

¹⁴ Based on UNDP's classification of Developing Countries (DCs) and the UN's classification of LDCs. There are 50 LDCs and 45 SSA countries, with 31 countries belonging to both categories.

Figure 1 suggests that, in LDCs and SSA, a very low percentage (7% and 4% respectively) of people have access to gas while only 1% and 7% respectively have access to kerosene. It is worth noting that there is a large gap between access to modern fuels in rural and urban areas. In fact, in LDCs and SSA, 3% and 5% of the rural population respectively have access to modern fuels while 27% and 42% of the urban population respectively have access to these fuels.¹⁶

1.1.3 Energy access situation in the ECOWAS region

The energy access situation in the ECOWAS region is characterized by a very low energy consumption level. This reflects the insufficient access to modern energy services, including electricity and modern fuels, which are crucial to developing economic activities and reducing poverty levels. Table 3 shows the electricity access rate in the ECOWAS region in 2009.

Table 3: Electricity Access Rate in the ECOWAS Region in 2009¹⁷

Country	Electrification rate (%)	Population living without electricity in 2009
Benin	24.8	6,655,119
Burkina Faso	14.6	14,064,282
Cape Verde	87	64,480
Côte d'Ivoire	47.3	10,401,821
The Gambia	15.0	1,469,135
Ghana	66.7	8,122,477
Guinea	15.0	8,484,352
Guinea-Bissau	15.0	1,287,940
Liberia	15.0	3,395,000
Mali	18.0	12,603,243
Niger	8.0	14,270,997
Nigeria	50.6	78,261,052
Senegal	42.0	7,211,562
Sierra Leone	15.0	4,987,406
Togo	22.0	4,701,682
ECOWAS	30.4	176,000,000

It is evident from Table 3 that only seven out of 15 countries in the ECOWAS region had electricity access rate above 20% in 2009. These were Togo, Senegal, Nigeria, Ghana, Côte d'Ivoire, Cape Verde and Benin, with Cape Verde and Ghana having the highest electricity access rates (84% and 66% respectively) in the region. The high electricity access rate in Ghana was probably due to the successful implementation of its National Electricity Scheme (NES) mentioned earlier in this

¹⁵ Adapted from WHO and UNDP, *The Energy Access Situation in Developing Countries*, 2011, at http://content.undp.org/go/cms-service/stream/asset/?asset_id=2205620, p.12.

¹⁶ *Ibid.*

¹⁷ Electricity access rates for the Gambia, Guinea and Guinea-Bissau have been extrapolated from the 2002 rates (5% for each country) published in the ECOWAS White Paper for a Regional Policy, p.16. The Mali access rate used herein resulted from the extrapolation of the 2006 data (16.6%) published in the Quatrième enquête démographique et de la santé au Mali. The electricity access rate for Sierra Leone was estimated at 10% in 2004 (see http://www.uneca.org/eca_resources/conference_reports_and_other_documents/sdd/cemrats_study.pdf). It has therefore been extrapolated to come up with an access rate of 15% in 2009. The access rate data of the rest of the countries was taken from http://www.worldenergyoutlook.org/database/electricity/electricity_access_database.htm; data of Cape Verde according to reports of the national utility ELECTRA.

document. The average electricity access rate in the region as a whole was estimated at 30.4% in 2009, while it was less than 20% in 2002.¹⁸ It is worth noting that this table masks the disparities between urban and rural areas. In fact, in the rural areas of most of the member countries, where the poor are mostly found, household electricity access is lower than 5%.

On the other hand, urban household electricity access can even be higher than 70%, such as in Côte d'Ivoire, Ghana, Nigeria and Senegal with 78%, 85%, 70% and 75% respectively.¹⁹ The lower access level of the rural areas in most ECOWAS member countries is partly due to the high level of poverty of local communities and the underdevelopment of the electricity supply infrastructure.

In most countries of the region, biomass energy contributes to more than 80% of the final energy consumption; hence, access to modern fuels is still very limited, with very low access rates to LPG. The populations, which are mainly concentrated in rural and peri-urban areas, rely on traditional biomass for cooking and heating, with the related environmental consequences. The rates of access to LPG are lower than 5% in all other member countries apart from Senegal, which is seen as a very advanced country in the LPG field.²⁰ As already mentioned, the success of Senegal in improving access to LPG was due to its butanization programme, which aimed at encouraging the use of LPG by providing incentives to end users.

1.1.4 Issues and challenges

Achieving the MDGs by 2015 in sub-Saharan African countries and especially in ECOWAS member countries requires that at least half the population of rural and peri-urban areas have access to modern energy services, which play a key role in achieving economic and social development. To support social and economic development, ECOWAS member countries have undertaken some investment programmes in the energy sector to improve access to modern energy services for their population. These countries still face common and similar issues and challenges in terms of access to modern energy services. These challenges are: (i) the low rate of access to modern energy services, (ii) the large gap of modern energy access between urban and rural areas, (iii) the lack of an adequate institutional and regulatory framework that offers incentives for new energy service providers and protection for investors, (iv) the heavy dependence on oil products for power generation and even for lighting in rural areas, (v) the barriers to the development of local and renewable energy sources, (vi) the lack of a strong political support in order to achieve energy efficiency and the lack of national access to energy targets.

1.2 HISTORICAL DEVELOPMENT OF ENERGY ACCESS

Prior to the 1990s, in the different ECOWAS member countries, past modern energy access initiatives typically concentrated on an approach of centralized electricity systems which consisted of connecting cities, villages and settlements to a national grid owned and operated by public

¹⁸ See the *ECOWAS White Paper for a Regional Policy*, p.16.

¹⁹ See *World Energy Outlook*, 2008 at

http://www.worldenergyoutlook.org/database_electricity/electricity_access_database.htm.

²⁰ ECOWAS, *White Paper for a Regional Policy on Energy Access*, 2005.

electricity utilities. As a result, most of the population settlements in rural areas could not access electricity. In fact, remote areas faced high transmission and distribution costs because of low densities and demand levels. In addition, the capacity of power lines were inefficiently used because of low population densities; and the line losses tended to be high.

Afterwards, during the 1990s, a decentralized approach as an alternative to modern energy access by the population was applied. This received more policy attention because of the awareness about the correlation between modern energy services and key elements of poverty such as low education levels and restricted opportunities for subsistence activities. In addition, in 2000, the ECOWAS member countries committed to the implementation of the Millennium Development Goals (MDGs), which are internationally agreed-on targets to reduce poverty by 2015. Achieving all of the MDGs in these countries will require much greater energy inputs and access to modern energy services. Failure to include energy considerations in national MDG strategies and development planning frameworks will severely limit the ability to achieve the MDGs. Therefore, at a national level, most of the ECOWAS member countries undertook reforms²¹ with a focus only on the energy sector in response to the issue of providing greater access to modern energy services.

In the electricity sub-sector, reforms were undertaken to change the prevailing regulations (laws and codes) and modes and forms of company ownership (privatization) with a view to increasing sub-sector financial viability. Companies of the electricity sub-sector that were until then entirely or mostly state-owned have since been opened up to private holdings through public-private partnerships. Beyond each member country's specificity, market segmentation between urban and rural areas has led to the creation of agencies which cater specifically for modern energy access development.

Regarding domestic cooking fuels, in some member countries, changes related to traditional domestic fuels are recorded in the Domestic Fuel Strategies, whose goal is to supply urban and rural households with domestic energy including traditional biomass that preserves forest resources and the environment. For decentralization purposes, some countries have delegated the management of their forests to local entities.

As far as modern fuels are concerned, the liberalization of the liquefied and gas fuel distribution sub-sector and efforts to foster competition should bring down the costs of modern fuels (LPG, kerosene, mineral coal), while enhancing the quality of the products.

A number of countries have committed to supporting renewable energies, among others, through fiscal incentive initiatives. Unfortunately there are still few of these initiatives.

As far as policies and tariffs are concerned, some countries have initiated social tariffs and other approaches, in view to ease energy access for the poorest. The move is a starting point which needs to be extended to the whole ECOWAS region.

²¹ Adapted from ECOWAS, *White Paper for a Regional Policy on Energy Access*, 2005.

1.3 SCENARIOS

1.3.1 Access to electricity

To better understand the seriousness of the electricity access situation in West Africa, a business-as-usual (BAU) model was developed with very simple assumptions. Based on the past trend in electricity access growth rate and the increasing efforts of governments in West Africa to expand electricity access for populations, the model assumes that governments continue their business as usual and constant efforts to promote energy access, with a great emphasis in rural areas where the electrification level is very low. Therefore, for each member country except Cape Verde and Ghana,²² it is assumed that there will be a boost of 5% in electricity access between 2010 and 2030 in urban areas as compared to a growth rate of 15% per year for the same period in rural areas, though the countries do not make the same level of efforts in electricity access promotion. The population is supposed to grow at a pace of 2.3% per year. The modelled growth under this business-as-usual (BAU) scenario is presented in Table 4 below.

Table 4: Modelled Growth of ECOWAS Electricity Access under BAU by 2030

Country	Rural electrification rate (%)		Urban electrification rate (%)		National electrification rate (%)	
	2015	2030	2015	2030	2015	2030
Benin	6	52	75	100	35	72
Burkina Faso	4	32	70	100	17	46
Cape Verde	100	100	100	100	100	100
Côte d'Ivoire	48	100	100	100	74	100
The Gambia	5	43	42	88	27	69
Guinea	7	54	56	100	24	70
Guinea-Bissau	5	43	56	100	21	60
Ghana	90	100	100	100	95	100
Liberia	3	22	39	82	24	57
Mali	29	100	82	100	47	100
Niger	3	22	56	100	12	35
Nigeria	69	100	97	100	83	100
Senegal	48	100	100	100	70	100
Sierra Leone	5	43	49	100	22	65
Togo	5	43	70	100	33	68
ECOWAS	29	64	73	98	46	76

Based on this growth scenario used in the model, the table above suggests that urban electricity access could be approximately 73% and 98% by 2015 and 2030 respectively, with only Cape Verde, Côte d'Ivoire, Ghana and Senegal achieving 100% access rate in urban areas. On the other hand, countries such as the Gambia, Guinea-Bissau, Liberia, Niger and Sierra Leone will have an

²² The model assumes an annual growth rate in electricity access of 2% in urban areas in Cape Verde and Ghana because of the current urban electrification which is almost 90%. Therefore, it is assumed that they would prefer focusing on rural areas where the electrification level is lower compared to the level in urban zones.

urban electrification rate below 60% by 2015. At the regional level, approximately 55% of households (40 million) will still be un-electrified in 2015, most of which will be in rural areas. In addition, approximately 25% of households in the ECOWAS region will still live without electricity in 2030, and most of these households will be in rural areas as most countries will have achieved a 100% electricity access rate in urban areas. This BAU growth scenario indicates how important and urgent it is to take aggressive measures to achieve universal access to electricity for all households in ECOWAS member countries.

1.3.2 Access to modern fuels

Despite the significant subsidies which have gone in LPG promotion in some countries, access to LPG and modern cooking technology is still very low as mentioned above in section 1.3. Based on current consumption data in Benin, Côte d'Ivoire, Mali, Niger and Senegal, Environment and Development Action in the Third World (ENDA-TM)²³ estimated that LPG consumption in these countries will expand from 334 thousand tons in 2010 to 469 thousand tons in 2015 and 659 thousand tons in 2020,²⁴ translating into a growth rate of 9.75% over 2010 and 2020. Assuming an average LPG consumption per capita of 12.4 kg per year for these countries, it is estimated that LPG demand will reach 600 million tons and 843 million tons in 2015 and 2030 respectively.²⁵ This means that even by 2015 or 2030 less than 1% of the LPG demand will be satisfied in these countries. Therefore, under this scenario, these figures show that a significant number of households will still depend on traditional fuels if no aggressive action is taken by governments in West Africa to provide access to clean cooking facilities to populations.

1.3.3 Access to motive power

As mentioned in section 1.3, energy access efforts have mainly focused on electricity access. Governments have not given much attention to initiatives to provide access to motive power, though mechanical energy stimulates economic activities. Only Burkina Faso, Mali and Senegal have made significant efforts to expand access to mechanical energy to rural communities, through the UNDP multifunctional platform programme which has already been extended to Senegal, Guinea and Niger, to mention a few.

Table 5 below presents the motive multifunctional platform access situation for 2015 for selected ECOWAS member countries.

²³ ENDA-TM is an international non-profit organisation based in Dakar, Senegal. Founded in 1972, ENDA is an association of autonomous entities co-ordinated by an Executive Secretariat. For more information visit <http://www.enda.sn/english/org.htm>.

²⁴ See NECTAR/IEPF/ENDA 2010.

²⁵ The estimate is also based on the assumption that an average 60% depend on traditional fuels for cooking in Benin, Côte d'Ivoire, Mali, Niger and Senegal.

Table 5: Multifunctional Platforms Scenario by 2015 in Selected ECOWAS Member Countries²⁶

Country	Number of multifunctional platforms installed in 2011	Projections for 2015	Growth rate over 2011-2015	Population in 2015	Number of villages in 2015	Gap between demand and projections
Burkina Faso	812	1,400	72%	18,451,763	13,580	12,180
Mali	1,000	5,000	400%	17,220,535	10,615	5,615
Senegal	176	1,000	468%	13,930,911	7,305 ²⁷	6,305

The table above shows the significant gap between the planned and actual needs of multifunctional platforms in the analysed countries. This situation is likely to be the same in the other ECOWAS member countries as the multifunctional platforms has started recently. There is a need to take effective action to accelerate access to mechanical power in order to achieve the ECOWAS target which is to reach at least 60% of people living in rural areas.

²⁶ Country Multifunctional Platform Programmes

²⁷ Senegal considers a village as a locality with less than 500 inhabitants. In 2003, these villages represented 46% of the rural population.

http://webcache.googleusercontent.com/search?hl=fr&rlz=1T4SKPB_frCA318CA318&q=cache:6fgcwB1es9lJ:https://enrgypedia.info/index.php/Senegal_Country_Situation+number+of+rural+localities+in+senegal&ct=clnk

The same share (46%) has been assumed for Burkina and Mali for estimate purposes.

2 IMPLEMENTATION STATUS OF ECOWAS/UEMOA WHITE PAPER

2.1 WHITE PAPER PRESENTATION

To undertake the challenges of energy access, especially in the rural and peri-urban populations, ECOWAS and the West African Monetary Union (WAMU), with the technical support of the United Nations Development Programme (UNDP) Regional Programme for Poverty Reduction (UNDP PREP), the Government of France and the Austrian Development Cooperation (ADC) developed, in 2005, a Regional Policy on Access to Energy Services for Rural and Peri-urban Populations in the ECOWAS Region. The Regional Policy, which is called the ECOWAS/WAMU White Paper,²⁸ has set a global objective to ensure access to modern energy services to at least half the population living in rural and peri-urban areas by 2015. The policy is based on a regional action plan which is structured around four themes of actions for the region, presented as follows:

- > Building capacities of public and private actors and developing methodologies;
- > Helping raise loans and funding from the private sector for projects aimed at extending energy services to rural and peri-urban areas;
- > Exchanging and disseminating sub-regional experiences in energy services supply in rural and peri-urban areas (knowledge management);
- > Promoting local production of energy goods and services.

The implementation cost for the themes mentioned above is estimated at US\$231.9 million over a 10-year period (2005-2015). The common Investment Programme, which is estimated at US\$52 billion over a period of 10 years or US\$16 per inhabitant, which the Region intends to promote and develop based on the Regional Action Plan, is composed of three specific regional investment programmes:

- > Access to modern domestic fuels for cooking for all rural and peri-urban populations;
- > Access to productive services, in particular motive power, to increase productivity and access to modern social services in rural areas;
- > Access to electricity services.

²⁸ See ECREEE website at <http://ecreee.vs120081.hi-users.com/website/download.php?f=04596a5c340228c3f14fe8d82294e8b4>.

ECOWAS' three targets for 2015 are:²⁹

- > 100% of the total population will have access to modern cooking energy by 2015. This means equipping 325 million people or 50 million households within ten years. Thirty million of these could be provided for through butanisation;
- > At least 60% of people living in rural areas will live in localities that have access to motive power capable of stimulating economic activities. This entails doubling – at least – the 2005 level;
- > 66% of the population in rural and urban areas, i.e., some 214 million people, will have access to individual electricity supplies.

The policy document also foresees that at least 20% of new investments in electricity generation in rural and peri-urban areas should originate from renewable sources.

2.2 HIGHLIGHTS OF IMPLEMENTATION

By formulating and adopting a regional policy on expanding energy access for rural and peri-urban populations, ECOWAS has set an example of the necessity to integrate the energy-access agenda into strategic-development frameworks, clearly defining the energy needs of the poor and setting time-bound regional targets necessary to achieve the MDGs. This is a significant effort to provide access to modern energy services for the poor in order to fight poverty and build sustainable development in the region, where over half the population lives on less than US\$1.25 per day. To date, the implementation of this regional policy has led to the realisation of several activities at both regional and national levels.

2.2.1 Policy

The White Paper was approved by ECOWAS Energy ministers in 2005 and endorsed by ECOWAS Heads of State and Government in January 2006. This has stimulated policy debates at the national level to upscale and accelerate ongoing national efforts for integrating energy access considerations into MDG-based poverty reduction strategies. As a result, several countries in the region—Benin, Burkina Faso, Côte d'Ivoire, the Gambia, Ghana, Guinea, Mali, Niger, Nigeria, Senegal and Sierra Leone—have integrated access to modern energy services into their policy documents such as the PRSP and national strategies to achieve the MDGs. Not only that, but in pursuance of the regional policy, the UNDP is currently providing ECOWAS member states with technical and financial support to formulate a national investment programme and the priority projects for the promotion of access to modern energy services (AES) for rural and peri-urban areas, and thereby enhance the achievement of the Millennium Development Goals (MDGs).

²⁹

http://energyaccessafrica.org/index.php?option=com_jdownloads&Itemid=186&view=finish&cid=135&catid=33&m=0&lang=en

2.2.2 Institutions

An energy access coordination mechanism has been put in place at both regional and national levels (the Regional Multisectoral Committee and the National Multisectoral Committee) to ensure an effective implementation of the White Paper. The Regional Multisectoral Committee is in charge of the monitoring and implementation of the White Paper. At a national level, each government in the region has created a National Multisectoral Committee (NMC), which is composed of representatives of the following sectors: health, education, rural development, economy and finance, planning, energy, water/hydraulics, and integration, to mainstream the contribution of each member country at the regional level. At a national level, the NMC is in charge of coordinating national stakeholder efforts in developing Energy for Poverty Reduction Action Plans and National Investment programmes. National committees serve as a basis for a network of experience sharing at the regional level and act as reference groups within countries.

In addition, in the process of the White Paper implementation, ECOWAS member states established in 2010 the Regional Centre for Renewable Energy and Energy Efficiency (ECREEE) to contribute to the sustainable economic, social and environmental development of West Africa by improving access to modern, reliable and affordable energy services, energy security and reduction of energy-related GHG emissions and climate change impacts on the energy system.³⁰

In addition to the activities mentioned above for the development of the institutional framework, ECOWAS is currently putting in place an access to energy services unit within energy departments in member countries to help integrate energy access in national policies and strategies and foster sustainable human development and poverty reduction.

2.2.3 Programmes

In the framework of the White Paper implementation, ECOWAS has partnered with international institutions (UNDP, GIZ, the EU, the Austrian Development Agency, etc.), foundations (Bill & Melinda Gates Foundation), and academic institutions such as ZIE in Ouaga to provide energy access to rural communities.

³⁰ <http://www.ecreee.org/>

Box 1: The Multifunctional Platform Programme in Burkina Faso, Mali and Senegal³¹

UNDP, in partnership with the Bill & Melinda Gates Foundation, the Governments of Burkina Faso and Luxembourg, the Shell Foundation and Aarhus United, introduced 600 multifunctional platform generators in countries across West Africa—Burkina Faso, Mali and Senegal—to help reduce poverty in rural communities, especially for women. These rural agro-enterprises are providing electricity for light and mechanizing laborious tasks, such as grinding grain.

The main impacts of the Multi-Functional Platform Programme include: time gain for women as the burden of their domestic tasks is lifted; increased agricultural production; development of income-generating activities, mobilisation of local banking systems and introduction to micro-financing; and creation of employment opportunities.

More importantly, ECOWAS with the support of the UNDP is currently undertaking capacity building programmes in energy access strategy and policy for policy makers and planners in member countries.

2.2.4 Finance

In 2011, the ECOWAS Regional Centre for Renewable Energy and Energy Efficiency (ECREEE) launched the ECOWAS Renewable Energy Facility (EREF), which is a seed fund managed by ECREEE in coordination with national focal institutions. The facility provides non-reimbursable grants through regular demand-driven competitive calls for proposals. During its first phase of operation (2011 to 2015), the EREF will test and sharpen its funding policy and find its comparative advantage in the West African market. In the second phase (2015 to 2020), the EREF will broaden its portfolio of financial instruments and support schemes such as microcredit.³²

To be in line with the White Paper, some member countries have already formulated an investment programme on access to energy services and mobilized the necessary resources for its implementation. This programme has already emerged in several countries in the region, and it is expected that the other countries will follow.

It is important to stress that governments have started giving attention to modern energy access by allocating budget, though very low compared to the real needs.

In conclusion, the White Paper is promoting a national vision regarding access to energy services, and this will positively influence the formulation and development of energy access policies in all the ECOWAS member countries. At the moment, there is no quantitative information as to how the implementation of the White Paper has influenced the access rate to modern energy services in West Africa.

³¹ http://www.beta.undp.org/undp/en/home/ourwork/womenempowerment/focus_areas/women_and_environmentalchange.html

³² <http://ecreee.vs120081.hi-users.com/website/download.php?f=4faf0d1b65e4733ba0bb542459ff2674>

3 ENERGY ACCESS APPROACHES AND POLICIES IN DIFFERENT ECOWAS COUNTRIES

3.1 NATIONAL LEVEL

Over the past two decades, at the national level, most ECOWAS member countries have made efforts to create an adequate policy environment to improve access to modern energy services for populations, mainly those living in rural and peri-urban areas. Not only have some countries integrated access to modern energy services into national plans such as a Poverty Reduction Strategy, a national energy policy or a renewable energy policy, but they have also set clear national policy targets with regard to access to electricity over a time horizon, for example, Benin, Burkina Faso, Ghana, Niger, Nigeria and Sierra Leone. However, it is worth noting that almost all ECOWAS member states have not yet set specific targets for access to modern cooking fuels, improved cooking stoves and mechanical power. Moreover, no country has set a specific target for reducing the share of the population relying on traditional biomass. The existing policies are based mainly on national projects/programmes as well as subsidies to electricity, modern fuels and cooking technologies to increase access rate. In addition to national programmes and subsidies, some countries have put in place other mechanisms such as dedicated funds for renewable energy technologies research and development or tax exemptions on imported renewable energy equipment, energy-efficient lighting bulbs and modern off-grid lighting products and financial support to private developers through rural electrification funds. For example, Mali has developed the concept of spontaneous private initiatives (PCASER) under which the Malian rural electrification agency (AMADER) selects projects based on the promoter's ability to develop and operate a viable electrification project with a fixed investment subsidy of 80% of the project cost—a maximum amount of US\$500,000 from the rural electrification fund (REF). Under the same electrification approach, there is the priority electrification zones (ZEM), under which AMADER solicits bids for the electrification of designated areas. Projects are selected on the basis of the lowest tariff. In poor rural areas, the REF conducts and finances the feasibility studies and puts the projects up for bidding, and the bid with the lowest tariffs wins.

As far as technology is concerned, most countries in the region have shifted their attention from on-grid electrification to renewable energy technologies to provide access to un-electrified households in the short and medium terms. As a result, renewable energies (RE) are becoming a more and more important strategic component for many countries' diversification of their national energy supply, particularly in the rural and peri-urban areas. REs have a competitive advantage because they provide a long-term energy supply (for electricity, heating or cooling) based on locally available RE sources and thus help to reduce dependency on energy imports. Besides, REs provide appropriate technological solutions for the electrification of rural or semi-urban areas where they can be used independently from grid connection. REs are key for the provision of modern energy services in these areas and contribute to local economic and social development.

Despite the policy efforts mentioned above, the pace of access to modern energy services in several countries in the region has been slow because these policies have been poorly put in practice, due to constraints described in section 5 below. The detailed country-related policy

instruments to improve access to modern energy services are described in Appendix II of this report.

3.2 REGIONAL LEVEL

At a regional level, because ECOWAS states are faced with significant deficiencies in the energy supply sector, they have adopted ambitious regional policies, committing themselves to harmonize national energy legislation, to increase the autonomy of energy supply and to significantly raise the level of access to modern energy services. In order to achieve these goals, various policy initiatives and programmes have been developed in the ECOWAS region, including the common energy policy, the White Paper for a Regional Policy on Energy Access, the West African Power Pool and the Strategic Programme on Energy in West Africa developed by the United Nations Industrial Development Organization (UNIDO) and the Global Environmental Facility (GEF).

Among the main energy access programmes and project components are demonstration projects, support for policy or regulatory framework, capacity building and RE-based mini-grids for productive uses in rural areas.

3.3 INTERNATIONAL LEVEL

To expand modern energy services to populations living without access, international aid agencies such as the United Nations (UN) development agencies and multilateral financing institutions (IFIs) assist ECOWAS member countries, using different approaches. For example, to achieve universal access to modern energy, the UN Energy Group established by the General Secretariat calls for a policy approach that is based on transforming the renewable energy and energy efficiency market, encouraging public- and private-sector investments and financing options, increasing international cooperation support and focusing on concrete energy access programmes which stimulate productive activities, modernizing basic social services and improving the situation of women.

The World Bank and the African Development Bank (AfDB) best illustrate specific approaches adopted by multilateral financing institutions in their countries of intervention. In fact, a review of recent programmes by these two major IFIs in West Africa led to the conclusion that the most important part of these donors' funds goes to electricity generation or transmission projects that are expected to translate into access for the poor. Such an approach, which has been putting emphasis on access only for industry and the well-off, left the poor yet again in the dark. This is the reason why in recent years, two dedicated financing schemes for energy access in developing countries have been set up with more focus on the rural and peri-urban poor.

4 SUCCESSES AND CONSTRAINTS IN THE IMPLEMENTATION OF POLICIES AND APPROACHES

4.1 SUCCESSES ACHIEVED IN SOME COUNTRIES

Though low levels of access to modern energy services still characterize the ECOWAS member countries, some of the policies and programmes implemented have been successful. At a national level, programmes such as the national electricity scheme (NES) in Ghana and the butanisation programme in Senegal have substantially improved energy access for the population (see box 1 and box 2 below).

4.1.1 The Ghana National Electrification Scheme³³

In 1989, the GOG instituted a National Electrification Scheme (NES), which is a 30-year programme covering the period between 1990-2020, as the principal vehicle for achieving universal access to electricity in Ghana. The objective of the NES is to extend the reach of reliable electricity supply to all communities with a population above 500 by the year 2020 through extending the national electric grid.

A complementary activity to the NES is the Self-Help Electrification Project (SHEP). Under the SHEP, communities that are within 20 km from an existing 33 kV or 11 kV sub-transmission line can bring forward their electrification projects provided they procure all the poles required for the LV network and have a minimum of 30% of the houses within the community wired. Once these conditions are met by the community, the obligation of the government is to provide the conductors, pole-top arrangements, transformers and other installation costs needed to provide supply to the community.

Prior to the commencement of the NES, the national electricity access was only 25% and rural coverage stood at less than 5% with 46 out of the 110 district capitals connected to the grid. Currently, an estimated 70% of the total population has access to electricity. Although increased access to electricity may have contributed to notable welfare improvements in beneficiary communities, especially in terms of enhanced provision of social services such as health, education and water supply, the overall socio-economic development/transformation highly anticipated in these communities has not been realized. This has been largely attributed to the fact that there have not been much productive uses of electricity to generate jobs and incomes for the people, in spite of the fact that ensuring productive uses of electricity was made an integral part of the NES. Electricity has primarily been used for domestic purposes, mainly for lighting, and entertainment.

³³ Source: <http://www.climateparl.net/cpcontent/pdfs/SHEP%20%E2%80%93%20Ghana%E2%80%99s%20Self-help%20Electrification%20Programme.pdf>

4.1.2 The Butanisation Programme in Senegal³⁴

In 1974, the Government of Senegal adopted the butanisation programme which objective was to substitute part of the charcoal consumed in urban areas with LPG. The first LPG cooker model that was introduced was equipped with a cylinder containing 2.75 kg of gas. Later, another, more robust, model was introduced that was fitted with a 6-kg bottle that was better suited to the cooking habits and purchasing power of the target households.

This programme led to a remarkable boom in the use of butane to cook. In fact, LPG use grew less than 3,000 tons in 1974, to 15,000 tons in 1987 and more than 130,000 tons in 2006. The improved access of population to butane was due initially to tax breaks (exemption from customs duties on equipment connected with butane) and later to subsidies awarded for this fuel in 1987. This programme has resulted to the expansion of modern cooking fuels to a significant number of households in Senegal. In fact, to date approximately 85% of households in Dakar own and use modern LPG stove to cook, while the other main urban areas the percentage is estimated at 66%.

Though the butanisation policy may not have succeeded in fully replacing other fuels, it will have not only increase population access to modern cooking technologies and fuels but also encourage the diversification of cooking fuels.

In the region, many successful policy support mechanisms do exist; nonetheless, modern energy access for populations has slowly improved with the implementation of government policies and approaches, in order to extend modern energy services to all parts of their countries, a goal that faces constraints which impact on the achievement of national target in terms of access to modern energy services.

4.2 MAJOR CONSTRAINTS IN THE IMPLEMENTATION OF POLICIES AND APPROACHES

As already mentioned, most ECOWAS member countries have the lowest energy access rates in sub-Saharan Africa because of an inadequate implementation of existing policies and approaches. This is due to several constraints which are described as follows:

- > **Budget constraints:** In general, governments in West African states are faced with budget constraints, which prevent them from achieving their ambitious target of increasing access to modern energy services for populations. Eleven out of fifteen countries in the region are included in the list of Least Developed Countries (LDCs),³⁵ which are mainly characterized by a very low level of economic development. As a result, in most countries in the region, investments in access to electricity, modern cooking facilities and motive power are far below the needs. For example, governments do not have enough budgets to fund the cost of creating appropriate policy mechanisms, regulations and institutions as well as new electricity generation or transmission facilities, as the electricity utilities are owned by the

³⁴ Source: Adapted from <http://bioenergylists.org/en/endatmlpg>

³⁵ http://www.un.org/esa/policy/devplan/profile/ldc_list.pdf

states. Moreover, current national investments are not enough to finance a subsidy scheme that could help expand access to modern cooking facilities to most of the poor. The international donor community will play an important role by providing financing and technical support in tapping international funds and in creating an adequate environment at a national level for the involvement of the private sector.

- > **Competing development priorities:** In West African countries, implementing ambitious policies and mainstreaming access to modern energy services into national development strategies is difficult because many issues compete for financing and political attention. It is important to stress that the simple economics of being a poor country means that access to modern energy services is likely seen as a low priority when compared to pressing and clearly definable issues such as health, employment, housing and education, though lack of access to modern energy services is a serious hindrance to economic and social development. There is a need for these countries to focus on building political will and government ownership of the energy access issues.

4.3 OPTIONS FOR IMPROVING ENERGY ACCESS SITUATION WITHIN THE REGION

4.3.1 Technology options

In order to provide access to clean, reliable and affordable energy services for the population currently living without access, the ECOWAS member countries have to supply energy for basic human needs and productive uses to promote economic development and growth. On the one hand, modern energy services for basic human needs include electricity for lighting, health, education, communication as well as community services and modern fuels and technologies for cooking and heating. On the other hand, services for productive uses include electricity and modern fuels for agricultural activities such as water pumping, mechanized tilling, agricultural processing and transport.

Access to electricity can be provided either at the community or household level. Electricity access has to be secured through both centralized and decentralized electricity systems which include options such as grid extension, mini-grid access and off-grid access. Currently, governments in West Africa typically concentrate on grid extension, diesel-powered mini-grids and mini-hydropower generators to improve energy access situation within their countries.

More recently, in the ECOWAS region, off-grid access has emerged as an alternative approach to improve access to energy services for populations; and stand-alone electricity service provision has drawn more policy attention than in the past. This is because various small-scale renewable energy-based technologies such as solar PV, wind, and micro-hydropower have reached a commercial maturity, and the West African region is well endowed with abundant renewable energy resources. Moreover, the continuous rise in the fossil fuel prices has increased the economic attractiveness of these technologies.

Access to modern fuels, including natural gas, LPG, diesel, kerosene and renewables such as biodiesel and bioethanol, is another component of energy provision. Of all the modern fuels, diesel

has been mostly used in the industrial and commercial sectors while kerosene is mostly used by households and shop owners for cooking and lighting purposes. More recently, natural gas, LPG and renewable fuels have emerged as viable alternatives to secure access to clean modern fuels because of the environmental and health benefits they bring for end users. In addition, it must be noted that in the immediate term, governments in West Africa view improved cooking stoves as a viable solution to address the serious health problems faced by people who lack access to sufficient livestock and biomass for biogas production and who cannot pay for LPG and natural gas solutions.

In addition to the electricity, mechanical power provision is also viewed as an option because it is critical to reducing poverty and enhancing human development in the region. Mechanical power has not yet drawn the same policy attention as electricity access and modern fuels provision though it has been used for centuries in meeting everyday energy needs at the local level. More recently in some ECOWAS member countries, it must be noted that pilot projects and programmes have been implemented to develop economic activities at community levels by providing access to mechanical power.

In conclusion, even though many ECOWAS member countries have already considered the energy access options described above, it must be pointed out that much more still needs to be done. Governments in the ECOWAS region need to take further actions to scale up access to modern energy services mainly in remote areas, where the vast majority of people live.

4.3.2 The role of renewable energy technologies

Renewable energy potential in ECOWAS countries³⁶

Technical potential for RE resources such as wind, solar, hydropower, biomass or geothermal energy is considered high in most developing and emerging countries. ECOWAS member countries are no exception.

A hydroelectric potential is mainly concentrated in five of the 15 member states, with a total estimated capacity of 23,000 MW, only 16% of which is currently exploited. Nigeria, Guinea, Ghana, Côte d'Ivoire and Sierra Leone account respectively for 37.6%, 25.8%, 11.4%, 10.9% and 5.2% of the total hydroelectric potential.

Biomass represents the main energy resources in the member states. A large part of the population in each country of the region relies on these resources for cooking and lighting purposes, and most of the people live in rural and peri-urban areas. In 2000, the International Union for Conservation of Nature (IUCN) revealed that the forest potential in many ECOWAS countries was considerable enough to cater for the overall fuel demand, although there are significant disparities among countries.³⁷

³⁶ Figures mentioned in this section are taken from ECOWAS, *White Paper for a Regional Policy on Energy Access*, 2005, p.14.

³⁷ *Ibid.*

As far as wind power is concerned, high speeds are along coastal lines or in desert zones, which represents an attractive alternative to conventional energy sources.

Regarding solar energy potential, the average sunshine potential in West Africa is around 5 to 6 kWh/m² per day, compared to 3 kWh/m² per day only in temperate Europe. The RE potential for ECOWAS member countries is presented in detail in Appendix III.

Available renewable technology options for ECOWAS

In most ECOWAS countries, programmes to expand modern energy access to populations, especially those living in rural and peri-urban areas where the majority lives without access to these services, mainly rely on renewable energy technologies. This is because renewable energy technologies can reduce environmental impacts and provide lower-cost alternatives than conventional energy technologies³⁸ in off-grid applications. In fact, the main technologies suited to rural areas are micro-hydro, biogas, wind generators, wind pumps, solar heaters for hot water and sustainable ways to provide wood supplies. In addition, recently photovoltaic (PV) systems are being used to provide electricity supplies for small-scale applications such as electric lights and domestic appliances, refrigeration for clinics, village water pumps, street lighting, and health clinics and schools.³⁹ The table below summarizes energy access options for renewable energy sources to achieve universal energy access in West Africa.

Table 6: Options for RE sources

Energy source	Present	Short term	Medium term	Long term
Electricity	Grid or no grid	Biomass-based generation using gasifier coupled to internal combustion engines, photovoltaic, small wind, small hydroelectric for applications remote from grids	Biomass-based generation using gasifiers coupled to micro-turbines and integrated gasifier combined cycles, minigrids involving various combinations of photovoltaic, wind, small hydroelectric, batteries	Grid-connected photovoltaic and solar thermal, biomass-based generation using gasifiers coupled to fuel cells and fuel cell/turbine hybrids
Fuel	Wood, charcoal, dung, crop residue	Biogas	Syngas, DME	Biomass-derived DME ⁴⁰ with electricity co-product
Cogeneration (combined heat and power)		Internal combustion engines, turbines	Micro-turbines and integrated gasifier combined cycles	Fuel cells, fuel cell/turbine hybrid

³⁸ http://martinot.info/Martinot_Reiche_WB.pdf

³⁹ World Bank, 1996, *Improving Energy Supplies for Two Billion People*, p. 58.

⁴⁰ Di-Methyl-Ether is a chemical substance that can be produced from different resources like natural gas, coal, biomass, and other hydrocarbon sources. Since 1963, DME has been used only as a chemical, mainly as a propellant in aerosols with small capacities worldwide. After 1995, due to its special characteristics, DME was introduced as a potential multipurpose fuel and subjected to a global intention for R & D as new fuel of the next century. The physical properties of DME are very similar to LPG. Its molecular structure, physical properties and fuel performance as well as the possibility of converting it to other chemicals such as olefins has made a unique position for this newly born fuel. In addition, DME is a non-toxic fuel with short half-life in troposphere and has very low reactivity. After combustion, DME does not produce any soot and reduces emission of NO_x, hydrocarbons and carbon monoxide.

Renewable energy technologies (RETs) provide attractive, environmentally sound technology options for the electricity industry in Africa, especially West Africa. As shown in Table 6 above, in the short, medium and long term, renewable energy sources, which are available locally, could be used to generate electricity, provide fuel and generate heat and power, thereby offsetting a significant proportion of foreign exchange that is used for importing oil for electricity generation in the ECOWAS member countries. This means that renewable energy technologies will play a crucial role in expanding access to modern energy services for populations in the region. In fact, because RETs are modular and utilize locally available resources and expertise, these technologies are well suited for meeting decentralized rural and peri-urban energy demand and providing employment opportunities for locals, thereby fostering economic growth and social welfare.

Despite the availability of renewable energy resources and the important role of RETs in expanding access to modern energy services for populations, most countries in West Africa do not have clear national targets and comprehensive policy initiatives to encourage the utilization of RETs.

5 FINANCING ENERGY ACCESS IN ECOWAS

5.1 STATUS OF INVESTMENTS IN ACCESS TO ENERGY SERVICES

In general, the lack of access to modern energy services represents one of the main barriers to economic and social development. Enhancing sustainable access to modern energy requires robust financing mechanisms that address the specific needs of key stakeholders. Governments in the ECOWAS region and many bilateral and multilateral development agencies have recognized the importance of improving access to modern energy, by financing projects that only increase access to these services.

The World Bank Group has committed to promoting access to modern energy services in developing countries, by putting in place a lending programme that includes direct investment in new energy projects and sector-specific policy advice to countries. The World Bank investment review study⁴¹ conducted in 2010 estimated that the total investment in energy access during the fiscal year 2000-2008 amounted to US\$4 billion, of which US\$1,080 million in Africa and US\$194.2 million⁴² in ECOWAS member countries. For the same period, the energy access investment in West Africa represented 18% of the total investments in Africa. This percentage is low because seven countries including Cape Verde, Côte d'Ivoire, the Gambia, Liberia, Niger, Sierra Leone and Togo did not implement any World Bank-funded energy access project between 2000 and 2008. It must be noted that these figures are only related to energy access investments, which are defined by the study as initiatives that support new delivery or improvement of the quality of energy services for households, communities, or local enterprises that are without access to a specific type of energy.⁴³

The Global Environment Facility (GEF), housed at the World Bank, finances access to energy services in rural areas where expansion of the grid is neither cost-effective nor affordable⁴⁴. This is mainly done under its climate change mitigation strategy which focuses on the promotion, deployment and transfer of innovative low-carbon technologies, the promotion of market transformation for energy efficiency, and the promotion of investment in renewable energy technologies, to mention a few. The GEF support for access to modern energy services in the West African region has increased recently. Between 2004 and 2009, the GEF invested a total amount of US\$36.5 million in climate change mitigation projects in the ECOWAS member countries. Under the fifth replenishment period, the facility has allocated an amount of US\$45.9 million to climate change activities including energy access projects, which represents an increase of 25%.

⁴¹ See <http://siteresources.worldbank.org/EXTENERGY2/Resources/EnergyForThePoor.pdf>, p. 26.

⁴² Compiled from the World Bank Energy Access Investment Portfolio: Fiscal 2000-2008 at <http://siteresources.worldbank.org/EXTENERGY2/Resources/EnergyForThePoor.pdf>.

⁴³ *Ibid*, p. 18.

⁴⁴ http://www.un-energy.org/activities/energy_access/description

In addition to the World Bank and the GEF, development agencies such as the AfDB and the UNDP, bilateral development agencies and regional governments have increased their investments in initiatives that improve access to modern energy services.

5.2 INVESTMENT REQUIREMENT FOR SCALING UP ENERGY ACCESS

5.2.1 Access to electricity

The International Monetary Fund (IMF) and the World Bank estimated the total investment requirements to achieve 100 per cent electricity access in sub-Saharan Africa at US\$11 billion per year between 2005 and 2030, with an additional 200 million households that would receive electricity before 2030.⁴⁵ This represents an average investment of US\$55/household/year.

Based on a population growth rate of 2.3% for the West African region,⁴⁶ it is estimated that only an investment of US\$4.3 billion per year will be required to achieve universal electricity access in the ECOWAS region, which would represent a total amount of US\$86 billion between 2011 and 2030. Table 7 presents the annual investment requirements per country.

Table 7: Investment Requirements for 100 Percent Electricity Access in ECOWAS Between 2011 and 2030

Country	Population in 2010 (in millions)	Population in 2030 (in millions)	Current electricity access rate (%)	Additional households that would receive electricity between 2011-2030	Investment per annum between 2011-2030
Benin	8.8	13.9	24.8	2,307,772	126,927,471
Burkina Faso	16.5	26.0	14.6	4,294,520	236,198,613
Cape Verde	0.5	0.8	87	129,000	7,113,748
Côte d'Ivoire	19.7	31.1	47.3	5,146,995	283,084,701
The Gambia	1.7	2.7	15	450,711	24,789,080
Guinea	10.0	15.7	15	2,602,883	143,158,580
Guinea-Bissau	1.5	2.4	15	395,123	21,731,740
Ghana	24.4	38.4	66.7	6,360,617	349,833,919
Liberia	4.0	6.3	15	1,041,541	57,284,745
Mali	15.4	24.2	18	4,007,961	220,437,829
Niger	15.5	24.4	8	4,045,027	222,476,496
Nigeria	158.4	249.6	50.6	41,311,760	2,272,146,802
Senegal	12.4	19.6	42	3,242,323	178,327,786
Sierra Leone	5.9	9.2	15	1,530,068	84,153,739
Togo	6.0	9.5	22	1,571,859	86,452,259
ECOWAS	300.8	474.0	27.23	78,438,500	4,314,117,507

⁴⁵ This estimate is consistent with that of the AfDB, which found that an amount of US\$12 billion will be required to achieve 100% electricity access in the SSA by 2030. See <http://www.afdb.org/fileadmin/uploads/afdb/Documents/Policy-Documents/10000025-EN-PROPOSALS-FOR-A-CLEAN-ENERGY-INVESTMENT-FRAMEWORK-FOR-AFRICA.PDF>.

⁴⁶ See http://www.humansecuritygateway.com/documents/UNOWA_UrbanizationInsecurityWestAfrica.pdf.

Table 7 illustrates the investment requirements across the ECOWAS member countries with Nigeria requiring half of the investment due to its high population.

5.2.2 Access to clean cooking facilities

ECOWAS member countries adopted a regional target to reduce the poverty in the region by half and achieve the MDGs by increasing access to modern energy services by the year 2015. These countries set a target of 100% access to improved domestic cooking services for populations by the year 2015. The achievement of this target will require the supply of 30 million stoves⁴⁷ to populations, at a unit price of US\$50.

In order to achieve 100 per cent access to cooking facilities in the ECOWAS region by 2030, it was estimated that 43 million stoves will be required.⁴⁸ Therefore, an investment of US\$2 billion over 20 years would be required for access to clean cooking facilities.

5.2.3 Access to motive power

No real economic activity can prosper without access to mechanical or electrical motive power. Such power makes it possible to run, for example, water pumps and mills. Experiments show that the costs of fitting a diesel motor and some key accessories is around \$15,000 for a locality.⁴⁹

For all of the ECOWAS countries, 100% of the villages with more than 1,000 inhabitants will have access to this service by the year 2030. It is estimated that in the next 20 years, 243 thousand villages will have to be served.⁵⁰ Therefore, the total investment requirement is estimated at US\$3.7 billion by 2030, which represents an annual investment of US\$182 million.

Table 8 below summarizes the investment requirements described above.

Table 8: Summary of Investment Requirements by 2030

Service	Additional number by 2030	Investment requirement per year (US\$ million)	Total investment requirement in US\$ million over 20 years (2011-2030)
Electricity	78,488,500 households	4,315	86,300
Cooking facilities	43,000,000 stoves	107	2,140
Motive power	243,000 rural communities	182	3,645
Total	4,604	92,085	

Table 8 also suggests that US\$92 billion will be required to achieve 100 per cent access to electricity, cooking facilities and motive power in the ECOWAS region by 2030, which represents an annual investment of US\$4.6 billion.

⁴⁷ See ECOWAS, *White Paper for a Regional Policy*, 2005.

⁴⁸ This assumes that only 60% of the additional 70 million households would receive the stoves between 2011-2030.

⁴⁹ *Ibid.*

⁵⁰ This assumes an average rural population of 57% and 1,000 inhabitants per village in the ECOWAS region.

5.2.4 Financing mechanisms to expand access to modern energy services

In most of the ECOWAS member countries, the modern energy access level has remained low because investments in access to modern energy services have been very limited. This is not surprising because government officials and decision makers find it difficult to mainstream energy access into national development strategies. This is because many issues compete for financing and political attention. However, the public sector should remain the key player while seeking the private sector participation.

In addition to the considerable efforts of national governments in this region, which consists of some of the poorest countries in the world, the international community will need to provide financial support for meeting the MDGs adopted by the ECOWAS.

To direct energy access projects towards households that are living without access to energy services, innovative financing mechanisms that address the specific needs of key stakeholders should be put in place. Such mechanisms, which include grants, subsidies, micro-credit, loans and guarantees, will be used as instruments to address energy access-related financing needs of regional programmes, national or local governments, utilities, NGOs, private sector entrepreneurs, and households. The examples of the World Bank Group lending programme, the GEF grant programme, the Self-Help Electrification Programme (SHEP), described in box 2 above, in Ghana and the butanisation programme in Senegal, described in box 3, best illustrate the utilization of innovative financing mechanisms to increase access to energy services for households.

In sum, good practices related to financing mechanisms to improve energy access for households exist and have proven successful. It is important to adapt these financing instruments to national realities in West African countries. Both national governments and multilateral and bilateral development agencies have a key role to play in promoting energy access, by putting in place appropriate financing mechanisms.

5.3 SOURCES OF FINANCING

Financing sources for improving access to modern energy services in developing countries include the balance sheet of state-owned utilities, subsidies provided by the government, grants and loans offered by national development banks and specialised national institutions and funds, such as rural energy funds.⁵¹ However, in West African countries, utilities rarely invest in energy access projects because they often operate at a loss, relying on public funds for capital investment and, sometimes operating expenditures.

In addition, national development banks are not involved in energy access promotion because energy access improvement is not part of their priorities. Most countries have a subsidy provided through electrification funds which are mostly supported by levies, donor funds and government budget. These funds mostly subsidise projects.

⁵¹ http://www.iea.org/papers/2011/weo2011_energy_for_all.pdf

Unfortunately, in most cases these subsidies do not prove efficient because they fail to target households who are unable to pay and the item they may have difficulty paying for, usually the electricity connection fee or clean cooking facilities. Other financing sources for modern energy access investments include multinational and bilateral financing institutions, carbon financing and private sector sources, local banks and microfinance institutions as well as project developers.

In the ECOWAS region, multilateral and bilateral institutions have been the main financing sources for energy access investments. Some examples of these sources are the World Bank through the Investment Framework for Clean Energy and Development, the International Finance Corporation (IFC) dedicated to the promotion of the private sector, the African Development Bank through the Clean Energy Investment Framework for Africa, the European Bank for Reconstruction and Development (EBRD) through the Sustainable Energy Initiative (SEI), the ACP-EU Energy Facility,⁵² and Carbon Finance, to mention a few. Other future potential sources include oil producers (Total, BP, etc.) and Bloomberg New Energy Finance⁵³.

5.4 BARRIERS FOR SCALING UP ENERGY ACCESS

Though significant efforts are being made to establish basic conditions for the increase of modern energy services, several barriers hinder the scaling up of these services in West African countries. These barriers include political, economic and financial barriers.

Political

Low political attention: Governments in West Africa face many pressing and clearly definable development issues, which needs to be addressed as well. These issues, which include education; health; housing and food, compete with modern energy access in terms of policy attention and resources allocation. Therefore, government officials and decision makers tend to put less emphasis on access to modern energy access than on the other issues. This barrier can be removed by implementing aggressive capacity building programmes, which will be aim at both private stakeholders –local operators, investors, donors- and public actors such as ministries, regulatory authorities, energy access related public agencies, just to mention a few.

Lack of capacities of policy makers and planners: Creating an enabling environment is crucial to the expansion of access to modern energy services for populations. Policy makers and planners of modern energy access issues lack capacities to formulate and establish an adequate policy and institutional framework to achieve universal energy access. Policy makers and planners lack adequate energy access-related information and data, which are important for informed decision and effective planning. As a result, there is no clear and comprehensive strategy, legal and regulatory framework or implementation to facilitate universal access to modern energy services for the population. For example, most countries have ambitious energy access policies, which do

⁵² The Energy Facility is a co-financing instrument established in 2005 in order to support projects aimed at increasing access to sustainable and affordable energy services for the poor living in rural and peri-urban areas in African, Caribbean and Pacific (ACP) countries.

⁵³ Bloomberg New Energy Finance was founded by Michael Liebreich in 2004 in order to provide subscription-based services of the clean energy industry. See: <http://bnef.com>.

not include clear targets for access to modern cooking facilities, motive power or reduction in traditional biomass use.

Economic

Low purchase power of a large part of the population: The major problem associated with the use of modern energy services products in households is the initial cost of purchase, especially for the lower-income group of consumers, who find these products unaffordable. In West African countries, the majority of households are income-poor and live in peri-urban and rural areas, where the energy access rate is low. These households, most of which live under US\$1.25 per day per person, cannot disburse the total upfront cost in cash to buy clean cooking technologies and fuels or off-grid lighting products. This barrier can be reduced if this group of the population is allowed to make payment in instalments, which is similar to their current habit of meeting other pressing needs such as food, kerosene or candle for lighting. Another way would be to provide loans or subsidies to households, mainly those living in poor zones.

Finance

Low investments: Modern energy services products such as off-grid electrification or lighting products and cooking stoves or engines for motive power are seen as a small market. This results in very low investments in this sector and in the absence of major players, unlike in the cell phone market in the region. This situation is mainly due to many factors including the low purchase power and demand by main beneficiaries.

Lack of financing: There is a general understanding that access to financing is one of the major barriers to scaling up access to modern energy services in West Africa. The Enterprise Surveys of the World Bank and IFC in 2007⁵⁴ suggests that access to financing is a major constraint for most private firms while the value of collateral needed for a loan can represent more than 100% of the loan. In the region, because private enterprises interested in modern energy service provision are small, they do not have access to financing to invest in modern energy services. The simple fact of being small means that these enterprises have limited financial capacity. Therefore, most enterprises in the distribution chain are not in a position to make investments in stock and are not willing to go in a market segment where it is challenging to make quick money. The difficulty to access financing with high interest rates and significant collateral are among important hurdles to private sector investments in the market.

In addition to the small size, private enterprises do not have access to finance because the personnel of financing institutions does not understand very well modern energy services products. With a better understanding of products, financial institutions would be better equipped to develop new lending products for enterprises and consumers.

⁵⁴ <http://www.enterprisesurveys.org/Reports>

6 SUMMARY OF APPROACHES TAKEN AND RECOMMENDATIONS

6.1 SUMMARY OF APPROACHES

As in other regions of the world, experience shows that West African countries use a variety of approaches to provide access to energy services to populations, especially those living in peri-urban and rural areas, where the majority of people without access to energy services live. The table below summarizes the approaches used in different ECOWAS member countries.

Table 9: Summary of Energy Access Approaches in the West African Region

Approach	Countries in the ECOWAS region	Observation
Financial support to private developers through rural electrification funds	Mali, Senegal	<ul style="list-style-type: none"> ZEM and PCASER concepts introduced based on competitive bidding in Mali. 25-year rural electrification concessions allotted to private operators through the process of competitive bidding in Senegal.
Output-based aid subsidies for energy services-related products (off-grid products, gas, kerosene, efficient stoves, etc.)	Ghana, Liberia, Senegal	<ul style="list-style-type: none"> Provision of partial subsidies to the poorest consumers to make solar home systems more affordable in Ghana. Offset part of the capital costs associated with building of electricity transmission and distribution networks and subsidies for connection costs to low income households in Liberia. Senegal provided a smart subsidy scheme, output-based aid subsidies, to provide electricity to rural households.
Traditional subsidies for modern cooking fuels and technologies as well as electricity	All	This traditional approach for subsidies has shown its limits for increasing the access to basic energy services because it is burdensome for low income states and it also excludes poor households.
Direct investments in energy access projects through national utilities and rural electrification agencies	Benin, Burkina Faso, Cape Verde, Côte d'Ivoire, the Gambia, Guinea, Guinea-Bissau, Ghana, Liberia, Mali, Niger, Nigeria, Senegal, Sierra Leone	This approach has proven ineffective in West African countries because of insufficient budget or budget cuts and insufficient capacities for designing, implementing and monitoring energy access projects
Programmes for access to both electricity and mechanical energy	Mali, Senegal, Ghana, Burkina Faso and Guinea	Multifunctional programmes developed to provide mechanical and electric energy.
Special support for Renewable energy technologies	The Gambia, Ghana, Nigeria, Senegal	<ul style="list-style-type: none"> Zero-import tax status and no license fee for operators in the electricity sub-sector using RE in the Gambia. Energy fund in the area of R&D and exemption from import duties in RETs in Ghana and Nigeria. Priority for PV systems in government rural electrification projects in Senegal.

6.2 WAY FORWARD FOR A REGIONAL APPROACH

Increasing access to modern energy services requires a co-ordinated effort in the implementation of a set of measures under axes presented hereafter. These recommendations are directed to various partners participating in this policy dialogue to assist ECOWAS in reaching its overarching goal of reducing energy poverty by half by 2015.

Political participation

A strong political participation is a prerequisite for the achievement of universal access to modern energy services for populations in ECOWAS member countries. It is crucial for governments in the region to recognize the urgency of their populations' needs. It is necessary to translate the clear and consistent statement as per the White Paper that modern energy access is a political priority into action, e.g. by reorienting national funding accordingly. Setting targets for electricity, modern cooking facilities and motive power is a necessary step to provide a framework for tracking progress and accountability. In the ECOWAS region, these targets have already been included in the Regional Policy for Energy Access. These targets should be part of viable national energy access strategies, backed by appropriate priorities, policies and programmes, and predictable financial resources. Currently, ECOWAS is implementing activities which aim to promote a national vision regarding access to energy services within member states. This is a step in the right direction, and it should be consistently carried on.

Capacity building

An effective participation of relevant stakeholders in the implementation of energy access policy requires that they understand energy access issues. The energy access level in the region is low because stakeholders lack the capacity to provide appropriate modern energy technologies and services. Therefore, there is a need to build the capacity of policy makers and planners and relevant government officials in energy access strategy and policy formulation, implementation and monitoring. Also, it will be necessary to inform and build the capacity of local banks and micro finance institutions in products regarding modern energy services. This will reduce their reluctance to embark on projects regarding modern energy access, for which they can even develop innovative lending products for enterprises and consumers.

Another way of building the capacity of relevant stakeholders would be to encourage the exchange, promotion and dissemination of experiences, between member countries, relating to energy services in local production of energy goods and services using renewable resources. It is worth noting that the ECOWAS/UEMOA White Paper is currently establishing a regional knowledge management system which is made of information systems that enable data collecting and mining, knowledge products and services as well as a knowledge dissemination mechanism. This is an important step in the right direction because of its potential to enhance the exchange of experience and information between the member states in the region.

Subsidies to low income households

To overcome the barrier of the initial capital cost of gaining access to some types of modern energy services, subsidies for low income and very poor households will be required at a later stage to reach people who live under the poverty line. These households may not be able to purchase an off-grid modern lighting device or modern cooking facilities without some type of financial assistance. When used, subsidies must be well targeted to reach the poorest because the real issue with subsidies is how to apply them and avoid their misuse by people who don't really need them. In fact, subsidizing these households is also a question of social equity as electricity and kerosene are currently cross-subsidised, and this benefits rich households in urban areas who can afford the products even without subsidy schemes. ECOWAS can help its member countries by providing them with the appropriate policy advice and technical support to design and implement an adequate subsidy scheme to expand modern energy services to populations, mainly the poorest.

Creation of an enabling environment for private sector participation

The private sector can play a critical role in promoting modern energy access in West African countries because private actors are necessary to secure access to capital and human resources and competence. Private sector investment needs to grow the most, but significant barriers must first be overcome. Therefore, it is recommended that national governments adopt strong governance and regulatory frameworks and engage in internal capacity building to support private sector development of commercial markets for modern energy technologies and services. This can be done by operating consumer and business finance through local banks and microfinance arrangements which can support the creation of local networks of energy services providers to strengthen the capacity of local entrepreneurs in the energy sector.

The Lighting Africa programme⁵⁵ in Senegal and Ghana best illustrates a market acceleration intervention aimed at supporting private sector development of commercial markets for modern off-grid lighting products to increase access to energy. ECOWAS could develop this kind of programmes to assist West African countries in transforming their modern energy technology and services market.

International partnerships

West African countries will need international aid to expand modern energy services to all households. International aid will be crucial to subsidise investments in the production and distribution of both electricity and clean cooking fuels, in capacity building and in creating an

⁵⁵ Lighting Africa, a joint IFC and World Bank programme, is helping develop commercial off-grid lighting markets in sub-Saharan Africa as part of the World Bank Group's wider efforts to improve access to energy. Lighting Africa is mobilizing the private sector to build sustainable markets to provide safe, affordable and modern off-grid lighting to 2.5 million people in Africa by 2012 and to 250 million people by 2030. For more information see <http://www.lightingafrica.org/>.

institutional system that integrates these different areas over the long term while simultaneously addressing climate change.⁵⁶ Therefore, it is recommended to strengthen internal cooperation with international UN agencies such as UNDP, UNEP, other UN RCs as well as international donors such as the GEF and the World Bank, among others. This partnership should commit to supporting countries in their efforts to develop their regulatory regime to attract private capital. In order to yield effective results, it is recommended to base this support on results. This means that the financing would be based on achieved and verified results in the form of energy access and reduced emissions.

Within the framework of the implementation of the ECOWAS/UEMOA White Paper, the UNDP is providing technical and financial support for regional policy implementation. This is a good initiative that needs to be encouraged.

⁵⁶ IEA, UNDP, UNIDO, 2010, *Energy Poverty: How to make modern energy universal?* p. 37.

CONCLUSION

In conclusion, it is clear that governments in the West African region have made some efforts over the last decade to expand modern energy services to their populations, when compared to the access level in the 1990s. However, there is still too much to do to achieve universal access to modern energy services because of the staggering number of people without access to these basic services today—approximately 176 million people lack access to electricity in the region. Current estimates predict that more than 200 million people in West Africa will live without access to electricity, clean cooking facilities and mechanical energy services by 2015, though these services are crucial for economic activities. This is surprising because cost-effective appropriate energy technologies exist. The market for modern energy technologies and services could develop rapidly in urban and rural areas if governments recognize the need to take aggressive actions and implement them, with the assistance of international donors. The table below summarizes key recommendations to achieve a universal access to modern energy services in the ECOWAS region.

Table 10: Summary of Recommendations

Intervention Axes	Recommendations
Political participation	<ul style="list-style-type: none"> Recognize the urgency of the needs for the provision of modern energy services. Translate the clear and consistent statement as per the White Paper that modern energy access is a political priority into action, e.g. by reorienting national funding accordingly. Setting targets for electricity, modern cooking facilities and motive power. Develop and implement appropriate priorities, policies and programmes, and predictable financial resources..
Capacity building	<ul style="list-style-type: none"> Build the capacity of policy makers and planners and relevant government officials in energy access strategy and policy formulation, implementation and monitoring. Inform and build the capacity of local banks and microfinance institutions in products regarding modern energy services. Encourage the exchange, promotion and dissemination of experiences relating to energy services in local production of energy goods and services using renewable resources between member countries.
Subsidies to low income households	<ul style="list-style-type: none"> Smart subsidies for low income and very poor households to purchase off-grid modern lighting devices or modern cooking facilities.
Creation of an enabling environment for private sector participation	<ul style="list-style-type: none"> Adopt strong governance and regulatory frameworks and engage in internal capacity building to support private sector development of commercial markets for modern energy technologies and services. Involve local banks and microfinance institutions Support the creation of local networks of energy services providers to strengthen the capacity of local entrepreneurs in the energy sector. Develop and implement programmes such as the Lighting Africa programme to transform the modern energy technology and services market.
International partnerships	<ul style="list-style-type: none"> Strengthen internal cooperation with international UN agencies such as UNDP, UNEP, other UN RCs as well as international donors such as the GEF, the World Bank and others.

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http://www.un-energy.org/activities/energy_access/description

http://www.worldenergyoutlook.org/database_electricity/electricity_access_database.htm;

https://www.cia.gov/library/publications/the-world-factbook/wfbExt/region_afr.html

APPENDIX I: COUNTRY FACT SHEETS ON ENERGY ACCESS

Benin

Socio-economic indicators

Population (in millions in 2010)	8.8
Rural population (% of total population)	58
Population below poverty line (% of the total population)	37.4
Current GDP (US\$1,000,000 in 2010)	6,633
GDP growth (% in 2010)	3
Human Development Index (HDI) (2010)	0.435
HDI rank (2010 ranking – 169 countries)	134

Energy access situation

The major part of the total primary energy consumption in Benin can be allocated to households, with a total of approximately 63.9 per cent. The transport sector accounts for 23.2 per cent, the service sector for 10.6 per cent and the barely developed industry sector consumes about 2.3 per cent. All of its petroleum product needs are imported.⁵⁷ In 2008, whereas 53% of urban dwellers had access to electricity in Benin, only 2.4 per cent of rural residents did.

According to the World Bank,⁵⁸ approximately 97 per cent of rural households rely on firewood for cooking. Hence, access to modern cooking facilities is predominantly low and was estimated at 5.6 per cent in 2006, with 1.1 per cent and 12.3 per cent in rural and urban areas respectively.

With regards to motive power, the current level of access is very low—less than 1 per cent of the rural population. In the past, as part of its efforts to reduce poverty in rural localities, the Government of Benin undertook multifunctional platform projects to promote access to mechanical energy. However, the projects, which were financed through public investments, did not yield the expected results as the consequence of the brutal reduction of credits allocated to the projects. It is worth mentioning that the country has included the multifunctional platform in the poverty reduction strategy paper.

Scenario for the future

Access to electricity

The Government of Benin has committed to very ambitious targets on access to modern energy services. In 2005, a rural electrification programme was launched which was aimed at increasing rural access to electricity to 36 per cent by 2015 and 65 per cent by 2025.⁵⁹ In addition, the policy paper for energy service provision to

attain the Millennium Development Goals has set ambitious targets to expand households' electricity access in urban and rural areas to 100 per cent and 42 per cent respectively by 2015. However, policy targets do not always translate into realities.

To better understand the electricity access situation in Benin, a BAU model was developed with very simple assumptions. The BAU scenario assumes an annual growth of 5 per cent in electricity access between 2010 and 2030 in urban areas and 15% per year between 2010 and 2030 in rural areas. Based on this growth scenario, it is estimated that approximately 36 per cent and 72 per cent of the total population will have access to electricity by 2015 and 2030 respectively—see Figure 2 below.

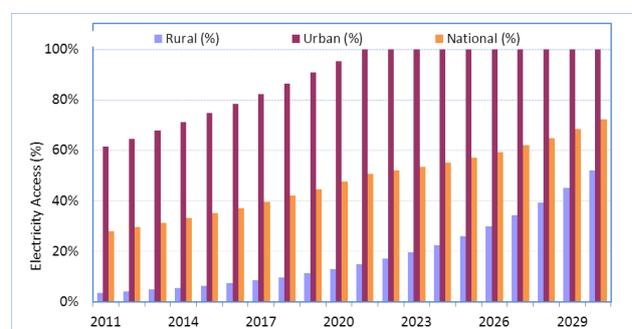


Figure 2: Modelled Growth of Benin Electricity Access by 2030

The figure suggests that even under an annual growth scenario of 15 per cent, less than 10 per cent of rural populations will have access to electricity by 2015, compared to approximately 50 per cent by 2030. In urban areas where the electricity access rate is higher, under an annual growth scenario of 5 per cent, approximately 75 per cent of urban populations will have access to electricity by 2015, achieving a 100 per cent access rate by 2030.

Access to modern cooking facilities

The policy paper target for modern cooking facilities is to expand access to modern cooking fuels to 55 per cent and modern cooking technologies to 45 per cent by 2015.

Access to motive power

Benin has committed to an ambitious target with regard to access to motive power for rural communities—100 per cent by 2015.

Considering the current low level of access to modern energy services, it will be almost impossible to reach these policy targets, which are very ambitious, if aggressive strategies are not taken to increase access to electricity, modern fuels and technologies and motive power.

⁵⁷ Renewable Energies in West Africa, 2009.

⁵⁸ World Bank, 2009a.

⁵⁹ Helio International, 2009.

Burkina Faso

Socio-economic indicators

Population (in millions in 2010)	16.5
Rural population (% of total population)	80
Population below poverty ILine (% of the total population)	46.4
Current GDP (US\$1,000,000 in 2010)	8,820
GDP growth (% in 2010)	9.2
Human Development Index (HDI) (2010)	0.305
HDI rank (2010 ranking – 169 countries)	161

Energy access situation

Burkina Faso's main sources of energy, classified by order of importance in total consumption are as follows:⁶⁰ (i) fuel wood (84% of total energy consumption); (ii) thermal hydrocarbon-based sources stemming (10% of total energy consumed). Hydroelectricity accounts for around 6% of energy consumption; renewable sources that covers less than 1% of Burkina Faso's energy consumption.

Like in other sub-Saharan African countries, insufficient energy access is a serious problem in Burkina Faso. In fact, the electricity access rate in Burkina Faso was 14.6 per cent in 2009. It is estimated that 95% of total available electricity is consumed in urban areas, while electricity needs in peri-urban and rural areas remain uncovered.⁶¹

Access to modern fuels was 7 per cent in 2007, while only 2 per cent of the population relying on solid cooking fuels for cooking has access to improved cooking stoves.

Burkina Faso along with the UNDP has undertaken several initiatives to provide access to motive power to rural communities. These initiatives include the installation of multifunctional platforms powered by a diesel engine. The platforms provide various associated tools such as grinding mills, huskers, alternators, battery chargers, pumps, welding stations and carpentry equipment. They can also be used to distribute water and electricity in a small village. In Burkina Faso, multifunctional platforms are reducing the burden of daily chores for women and allow them time to engage in income-generating activities. It is estimated that a total of 812 platforms have been installed in the whole country.

Scenario for the future

⁶⁰ Based on 2007-2008 data from the Ministry of Energy.

⁶¹ SONABEL, 2008.

Access to electricity

The government target is to increase electricity access rate from 14.6 per cent in 2009 to 60 per cent in 2015 and 100 per cent in 2020. These targets are ambitious and require significant efforts.

To better understand the electricity access situation in Burkina Faso, a BAU model was developed with very simple assumptions. The scenario assumes a constant annual growth of 5 per cent in electricity access between 2010 and 2030 in urban areas and 15% per year between 2010 and 2030 in rural areas. Based on this growth scenario, it is estimated that approximately 20 per cent and 50 per cent of the total population will have access to electricity by 2015 and 2030 respectively—see Figure 3 below.

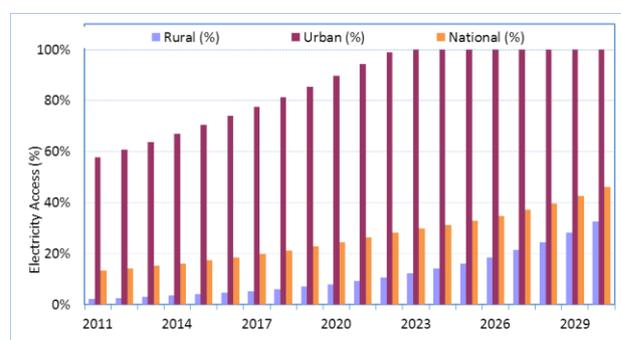


Figure 3: Modelled Growth of Burkina Faso Electricity Access by 2030

It can be seen that even under a growth scenario of 15 per cent per year in rural areas, the electricity access level will be less than 5 per cent and 35 per cent by 2015 and 2030 respectively. However, all households in urban areas will have access to electricity by 2023 after reaching a level of approximately 70 per cent in 2015.

Access to modern fuels

As already mentioned, the current access to modern cooking facilities is very low. Under the business-as-usual scenario, the situation as for access to cooking facilities is likely to remain the same by 2015 and 2030, with significant inequity of access between urban and rural areas.

Access to motive power

Burkina Faso's target for multifunctional platforms is to install a total of 1400 by 2020.

Considering the current low level of access to modern energy services, it will be almost impossible to reach these ambitious policy targets, unless very aggressive strategies are taken to increase access to electricity, modern fuels and technologies and motive power for populations.

Cape Verde

Socio-economic indicators

Population (in millions in 2010)	0.5
Rural population (% of total population)	39
Population below poverty line (% of the total population)	30
Current GDP (US\$1,000,000 in 2010)	1,648
GDP growth (% in 2010)	5.4
Human Development Index (HDI) (2010)	0.534
HDI rank (2010 ranking – 169 countries)	118

Energy access situation

Cape Verde depends entirely on imported sources of fossil fuel, primarily imported oil, for power generation. Currently, 90% of the electricity generation is based on imported diesel, with the result that islanders pay nearly double the mainland cost per kilowatt-hour. However, the country has the highest electricity access rate in West Africa and Africa at large with access rate that have increased from 70% in 2005 to 95% in 2010. The islands of São Vicente, São Nicolau, Boavista, Sal and Brava had coverage rates of 100% in 2009.

Most of the modern fuels in Cape Verde are from gas. The part of the population with access to modern fuels was 62.5 per cent in 2006; 27.6 per cent of rural populations and 86 per cent of urban populations had access. However, according to the UNDP, 70.7 per cent of people living in rural areas in Cape Verde still depend on wood as a source of cooking fuel.⁶²

Data for access to motive power are not documented.

Scenario for the future

Access to electricity

To reduce its strong dependence on fuel imports, Cape Verde has a plan to cover 25% of its needs with renewable energy by the end of 2011 and 50% by 2020.

As already mentioned, the country has the highest electricity access rate—more than 85% at the national level.

To better understand the electricity access situation in Cape Verde, a BAU model was developed with very simple assumptions. The scenario assumes a constant annual growth of 2 per cent in electricity access between 2010 and 2030 in urban areas and 15 per cent per year between 2010 and 2030 in rural areas. Based on this growth scenario, it is estimated that the country will have achieved universal access to electricity both in urban and rural areas by 2015, as presented in the Figure 4 below.

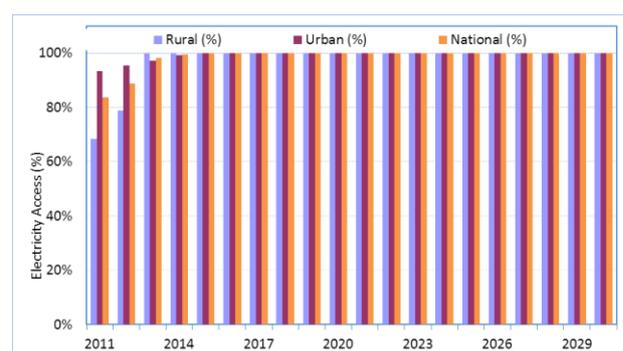


Figure 4: Modelled Growth of Cape Verde Electricity Access by 2030

It is worth noting that Cape Verde is the smallest country in the ECOWAS region, with approximately 0.5 million inhabitants in 2010. This explains in part the rapid growth observed in electricity access in the country.

Access to modern fuels

Current access to modern cooking facilities is lower than access to electricity in the country, which has one of the highest access levels in the West African region. Under a business-as-usual scenario, it is expected that the slow pace in access to modern fuels will continue. Therefore, achieving 100 per cent access to modern fuels by 2015 will require significant investments and the implementation of innovative policy frameworks.

Access to motive power

Cape Verde does not have a specific target for access to mechanical energy. It is also estimated that significant investments and the implementation of innovative policy frameworks will be required to achieve a 100-per cent access rate by 2015.

⁶² http://content.undp.org/go/cms-service/stream/asset/?asset_id=2205620

Côte d'Ivoire

Socio-economic indicators

Population (in millions in 2010)	19.7
Rural population (% of total population)	50
Population below poverty line (% of the total population) (2006)	42
Current GDP (US\$1,000,000 in 2010)	22,780
GDP growth (% in 2010)	3
Human Development Index (HDI) (2010)	0.397
HDI rank (2010 ranking – 169 countries)	149

Energy access situation

Cote d'Ivoire's energy consumption per capita was 134.0 kilograms of oil equivalent in 2008.⁶³ The national electricity access rate has since been increasing from 25% in 1999 to 39% in 2002 and 47.3% in 2009. In 2008, the electricity access rates in rural and urban populations were estimated at 18% and 78% respectively.

In 2006, national access to modern fuels for cooking in the country was estimated at 13.8%, with only 0.3% and 31.4% in rural and urban areas respectively. This is because biomass is the most used energy source in the country, contributing to 76% of the overall satisfaction of energy needs. Biomass, which mainly includes firewood, charcoal, agricultural residues, agro-industrial and forestry products, is widely used as a source of cooking fuel. In rural and urban areas, 94.7% and 29.4% of the population respectively relies on firewood as cooking fuel.

Improved cooking stoves are not commonly used in the country. In fact, only 6.3% of the population relying on solid fuels uses improved cooking stoves.

The access to mechanical power is very low because of a lack of project activities aimed at providing access to motive power, mainly in rural areas.

Scenario for the future

Access to electricity

The government's target is to increase the electricity access rate to 55% by 2015 and achieve universal access to the whole country by 2020. The government has also made rural electrification a main priority, aiming to connect 200⁶⁴ rural districts to the national

grid every year. Experiences showed that clear targets along with adequate policy measures increase electricity access rates. To better understand the electricity access situation in Côte d'Ivoire, a BAU model was developed with very simple assumptions. The scenario assumes an annual growth of 5% in electricity access between 2010 and 2030 in urban areas and 15% per year between 2010 and 2030 in rural areas.

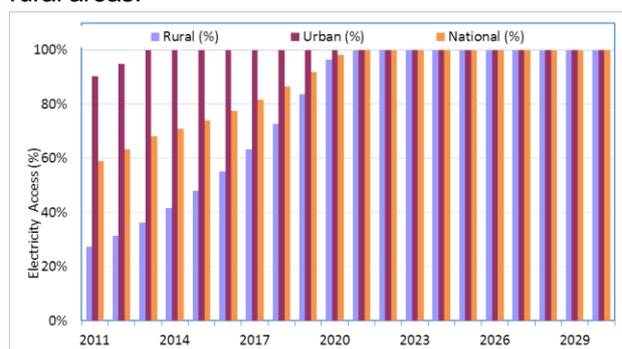


Figure 5: Modelled Growth of Côte d'Ivoire Electricity Access by 2030

Based on this scenario, the figure suggests that approximately 75% of the total population of the country will have access to electricity by 2015, with almost the whole population having access by 2020—98 per cent of the total population. In addition, inequity in electricity access between rural and urban households will still be considerable in 2015, with universal access within the country after 2020.

Access to modern cooking facilities

Côte d'Ivoire's Poverty Reduction Strategy Paper sets targets for access to modern fuels to 40% in 2013 and 60% of the population by the year 2015. The target proportion of the share of new and renewable energies in the national energy consumption is from 0% in 2008 to 3% in 2013 and 5% in 2015.⁶⁵

Access to motive power

By 2015, the access level in motive power will still be far lower than that of electricity and cooking fuel because the latter will likely be prioritized over mechanical power under current energy access approaches.

It is then clear that an aggressive approach needs to be taken to achieve universal access to modern energy services.

⁶³ unstats.un.org/unsd/pocketbook/Pocketbook%202010.pdf

⁶⁴ <http://fayzeh.com/Cote%20d%20Ivoire.htm>

⁶⁵ www.imf.org/external/pubs/ft/scr/2009/cr09156.pdf

The Gambia

Socio-economic indicators

Population (in millions in 2010)	1.7
Rural population (% of total population)	42
Population below poverty line (% of the total population) (2006)	39.6
Current GDP (US\$1,000,000 in 2010)	807
GDP growth (% in 2010)	5
Human Development Index (HDI) (2010)	0.390
HDI rank (2010 ranking – 169 countries)	151

Energy access situation

Fuel wood accounts for more than 80% of national primary energy consumption and approximately 97% of the household energy consumption.

Current electricity production capacity is insufficient to meet the demand in urban and rural areas and therefore requires significant investments. Electricity is available mostly in urban areas and provincial centres of rural areas, with coverage of less than 25%, with electricity consumption representing about 3% of total energy consumed in the country.⁶⁶ In 2009, the national electricity access rate was estimated at 15 per cent, with an access level of approximately 31 per cent and less than 3 per cent in urban and rural areas respectively.

The portion of the population with access to modern fuels for cooking in the Gambia was estimated at 5% in 2007, and only 20% of the population relying on solid fuels for cooking had access to improved cooking stoves.⁶⁷

Scenario for the future

Access to electricity

The Gambia's electrification target is to achieve a 50% national electrification rate by the end of 2011 and a rural electrification rate of 19%.⁶⁸ The Gambia's participation in regional/international energy-related initiatives, including the development of the West Africa Power Pool and the West African

gas pipeline, is a potential alternative source of fuel for the production of electricity.

To have an idea about the trend of electricity access rates in Mali by 2030, a BAU model was developed with very simple assumptions. The scenario assumes a boost of 5% in electricity access between 2010 and 2030 in urban areas and 15% per year between 2010 and 2030 in rural areas.

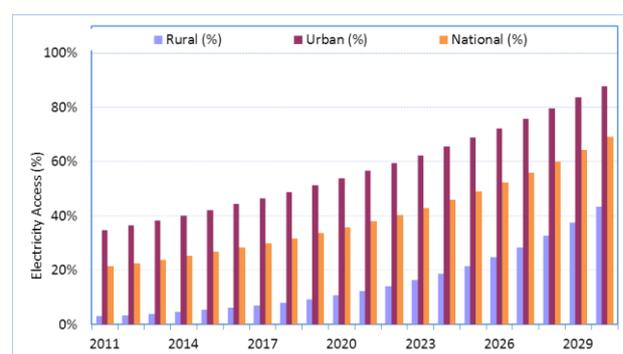


Figure 6: Modelled Growth of the Gambia Electricity Access by 2030

Under this scenario, Figure 6 suggests that by 2030 the Gambia will not achieve universal electricity access, which will be characterized by an increasing access level and considerable inequity in electricity access between rural and urban areas. It is estimated that less than 50 per cent and 90 per cent will have access to electricity by 2015 and 2030 respectively. In rural areas, more than 90 per cent of the rural population will live without access to electricity by 2015.

Access to modern fuels and motive power

The current situation regarding access to modern fuels and motive power is worse than that of electricity. Under this business-as-usual scenario, no important change is expected in that regards, as the country does not have a specific target to increase access to modern fuels and motive power. Placing a high priority on access to modern energy services for the population will be critical for achieving universal access to these services in the Gambia.

⁶⁶ Gambia Joint Assistance Strategy 2008-2011.

⁶⁷ UNDP, 2009.

⁶⁸ *Ibid.*

Ghana

Socio-economic indicators

Population (in millions in 2010)	24.4
Rural population (% of total population)	49
Population below poverty line (% of the total population)	29
Current GDP ⁶⁹ (US\$1,000,000 in 2010)	31,306
GDP growth (% in 2010)	6.6
Human Development Index (HDI) (2010)	0.467
HDI rank ⁷⁰ (2010 ranking)	130

Energy access situation

The access to electricity has been increasing in Ghana; from about 15% in 1989 to 43% in 2000 to 54% in 2008 and currently at 66% by October 2011. In rural and urban areas, access to electricity was 23% and 85% respectively in 2011.

Access to modern energy services for cooking is still very low in Ghana. Only 6% of the population had access to modern fuels in 2011, with 2.3 per cent and 23.7 per cent of rural and urban population respectively. As in most West African states, a significant number of people mainly in rural localities still don't have access to mechanical energy. To enhance women's productivity and save their time for other activities, the Government of Ghana with the support of the UNDP initiated in 2005 a project which aimed to provide access to mechanical energy to rural localities, by establishing a multifunctional platform (MFP). By 2009, there were a total of 40 MFPs installed around Atebubu, Salaga and Tamale.⁷¹ The level of access to motive power is still very low—less than 1%—considering the number of villages that need to be provided with access to mechanical energy.

Scenario for the future

Access to electricity

The goal of the power sub-sector in Ghana is to increase installed power generation capacity from about 2,000 MW in 2010 to 5,000 MW by 2015, increase electricity access from the current level of 66% to 80% in 2015, and achieve universal access by 2020. The target for the renewable sector is to achieve 10% contribution of modern renewables (excluding large

hydro and wood fuels) in the electricity generation mix by 2020 and reduce the demand on wood fuels from 72% to 50% by 2020.

To better understand the scenario for future electricity access in Ghana, a BAU model was developed with very simple assumptions. The scenario assumes a boost of 2% in electricity access between 2010 and 2030 in urban areas and 15% per year between 2010 and 2030 in rural areas. It is therefore estimated that the country will achieve a 100 per cent access rate in urban areas by 2015 while it will achieve universal access to electricity by 2030, starting from 2016—see Figure 7 below.

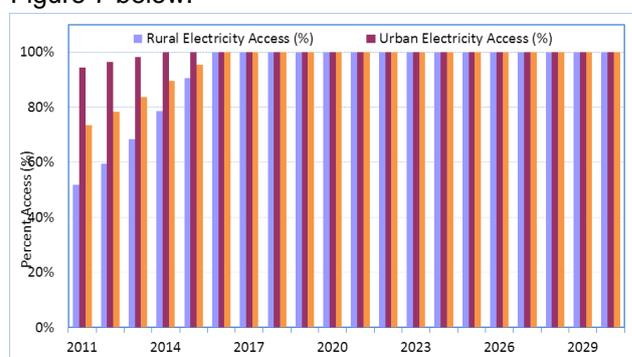


Figure 7: Modelled Growth of Ghana Electricity Access by 2030

Access to modern fuel

With regard to access to modern cooking facilities, the policy target for LPG in Ghana is to increase the access level from the current level of 6 per cent to 50 per cent within 5 years—by 2015.⁷²

Access to motive power

There is no clear policy target to expand the access to mechanical energy to rural localities. Although projects to promote the utilisation of MFP are underway, it is likely that the access level will remain very low until 2015.

Based on the scenario described above, it is clear that aggressive upscaling strategies are required to bring the benefits of modern energy services to all the populations in the most deprived parts of the country by 2015.

⁶⁹ <http://data.worldbank.org/data-catalog/>

⁷⁰ http://hdr.undp.org/en/media/HDR_2010_EN_Table1_reprint.pdf

⁷¹ <http://www.undp-gha.org/news&event.php?id=107>

⁷² <http://www.energycenter.knust.edu.gh/downloads/7/7326.pdf>

Guinea

Socio-economic indicators

Population (in millions in 2010)	10.0
Rural population (% of total population)	65
Population below poverty line (% of the total population) (2006)	30.5
Current GDP (US\$1,000,000 in 2010)	4,511
GDP growth (% in 2010)	1.9
Human Development Index (HDI) (2010)	0.340
HDI rank (2010 ranking – 169 countries)	156

Energy access situation

Guinea's electricity access rate increased from 12.5% in 1996 to 18% in 2009, with an access rate of 45% and 3% in urban and rural areas respectively. Due to the weak penetration of modern fuels in Guinea, firewood and charcoal are the main fuels used by households for cooking, lighting, heating, ironing, and so on. Access to modern fuels for cooking is low in the country with only 0.5% in 2005 of the national population with access to modern fuels. In 2005, zero per cent of the rural population had access to modern fuels for cooking while 1.6% of the urban population had access to modern fuels. Coal and charcoal are the main sources of fuel used by most urban dwellers with 59.6% and 33.8% of the urban population who had access to these products respectively⁵ in 2005.

With regard to mechanical power in Guinea, there is not much data. However, from the country's Poverty Reduction Strategy Paper 2002, the proportion of households with access to mechanized agricultural equipment is insignificant and only 10 per cent of households have animal traction tools⁶.

Scenario for the future

Access to electricity

The Government of Guinea targets an increase of the electricity access rate for its population to 65% by 2015.⁷³ The rural population target is 40%, and

the target for urban population with access to electricity is 100% by 2015. To have an idea of the trend of the electricity access rate in Guinea by 2015 and 2030, a BAU model was developed with very simple assumptions. The scenario assumes a boost of 5% in electricity access between 2010 and 2030 in urban areas and 15% per year between 2010 and 2030 in rural areas.

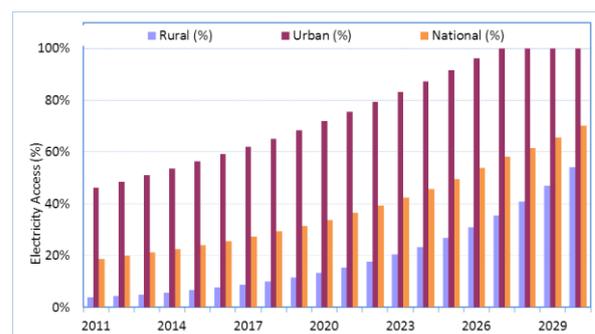


Figure 8: Modelled Growth of Guinea Electricity Access by 2030

Under this scenario, Figure 8 suggests that approximately 25% and 70% of the total population of Guinea will have access to electricity by 2015 and 2030 respectively. Inequity in electricity access will be important as approximately 60% and 100% of the urban population will have access to electricity by 2015 and 2030 respectively. In comparison, only approximately 7% and 55% of rural population will have access to electricity by 2015 and 2030 respectively.

Access to modern cooking facilities

Guinea's government also aims to provide 24.4% of its population with access to modern cooking fuels—20% of rural and 30% of urban populations—by 2015. With improved cooking stoves, the government aims to achieve rates of 75.6% (national), 80% (rural) and 70% (urban) as regards access to improved cooking stoves by the year 2015.⁵

Access to motive power

Promoting multifunctional platforms is one of the solutions identified and retained by the country's Poverty Reduction Strategy Paper (PRSP) for expanding access to modern energy services to populations. The PRSP also recognizes the need to improve agricultural machinery in the sector.

⁷³ siteresources.worldbank.org/...Papers-and.../12082_Guinea_PRSP.pdf

Guinea-Bissau

Socio-economic indicators

Population (in millions in 2010)	1.5
Rural population (% of total population)	70
Population below poverty line (% of the total population) (2006)	51.6
Current GDP (US\$1,000,000 in 2010)	879
GDP growth (% in 2010)	3.5
Human Development Index (HDI) (2010)	0.289
HDI rank (2010 ranking – 169 countries)	164

Energy access situation

Biomass represents over 95% of all the energy consumed by households in Guinea-Bissau⁷⁴. Wood is the dominant fuel used in rural areas, followed by charcoal which is the most used fuel in urban areas, with 74.2% of the urban population having access to it in 2006. Only 21.8% of urban dwellers used wood for cooking. In rural areas, 96.8% of the rural population used wood as a cooking energy source.

In 2009, the country's national electricity access rate was 15% with approximately 2% in rural and 40% in urban areas.

Access to modern fuels is still poor in Guinea-Bissau. In 2006, the national access rate to modern fuels for cooking was only 1.2%, with 0.1% of rural and 3% of urban populations having access to modern fuels. In 2006, the use of improved cooking stoves was somewhat high in the Guinea-Bissau. 51.1% of the population relying on solid fuels for cooking used improved cooking stoves, while the corresponding rural and urban populations were 53.8% and 46.2% respectively.⁷⁵

Scenario for the future

Access to electricity

Guinea-Bissau does not have any future targets regarding electricity access for its population. The definition of long-term goals for access to energy

services at the national level remains to be done.⁷⁶

To have an idea about the trend of the electricity access rate in Guinea-Bissau by 2015 and 2030, a BAU model was developed with very simple assumptions. The scenario assumes a boost of 5% in electricity access between 2010 and 2030 in urban areas and 15% per year between 2010 and 2030 in rural areas.

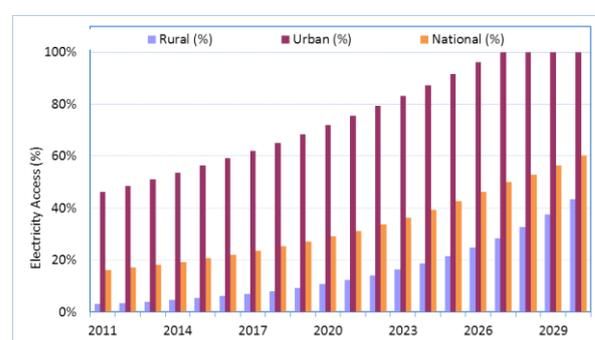


Figure 9: Modelled Growth of Guinea-Bissau Electricity Access by 2030

Under this scenario, Figure 9 suggests that approximately 20% and 60% of the total population of Guinea will have access to electricity by 2015 and 2030 respectively. Inequity in electricity access will be important as approximately 60% and 100% of the urban population will have access to electricity by 2015 and 2030 respectively. In comparison, only approximately 6% and 45% of rural population will have access to electricity by 2015 and 2030 respectively.

Access to modern and motive power

Guinea-Bissau does not have any future targets regarding access to modern cooking facilities and motive power for its population.

To achieve universal access to modern energy services in Guinea-Bissau, there is a need to place high priority on modern energy services by investing significant amounts of investment finance from local as well as external sources and developing and implementing innovative policy frameworks.

⁷⁴ www.gtz.de/de/.../gtz2009-en-regionalreport-wa-guinea-bissau.pdf

⁷⁵ UNDP: The Energy Access Situation in Developing Countries.

⁷⁶ ECOWAS/UEMOA, access to energy services mission support, Leaflet – Guinea-Bissau.

Liberia

Socio-economic indicators

Population (in millions in 2010)	4.0
Rural population (% of total population)	39
Population below poverty line (% of the total population) (2006)	80
Current GDP (US\$1,000,000 in 2010)	986
GDP growth (% in 2010)	5.5
Human Development Index (HDI) (2010)	0.300
HDI rank (2010 ranking – 169 countries)	162

Energy access situation

Access to conventional energy services in Liberia is driven by petroleum products which are insufficient, relatively expensive and skewed in favour of the urban population mainly in the Monrovia area. About 10% of the population at the national level and less than 2% of rural residents have electricity access, largely from self-generation using expensive imported fuel.⁷⁷ Less than 1% have access to modern fuels.

As in most of the countries in West Africa, data for access to motive power are not documented. However, it is likely that most of the population, mainly those living in rural areas, do not have access to mechanical energy.

Scenario for the future

Access to electricity

The targets set by the government are that, in line with the Millennium Development Goals as adopted by the Economic Community of West African States (ECOWAS), the government expects to achieve the following goals by 2015:

- 40% of Liberian citizens living in rural and peri-urban areas and using traditional biomass for cooking shall have access to improved stoves and kerosene or efficient-gas cookers in order to reduce indoor pollution;
- 30% of the urban and peri-urban population shall have access to reliable modern energy services enabling them to meet their basic

needs (lighting, cooking, communication, and small production-related activities);

- 15% of the rural population shall have access to reliable modern energy services toward meeting the same basic needs;
- 25% of the schools, clinics, and community centres in rural areas shall have access to modern energy services for lighting, refrigeration, information and communication, etc., and shall be equipped with productive energy capacity.

To have an idea about the trend of the electricity access rate in Liberia by 2015 and 2030, a BAU model was developed with very simple assumptions. The scenario assumes a boost of 5% in electricity access between 2010 and 2030 in urban areas and 15% per year between 2010 and 2030 in rural areas.

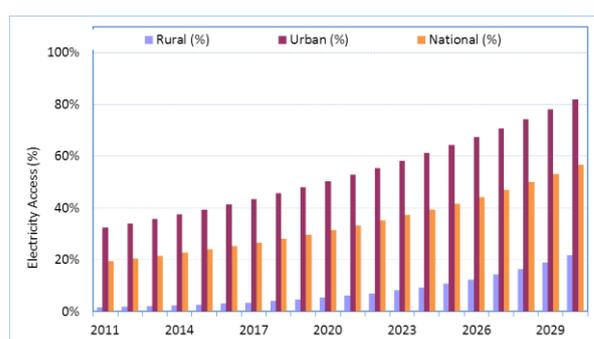


Figure 10: Modelled Growth of Liberia Electricity Access by 2030

Under this scenario, Figure 10 suggests that approximately 25% and 60% of the total population of Liberia will have access to electricity by 2015 and 2030 respectively. Inequity in electricity access will be important as approximately 40% and 82% of the urban population will have access to electricity by 2015 and 2030 respectively. In comparison, only approximately 3% and 22% of the rural population will have access to electricity by 2015 and 2030 respectively.

Access to modern and motive power

Liberia does not have any future targets regarding access to modern cooking facilities and motive power for its population.

To achieve universal access to modern energy services in Liberia, there is a need to place high priority on modern energy services by investing significant amounts of investment finance from local as well as external sources and developing and implementing innovative policy frameworks.

⁷⁷ Energy policy, 2009.

Mali

Socio-economic indicators

Population (in millions in 2010)	15.4
Rural population (% of total population)	67
Population below poverty line (% of the total population) (2009)	25.5
Current GDP (US\$1,000,000 in 2010)	9,251
GDP growth (% in 2010)	4.5
Human Development Index (HDI) ⁷⁸ (2010)	0.309
HDI rank (2010 ranking – 169 countries)	160

Energy access situation

In Mali the rates of access to modern sources of energy are low. This is mostly the case in rural areas, where more than 95% of the population lives without energy for purposes such as lighting, cooking, refrigeration, communication, pumping and motive force, according to the UNDP and the World Health Organization (WHO). In 2007, 78 per cent of all final energy consumption in Mali was biomass-based, almost exclusively firewood and charcoal. This percentage is far higher than the average in Africa, which is around 60 per cent.⁷⁹

Mali's national electricity access rate was 18 per cent in 2009. The access rate in urban areas is 55.27 per cent compared to only 14.89 per cent in rural areas. The level of access to modern cooking fuels by population is very low. In 2009, the UNDP estimated that only 0.2 per cent of the population had access to modern fuels for cooking. Since the late 1990s, Mali has undertaken initiatives to provide populations, mainly those living in rural communities, with access to mechanical power. In 1997, the Government of Mali with the support of the UNDP initiated the multifunctional platform (MFP) programme which expanded over five per cent of the rural population in Mali.⁸⁰ To date, it estimated that 1000 MFPs have been installed in Mali, each engine serving 500 to 1500 people.

Scenario for the future

⁷⁸ http://hdr.undp.org/en/media/HDR_2010_EN_Table1_reprint.pdf

⁷⁹ Ministère de l'Énergie et de l'Eau, 2007.

⁸⁰

http://practicalaction.org/docs/consulting/UNDP_Mechanical_Power.pdf

Electricity access

Through the Investment Plan for Scaling Up Renewable Energy adopted in 2011, the Government of Mali has set specific objectives to achieve a rural electrification rate of 55 per cent and a 10 per cent contribution of renewable energy to the country's energy mix by 2015. To have an idea about the trend of the electricity access rate in Mali by 2030, a BAU model was developed with very simple and optimistic assumptions. The scenario assumes a boost of 5% in electricity access between 2010 and 2030 in urban areas and 15% per year between 2010 and 2030 in rural areas.

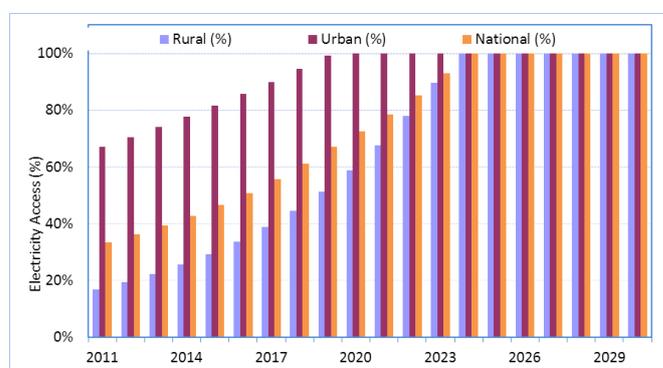


Figure 11: Modelled Growth of Mali Electricity Access by 2030

Under this scenario, Figure 11 above shows that less than 50 per cent of the population will have access to electricity in 2015, with 30 per cent and 81 per cent of the populations in rural and urban areas respectively. Until 2024, there will still be inequity in electricity access between these areas in the country. Interestingly, all households in the country will have access to electricity from 2024 onwards.

Access to modern fuels

Mali has no specific target for modern fuels. It is likely that the percentage of the population relying on modern fuels to cook will remain very low until 2015.

Access to motive power

Mali has set a target to install 5000 MFPs by 2015, thereby providing 2.5 to 7.5 million people in the country with mechanical power.

Expanding access to modern energy services to all the households in Mali by 2015 is feasible if aggressive investments and policy mechanisms are put in place.

Niger

Socio-economic indicators

Population (in millions in 2010)	15.5
Rural population (% of total population)	83
Population below poverty line (% of the total population) (1993)	63
Current GDP (US\$1,000,000 in 2010)	5,549
GDP growth (% in 2010)	8.8
Human Development Index (HDI) (2010)	0.261
HDI rank (2010 ranking – 169 countries)	167

Energy access situation

Wood resources represent 90% of the energy sector against 8% for hydrocarbons and 2% for electricity.⁸¹ Niger is 100% dependent on oil and electricity imports from neighbouring Nigeria, which supplies 87% of the electricity.

Firewood is relied on as a cooking fuel for both rural and urban communities with 84.9% of the rural and urban populations relying on it respectively, the national average being 94.2% in 2006. Only 10.4% of the urban population and 1.2% of the rural use charcoal for cooking.

Access to electricity in Niger increased from 6.7% in 1998 to 8% in 2009 at the national level with 1.5% and 40% in rural and urban areas respectively.

Regarding modern fuels for cooking, only 0.9% of the national population had access in 2006, with 0.2% and 4% in rural and urban areas respectively. In Niger, only 8.7% of the population relying on solid fuels for cooking uses improved cooking stoves.⁸²

Scenario for the future

Access to electricity

The Accelerated Development and Poverty Reduction Strategy for 2008-2012 aims to raise the household access rate to electricity to 15% (national) and to 3% in rural areas and 46% in urban areas by the end of 2012.⁵ In addition, the country's National Strategy Access to Modern Energy aims to improve the supply by providing a higher percentage of the population with modern energies by 2015 through granting, access to modern fuels for cooking, access to motive power for villages, and access to electricity for rural and peri-urban populations to reach a cover rate of 66% by 2015.⁴

To have an idea about the trend of the electricity access rate in Niger by 2030, a BAU model was developed with very simple assumptions. The scenario assumes a boost of 5% in electricity access between 2010 and 2030 in urban areas and 15% per year between 2010 and 2030 in rural areas.

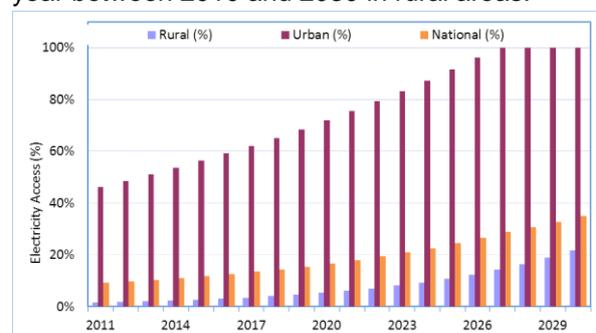


Figure 12: Modelled Growth of Niger Electricity Access by 2030

Under this scenario, Figure 12 suggests that approximately 12% and 35% of the total population of Niger will have access to electricity by 2015 and 2030 respectively. Inequity in electricity access will be important as approximately 56% and 100% of the urban population will have access to electricity by 2015 and 2030 respectively. In comparison, only approximately 3% and 22% of the rural population will have access to electricity by 2015 and 2030 respectively.

Access to modern cooking facilities

Niger's target for access to modern fuels for its population is 50.8% at the national level, with 30% and 100% to be achieved respectively in rural and urban areas by 2015. The Government of Niger is further determined to increase the population with access to improved cooking stoves to 49.2% at national level and to 70% in rural areas by 2015.⁵

Access to motive power

The Reference Programme on Access to Energy Services focuses on the access to energy facilities for social and productive activities (cooking, motive power and electricity) for the entire population of Niger.

Considering the current level of energy access in Niger, which is very low, there is a need to place high priority on modern energy services by investing significant amounts of investment finance from local as well as external sources and developing as well as implementing innovative policy frameworks to achieve universal access to modern energy services.

⁸¹ unfccc.int/resource/docs/napa/ner01e.pdf

⁸² UNDP: The Energy Access Situation in Developing Countries.

Nigeria

Socio-economic indicators

Population (in millions in 2010)	158.5
Rural population (% of total population)	50
Population below poverty line (% of the total population)	43.1
Current GDP (US\$1,000,000 in 2010)	193,669
GDP growth (% in 2010)	7.9
Human Development Index (HDI) (2010)	0.423
HDI rank (2010 ranking – 169 countries)	142

Energy access situation

Nigeria's economy depends on oil products with 98% of the proven reserves of crude oil, natural gas and coal. The country is also well endowed with other energy resources such as tar sands, uranium, solar, biomass, hydropower and wind. There is however poor access to modern energy services, which constitutes a major barrier to the exploitation of economic opportunities, and consequently to sustained economic growth and the achievement of higher living standards.

The UNDP report on the Energy Access Situation in LDCs indicated that, in 2008, 46.8 per cent of Nigeria's population had access to electricity while only 26 per cent of the rural households did. In 2007, it was estimated that 24 per cent of the population had access to modern fuels. Moreover, over 72 per cent of the population depends on fuel wood for cooking while 0.3 per cent, 1 per cent, 23 per cent and 2.2 per cent depend respectively on electricity, gas, kerosene and charcoal for cooking. The consumption of fuel wood is worsened by the widespread use of inefficient cooking methods, the most common of which is still an open fire. The UNDP estimated that in 2009, only 6 per cent of the population relying on solid fuels for cooking in Nigeria had access to improved cooking stoves.

Scenario for the future

Electricity access

The National Energy Policy (NEP) sets the target to expand the national electricity access rate to 75 per cent of the total population by 2020. At the same time, the Renewable Energy Master Plan set a target to expand electricity access to 75 per cent of

the rural population by 2025. To have an idea about the trend of the electricity access rate in Nigeria by 2030, a BAU model was developed with very simple assumptions. The scenario assumes a boost of 5% in electricity access between 2010 and 2030 in urban areas and 15% per year between 2010 and 2030 in rural areas.

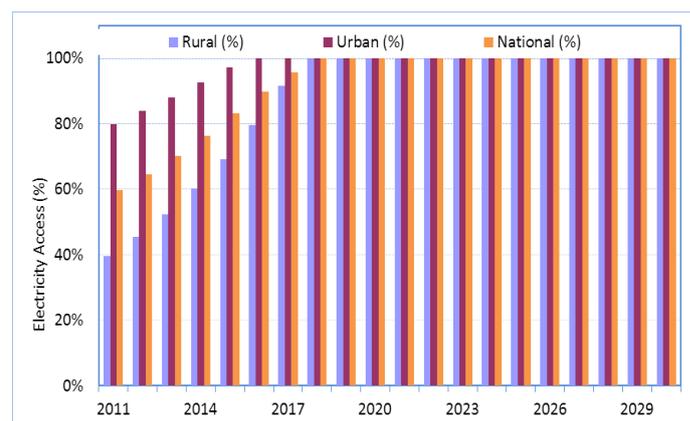


Figure 13: Modelled Growth of Nigeria Electricity Access by 2030

Under this scenario, Figure 13 above shows that approximately 83 per cent of the population will have access to electricity in 2015, with 70 per cent and 97 per cent of the populations in rural and urban areas respectively. Interestingly, all households in the country will have access to electricity from 2021 onwards, with universal access in both rural and urban areas afterwards.

Access to modern fuels

Nigeria has set a target to expand modern energy services, including modern fuels, to all Nigerians by 2025.

Access to motive power

Nigeria has set a target to expand modern energy services, including mechanical power, to all Nigerians by 2025.

Expanding access to modern energy services to all the households in Nigeria is feasible if appropriate investments and policy mechanisms are put in place.

Senegal

Socio-economic indicators

Population (in millions in 2010)	12.4
Rural population (% of total population)	57
Population below poverty line (% of the total population) (2009)	35.1
Current GDP (US\$1,000,000 in 2010)	12,954
GDP growth (% in 2010)	4.2
Human Development Index (HDI) (2010)	0.411
HDI rank (2010 ranking – 169 countries)	144

Energy access situation

The poor level of access to modern energy services and low levels of energy consumption (0.18 toe per capita) and the resultant energy poverty are the major characteristics of Senegalese households.

In 2009, it was estimated that 42 per cent of the total population had access to electricity, with approximately 80 per cent and 18 per cent of urban and rural populations respectively having access to electricity.

Access to modern cooking facilities is high compared to most of the other ECOWAS countries, due to successful initiatives undertaken by the government to increase access to modern cooking facilities. In 2009, the UNDP estimated that 41 per cent of the population had access to modern fuels for cooking, while 16 per cent of the population relying on solid fuels for cooking had access to improved cooking stoves.

In 2005, community access to mechanical power was estimated at 36%, with 100 per cent of communities in Dakar and other urban zones having access to mechanical power as compared to only 24 per cent in rural areas.⁸³ Senegal, with the financial and technical support of the UNDP, carried out programmes to increase access to motive power by installing multifunctional platforms in rural communities. It is estimated that 176 multifunctional platforms have been installed in the country, each engine serving 500 to 1500 people.

Scenario for the future

Access to electricity

In 2008, the Government of Senegal adopted a policy letter for the development of the energy sector (LPDSE) which set the target for access to electricity to 75% at the national level, and 50 per cent and 95 per cent in rural and urban areas respectively by 2015. To have an idea about the trend of the electricity access rate in Senegal by 2030, a BAU model was developed with very simple assumptions. The scenario assumes a boost of 5% in electricity access between 2010 and 2030 in urban areas and 15% per year between 2010 and 2030 in rural areas.

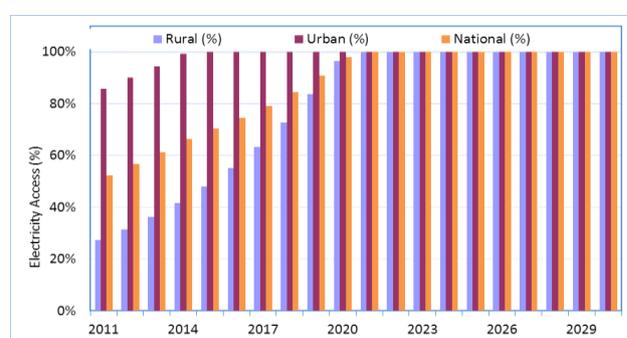


Figure 14: Modeled growth of Senegal Electricity Access by 2030

Under this scenario, Figure 14 above shows that approximately 70 per cent of the population will have access to electricity in 2015, with 48 per cent and 100 per cent of the populations in rural and urban areas respectively. Interestingly, all households in the country will have access to electricity from 2021 onwards, with universal access in both rural and urban areas afterwards.

Access to modern fuels

Senegal has set a target to achieve a 100 per cent household access rate for modern cooking systems by 2015.

Access to motive power

Senegal has set a target of achieving 100 per cent community access rate to mechanical power by 2015. It is also planned to install 1000 multifunctional platforms by 2015. All communities will be provided with mechanized agro-processing.

Expanding access to modern energy services to all the households in Senegal is feasible if appropriate investments and policy mechanisms are put in place.

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http://www.un.org/esa/sustdev/csd/csd14/lc/presentation/undp_en_ergy.pdf

Sierra Leone

Socio-economic indicators

Population (in millions in 2010)	5.9
Rural population (% of total population)	62
Population below poverty line (% of the total population) (2009)	47
Current GDP (US\$1,000,000 in 2010)	1,905
GDP growth (% in 2010)	5.0
Human Development Index (HDI) (2010)	0.317
HDI rank (2010 ranking – 169 countries)	158

Energy access situation

Sierra Leone's national access to electricity increased from 10 per cent in 2004 and to 15 per cent in 2009. The country's rural population has almost no access to electricity, with only 0.1 per cent of the countryside having access in 2007. The electricity is mostly accessible in the Western Area of the country, where the capital, Freetown, is situated

Sierra Leone's energy use is characterized by the dominance of traditional fuels—firewood and charcoal in the domestic sector largely for cooking. In 2007, it was estimated that 85.2 per cent of the total population of the country used firewood for cooking, with 99 per cent of the rural population and 61 per cent of the urban population using firewood as cooking fuel. As for charcoal, it was estimated in 2007 that 13.8 per cent of the national population used this fuel, with 37.1 per cent of the population using charcoal in urban areas.

Access to modern cooking fuels is still very low in Sierra Leone with only 0.8% of the national population having access to modern fuels. In rural areas, in 2007 modern fuels accounted for 0.3 per cent of cooking fuels while it accounted for 1.7 per cent in urban areas. The use of improved cooking stoves is minimal in Sierra Leone, as only 9.6 per cent of the national population have access to these technologies, with 9.0 per cent and 11.1 per cent of people who rely on solid fuels for cooking in the rural and urban areas respectively use improved cooking stoves.⁸⁴

The government's Statistical Report reported in 2007⁸⁵ that 0.6 per cent and 3.6 per cent of the households in the country had respectively access to milling machines and grinding services. Rice mills/haulers and Cassava graters/grinders were predominantly used in the areas where these crops are grown on a very large scale.

Scenario for the future

Access to electricity

Sierra Leone's target is to attain electricity access to 35% of its population by 2015—only 2.3 out of 6.6 million with access to electricity.

To have an idea about the trend of the electricity access rate in Sierra Leone by 2030, a BAU model was developed with very simple assumptions. The scenario assumes a boost of 5% in electricity access between 2010 and 2030 in urban areas and 15% per year between 2010 and 2030 in rural areas.

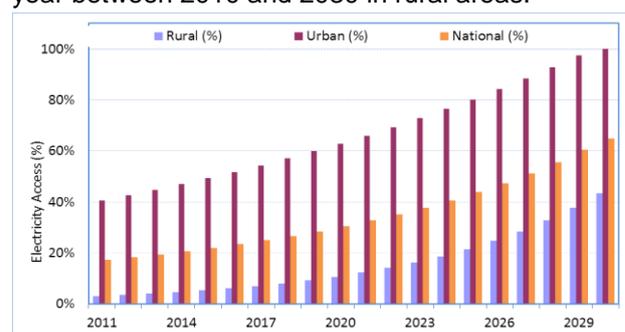


Figure 15: Modelled Growth of Sierra Leone Electricity Access by 2030

Figure 15 suggests that by 2030 Sierra Leone will not achieve universal electricity access, which will be characterized by increasing levels and considerable inequity in electricity access between rural and urban areas.

Access to modern cooking facilities

The Government of Sierra Leone has no specific future targets for modern cooking facilities.

Access to motive power

The Government of Sierra Leone has no specific future targets for motive power.

Therefore, the level of access to modern cooking facilities and motive power is likely to remain very low by 2015 and 2030. This scenario underscores the urgent need for aggressive strategies and measures to expand access to electricity, cooking facilities and mechanical energy for households living in the country.

⁸⁴ UNDP: The Energy Access Situation in Developing Countries.

⁸⁵ www.statistics.sl/cwiq_report.pdf

Togo

Socio-economic indicators

Population (in millions in 2010)	6.0
Rural population (% of total population)	57
Population below poverty line (% of the total population) (2009)	36.8
Current GDP (US\$1,000,000 in 2010)	3,153
GDP growth (% in 2010)	3.4
Human Development Index (HDI) (2010)	0.428
HDI rank (2010 ranking – 169 countries)	139

Energy access situation

Energy access remains a challenge in Togo as many areas remain off the national grid and without a stable and affordable power supply. Access to electrical power remains a luxury for most of the Togolese population, whose main source of energy is firewood and charcoal, which when combined comprise 80% of the country's energy.

At the end of 2009, the country's national household electrification rate was estimated at 22 per cent, with 42 per cent and 4 per cent in urban and rural areas respectively.

Access to modern cooking fuels was estimated at 2 per cent in 2007, and the portion of the population relying on solid fuels for cooking with access to improved cooking stoves was estimated at 3 per cent.

Access to mechanical power is not documented in Togo. However, like any other ECOWAS member state, the country has a very low level of mechanical power access.

Scenario for the future

Access to electricity

The government, through the Country Strategy Paper 2011-2015, set an objective to satisfy the energy needs of businesses and households at low cost.

To have an idea about the trend of electricity access rate in Togo by 2030, a BAU model was developed with very simple assumptions. The scenario assumes a boost of 5% in electricity access between 2010 and 2030 in urban areas and 15% per year between 2010 and 2030 in rural areas.

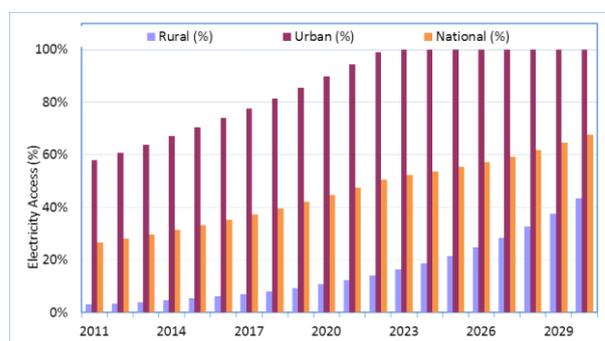


Figure 16: Modelled Growth of Togo Electricity Access by 2030

Figure 16 suggests that by 2030 Togo will not achieve universal electricity access, which will be characterized by increasing levels and a considerable inequity in electricity access between rural and urban areas.

Access to modern cooking facilities

The Government of Togo has no specific future targets for modern cooking facilities.

Access to motive power

The Government of Togo has no specific future targets for motive power.

Therefore, the level of access to modern cooking facilities and motive power is likely to remain very low by 2015 and 2030. This scenario underscores the urgent need for aggressive strategies and measures to expand access to electricity, cooking facilities and mechanical energy to households living in the country.

APPENDIX II: POLICY ENVIRONMENT TO PROMOTE ACCESS TO MODERN ENERGY SERVICES

Country	Policy	Instruments	Target and Objectives
Benin	Policy for energy service provision to achieve the Millennium Development Goals	<ul style="list-style-type: none"> Subsidies for grid-connected electricity customers Subsidies on butane gas, kerosene and diesel fuel—residential cooking and lighting as well as economic activities Government rural electrification programmes—PV, mini-grid and grid extension 	<ul style="list-style-type: none"> Expand access to modern fuels⁸⁶ to 55% by 2015. Expand access rate to modern cooking technologies to 45% by 2015. Expand household electricity access in urban and rural areas to 100% and 42% respectively by 2015. Expand access to motive power in rural communities to 100% by 2015.
Burkina Faso	National White Paper (LBN)	<ul style="list-style-type: none"> Subsidies for grid-connected electricity customers Subsidies on butane gas, kerosene and diesel fuel—residential cooking and lighting as well as economic activities Government rural electrification programmes—PV, mini-grid and grid extension Multifunctional platform projects 	Focus on the provision of modern energy services to the entire population of Burkina Faso by the year 2020. Renewable energy is considered to be a major contributor to this goal.
Cape Verde	Cape Verde's energy policy	<ul style="list-style-type: none"> Subsidies on electricity consumption Electricity connection subsidies Subsidies on kerosene, LPG and diesel fuel consumption Government programmes and projects 	Reinforce rural electrification.
Côte d'Ivoire		<ul style="list-style-type: none"> Subsidies on electricity consumption Electricity connection subsidies Subsidies on kerosene, LPG and diesel fuel consumption 	Presently, there are no specific regulations, incentives or legislative framework conditions available for the implementation and promotion of RE. But the new regulations drafted at the Ministry of Mines and Energy provide the necessary environment to develop the RE sub-sector in Côte d'Ivoire.

⁸⁶ http://www.bj.undp.org/docs/omd/OMD_energie_Benin.pdf

The Gambia	Renewable energy and energy efficiency policy	<ul style="list-style-type: none"> • Subsidies for grid-connected electricity customers • Subsidies on butane gas, kerosene and diesel fuel—residential cooking and lighting as well as economic activities • Zero-import tax status on all solar PV panels, solar water heaters, wind energy equipment and energy-efficient light bulbs (compact fluorescent lamps) • No license fee for operators in the electricity sub-sector using RE • Incentives are provided by the Gambia Investment Promotion and Free Zone Agency (GIPFZA) for investments especially in energy and RE. 	Disseminate RE and energy efficiency devices to increase population access to modern energy services.
Ghana	National Electrification Scheme – Energy Plan 2006-2020	<ul style="list-style-type: none"> • Energy Fund in the area of R&D in RETs • Government subsidies for electricity and grid connection costs • Total exemption from import duty on RE generators including solar generators, wind turbines and municipal waste • Exemption from VAT in importing RE products only if the components are brought in whole (i.e., not in separate pieces) into the country • Exemption from the payment of customs import duties on plant, machinery, equipment and accessories imported specifically and exclusively to establish the enterprise • Energy Fund in the area of R&D in RETs 	Electricity access for all by 2020. Incentives include:
Guinea	Letter for sectorial policy on decentralized rural electrification	<ul style="list-style-type: none"> • Subsidies for grid-connected electricity customers • Subsidies on butane gas, kerosene and diesel fuel—residential cooking and lighting as well as economic activities 	<ul style="list-style-type: none"> • Promote electricity access in rural areas.
Guinea-Bissau	Strategic plan for RE was elaborated during 2004-2008	<ul style="list-style-type: none"> • Subsidies for grid-connected electricity customers • Subsidies on butane gas, kerosene and diesel fuel—residential cooking and lighting as well as economic activities 	No explicit policies on Renewable Energies (RE). Even though a draft was developed by the Government as early as in 2004, the document has not been adopted yet. Furthermore, the adopted strategic plan for RE has not been implemented yet due to a lack of funds.

Liberia	Renewable Energy Policy	<ul style="list-style-type: none"> • Subsidies for grid-connected electricity customers • Subsidies on butane gas, kerosene and diesel fuel—residential cooking and lighting as well as economic activities 	Produce a national policy instrument to build and increase the application of renewable energy and energy-efficiency technologies in Liberia by promoting investment, technology transfer, market development and local capacity building.
Mali	Energy policy of Mali in March	<ul style="list-style-type: none"> • Subsidies for grid-connected electricity customers • Subsidies on butane gas, kerosene and diesel fuel—residential cooking and lighting as well as economic activities • Biofuel development programmes • Multifunctional platform projects • Rural electrification funds 	Contribute to the sustainable development of the country, through the supply of energy services accessible to the highest possible number of people at low cost, and supporting the promotion of socio-economic activities.
Niger	National Renewable Energies Strategy (SNER)		<ul style="list-style-type: none"> • Aims to increase the contribution of RE to the national energy balance from less than 0.1% in 2003 to 10% by 2020 by:
	National strategy for domestic energy		<ul style="list-style-type: none"> • Create a global and coherent frame for intervention in the sub-sector of domestic energies.
	Strategy of Rural Development		<ul style="list-style-type: none"> • Create adequate conditions to help rural communities to develop their local economy and improve their living conditions.
	National Strategy for Access to Modern Energy Services (SNASEM)		<ul style="list-style-type: none"> • Aims to improve the supply of modern energies to a higher percentage of the population by 2015 through granting (i) Access to modern fuels for cooking, (ii) Access to motive power for villages with 1,000–2,000 inhabitants, and (iii) Access to electricity for rural and peri-urban populations to reach a cover rate of 66%.
Nigeria	Renewable Energy Equipment bill	<ul style="list-style-type: none"> • Tax exemptions for the import duty of PV equipment • Subsidies on kerosene and butane used to cook and meet lighting needs 	<ul style="list-style-type: none"> •
	National Energy Policy (NEP)		<ul style="list-style-type: none"> • Expand national electricity access rate to 75% of the population by 2020.
	Renewable Energy Master Plan (REMP)		<ul style="list-style-type: none"> • Expand access to energy services for Nigerians. • Expand electricity access in rural areas to 75% by 2025.

Senegal	Strategy paper on the development of the energy sector	<ul style="list-style-type: none"> • Subsidies for grid-connected electricity customers • Subsidies on butane gas, kerosene—residential cooking and lighting • Grid electricity subsidies depending on the type of connection • ASER manages a programme for rural electrification, with a dual approach: grid extension where possible, filling in through alternative means (PV mainly) elsewhere 	
Sierra Leone	National energy policy	<ul style="list-style-type: none"> • Still at draft stage 	<ul style="list-style-type: none"> • Electricity access rate of 35% by 2015.
	Poverty Reduction Strategy Paper (PRSP) for 2005-2007		<ul style="list-style-type: none"> • Expand the population's access to reliable modern energy services while improving supply reliability.
Togo	Poverty Reduction Strategy Paper Interim (PRSP-I)	<ul style="list-style-type: none"> • Subsidies for grid-connected electricity customers • Subsidies on butane gas, kerosene and diesel fuel—residential cooking and lighting as well as economic activities • Government rural electrification programmes—PV, mini grid and grid extension 	There are currently no dedicated policies for energy access. According to the Togo for 2006-2008 however, the government pursues several objectives in the energy sector. This includes the implementation of policies for the promotion of RE, the increase of electricity supply to rural areas and the implementation of regulatory institutions.

APPENDIX III: RE POTENTIAL IN ECOWAS MEMBER STATES

	Large hydro (MW)	Small hydro	Fuel wood, animal waste and crop residue (million tons)	Solar radiation kWh/m ² /day	Wind m/s	Crop residue (million tons/year)	Animal waste (million tons/year)	Biofuel
Benin ⁸⁷	760		6	3.9-6.2	3-6	5		46.5 million litres
Burkina Faso		1		5.5	1-3			35,000 units
Cape Verde	No (economically feasible) potential	No (economically feasible) potential	6	>6				Cape Verde
Côte d'Ivoire	5-288 MW	0.5-5.0 MW	369,612 toe and 1,000,000 tons	4-5	1-2			
The Gambia	No national hydro power potential	No national hydro power potential		4.5-5.3	3			
Ghana		16 million metric tons of wood		3-5				
Guinea	6,000 MW		4.8	2-4			8.5 million to 14 million m ³	
Guinea-Bissau	184 MW	67,000 m ³ per year	4.5-5.5	2.5 to 7			10,000 m ³ from cashew and about 20 hectares of jatropha plantations	
Liberia		15,248 (GWh/yr) ⁸⁸	4-6	No data available	6077 (GWh/yr) ¹⁸	219 (GWh/yr) ¹⁸	26,869 (GWh/yr)	
Mali	5,000	1,050		6	4.7-5.3	320,000		
Niger ⁸⁹	125.0	26.0	9.9 million ha	5-7	2.5-5	4	55	
Nigeria ¹⁵	14,750	734	144 million tons	3.5-7.0	2-4	83	61	
Sierra Leone		1,513 MW	2,706 GWh	1,460 to 1,800 kWh/m ² /y	3-5	2,706 GWh		
Togo	224 MW		2.6 million toe	4.4-4.5				

⁸⁷ Renewable Energies in West Africa Regional Report on Potentials and Markets Energy-policy Framework Papers, gtz.

⁸⁸ Assessment of Biomass Resources in Liberia, as of 2008.

⁸⁹ CNES Inventory, as of 2006.

