

# *The ECOWAS Energy Efficiency Policy (EEEP)*

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## Executive Summary

The energy system of West Africa is facing serious interrelated challenges of energy access, energy security and climate change adaptation and mitigation. Furthermore, during the last years the ECOWAS Region has gone through an energy crisis that hampers social and economic development, and affects particularly low-income population groups. To address these multiple challenges, ECOWAS has taken action to adopt and implement a Energy Efficiency Policy.

The policy will contribute to achieving ECOWAS development goals in general, and specific goals for the energy sector, notably for energy security and for energy access (as defined in ECOWAS/UEMOA White Paper on Access to Energy Services in Peri-Urban and Rural Areas). The energy efficiency policy will complement the existing array of ECOWAS policies by addressing the challenge of making the most efficient use of the region's energy resources. Together with the policies on energy access and renewable energy, it will constitute a comprehensive ECOWAS policy framework to achieve Sustainable Energy for All, aiming for universal access by 2030. The policy contributes as well to the goals of the Africa-EU Energy Partnership. It will become a part of the overall ECOWAS energy policy framework, currently under development.

The ECOWAS energy efficiency policy framework will contribute to creating a favourable environment for private investments in energy efficiency, and will spur industrial development and employment through reduction of energy bills. Energy efficiency will contribute to job creation, both in energy using sectors, and in the energy efficiency supply chain. Increasing energy efficiency is an integral part of the modernisation and greening of the West African economies

Energy efficiency will contribute to reliability and security of energy supply, by decreasing losses at all links in energy value chains. It will thus decrease dependency on fossil fuels.

Energy efficiency will contribute to raising the standard of living for ECOWAS populations, by reducing energy bills, and making access to energy more affordable and easier to attain, both in urban and rural areas. It will facilitate provision of energy for all public services, including education, health and clean water.

Finally, energy efficiency reduces the negative environmental externalities - GHG emissions, air, soil and water pollution, land degradation - of use of energy.

The energy efficiency policy has the following **objectives**:

**The overall objective of regional policy by 2020** is to double the annual improvement in energy efficiency, to attain levels comparable to those of world leaders. This means that each year, the amount of energy needed to produce a certain quantity of goods and services will decrease by about 4%.

**The specific targets of the regional policy are:**

- phase out inefficient incandescent lamps by 2020;
- reduce losses in electricity distribution, from the current range of 15% to 40%, to under 10% by 2020;
- achieve universal access to safe, clean, affordable, efficient and sustainable cooking for the entire population of ECOWAS, by 2030;
- establish an ECOWAS Technical Committee for Energy Efficiency Standards and Labelling, and adopt initial region-wide standards and labels for major energy equipment by end 2014;

- create instruments for financing sustainable energy, including carbon finance, by the end of 2013;
- by 2015, begin implementation in each ECOWAS country at least one of the priority initiatives;
- by 2016, implement measures that free 2 000 MW of power generation capacity.

The **Strategy** of the energy efficiency policy will add value through regional support to national efforts. The strategy focuses on **policy, capacity, awareness and finance**.

- a **harmonised policy, legal and regulatory framework in energy efficiency** for the ECOWAS region, including energy efficiency labels and standards. ECOWAS will support Member States in adopting national energy efficiency targets and action plans. Policies will be designed to be gender responsive, and will aim at encouraging private investment, so as to create a regional market and regional manufacturing capacity for energy efficient technologies. Energy efficiency policies will be linked to the ECOWAS Policy on Renewable Energy.
- regional **coordination of capacity building** to create the necessary institutional and human skills to implement energy efficient technologies. Exchange of experience will facilitate the dissemination of lessons learned and best practices, for both public and private actors.
- **awareness raising** for energy users and the multiple decision makers in the design, purchase and maintenance of energy using equipment, from the simple cook stove to complex industrial systems. The ECREEE Observatory for Renewable Energy and Energy Efficiency (EORE) will serve as a storehouse for information on energy efficiency technologies, potentials, investments and business contacts.
- **financial instruments** to allow users to pay for energy efficient equipment through future energy savings.

The ECOWAS energy efficiency **action plan** is based on five flagship energy initiatives, each including policy, capacity building, awareness raising and financing elements.

- **Initiative on Efficient Lighting** to phase out inefficient incandescent lamps, and replace them with high efficiency lamps.
- **Achieving High Performance Distribution of Electricity**, by reducing commercial and technical losses in electricity distribution systems.
- **Safe, Sustainable and Affordable Cooking** to ensure that the entire ECOWAS population has access to clean and efficient stoves, with an assured supply of adequate fuels.
- **Standards and Labelling Initiative** to create a regional harmonised system of energy standards and energy efficiency labels.
- **Finance for sustainable** will mobilise environmental finance instruments - for Green House Gases emissions reductions through Kyoto, NAMAs and voluntary markets, for ozone depleting substances through the Montreal Protocol, etc. - to support regional projects on energy efficiency and renewable energy.

## 1. Introduction: the Energy Challenge in West Africa

The energy systems of West Africa are facing serious interrelated challenges of energy access, energy security and environmental degradation (notably due to deforestation and climate change). During the last several years the ECOWAS Region has gone through an energy crisis, hampering social and economic development, particularly affecting low-income population groups. The reasons are manifold: political crisis; rapidly growing electricity demand; escalating diesel and heavy fuel prices; high power generation costs and consumer tariffs; under investment; slow sector reforms.

High energy prices<sup>1</sup>, and crisis situations in many of the West African power systems provide a strong incentive to save energy through application of energy efficiency measures. There is increasing recognition that the economics of energy efficiency are very favourable and that a vast potential exists for actions, large and small, with short payback periods. High level political will exists to support action, as shown by the mandate to the Commissions of ECOWAS and UEMOA to create EE programmes, and by the decision of West African Heads of State to create ECREEE as a specialised agency focused on energy efficiency as well as renewable energy.

This ECOWAS energy efficiency policy (EEEP) aims to put into place a solid institutional framework, the foundation for efforts to achieve a step change in the region's progress towards an energy efficient economy. The strategy outlined in this document focuses on **policy, capacity, awareness** and **finance**, four pillars that will allow reaping the benefits of energy efficiency in West Africa, and on **ECOWAS regional support to national actions** of Member States through regional cooperation, cross-learning and exchange.

The Energy Efficiency policy will form part of the overall ECOWAS energy policy framework, currently under development, and will complement the existing array of ECOWAS policies by addressing the challenge of making the most efficient use of the region's energy resources. Together with the policies on energy access and renewable energy, it will constitute a comprehensive ECOWAS policy framework to achieve Sustainable Energy for All. Application of the policy will:

- accelerate the achievement of the regional power trade scenario of the Master Plan of the West African Power Pool (WAPP), the objectives of the ECOWAS/UEMOA White Paper on Access to Energy Services in Peri-Urban and Rural Areas, the UN Goals on Universal Access to Energy Services by 2030 and the goals of the Africa-EU Energy Partnership;
- contribute to solving the severe energy crisis in the ECOWAS region by addressing the challenges of energy security, energy access and protection of the environment;
- create a favourable environment to attract private sector investments. Energy efficiency should be a motor for industrial development, creating jobs in the energy efficiency supply chain. Increasing energy efficiency is an integral part of the modernisation and greening of the West African economies;
- improve reliability and security of electricity supply, by decreasing the generation, transmission and distribution losses and related fossil fuel dependency of ECOWAS countries;
- reduce electricity bills of the public and private sector. Particularly, urban low-income groups can benefit from income savings, through reduction of costs for lighting and refrigeration.

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<sup>1</sup> Energy, in all forms, is generally considerably more expensive in West Africa than in other regions of the World. For instance, grid connected customers in Senegal pay an average price of 0,17 €/kWh. High fuel prices make transport expensive, and increase costs for decentralised power produced in a diesel powered mini-grid: typically costs range from 0.25 to 0.50€/kWh. Even though overall costs for renewable energy systems are rapidly declining, they are for the moment often greater than costs for fossil fuelled systems.

Companies would benefit from productivity gains and governments could invest in other sectors;

- increase access to modern, reliable and affordable energy services in rural and urban areas;
- support social and economic development: job creation; productive uses; business development (planning, manufacturing, assembling, installation and maintenance services); provision of social services (health and education);
- reduce negative environmental externalities, such as GHG emissions, air, soil and water pollution and land degradation.

The energy efficiency policy creates added value and can complement or facilitate the adoption and execution of national policies and activities. It has the potential to:

- encourage the adoption of national targets and action plans that contribute to the achievement of the regional targets;
- foster a harmonised policy, legal and regulatory framework across the region, including common standards and labelling for equipment and systems. Implementation will be facilitated by ECREEE, WAPP and ERERA;
- facilitate harmonisation of tax and duty policies, often discussed in regional institutions such as UEMOA and ECOWAS, in order to avoid illegal trade of equipment across borders;
- encourage dissemination of knowledge, lessons learned and market information on energy efficiency technologies, potentials, investments and business contacts through the ECREEE Observatory for Renewable Energy and Energy Efficiency (EORE).
- promote a regional market for energy efficiency equipment manufacturing;
- harness the full potential of sustainable energy options by creating strong links to the ECOWAS Policy on Renewable Energy.

### **1.1. Expanding access to modern energy services**

A majority of the population of West Africa today lacks access to essential modern energy services. Achieving universal access to electricity, to mechanical power as well as to safe and affordable cooking is thus a major challenge in achieving economic development and social progress for women and men in the region.

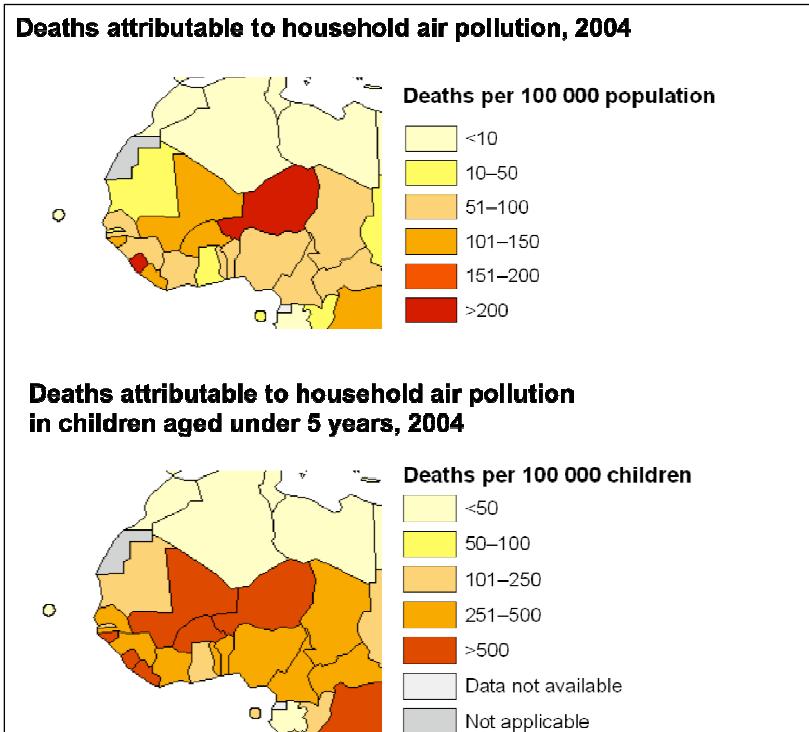
#### ***ECOWAS action on access***

The ECOWAS countries have recognised the importance of access to energy services, notably to meet the energy needs of the poor, of rural and peri-urban areas, and of women. A process that was initiated at the first meeting of the Regional Multisector Group (Bamako, May 2005) led to the adoption by ECOWAS-UEMOA Heads of State (Niamey, January 2006) of a strategy for improved access to energy services: the "White Paper for a Regional Policy For Increasing Access to Energy Services For Populations in Rural and Peri-Urban Areas in Order to Achieve the Millennium Development Goals". The White Paper contains the following ambitious numerical targets for access to modern cooking fuel, to mechanical power for productive activities, and to electricity:

- 100% access to a modern cooking fuel;
- 60% access in rural areas to productive energy services in villages, in particular mechanical power to boost the productivity of economic activities;
- 66% access to an individual electricity supply;
- 60% of the rural population will live in localities with:
  - modernised basic social services - healthcare, drinking water, communications, lighting, etc;
  - access to lighting, audiovisual and telecommunications service, etc.;
  - the coverage of isolated populations with decentralised approaches.

Since adoption of the White Paper, progress towards achieving its goals has been uneven, hampered by geographical, economic and institutional factors. Only five ECOWAS countries have been able to extend electricity access to the majority of their populations. Thus, over 200 million people in the region still do not have access to electricity or mechanical power, and are still dependent on traditional forms of wood and charcoal for cooking.

Women and girls spend several hours per day collecting and hauling wood and water. In addition, smoke from inefficient stoves in



poorly ventilated homes causes respiratory disease and death, particularly for women and children. Furthermore, in areas threatened by deforestation, the long-term supply of wood is threatened. For women, responsible for nearly every aspect of domestic energy system, access to electricity would make enormous differences in reducing the physical and time burdens of household work and as well as opening up the prospect for new revenue generating activities.

Lack of mechanical power (including mechanised transport) and electricity, necessary for new revenue generating activities, is a barrier to economic progress. Lack of refrigeration in clinics, electronic devices in schools, and pumping for supply of clean water are barriers to social progress. The gap between a minority, mostly urban, with access to modern energy, and the majority who lack it, poses a basic problem of equity, and threatens the cohesion of societies.

### ***Energy efficiency to lift the barriers to access***

Improved energy efficiency particularly in combination with renewable energy solutions has the potential to boost universal access to energy services in West Africa. The heart of the energy access challenge consists of making modern energy services affordable to poor women and men, both in rural and urban areas. It is difficult for women and men with low incomes (42% of the West African population lives with less than 1.25\$/day<sup>2</sup>) to afford modern energy services. For instance, even in urban areas where the power grid exists, connection costs of over 100€ are a barrier for poor families. In rural areas, investing in a household energy system (over 300€ for a solar home system) is equally out of reach. When women are the head of household, this becomes even more problematic, notably due to the challenges they can face in securing loans.

Energy efficiency can help lift this barrier. It may seem paradoxical to promote energy saving for those who do not have any energy to save. Yet, meeting the access challenge must include an increase in efficiency. Efficiency in energy use makes it possible to meet the vital energy needs of women and men, while consuming fewer expensive resources, both for operating costs (less fuel), and investment costs (lower investments for smaller energy systems). Thus by making access less expensive, energy efficiency puts modern energy services within the reach of poor women and men.

<sup>2</sup> Source : Regional Energy Poverty Project - ECOWAS Region, UNDP Dakar, 2011

Greater efficiency in the use of electricity from the grid will free up capacity, effectively creating new "energy efficiency virtual power plants". The reduction of waste of electricity liberates generation capacity that can be redirected to rural electrification purposes through grid extension. This aids power utilities both in accelerating extension of national grids to new users, and in improving reliability and quality of service for existing grid connected users.

By lowering the cost to users of energy services, more efficient household appliances, notably for lighting and refrigeration, will lower the cost of providing electricity service to new users. Thus, it will favour both grid extension and building of decentralised systems, thus facilitating service to users in zones far from the national grid. This will contribute to a step change in the pace of growth in decentralised and stand-alone systems, essential for providing service in rural zones, where currently less than 12% of the population<sup>3</sup> is served in the ECOWAS region<sup>4</sup>.

More efficient equipment will contribute to faster growth in productive activities, making modern energy services more accessible and affordable for enterprises and artisans, both in areas served by national grids, and in areas where decentralised grids or stand alone solutions must be used to meet the needs of power for production.

## **1.2. Assuring reliable supply of energy**

West African power systems suffer from frequent blackouts and brownouts. At times of stress in world petroleum markets, some countries have suffered from shortages of fuel for transport and power generation.

Unreliable power hinders the region's enterprises and impacts negatively on productive activities of women and men. The cost of providing backup power (typically €0.30 per kWh or more) holds back productive industries: the World Bank estimates that blackouts reduce annual economic growth in Africa by 2%. A recent survey<sup>5</sup> estimates that firms in Africa lose 6% in sales due to frequent power outages. Some informal sector firms, unable to afford backup generation facilities, cite losses of up to 16 %. On average, shortages affect electricity users in the region 56 days per year<sup>6</sup>. Indeed chronic unreliability in power has become a burning political issue in some of the countries in the region. Increased energy efficiency - along with regional integration of energy systems and increased use of local energy resources - is key to assuring more reliable power supply.

Thus, all ECOWAS countries face the challenge of guaranteeing reliable supply of electricity and fossil fuels to their growing economies. Accelerating economic growth has stimulated demand for energy, increasing the strain on energy systems.

More efficient use of energy is a powerful tool to increase the reliability of energy systems. In the power sector, higher efficiency would free up capacity, and reduce the need for imports, both for the power sector and for transport fuels. More efficient cooking will reduce demand for cooking fuels, both fossil and renewable. It will thus facilitate efforts to protect forest resources, and guarantee the future supply of cooking fuels.

## **1.3. Stimulating economic growth**

The energy sector presents vast opportunities to accelerate economic development. Energy efficiency measures can benefit energy using productive activities throughout the economy. Indeed, increasing energy efficiency lowers energy bills for households - contributing to raising

<sup>3</sup> Source : The energy access situation in developing countries – UNDP, WHO, 2009

<sup>4</sup> Overall, the electricity access rate in the ECOWAS Region is about 45%.

<sup>5</sup> Foster and Briceño-Garmendia 2010)

<sup>6</sup> WBG.

their standard of living - as well as for enterprises, contributing to their competitiveness and ability to sell in international markets.

In addition to their beneficial impact on energy users, energy efficiency measures are in and of themselves a major source of jobs, of national value added and of export revenues. Many energy efficiency measures, particularly in the building sector, are labour intensive, and create jobs. Energy efficiency, by reducing the need for energy imports (oil, gas, electricity), improves the national balance of payments. For countries that export energy, increasing efficiency releases resources to increase exports. Improved balance of payments makes resources available for more investment, contributing to a virtuous circle of economic growth.

#### **1.4. Fostering social development**

Access to energy services contributes to improving essential services such as health, education, and water supply. Efficient use of energy makes it possible to provide these services - vaccine refrigeration for health clinics, computers for schools, water pumping for agriculture and households - at a lower cost. Since access to modern energy for cooking and water supply greatly facilitate the daily lives of women, EE can contribute to improving gender equality. These savings can make modern energy affordable for cash strapped public services.

#### **1.5. Improving the status of Women**

Women are responsible for nearly every aspect of the domestic energy system, especially in rural areas. The burdens of energy scarcity and the heavy reliance on biomass fuels fall disproportionately on women. Women work longer workdays than men, providing human energy for activities such as collecting fuel and water, cooking, food processing, transport, agriculture. This is mostly non-monetised work that remains largely invisible in national energy and labour force statistics.

More efficient use of energy facilitates access to efficient modern energy services, reducing the drudgery of women's household work, while extending the opportunities for productive activities or allowing them to spend more time with their families. Safe and affordable cooking fuels and stoves are of particular importance to their health. Modern energy - mechanical power for food processing, heat for food drying, electricity for phone charging and night time light - provide women with the opportunity to expand their small scale businesses. As many of the businesses that women run are energy intensive (e.g. food vending, baking, fish smoking, food processing), more efficient technologies could make a big impact in terms of reducing environmental degradation, improving working conditions, improving health, and in social and economic development of rural families. Furthermore, studies have shown that an increase in income generated by women is likely to be spent on schooling and healthcare for the children, thus contributing to sustainable development.

Gender mainstreaming examines the specific roles of women and men as actors and beneficiaries in energy efficiency. Thus, gender mainstreaming will create space for identifying the gender issues through the use of practical gender tools, and will aid in setting adequate goals for positive gender outcomes from EE.

#### **1.6. Protecting the environment and dealing with climate change**

While energy services are essential for modern societies, for life itself, the use of energy can cause multiple forms of harm to our environment. Using less energy to provide the same or better services is the shortest path to reducing negative environmental impact from energy use. Energy efficiency is a sound option for mitigation of the emissions of greenhouse gases and helps to confront the adaptation challenges that climate change poses to infrastructure and living conditions of the population in West Africa.

- Unplanned or poorly managed harvesting of wood can contribute to deforestation and desertification. On the other hand, energy efficiency at each link of the fuel wood supply chain - sustainable forest management, improved charcoal conversion, rationalised transport through rural wood markets, improved cook stoves - can contribute to making forests a sustainable and renewable source of energy, as well as a source of valuable non wood forest products. Regional efforts, through the "Comité permanent Inter-Etats de Lutte contre la Sécheresse (CILSS)" have shown that concerted efforts can ensure reliable energy supplies, while at the same time protecting the long-term viability of the region's forests, with positive effects for the global carbon balance.
- Improved energy efficiency at the end of the wood fuel value chain, notably through improved cook stoves, can reduce the emissions of harmful smoke particles, that are both a danger for health - particularly for women and children - and a factor contributing to local air pollution and global climate change.
- The extraction, transport and combustion of fossil fuels - coal, oil, natural gas - involves multiple environmental risks: oil spills that pollute land and water; run off and erosion from coal mines; acid rain from coal fired power plants; urban air pollution (sulphur dioxide, nitrous oxide, carbon monoxide, ozone) from vehicle emissions; etc. Extracting and burning smaller quantities of fossil fuels, through efficient use, immediately reduces all these associated risks. Furthermore, it reduces the emissions of Green House Gases, such as carbon dioxide, methane, and of black soot, that contribute to climate change.
- Promoting the use of energy-efficient buildings, adapted to the climate conditions in West Africa and following principles of tropical architecture, would help to offset energy demand increases and peak loads due, for instance, to additional cooling needs in a warmer climate.
- Through access to modern forms of renewable energy as well as efficient use of the energy resources at their disposal, people in the ECOWAS region can become more resilient to climate alterations that impose stringent conditions on their lives and infrastructure, affecting the availability of biomass, water and food.
- Deploying energy efficient technologies in end uses and in power generation, transmission and distribution can help counteract increases in electricity demand and decreased output of thermal or hydro power plants due to higher temperatures.

### **1.7. Cross cutting issues for Energy Efficiency and Renewable Energy**

Energy efficiency and renewable energy are two complementary and essential building blocks to achieve sustainable development.

Many of the public policy actions to encourage energy efficiency will also encourage increased use of renewables. Furthermore, expansion of the use of renewables is facilitated by efficient use of energy. Thus, in parallel to the current policy on energy efficiency, ECOWAS has also adopted a policy on renewable energy. These two policies, along with the existing policy on access, form a "Sustainable Energy For All" policy framework for the ECOWAS region.

Synergies between energy efficiency and renewable energies can be exploited in several ways.

- Energy efficiency measures, by reducing total energy consumption, allow renewable energy systems to meet a larger share of demand, thus diminishing the need for fossil fuelled systems, and facilitating achievement of national targets for renewable energy.
- Energy efficiency contributes to optimising the use of off-grid systems based on renewable energy.
- In buildings, renewable energy and energy efficiency technologies are complementary: on-site renewable energy systems for cooling, water heating and electricity production can be optimised through energy efficiency measures.
- Improving the energy efficiency of cook-stoves using traditional biomass contributes to optimising the use of biomass and to the conservation of forests.
- Where applicable, co or tri generation of electricity, heat and cold increase the conversion efficiency of biomass resources.

## 2. Current Situation for Energy Efficiency

ECOWAS Heads of State, recognising that Renewable Energy and Energy Efficiency are essential tools to meet the energy access challenge, inscribed energy efficiency into the ECOWAS Energy Protocol (Article 43), thus laying the foundation for regional cooperation on energy efficiency. Furthermore, they decided in 2007 to create the ECOWAS Centre for Renewable Energy and Energy Efficiency (ECREEE). Today, the broad elements of an institutional framework are in place to achieve greater energy efficiency in West Africa.

In order to accelerate progress in energy efficiency, a workshop was organised in Ouagadougou, April 2010, bringing together high-level representatives of the region's Energy Directorates. The workshop concluded with consensus on areas for priority actions:

- drafting a White Paper on energy efficiency for the ECOWAS and UEMOA States:
  - development of a common, harmonised legislative framework on energy efficiency
  - promulgation of directives on energy efficiency;
  - general framework for building codes;
  - creation of a framework for discussion on the power sector;
- creation of an information system on energy efficiency and "good practices";
- gradual phase out of inefficient incandescent lamps, dissemination of high efficiency lighting;
- aid in the creation of financing mechanisms;
- energy performance labelling, certification, standards and test centres for household appliances and office equipment;
- use of local materials in construction;
- capacity building, training, education and regional cooperation in support of national action on energy efficiency.

On the basis of this consensus, ECREEE formulated a work programme to set the stage for a broad, concrete effort to capture the potential of energy efficiency measures. ECREEE established a regional network of National Energy Efficiency Focal Institutions (NFI). In cooperation with the NFIs, ECREEE, from October 2011 to March 2012, conducted stock taking missions in all the region's countries, to evaluate the potential benefits of energy efficiency measures, and to determine the status of the framework for action on energy efficiency. The stock taking inventoried the successful energy efficiency actions in the region, focusing on cooking, lighting, buildings, electricity distribution and refrigerators. Finally, the stock taking identified a list of priority measures to be put into place.

The following paragraphs describe the current situation, with information collected during these stock taking missions. A comparison is made with international practice in energy efficiency. On the basis of the current situation, and a comparison with international practice, conclusions are drawn with respect to the major barriers to increased energy efficiency in the region.

### 2.1. Energy Access and Energy Efficiency Baseline

The West African situation with respect to access to energy and energy efficiency is paradoxical: on the one hand, the majority of the population lacks access to modern energy services, while on the other hand, a significant proportion of existing energy resources are wasted. The table on the following page shows the current situation with respect to access to energy and energy efficiency in the ECOWAS countries<sup>7</sup>. The table includes data on energy intensity, a significant indicator of the efficiency of use of energy.

<sup>7</sup> The data for this baseline is drawn from the 15 stock taking missions carried out by ECREEE in the ECOWAS countries, complemented by international sources. A complete account of the stock taking missions has been published separately. Note that the Renewable Energy policy paper, in order to take into account unmet demand as part of the potential for use of renewables, used data from the WAPP master plan. Thus data in the two policy papers is not strictly comparable.

Country	Population (Year 2009)	Total primary energy supply (TPES, ktoe)	Electricity consumption (MWh) 2009	GDP in 2009 (million USD) Source: World Bank	Energy intensity (TPES/GDP, ktoe/000 USD)	Elec. per cap. (kWh)	Elec. per cap. for those w. access (kWh)	Rate of access to electricity (%)
Benin	8'520'876	3'470	800'605	6'585	0.53	94	354	26.5
Burkina Faso	15'224'780	3'260	699'789	8'348	0.39	46	170	27.0
Cape-Verde	506'000	121	294'934	1'600	0.08	583	670	87.0
Côte d'Ivoire	21'080'000	9'978	3'672'819	23'041	0.43	174	239	72.9
Gambia	1'766'100	506	204'600	983	0.51	116	772	15.0
Ghana	23'840'000	9'240	6'060'000	25'978	0.36	254	381	66.7
Guinea	10'498'597	4'275	855'600	4'164	1.03	81	403	20.2
Guinea Bissau	1'449'000	219	65'100	834	0.26	45	300	15.0
Liberia	4'128'600	227	311'600	879	0.26	75	503	15.0
Mali	14'528'662	3'500	979'767	8'964	0.39	67	249	27.1
Niger	14'693'112	4'000	580'977	5'254	0.76	40	412	9.6
Nigeria	154'880'872	108'250	18'140'000	168'567	0.64	117	231	50.6
Senegal	12'767'600	2'940	2'328'372	12'769	0.23	182	338	54.0
Sierra Leone	5'997'500	317	53'940	1'856	0.17	9	60	15.0
Togo	6'191'000	2'630	671'900	3'156	0.83	109	482	22.5
<b>ECOWAS</b>	<b>296'072'699</b>	<b>152'933</b>	<b>35'720'003</b>	<b>272'978</b>	<b>0.56</b>	<b>121</b>	<b>266</b>	<b>45.3</b>

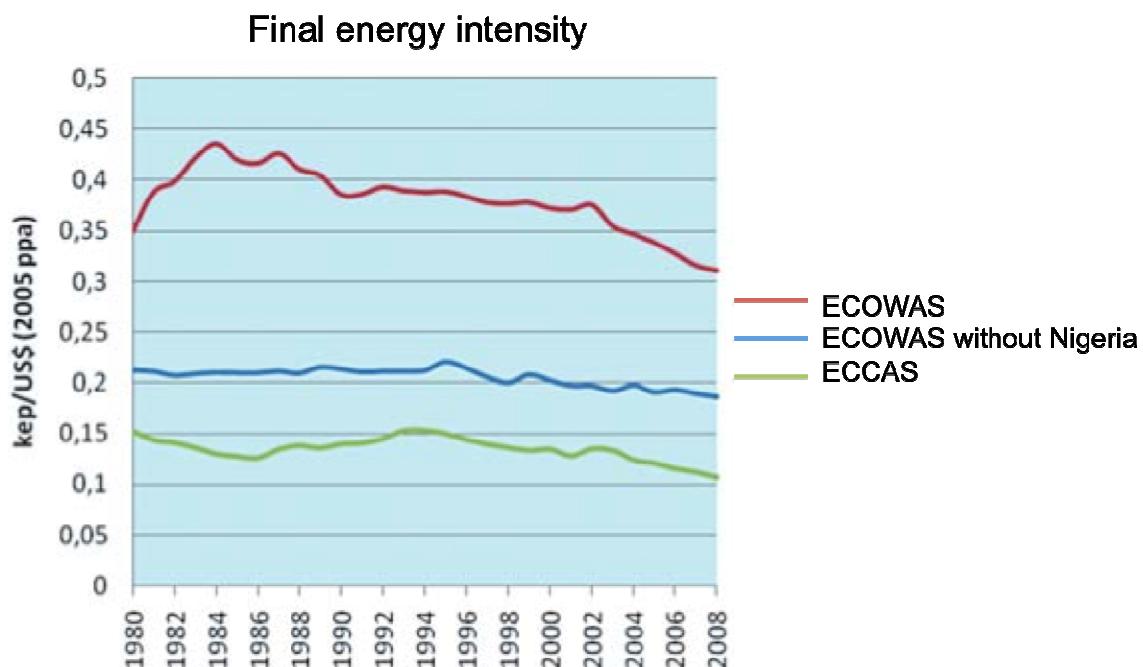


### **Energy intensity, grid losses**

Energy intensity<sup>8</sup> is a measure of how much energy is consumed to produce a unit of economic output. Low energy intensity indicates an efficient economy, while a high intensity indicates inefficiency. As shown in the following table, ECOWAS energy intensity is quite high, as compared to other regions and countries.

Region/country	Energy intensity 2009 (TPES/GDP) ktoe/million\$
<b>ECOWAS</b>	<b>0.56</b>
China	0.46
USA	0.16
Latin America	0.13
UE	0.11
Japan	0.09

Furthermore, in almost all countries in the world, the energy intensity is declining, indicating improving energy efficiency. Despite the importance of making the best and wisest use of energy, the energy efficiency of West African economies has improved by less than 1% per year over the last two decades, as shown below. In comparison, the dynamic economies of East Asia have seen their energy intensity decrease by some 4% per year.



Thus, the rate of improvement of efficiency in the ECOWAS region is less favourable than in other regions.

<sup>8</sup> Energy intensity is calculated as the ratio of total primary energy use to gross domestic product. The energy intensity of an economy decreases as the economy becomes more energy efficient.

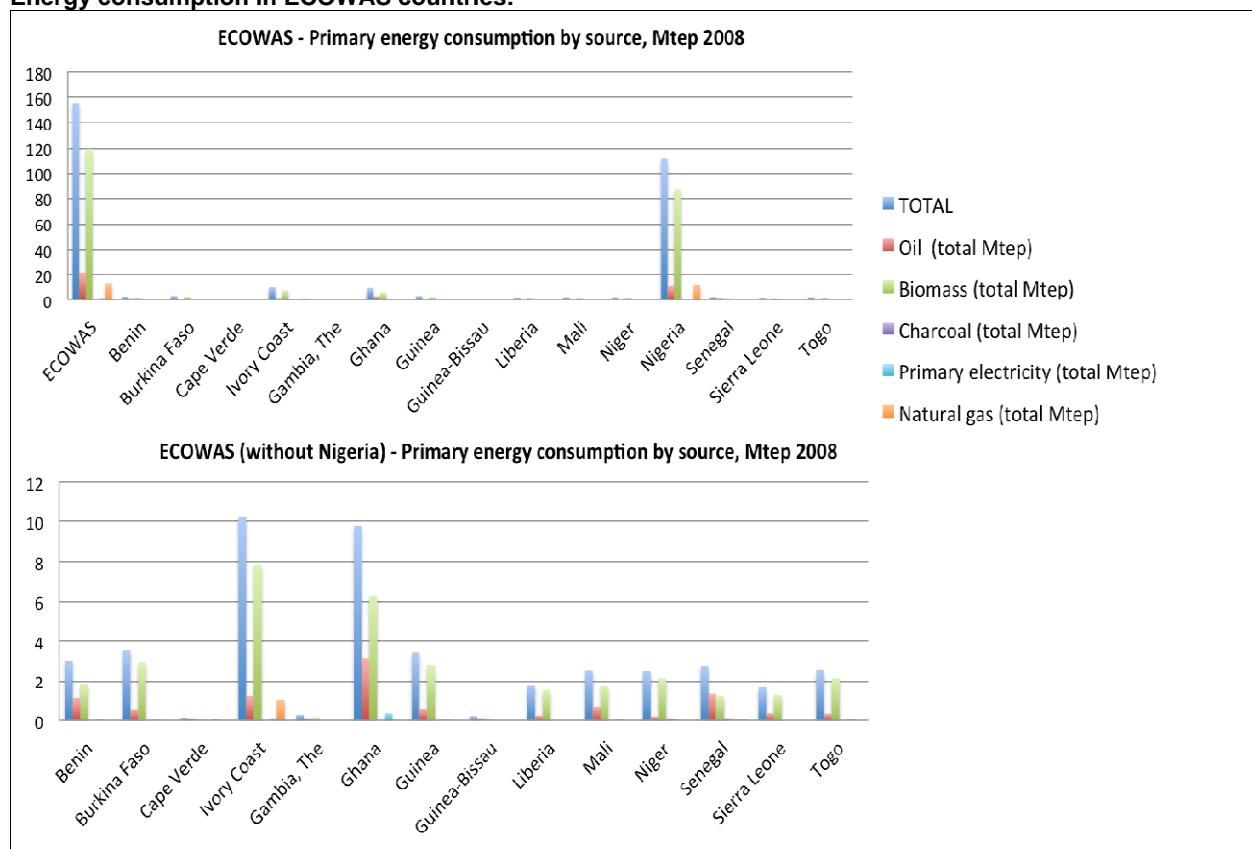
Losses in the ECOWAS region electricity grids vary from 15% to 40%, compared to normal losses of 7%. This means that more than 10% of electricity is wasted in the network, before it even reaches users<sup>9</sup>.

Among the reasons for the slow pace of improvement in energy efficiency, are the lack of public policy instruments, and the small number of public or private actions to achieve greater energy efficiency. The following paragraphs describe current energy consumption, and the baseline framework situation for policies and actions in ECOWAS countries.

## 2.2. Energy Efficiency potential in the West African economy

Total primary energy consumption in ECOWAS countries is about 155 MTOE per year<sup>10</sup>. Wood and charcoal used for both commercial and household cooking are the largest sources of energy and represent 77% of the primary energy consumption (2008). Modern commercial energy consumption consists of 22 MTEP of petroleum products and 43 TWh electricity.

### Energy consumption in ECOWAS countries:



Source: ADEME - Les consommations d'énergie des pays de la CEDEAO et de la CEMAC, 2011

The ECREEE EE regional Stock Taking has concluded that implementation of economically viable measures could lead to approximately 30% savings for electricity in the short and medium term. This would mean **releasing over 4 000 MW of power** for new uses and new users.

<sup>9</sup> Currently, reliable comprehensive data on grid losses is not available for many ECOWAS countries. Extrapolations, based on data from the stock taking missions and on international data sources - IEA, DOE/EIA, Enerdata, World Bank - indicate that average losses over the region are in the neighbourhood of 25%. In the future, the work of the ECOWAS initiative on high performance electricity distribution (see below 4.2) and the ECREEE Observatory for Renewable Energy and Energy Efficiency (EORE), should make this data available.

<sup>10</sup> Source: Les consommations d'énergie des pays de la CEDEAO et de la CEMAC, ADEME. Data from 2008.

### ***Evaluating the short term EE potential***

Experience from around the world has shown that concerted public efforts to promote energy savings can provide improved services while consuming less energy. Measures that pay for themselves in less than 3 years can generally save over 30% of energy consumption. The World Energy Council/ADEME estimate that long term overall savings in West Africa could be even greater, amounting to 40% of current energy consumption.

In the context of West Africa, two measures alone could save approximately 25% of current electricity use:

- use of high efficiency lights - CFLs and LEDs - can save approximately 10% of power ;
- improvement of efficiency in electricity distribution networks could save from 10 to 20% of energy, depending on the specific conditions of national networks.

The regional Stock Taking has concluded that the most important short term potential for savings in electricity consumption lies in a few key electricity consuming technologies: lighting; refrigerators and air conditioning; electricity distribution networks. Each of these technologies might contribute 10% savings, through improved efficiency. Further savings are possible in the longer term in buildings, industry and services.

The savings potential in cooking and boiling water is of vast importance, since cooked food and clean water are vital needs, and currently represent the single largest use of primary energy in West Africa. The paragraph on "Safe and affordable cooking" (see below) describes how improved efficiency - in charcoal transformation, in transport of cooking fuel, in cook stoves, linked with sustainable forest management and alternative fuels - could guarantee the long term availability of safe and affordable cooking and boiled water for all.

There is a similar potential for savings in the consumption of fossil fuels in transport. Capturing this potential will require longer term efforts, as described below in the paragraph below on «Sustainable cities» (see below).

### **2.3. Baseline for public policy and planning instruments**

The Stock Taking missions in the ECOWAS Member States inventoried the current status of the institutional framework - documents, policies, action plans, institutions, regulations - pertinent for EE.

#### ***Institutional framework: Policy and planning documents, laws and regulations***

All ECOWAS countries have a policy document on energy, although the status of the document varies between countries. Ivory Coast and Togo, for instance, are in the process of drafting a global energy policy. While EE is treated in the energy policies, only a few countries have a specific document focused on energy efficiency. In most cases, the existing policies have not been applied. Application of a gender approach in the energy policy and planning processes has been limited.

***Examples of ECOWAS countries with specific documents and regulations on EE***

**Benin:**

- The National Policy on Energy Management (PONAME) has the overall objective to "contribute, through rational use of energy, to improving competitiveness, the trade balance and the preservation of the environment in Benin." The policy aims to: create an institutional and regulatory environment for rational use of energy (RUE); mobilize and build capacity of the various key players involved in RUE; develop a culture of energy efficiency by raising awareness; develop financial instruments for the promotion of RUE; promote technical instruments for energy efficiency in all sectors; build a market for energy efficiency.

**Ghana:**

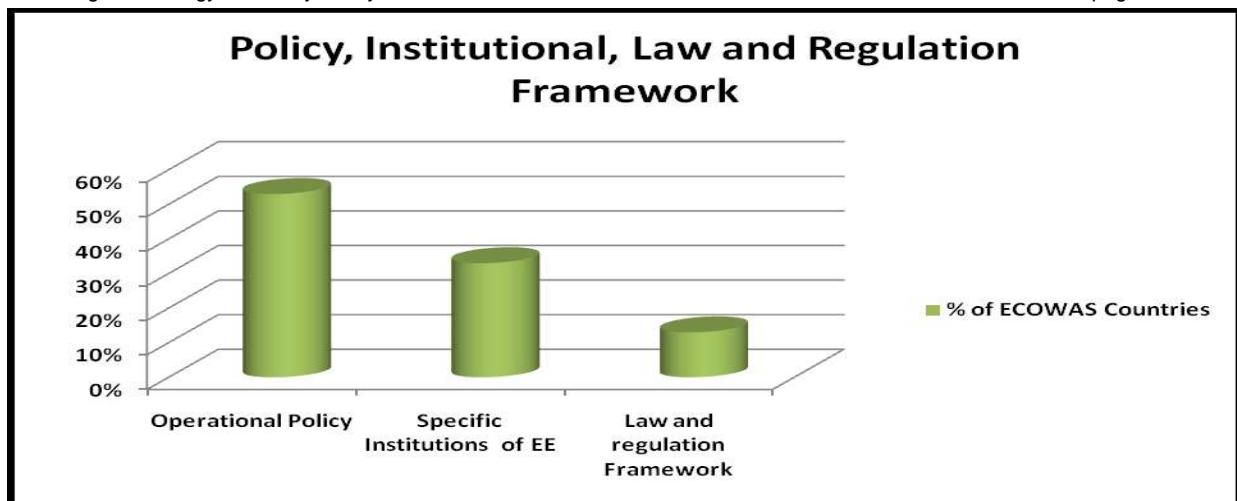
- Energy Efficiency (Prohibition of Manufacture, Sale or Importation of Incandescent Filament Lamp, Used Refrigerator, Used Refrigerator-Freezer, Used Freezer and Used Air-conditioner) Regulations, 2008, LI1932 prohibit the importation of used refrigerators and air-conditioners as well as the importation or manufacture of incandescent filament lamps because of they are energy inefficient.
- Energy Efficiency Standards and Labelling (Household Refrigerating Appliances Regulations, 2009, LI 1958 and amendment 2010 LI 1970) prescribe the minimum energy performance standards for refrigerating appliances
- Energy Efficiency Standards and Labelling (Non-Ducted Air Conditioners and Self-Ballasted Fluorescent Lamps, Regulation, 2005. LI 1815) prescribes the minimum energy performance standards for air conditioners and CFLs.

**Mali:** Programme National de Maîtrise et d'Economie d'Energie

**Senegal**

- Decree No. 2011-160 was promulgated on January 28, 2011, prohibiting the importation or production in Senegal of incandescent lamps, and promoting energy saving lamps. Furthermore, a standard on lamps was drafted by the Senegalese Association for Standardization (Association Sénégalaise de Normalisation, ASN). The ASN has drafted over 300 norms, on a variety of areas pertinent to EE, such as electronics, buildings, environment, etc.
- Several laws - on city planning, Loi n°2008-43 of 20 August 2008, and Loi n°2009-26 of 8 July 2009 - were adopted by Parliament in view of introducing energy efficiency into the building code. To come into force, Presidential Decrees will be needed relating to construction materials and building characteristics (inertia, sun-exposure, air-permeability, insulation, air-conditioning systems, etc.).

Most ECOWAS countries have specific laws and regulations on energy, mostly concerning electricity and petroleum products. Many have national institutions focusing on energy, such as an Energy Commission, a rural electrification and domestic energy agency, an electrification or energy management agency, etc (see graph below). Nevertheless, an adequate institutional framework for EE is still lacking in most ECOWAS countries.



***Example of EE structures in ECOWAS countries***

- **Mali.** The Agence Malienne pour le Développement de l'Energie Domestique et l'Electrification Rurale (AMADER) has as its mission is to accelerate the use of modern energy in rural and peri-urban zones, so as to: increase productivity in SMEs; improve the quality of health care and education; raise the standard of living; favour sustainable forest management. In addition, AMADER is responsible for initiatives on EE, as well as for the strengthening of the institutional framework to attract the private sector to supply decentralized energy services in rural and peri-urban areas. In a World Bank supported initiative, AMADER is evaluating how taking a gender approach can increase access to modern energy in rural areas.
- **Benin.** The Benin Agency for Rural Electrification and Energy Management (ABERME) was created in August 2004. Its mission is to implement the public policy in the field of rural electrification and energy saving. To this end, it should : develop and implement national programs and regional development actions to manage rural electrification; implement pilot demonstration projects; offer incentives to promote energy saving and private investment in rural electrification; study and advise on investment projects seeking incentives for the promotion of energy management and rural electrification; contribute to the development and strengthening of the domestic private sector in the areas of supply of technical services and equipment.
- **Ivory Coast.** CODINORM (Ivory Coast Normalization organisation) is the structure charged with the management of normalization. CODINORM had drafted norms in view of the certification of environmental management systems.
- **Senegal.** ASER, Agence sénégalaise d'électrification rurale is responsible for rural electrification. The newly created Agence pour l'Economie et la Maîtrise de l'Energie is responsible for energy efficiency.

The table on the following pages provides detailed information on the institutional framework for EE in ECOWAS countries.

<b>Country</b>	<b>Energy policy</b>	<b>Legal and regulatory framework</b>	<b>Financial incentives for EE</b>	<b>Institution responsible for energy efficiency</b>
Benin	Strategy and Energy Policy of Benin; The National Policy on Energy Management (PONAME)	The law on the electrical code - 2007 ; The Benin-Togo Electricity Code - 2003 (revised in August 2006)	Subsidies through the budget of ABERME. GEF Energy Efficiency Project (US\$1.82 million), on lighting and the distribution of 350,000 CFLs.	The Benin's Agency for Rural Electrification and Energy Conservation (ABERME), created in 2004
Burkina Faso	The Energy Sector Development Policy Paper revised in 2009	Currently, the 027 law is revised, concerning energy efficiency and renewable energy	No financial incentives	The Energy Management Unit
Cape-Verde	The Energy Policy of Cape Verde; Renewable Energy Sector Strategic Plan	Decree-law 01/2011	Not yet	General Direction of Energy
Ivory Coast	The Policy Paper on the electrical sector development (EPCs are being elaborated), Strategic Development Plan 2011-2030	Legislation n°85-583 of the 29th July 1985, which organizes the production, transportation and distribution of electric energy in the Ivory Coast; the decision of 9th April 1986 to create the Energy Efficiency Office which ensures : the coordination of energy efficiency projects ; decision n°002 of 4th October 2011 to nominate a project director on LFCs	Yes, EE is subject to a state budget allocation of about 100 to 200 millions FCFA per year	Energy Efficiency Office
Gambia	The National Energy Policy	National Energy Policy; The Electricity Act; PURA (Public Utilities Regulatory Authority) Act; Model petroleum exploration, development and production license ; Model petroleum production sharing agreement	Sales and import duties waived for EE	Gambia Renewable Energy Centre (GREC)



<b>Country</b>	<b>Energy policy</b>	<b>Legal and regulatory framework</b>	<b>Financial incentives for EE</b>	<b>Institution responsible for energy efficiency</b>
Ghana	The 2010 Ghana National Energy Policy	The Energy Efficiency Standards and Labelling (Household Refrigerating Appliances) Regulations, 2009, LI 1958 and amendment 2010, LI 1970.  Energy Efficiency Standards and Labelling (Nonducted Air-conditioners and Self Ballasted Fluorescent Lamps) Regulations 2005, LI1815Energy Efficiency (Prohibition of Manufacture, Sale or Importation of Incandescent Filament Lamp, Used Freezer and Used Air-conditioner) Regulations, 2008. LI 1932.	subsidies by government, loans from the World Bank (The Ghana Energy Development and Access Project (GEDAP) etc.  Import duty and tax exemptions.	Energy Commission, Energy Foundation
Guinea	The energy sector policy document of 1992 (LPDSE). Electrification Master Plan (2008)	The L/93/039/CTRN law of 13th September 1993 related to the regulation of the production, transport and distribution of electricity. The L/98/012/ law of 1st June 1998 relating to finance, construction, operation, maintenance and transfer of production infrastructures.	Budget allocation is integrated in a global project. Loans from World Bank (The Electricity Sector Efficiency Improvement Project, 2006)	No dedicated government agency in sustainable energy. But the University of Kofi Annan of Guinea could play an important role
Guinea Bissau	The Sector Development Policy Paper on the Supply of Different Forms of Energy	Framework Law: electricity subsector	None	Ministry of Energy/ Secretary of State for Energy/ General Direction for Renewable Energy
Liberia	The National Energy Policy for Liberia (2009)	Liberian Energy Law (2009); The New Petroleum Law is expected to be completed in August 2012.	Grants from Rural and Renewable Energy Agency and Renewable Energy Fund	Rural and Renewable Energy Agency (RREA)



<b>Country</b>	<b>Energy policy</b>	<b>Legal and regulatory framework</b>	<b>Financial incentives for EE</b>	<b>Institution responsible for energy efficiency</b>
Mali	The National Energy Policy (2006) Energy Sector Policy Letter (2009-2012)	Law N°05-019 of May 30, 2005 on the organization of the electrical sector; law N°00-080 of 20th December 2000 related to the creation of the Regulatory Commission (CREE); Decree N°90-45/P-RM of December 31, 1990 related to the CNESOLER creation; directive N°09-001/C-CREE on electricity costs	Yes, state budget allocations for EE	Energy Efficiency Division; The National Centre of Solar Energy and Renewable Energies (CNESOLER); Malian Agency for the Development of Household Energy and Rural Electrification (AMADER)
Niger	The statement for energy policy was adopted by the government in 2004. The document is being revised to integrate EE objectives.	Law N°2003-2004 of January 31st, 2003 on the electrical code; law N°2007-01 of January 31st on oil code; decree N°2004-266/PRN/MME of September 14th establishing terms of implementing the electrical code; decree N°2004-031 of January 30th, 2004 on the adoption of RE strategy	The grant is conditioned by a programme of the ministerial department in charge of energy or getting support from partners for development	No institution except a GTM created to set up the National Agency for Energy Efficiency (ANME)
Nigeria	The National Energy Policy (2003), Electricity Policy, Bio-fuel Policy	Petroleum Act; Land use Act; Electric Power Reform Act; Nigerian Extractive Industries Transparency Act	None	Energy Commission of Nigeria; Federal Ministry of Power; Federal Ministry of Transport



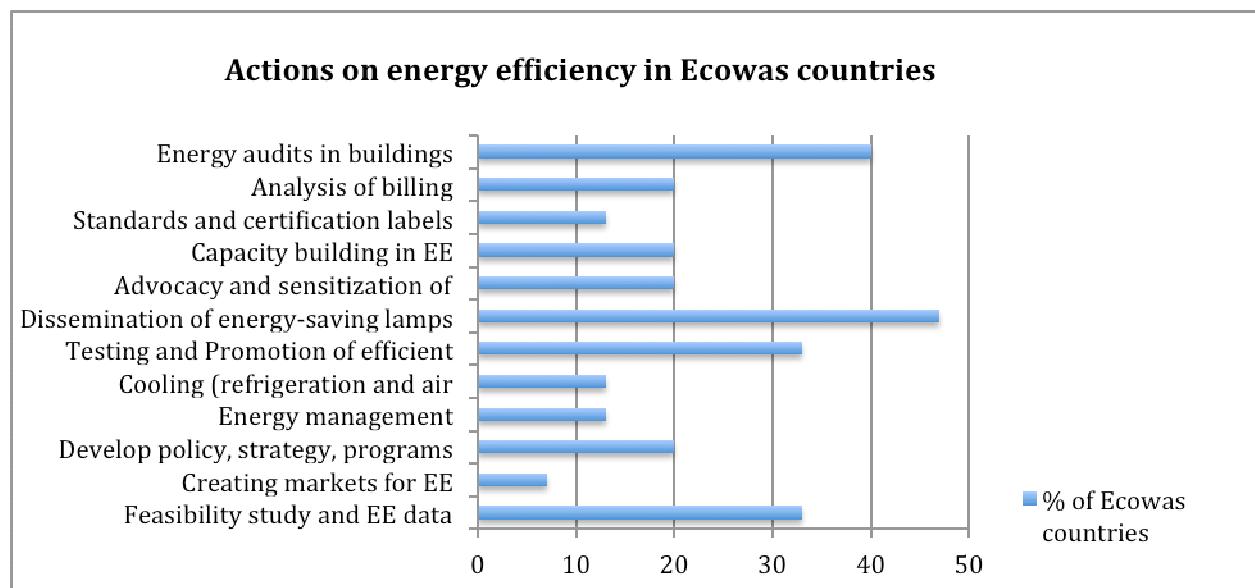
<b><i>Country</i></b>	<b><i>Energy policy</i></b>	<b><i>Legal and regulatory framework</i></b>	<b><i>Financial incentives for EE</i></b>	<b><i>Institution responsible for energy efficiency</i></b>
Senegal	The Policy Paper on Energy Sector Development (2007)	Decree establishing the National Agency for Energy Efficiency; Law n°98-29 April 14th, 1998 on electricity sector; Decree n°98-334 on the production, distribution and sale of electricity; Decree n°98-335 on feed-in tariffs; Decree No. 2011-160 of January 28, 2011 prohibiting the importation and production in Senegal of incandescent lamps and promotion of energy saving lamps	The Department of Energy Efficiency has a state budget for the implementation of their annual programs	National Agency for Energy Efficiency (created in 2011 but still not operational); The Senegalese Rural Electrification Agency
Sierra Leone	The National Energy policy and Strategic Plan 2009	The National Power Authority Act of 1982 and the National Power Authority (Amendment) Act of 2005.	No financial incentives	No government agencies in the field of sustainable energy
Togo	The National Energy Policy is being finalized	No dedicated regulatory framework for sustainable energy; The Benin-Togo Electricity Code - 2003 (revised in August 2006)	No financial incentives	No dedicated government agency in sustainable energy



## 2.4. Baseline for Public and Private action on energy efficiency

Some ECOWAS countries have implemented energy efficiency initiatives through pilot projects, for instance Côte d'Ivoire, Niger and Togo. Others have acted to disseminate high efficiency lamps, for instance Nigeria, Ghana, Mali, and Senegal. However, in terms of standards and labels, in the ECOWAS region, only Ghana has tangible experience of developing and applying labels for lighting equipment and refrigeration. The majority of actions are public, with only marginal implication of the private sector.

Several ECOWAS countries have a public entity responsible for the modernization of the industrial sector, whose mandate sometimes includes energy efficiency. Some of the ECOWAS countries have begun using energy efficiency policy tools, as shown in the following graph.



### **Energy Efficiency Standards and Labelling**

**Ghana:** Operates a Mandatory Appliance Standards and Labelling regime under which importers and retailers of Room Air Conditioners and Compact Fluorescent Lamps (CFL) and refrigerating appliances are required to import and sell only products that meet minimum efficiency and performance standards approved by the Ghana Standards Authority. In accordance with the provisions of the Energy Efficiency Standards and Labelling (Non-ducted Air Conditioners and Self Ballasted Fluorescent Lamps) Regulations, 2005 (LI1815) and Energy Efficiency Standards and Labelling (Household Refrigerating Appliances) Regulations, 2009, LI 1958 and amendment 2010, LI 1970, appliance manufacturers who export to Ghana and retailers who sell in Ghana are obliged to display a label which indicates the energy efficiency rating of the product before the first retail sale.

**Nigeria:** The project "Promoting Energy Efficiency in Residential and Public Sector in Nigeria" (2011-2015), aims to introduce energy efficiency policies and measures including standards and labels for appliances and the promotion of efficient refrigerators and CFLs in Nigeria. The project will coordinate with other similar projects in the West Africa region through the Strategic Program for West Africa led by UNIDO.

The project is composed of four components: 1) Establish a regulatory and institutional framework to support end-use energy efficiency codes, standard labels & certification. 2) Adopt labelling and enforcement mechanisms and establish testing facilities. 3) Train appliance professionals, and national outreach campaign to educate buyers, consumers and businesses; along with a verification & enforcement plan for retailers; 4) Transform the lighting market

through promotion of energy savings lamps and recycling of used CFLs in coordination with regional efforts.

**Senegal.** The Presidential Decree n°2003-585 of 16 July 2003 created the Association Sénégalaise de Normalisation (ASN, Agency for Standards) responsible for certification and quality control, within the Ministère de l'Industrie et de l'Artisanat.

The following table indicates the detailed baseline status of ECOWAS countries with respect to private and public action on EE.

<b>Country</b>	<b>Capacity building</b>	<b>Awareness raising</b>	<b>Dissemination of efficient lights</b>	<b>Promotion of efficient cook stoves</b>	<b>Refrigeration and air conditioning</b>	<b>Energy management</b>	<b>Policies strategies, programs and projects</b>	<b>Support for EE markets</b>	<b>Feasibility studies, data collection</b>
<b>Benin</b>	yes			yes			yes		
Burkina Faso	yes		yes	yes					
Cape-Verde	yes						yes		yes
Côte d'Ivoire	yes	yes					yes	yes	yes
Gambia			yes						yes
Ghana	yes	yes	yes	yes	yes	yes	yes	yes	yes
Guinea	yes			yes					yes
Guinea Bissau	yes								
Liberia									
Mali	yes		yes	yes			yes		yes
Niger	yes	yes		yes	yes				yes
Nigeria		yes	yes						
Senegal	yes		yes	yes					yes
Sierra Leone	yes								
Togo	yes		yes			yes			

This table shows that while many steps have been taken, in order to achieve the full potential of energy efficiency, substantive action must be taken in order to institutionalise energy efficiency - through action on policies, capacity, awareness and finance - in each ECOWAS country.

## 2.5. International energy efficiency policies and practices

It is useful to compare ECOWAS framework conditions for EE with international practice in this area. At the international level, good energy efficiency governance has been identified as essential for the effective implementation of energy efficiency measures. Energy governance refers to the combination of four main elements, which work together to support the implementation of energy efficiency strategies, policies and programmes as follows:

- Legislative frameworks
- Funding mechanisms
- Institutional arrangements
- Co-ordination mechanisms

According to the International Energy Agency (IEA), an effective energy efficiency governance scheme will help garner political support, achieving recognition and legitimacy to implement EE policies and programmes, mobilizing resources, developing partnerships and assigning concrete responsibilities for policy development and implementation to different actors as well as developing systems to monitor and verify results.

A number of countries and/or regions have formulated quantitative energy efficiency targets. Targets are typically formulated as reduced energy consumption relative to a baseline year, a rate of energy intensity decrease or as a given physical quantity (e.g. a given number of buildings to be refurbished). These targets can be formulated for a particular sector or for the economy as a whole. Some examples of targets are as follows:

- China set a target of reducing economy-wide energy intensity by 16-17% by 2015, as compared to 2010.
- In the framework of the Energy Services Directive (ESD), the European Union has an indicative, non-binding target of reducing final energy consumption by 9% in the year 2016 compared to the year 2008. Furthermore, the EU aims at achieving 20% reduction in primary energy consumption by 2020 as compared to a baseline consumption in the same year.
- The United States has a target for improving the energy efficiency of commercial buildings by 20% in the year 2020 compared to 2011 as part of its “better buildings initiative”.
- Mexico set individual improvement targets for the buildings (16%), industrial (12%) and transport (26%) sectors as well as appliances and lighting (52%), according to their different efficiency improvement potentials, to be achieved by the year 2030, compared to the baseline year 2009.
- South Africa, as part of its energy efficiency strategy, has proposed a final energy demand reduction of 12% by 2015 relative to the business-as-usual projection.

Implementation of energy efficiency faces a number of barriers. Among others, market, financial, information and awareness, regulatory, institutional and technical barriers need to be surmounted. In order to overcome them, a number of countries are currently working on improving various aspects of energy efficiency governance. There are, however, no general recipes for successful schemes. Solutions are multiple, and must be adapted to national circumstances, availability of resources, impact on gender equality, culture, and history.

The development of legislation, overarching strategies or action plans create a framework for the implementation of EE policies and programs and provide a basis to secure the necessary financial and human resources. Besides enabling frameworks, different kinds of energy efficiency policies and programmes are necessary in order to address needs and barriers in different sectors:

- pricing mechanisms to internalise long-term costs and benefits in the market;
- regulatory and control mechanisms;
- fiscal measures and tax incentives for energy efficient technologies;
- labelling and technical standards;
- Research & Development on end-use energy efficiency, including technology development, and on behavioural change;
- development of markets, business models and commercial strategies;
- public procurement;
- capacity building of different institutions and actors;
- educational and training programmes;
- awareness raising and information campaigns.

Generally, packages of complementary policy measures are more effective than individual, isolated actions. Moreover, quantitative targets for energy efficiency increasingly accompany policies. An important role is played by the public sector, which can lead by example in the implementation of energy efficiency policies and measures, notably through the inclusion of energy efficiency criteria in public procurement procedures, serving as a model to other actors.

Implementation of public-private-partnerships can reinforce the positive effects of government policies.

The specific form of the policy instruments depends on the sector being targeted and the national circumstances. Although there are many differences across countries, coordination at the international and regional level is increasingly seen as a way to reinforce the impact of energy efficiency policies and initiatives.

Institutions in charge of energy efficiency, and the women and men who work within them, have a critical role to play to make energy efficiency become a reality and to secure the continuity of efforts and the accumulation of know-how. In order to surmount the institutional barriers persisting in different countries, international experience shows the importance of taking into account the following elements.

- There are different options for institutions in charge of energy efficiency, ranging from generalized/specialized government agencies to public-private-partnerships or Non-Governmental Organisations. The legal form of the institutions in charge of energy efficiency is important but the alignment with the overall institutional set up of the country is the key to effective development of energy efficiency policies and programmes.
- The institutional arrangements have to be tailored to national conditions. There is no “one-size-fits-all” solution.
- Capacity building and communication are key processes when building institutions.
- Gender balance in the work force, by encouraging and enabling women to work in institutions dealing with energy efficiency, diversifies skills in the work force, strengthening institutions as well as improving gender equality.
- Resources, structure, targeted sectors, policies to be implemented, responsibilities and cooperation with other actors are essential questions when choosing an institutional form.
- Building of institutions is a long-term process that requires continuity and commitment.
- When developing institutions, it is important to make use of existing know-how and skills from energy efficiency players already in the field.

Building capacity on energy efficiency is fundamental to guarantee effective policy implementation, through the availability of qualified women and men at a number of different levels. Terms and conditions of employment should be formulated so that they do not disadvantage or discourage women. Programme managers and policy makers in governmental agencies must integrate energy use into decision making. Technicians and engineers must be capable of building, installing, maintaining and repairing energy efficient technologies. Qualified business managers as well as staff of financial institutions must understand the financial and economic aspects of energy efficiency projects. Architects and building engineers must be familiar with bio-climatic building techniques.

In order to implement energy efficiency policies and programmes, adequate financial resources are required. The mechanisms and their effectiveness, vary from country to country and include:

- earmarked energy or environment taxes
- public benefit charges collected by energy providers from their customers and earmarked for energy efficiency activities
- carbon financing
- bank credits and low-interest loans for EE investments
- energy saving funds
- donor funding and international co-operation
- use of energy service companies (ESCO).

The successful development and operation of energy efficiency investment delivery mechanisms requires institutional solutions that are well integrated into the national institutional environment and sustained efforts over a long-term period.

## 2.6. Lifting barriers to increased energy efficiency

A number of barriers to effectively implement energy efficiency measures in West Africa have been identified through the stock taking missions. In order to lift these barriers and reap the benefits of energy efficiency in the ECOWAS region, there is an urgent need for public action at both regional and national levels. Both targeted actions in key energy-using sectors and cross-cutting actions are necessary. These actions can be grouped into four main areas:

- Energy efficiency policies and tools
- Capacity for improving energy efficiency
- Awareness raising of energy efficiency
- Financing for sustainable energy

### 2.6.1. Energy efficiency policies and tools

Energy efficiency policies and tools create framework conditions for different actors to pursue energy efficiency. Policies help in conceiving and implementing targeted programmes and projects in specific sectors as well as cross-cutting, horizontal measures. Implementation and enforcement of legislative and regulatory frameworks as well as the development and implementation of national energy efficiency strategies and plans are essential for energy efficiency measures to be undertaken. Maximising synergy among public actions is a key to success. Energy efficiency measures must address a large variety of types of energy use, with numerous actors and stakeholders. Public authorities must meet the challenge of coordinating their many actions, undertaken by different public bodies.

The ECOWAS Commission can play a key role in aiding the ECOWAS States in coordinating their respective efforts, so as to achieve maximum synergy and effectiveness.

### 2.6.2. Capacity for improving energy efficiency

ECOWAS member states and the region as a whole need to build substantial capacity to effectively design, implement and monitor energy efficiency measures. Capacity building is a long-term process requiring a systemic approach encompassing many different areas and supply of well-structured organizations and skilled personnel. It needs to take place at an individual level, an institutional level and the societal level.

Building this capacity for improving energy efficiency requires actions in a number of areas:

- Training and qualification
- Research and development
- Demonstration projects
- Production, distribution and use of energy efficient technologies
- Creation and strengthening of national institutions to design and implement energy efficiency policies and programmes
- Improving the coordination between different national and regional institutions and actors.

### 2.6.3. Awareness of energy efficiency

Raising awareness of energy efficiency is necessary to change energy consumption behaviour towards more efficient patterns. It is also necessary to make different actors realize the opportunities and improvement potential that energy efficiency measures bring. Awareness raising leads to a higher commitment and is thus a key element in the strategy to implement energy efficiency in the ECOWAS region.

#### *Raising the visibility of energy efficiency*

Energy that is saved is "invisible". Thus, it is more difficult to build political support for public action on energy efficiency. Inaugurating a new power plant is easier than inaugurating a million energy efficient refrigerators, although the impact of the two might be similar. Lighthouse actions

in anyone of the ECOWAS States could be publicised throughout the region, so as to make the impact of energy efficiency visible to the public, to the private sector and to political decision makers.

#### **2.6.4. Financing for sustainable energy**

Effective financial mechanisms are necessary in order to move forward energy efficiency in the ECOWAS region. Access to finance is instrumental to the uptake and development of more energy efficient technologies, and thus to the materialization of resulting energy and money savings.

Financing can come from different sources and through different channels. A range of funding options is available, from models coordinated by governments, to public-private partnerships (PPPs) and Energy Service Companies (ESCO), which involve private actors. Financial support will be required to launch programmes and activities and set in motion market transformation processes, among others. The long term goal is, however, to create a conductive environment for energy efficiency to become a sustainable, profitable economic activity in the region.

### 3. Objectives and strategy of the Energy Efficiency policy

Analysis of the ECOWAS situation with respect to energy efficiency, based on stock taking missions in all of the region's countries, leads to three main conclusions.

- There is a huge economic and technical potential for energy savings measures. For the electricity sector alone, short term measures could save over 20% of current consumption, reducing energy bills for users and freeing power for new uses.
- Since the majority of energy savings measures pay for themselves, the main barriers to improved energy efficiency are institutional, related to policies, capacity, awareness and specific financial mechanisms to capture the economic potential of savings.
- A regional programme on energy efficiency could have a major impact, supporting the necessary private actions.

Based on these conclusions, ECOWAS has fixed **objectives**, a **strategy** and an **action plan**.

The **objectives** are based on the potential identified during the stock taking missions.

The **strategy** is based on lifting the main barriers to energy efficiency identified in the region, through action on **policies, capacity, awareness** and **financing**.

The **action plan** is based on five flagship initiatives - targeting **lighting, electricity distribution, cooking, standards and labels, environmental finance** - in areas where a large short term potential for savings exists. Each of these initiatives will have components on policies, capacity, awareness and financing, corresponding to the strategy.

#### 3.1. Regional objectives for increasing Energy Efficiency

The EE policy aims to attain the following short and medium term objectives:

**The overall objective of regional policy by 2020** is to double the annual improvement in energy efficiency, to attain levels comparable to those of world leaders. This means that each year, the amount of energy needed to produce a certain quantity of goods and services will decrease by about 4%<sup>11</sup>.

Specifically:

- by 2013, create the institutional basis for the five priority regional initiatives, with the following concrete objectives:
  - **lighting**: phase out inefficient incandescent lamps by 2020;
  - **electricity distribution**: reduce losses in electricity distribution, from the current range of 15% to 40%, to under 10% by 2020;
  - **cooking**: achieve universal access to safe, clean, affordable, efficient and sustainable cooking for the entire population of ECOWAS, by 2030;
  - **standards and labels**: establish an ECOWAS Technical Committee for Energy Efficiency Standards and Labelling, and adopt initial region-wide standards and labels for major energy equipment by end 2014;
  - **finance**: create instruments for financing sustainable energy, including carbon finance, by the end of 2013;
- by 2015, begin implementation in each ECOWAS country of at least one of the priority initiatives;

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<sup>11</sup> In technical terms, this means a 4% annual rate of improvement in "energy intensity", expressed, for instance, as the ratio MTEP of primary energy/GDP.

- by 2016, implement measures that free 2 000 MW of power generation capacity, available to power development, serving new users and new needs;
- 

The ECREEE Energy Observatory will publish data on progress in reaching these objectives.

*Regional and National Public action:*

- ECOWAS, through ECREEE, will aid Member Countries in developing nationally appropriate EE policies and targets.

### **3.2. Strategy: Regional Support to National Actions**

Energy efficiency pays for itself. Thus, private actors finance the bulk of investments in equipment and infrastructure. However, public action, at the national and regional level, is essential to unleash the underlying favourable economics of energy efficiency. The key public interventions consist of low cost public policy tools to lift the fundamental information barriers to EE: help the people who make decisions on energy consuming products - from simple light lamps to complex industrial equipment - to understand the benefits of EE, and to be able to apply EE technologies. These public actions are:

- adoption of adequate regional and national EE policies;
- capacity building for public and private actors and institutions, including the implementation of EE labelling, certification and performance standards;
- advocacy and awareness raising, among all categories of the population;
- implementation of adequate financial instruments.

#### **3.2.1. Regional integration through Regional and National energy efficiency policies and tools**

Public action, at the national and regional level, is essential to unleash the underlying favourable economics of energy efficiency. Coordinating action on energy efficient goods is completely in line with the more general ECOWAS efforts in favour of a vibrant integrated regional market, with increased regional trade.

***Fostering coordination, cooperation and harmonisation***

The purpose of this policy is to create a policy framework within which regional organisations could support national efforts, in a coordinated way. In this manner, the combination of political will and necessary expertise will allow a step change in regional efforts on energy efficiency.

Implementing EE measures in the region will require close coordination between national and regional authorities. On the one hand, many measures must be implemented at a local level, in households and enterprises. Thus, much of the necessary public action will take place at the national level. On the other hand, since EE measures involve goods that are traded across borders, implementing standards, labels and testing requires regional coordination, and thus regional action.

Regional cooperation in energy efficiency will create a "critical mass" in a regional market for energy efficient appliances and equipment such as light lamps, refrigerators, air conditioners and transformers. This will create scale economies, lowering costs for design, manufacture and testing, thus encouraging regional production of EE goods. Regional cooperation increases the cost effectiveness of the capacity building and awareness raising measures. It reduces the cost for developing government and utility energy efficiency programs.

The necessary synergy between regional and national action has determined the nature of the EE strategy put forth in this document: Regional Support to National Actions.

*Regional and National Public action:*

- ECOWAS will work with Member Countries to coordinate action across the region.
- ECOWAS will aid Member Countries in establishing a national institutional framework to maximise synergy at the regional and national levels.

### ***EE labelling, certification and performance standards***

The types of equipment involved - lights, refrigerators and air conditioners, building materials, electric motors, etc. - are widely traded across the ECOWAS region. It is thus evident that public action must be coordinated across the region.

- Energy efficiency labelling can only be effective if all countries of the region adopt the same labels and standards.
- Testing and certification of goods would only be effective if applied to the entire regional market.
- The economics of investment for regional production of energy efficient equipment would be improved if manufacturers could sell to an integrated regional market.
- Awareness raising for labelling would be more effective if it were carried out simultaneously across the region.
- Attaining "critical mass" in technical competence for implementing energy efficiency labels and standards would require integration and cooperation among the region's technical centres and universities.
- Exclusion of substandard or fraudulently labelled equipment would be most effective at the regional level.

*Regional and National Public action:*

- ECOWAS will launch a regional initiative on Standards and Labels.

### **3.2.2. Capacity building for energy efficiency**

As part of the implementation of this EE policy, the ECOWAS Commission and ECOWAS Member States will implement a programme of capacity building for private and public actors.

Indeed, limited capacity is one of the barriers to achieving greater energy efficiency. Since energy efficiency measures apply to all sectors of activity, a very wide range of expertise will be needed. In order to accelerate the building of the many types of competence, ECREEE is working with **Competence Centres** throughout the region. Each Competence Centre will specialise in a few of the key competence areas, so that specialists will soon be available in the region to cover a wide range of demands.

ECOWAS action will focus on **building capacity at all levels**: at the regional and national level in terms of regulations and tariffs; at the level of institutions, organisations and enterprises involved in energy value chains; as well as for individuals who use energy and produce, sell or buy energy using appliances or devices.

Capacity building for the public sector will focus on the following areas:

- adopting standards and labels pertinent to the specific West African context;
- implementing reliable certification systems for both imported and locally manufactured appliances and equipment;
- taking into account energy consumption as an important criteria in national and urban spatial planning, as well as planning for energy consuming sectors such as transport;
- taking into account the under-representation of women in the energy sector and taking steps to promote their involvement;
- introducing energy efficiency criteria in public procurement;
- mobilising public policy tools - energy tariffs, import tariffs, fiscal system, regulations, public purchase of equipment, public education and training - to encourage, and where necessary require, use of energy efficient materials and practices.



Capacity building for the private sector will focus on manufacture, distribution and use of specific technologies:

- efficient stoves for household, institutional and commercial use;
- lights, refrigerators and air conditioners, notably to stimulate regional production of energy efficient models;
- energy efficient equipment for industry and services, for instance high efficiency electric motors.

### ***Spurring Research, Development and Demonstration***

Energy efficiency measures must be designed to address the specific conditions of West African women and men. While the ECOWAS region can and should benefit from international progress in EE technologies, models for action imported from other contexts often prove inapplicable in West Africa. Today, there is insufficient capacity for research and development, to adapt energy savings measures to West African conditions.

The ECOWAS Commission can help Member States in building a regional RD&D network, helping to avoid duplication, and guaranteeing that for any critical area of technology, a competence centre is built up in one of the States.

In order to become effective, energy efficiency policies and programmes need to be supported by sound research, development and demonstration activities. These include:

- data collection and statistical analysis of energy consumption patterns and penetration of different energy conversion and use technologies in different sectors;
- development of technology solutions and/or adaptation to West African conditions;
- research on optimisation and efficiency improvements of energy using technologies, including measurements of energy efficiency in laboratories and on the ground;
- monitoring, evaluation and verification of the effectiveness and impacts of EE policy instruments;
- understanding of socio-economic, cultural and institutional factors that can lead to successful EE programmes and projects;
- conception and implementation of information systems and software solutions to support the implementation of energy efficiency at different levels;
- exploration of innovative instruments to finance energy efficiency projects in West Africa;
- incorporation of energy efficiency topics into the research, development and demonstration activities of universities, research centres and think tanks in West Africa;
- strengthening of national and regional networks of research and academic institutions working on energy efficiency subjects and development of partnerships with similar institutions in other regions;
- development and application of energy planning and decision-support tools.

### ***Investing in the people: Training and education for energy efficiency***

The manufacture, distribution and operation of energy efficient devices concern many technologies, ranging from simple to very complex. Success of a programme of energy efficiency requires trained personnel, at all levels. The women and men - architects who design buildings, engineers who operate factories, the artisans who produce stoves - have to understand these energy efficient technologies, so as to be able to manufacture, operate and improve them.

To meet the human capacity challenge, public authorities will have to mobilise resources for training, education and research, at all levels, for instance:

- educate public decision makers on the necessity of integrating energy efficiency into public planning and decision making, taking into account factors such as local resources, gender impact, national culture and history, etc.;

- train stove builders in manufacturing affordable stoves that save energy and burn fuels cleanly;
- educate architects to apply bio-climatic design techniques, in ways that are appropriate for West African conditions;
- train building maintenance staff to operate and maintain complex air conditioning equipment;
- educate scientists who will be able to develop new building materials that will contribute to energy efficient offices and housing;
- train technicians in building, installing, maintaining and repairing energy efficient equipment
- educate energy managers and energy auditors capable of implementing energy management systems in industrial, commercial and public facilities
- educate energy efficiency advisors capable of providing advice on improvement of energy consumption patterns and introduction of energy efficient technologies to relevant economic and social actors.

Some of the training will be local, and should be replicated in all countries and regions. Other areas are quite technical: universities and research centres should be aided and encouraged to create at least one West African pole of competence for each important area of technology. Technical and vocational education and training are especially relevant for the young generation. Vocational training programmes in energy efficiency could be undertaken, in the framework of the ECOWAS Regional Action Plan on Youth Employment and Job Creation, currently being developed. Harmonised standards among ECOWAS Member States would support the creation of energy efficiency markets and facilitate the mobility of a skilled EE workforce in the ECOWAS region.

The development of training and education in energy efficiency in the ECOWAS region should:

- design and implement vocational education programmes in energy efficiency, that respond to market needs, and prepare experts able to propose and apply up-to-date energy efficient technologies;
- develop and supply appropriate training equipment tools, textbooks and training manuals;
- ensure the availability of qualified instructors and implement “train the trainer” programmes;
- develop life-long learning to aid in refreshing knowledge and skills in energy efficiency;
- foster possibilities for persons that pursue the vocational path on energy efficiency to access higher education programmes later on;
- encourage women to follow vocational education programmes in energy efficiency.

### ***Working with the informal sector***

Informal economic activities represent a major portion of energy consumption in West Africa. Since the informal sector - an important source of jobs, goods and services, notably for the poor - is often the source of new and innovative practices that have great potential for replication, designing effective public action aimed at informal economic activity could have great impact.

Given that such energy savings measures would have a positive impact, it is very relevant for public authorities to design actions that are effective in reaching the many millions of people in the informal sector, and to implement effective communication channels towards this important segment of the economy. Furthermore, efforts to collect reliable data on this sector should be stepped up, such that public authorities are able to gather sufficient information to design appropriate policy actions. Efforts to monitor and understand gender impact of policies are necessary in order to foster development of effective and equitable policy tools. In this manner, the potential for energy efficiency in the informal sector of West African economies can be tapped.

Specific focus should be given to building skills on energy efficiency among actors in the informal sector, as a way to help people increase the added value of their activities. For

instance, programmes for improved cook stoves and more efficient charcoal production need to include training and organisation of small-scale informal producers.

Energy efficiency in the informal sector is of particular importance for women, whose income generating activities are mostly informal and tend to be energy intensive (e.g. food vending, beer brewing, fish smoking). Therefore, women are a key target group when implementing energy efficiency strategies and policies. On the one hand, energy efficiency measures can help women make their informal business more profitable. On the other hand, women in the informal sector can receive training and qualification to install, maintain and repair energy efficient technologies and provide other related energy efficiency services.

In this critical area, regional action could facilitate sharing of experience, on success stories as well as lessons learned from failure, among the ECOWAS States.

### ***Educating a new generation of energy efficient citizens***

In addition to vocational training, significant opportunities are available to introduce energy efficiency notions, information about technologies and practical measures in school curricula and teach them to children. Tapping these opportunities would create more efficient patterns of energy consumption in a new generation of EE-minded consumers.

Educational measures targeting school children and youth will help improve knowledge and attitudes about energy efficiency and to lay a foundation for wise behaviour as children grow into adults. These programmes can also have an influence on the actual practices of children, and achieve an impact upon parents and the local community, as children act as a communication vehicle towards them. School projects can be visible models to the community as well as to their fellow students.

- Integration of energy efficiency subjects into science and environment curricula;
- Development of didactic materials and kits of easy to install measures;
- Training of school teachers to educate school children in energy efficiency and to motivate children to put their knowledge in practice;
- Coordination with ministries of education in the ECOWAS region for the development, approval and distribution of curriculum and training material, the training of teachers and the monitoring of energy efficiency educational programmes;
- Ensuring ownership by school's administration of energy efficiency educational programs;
- Development of partnerships between schools and other stakeholders working in the area of energy efficiency education and training;
- Ensuring adequate coordination and communication between programme designers, implementers, communities and funding organisations;
- Exchange of best practices in teaching energy efficiency.

#### **3.2.3. Advocacy and awareness raising**

One of the main obstacles to achieving energy savings is lack of awareness of the potential for savings among energy users, large and small. Much will be done at the national or local level, considering the linguistic and social diversity of ECOWAS region. Nevertheless, a regional component can complement national awareness raising, adding weight and credibility to national efforts.

Since women carry out many of the energy intensive tasks in households, they influence the decisions related to household energy. Thus, awareness raising campaigns about energy efficiency must target both men and women, by using appropriate information channels, with messages framed in a language they understand, and with content that meets their needs.

Awareness raising and information activities will aim at making consumers aware of their behaviour and consumption patterns. Further, they will provide consumers with guidance and practical advice to change inefficient consumption patterns towards more efficient patterns. In

order to be effective, this needs to go hand in hand with other activities such as the introduction of efficient technologies into the markets and training of qualified installers.

Awareness raising activities must also target decision makers, with emphasis on the numerous benefits of energy efficiency measures. Moreover, awareness raising programmes aiming at specific professional groups such as architects, engineers, technicians and personnel from regional and local administrations and energy utilities will contribute to awaken their interest and get them involved in the implementation of energy efficiency programmes.

Effective advocacy and awareness raising requires action in the following areas:

- development of websites with information on energy efficiency products and practices;
- development of movie documentaries and/or TV spots, radio messages and cartoons that inform the viewer about energy efficiency;
- distribution of brochures and leaflets;
- posters, advertisements in public areas;
- information activities on the local level;
- seminars and workshops for stakeholders;
- holding of "Energy efficiency days" at the national or international level.

The development of awareness raising activities requires the involvement of a number of different actors such as energy utilities, ministries of education, ministries of communication, professional associations etc. with access to the general public or specific target groups. The specific design of the awareness raising programmes will be based on prior diagnosis and research, in order to better tailor the communication instruments to the target groups.

### **3.2.4. Financing sustainable energy**

Energy efficiency saves money. Nevertheless, some energy efficiency measures may require increased initial investment. For instance, a CFL is more costly than an incandescent light lamp, a class IE3 "Premium Efficiency" motor is more expensive than a standard efficiency motor, a class A+ refrigerator may be more expensive than a low quality, class D refrigerator.

In other words, to achieve long-term savings, some up-front investment may be necessary. This is precisely what financial mechanisms do: exchange a sum of money available today against future payments.

#### ***Specific energy efficiency financial mechanisms***

While financing of energy efficiency investments can be carried out through standard financial mechanisms - structured project financing, micro-finance, etc. - some specific energy efficiency financial instruments have been developed that can considerably lower the financial barrier.

- **public financial support.** Public authorities may choose to allocate public resources to encourage EE measures, as a cost effective way to achieve public policy objectives on access, on energy security and reliability, or to reduce public investment in energy infrastructure such as new power plants;
- **Energy Service Company (ESCO).** The ESCO approach combines a financial service with technical services, thus simplifying energy savings for the user, by:
  - choosing energy efficiency measures adapted to the user's needs;
  - financing the purchase of necessary equipment;
  - installing the equipment;
  - in some cases, operating and maintaining the equipment;
  - measuring the energy savings achieved, and billing the customer for a part of the savings.

### ***ESCOs, Ivory Coast***

With support from IEPF, in April 2000 Ivory Coast started a programme to develop ESCOs. These companies were to help large private energy users to realise energy saving investments with an estimated value of 400 000 USD, leading to emissions reductions of 80 000 teqCO<sub>2</sub>. The project demonstrated the pertinence of the ESCO approach in West African conditions.

- **mobilising "environmental finance".** Public authorities can aid an energy user in obtaining financing through an environmental protection mechanism - for instance the Kyoto protocol Clean Development Mechanism, voluntary carbon markets, the financial mechanism of the Montreal Protocol on ozone depleting substances - in return for "environmental services" achieved by investing in energy efficiency. Carbon financing is of specific importance for energy efficiency, including a range of sources of funds, from climate related ODA such as the Global Environment Facility, to Market Based schemes like the Clean Development Mechanism. In the medium term, new sources of funding are expected to play a role, in particular the Green Climate Fund in the context of Nationally Appropriate Mitigation Actions (NAMAs).
- **revolving funds for energy efficiency projects.** In order to support the introduction of energy efficiency technologies in the ECOWAS region, energy efficiency revolving funds could be created at the national and ECOWAS levels. EE revolving funds provide capital at low cost to private banks and other financial institutions to fund energy efficiency projects. In their turn, the banks provide low-cost loans to project applicants. In this way, loans can be made to multiple small business development projects. The energy savings from these projects are used to pay back the banks. Revolving funds require a one-time initial investment and would be replenished as individual projects pay back their loans. The establishment of revolving funds should be accompanied by:
  - stimulation of involvement of local financial institutions;
  - capacity building for staff from financial institutions in assessing loan applications and administering loans in energy efficiency projects;
  - technical assistance to project applicants in developing the technical and financial aspects of business plan;
  - mechanisms to improve access to credit for small entities.

### ***Demand side management***

Demand side management (DSM) in electricity distribution systems is a useful tool for electricity suppliers to encourage consumers to use less energy during peak hours, or to move the time of energy use to off-peak times. DSM can contribute to mitigate emergencies and increase reliability, as well as to reduce expensive imports of electricity or fuel. DSM can also defer investments in transmission and distribution networks and/or power plants.

Measures to promote DSM in ECOWAS member states could include:

- time-of-use tariffs, real time tariffs or peak pricing to encourage demand response, allowing customers to schedule demand activities at off-peak times, such that they reduce their electricity bills;
- load control strategies to reduce end-use loads and/or switch them off during peak hours (e.g. load-shedding devices). This kind of measure can be made possible through installation of improved control, monitoring and communication equipment;
- use of power factor charges, where users are penalized for having power factors below a fixed threshold;
- development of improved methods for cost/benefit analysis of DSM and for incorporating DSM into integrated resource planning by electricity suppliers;
- measurement and monitoring of loads and electricity savings by electricity suppliers using, for example, local metering, customer bill analysis and customer surveys;

- regulatory mechanisms such as Energy Efficiency Obligations (EEO) that require electricity providers to meet quantitative energy saving targets by implementing approved end-use energy efficiency measures;
- Demand Response Programs that provide incentive payments to customers for load reductions when reserve shortfalls arise;
- exchange of experience and good practice on DSM between West African electricity distribution companies;
- capacity building programmes on DSM for West African electricity distribution companies.

### **Public-private partnerships (PPP)**

Public-private partnerships (PPP) can effectively leverage private sector financing for energy efficiency in addition to public funds and allow risk sharing between public and private actors. PPPs can stimulate an active involvement of commercial banks and financial institutions and other private actors in supporting the development, financing and implementation of energy efficiency projects. PPP mechanisms that can be used for energy efficiency financing are, among others:

- Dedicated credit lines** established by a government agency or a donor institution that create incentives for private financial institutions to provide co-financing to energy efficiency projects, thus increasing the amount of financing to project developers or implementers.
- Risk-sharing facilities** in which public entities or donors provide a partial credit warranty or a partial risk guarantee to private local financial institutions in order to reduce the risk for these institutions in financing energy efficiency projects. Generally, risk-sharing facilities are accompanied by technical assistance programmes that provide capacity building on energy efficiency project financing, marketing and development to the local financial institutions, project developers, project hosts and suppliers of energy efficiency products and services.
- Energy saving performance contracts (ESPCs) in the public sector:** Legislative or regulatory instruments that facilitate the implementation of energy saving performance contracts (ESPCs) by Energy Service Companies (ESCOs) in the public sector can help overcome barriers for carrying out energy efficiency measures and provide risk-management. These instruments normally condition payments on a performance guarantee, thus reducing risk for the public entity. One critical element in the implementation of ESPCs is capacity building of public agencies, local financial institutions and ESCOs.

PPPs are a credible solution to meet resource insufficiency, mobilize private sector resources and effectively manage and deliver energy efficiency projects in the ECOWAS region. PPP models of financing can stimulate the simultaneous intervention of many different actors. In this way, PPPs can strengthen the regional support to national actions, which is the core of the ECOWAS energy efficiency policy outlined in this document.

In order to materialize the benefits of PPPs, a number of actions are necessary:

- develop supporting legal and regulatory instruments necessary for facilitating PPP investment models in energy efficiency, for instance providing guidelines for contractual obligations of parties involved and allocation of risks between those parties;
- strengthen public management of the PPP process (e.g. through the establishment of PPP units in relevant authorities and training of their staff in energy efficiency projects);
- improve marketing and showcasing of PPP opportunities in the energy efficiency area in the ECOWAS region;
- build capacity for public authorities, local financial institutions, project developers, project hosts and suppliers of energy efficiency products and services in all relevant skills (finance, accountancy, law, engineering etc.) required for the management and implementation of PPPs in energy efficiency;
- improve communication channels between public and private sectors;
- improve governance related to the PPP process, for instance through streamlining of tendering and procurement processes and procedures.

### 3.3. Sectoral actions to improve energy efficiency

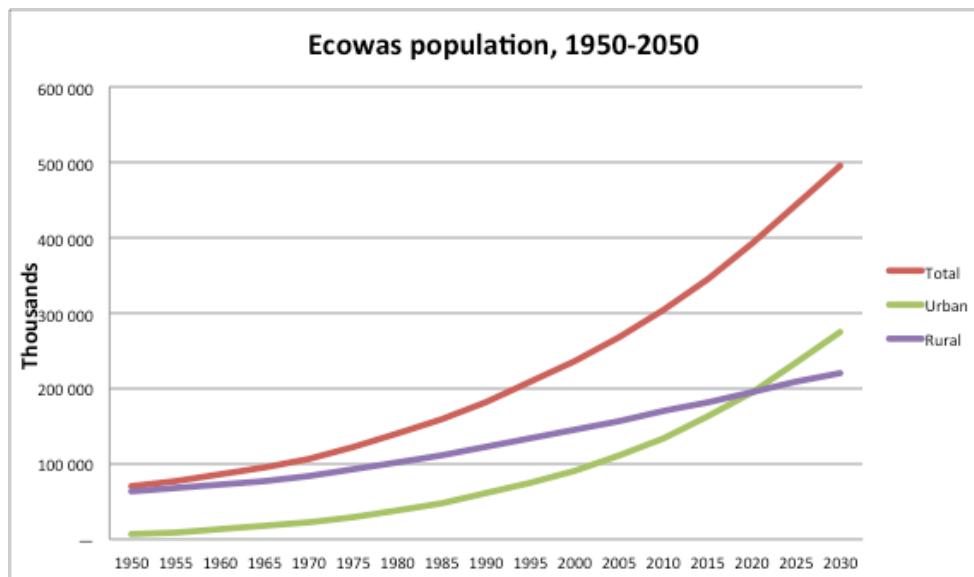
Achieving a high performance, energy efficient economy, requires action in all energy-using sectors, involving a multitude of actors, many technologies, women and men, households and enterprises. From the standpoint of public authorities, the actions necessary can be categorised according to the nature of use:

- urban infrastructure, including buildings, transport, spatial planning and the water sector;
- economic activity in industry and services;
- energy use in households.

The following paragraphs treat each major type of energy use, and outline the public actions that are needed to achieve energy savings in these key energy-using sectors in West Africa.

#### 3.3.1. Sustainable cities

Today, city dwellers account for well over half of consumption of electricity and modern fuels. West African cities are growing quite rapidly, by 4% per year. By 2020, the majority of West Africans will live in cities.



Rapid urbanisation will increase the demand for energy. The manner in which long lived infrastructure is being built today - transport systems, offices, schools, housing - will determine energy consumption for many decades to come. Furthermore, the challenge of access to energy is an urban as well as a rural issue: large and rapidly growing peri-urban zones do not benefit from modern energy services.

Energy efficiency in cities goes hand in hand with other development goals: achieving universal access to energy in urban and peri-urban areas; building quality housing for the rapidly increasing urban population; providing essential services such as water, sewage, health, education, police; creating jobs to employ a growing population; providing transport for people and goods within urban areas.

#### ***Spatial planning of urban growth to facilitate energy efficiency***

Spatial planning is the key to energy efficient, sustainable cities. Unplanned sprawling cities use as much as 10 times more energy per person than better planned cities. Spatial planning helps balance demands for development with the need to protect the environment, and to achieve social and economic objectives. Urban planning has a major impact on energy use in buildings and transport. Unplanned habitat has major disadvantages: difficulty in building and maintaining infrastructure; high crime rates; etc. From an energy standpoint, unplanned habitat is highly

energy inefficient, and is often accompanied by widespread theft of electricity. Spatial planning can contribute to reduce energy use.

Public action	Spatial planning
<i>Energy efficiency policies and tools</i>	<ul style="list-style-type: none"> <li>• planning the location of jobs and housing, and the expansion of public services - notably schools - in a way that places them close to users, and so that major portions of daily trips can be accomplished on foot, and so that the total distance men and women must travel in a day is minimized.</li> <li>• design of pedestrian and bicycle friendly urban environments.</li> <li>• introduction of efficient and viable public transport means.</li> </ul>
<i>Capacity for improving energy efficiency</i>	<ul style="list-style-type: none"> <li>• training and education for planning officials.</li> <li>• strengthening institutions in charge of spatial planning.</li> <li>• coordination between authorities in charge of spatial planning and building regulations with regard to energy efficiency criteria in building codes</li> </ul>
<i>Awareness of energy efficiency</i>	<ul style="list-style-type: none"> <li>• awareness raising for municipal authorities and building planners on the advantages of sound spatial planning;</li> </ul>
<i>Financing for sustainable energy</i>	<ul style="list-style-type: none"> <li>• provision of financial assistance for improvement of spatial planning in municipalities.</li> </ul>

### **Transport**

Transportation is at the heart of energy efficient sustainable cities. There can be no economic development if goods cannot be brought to markets, and if workers cannot go to jobs. In fact, lack of access to transportation services is one of the fundamental barriers to growth and development. With rapid globalisation, transportation services are growing twice as rapidly as the world economy. Energy use in transport is the "hard nut to crack" of energy value chains, since over 95% of transport energy comes from increasingly costly fossil fuels.

Of course, energy is only one of the components in providing transportation, along with transportation infrastructure (roads, rail lines, water ways, rolling stock). Thus, consideration of the energy impact must be integrated into more general issues in transport planning. Reducing energy consumption in transport depends on improving road, rail and public transport infrastructure.

Public action	Transport Sector
<i>Energy efficiency policies and tools</i>	<ul style="list-style-type: none"> <li>• use city planning to shorten distances and reduce the number of daily trips (see above).</li> <li>• reserve space as cities grow for future of roads and rail lines.</li> <li>• favour the use of fuel-efficient vehicles, for instance through vehicle standards and controls on imports of used vehicles.</li> <li>• expand bus services. Introduce Bus Rapid Transit (BRT) systems using exclusive right of way lanes in urban areas.</li> <li>• maximise the number of riders in each vehicle, for instance through car sharing schemes.</li> <li>• develop and enforce public procurement guidelines for the acquisition of low-consumption vehicles in the public sector.</li> </ul>

Public action	Transport Sector
<i>Capacity for improving energy efficiency</i>	<ul style="list-style-type: none"> <li>• develop and implement transport demand management and mobility management programmes.</li> <li>• improve safety for bicyclists and pedestrians, by promoting safe space for all modes of transportation.</li> <li>• establish or strengthen entities responsible for the planning, regulating and implementing sustainable transport.</li> <li>• invest in facilities for inter-modal transfer to create fast and efficient transport chains.</li> <li>• invest in public transport systems, including surface or underground rail lines, tramways, bus rapid transit systems;</li> </ul>
<i>Awareness of energy efficiency</i>	<ul style="list-style-type: none"> <li>• encourage walking and bicycle use.</li> <li>• encourage eco-driving through awareness raising campaigns.</li> </ul>
<i>Financing for sustainable energy</i>	<ul style="list-style-type: none"> <li>• mobilize financial resources for investment in energy-efficient and environmentally friendly transport modes and technologies.</li> <li>• Introduce financing schemes / incentives to popularise low fuel consumption transport systems.</li> </ul>

### ***Bus Rapid Transit***

Building fixed rail rapid transit systems - trains, metros, tramways - is a complex, highly capital-intensive process. In many cases, the various obstacles have made it difficult for rapidly growing cities in the developing world to build and operate such systems.

*Bus Rapid Transit*<sup>12</sup> systems are a useful technological and institutional alternative. They consist of allocating special bus lanes on roads to major bus lines, and using high capacity buses. They are less expensive and more rapid to put into place than fixed rail systems. They are modular: their capacity can be easily adjusted to need by adding or removing vehicles, and the routes can be rapidly and inexpensively adjusted to changing needs. Their higher average speed makes efficient use of rolling stock, making the lines profitable and attractive for users.

Bus Rapid Transit systems have been built in Nigeria (22 km in Lagos), as well as in South Africa (15 km in Capetown, 25 km in Johannesburg).

### ***Energy efficient buildings, building codes***

Buildings account for roughly one third of energy use globally, and considerably more in many African cities. Since buildings are long-lived infrastructure, the energy performance of the rapidly growing built environment will have a long-term impact on energy consumption. Energy efficiency techniques can and should be tailored to local construction practices in every economy, so that buildings in growing urban areas use design and construction practices that provide light, cooling and hot water, while using a minimum amount of energy.

<sup>12</sup> The International Energy Agency and the World Resources Institute have created a data base on Bus Rapid Transport systems. see <http://www.brtdata.org/>.

### ***International Programme to Support Energy Management (PRISME)<sup>13</sup>***

PRISME, executed by the Francophone Energy Institute (IEPF), includes both sectoral energy efficiency actions and networking among the 33 French speaking countries. Nine ECOWAS States - Benin, Burkina Faso, Ivory Coast, Guinée, Guinée Bissau, Mali, Niger, Sénégal, Togo - participate in PRISME.

The principal sectoral action of the programme has focused on energy efficiency in public buildings. The programme carried out two technical training sessions, and equipped the national teams with measuring equipment as well as a computer with specific software for building energy use audits.

Numerous techniques exist to reduce the energy consumed by a building. Modern "bio-climatic" building methods combined with insulating materials and sound management can drastically reduce energy consumption for air conditioning, while improving comfort for building users and dwellers. Furthermore, advanced building techniques capture significant amounts of solar energy<sup>14</sup>. The incorporation of energy efficiency criteria into building codes and other pertinent regulation provides an important tool in achieving energy efficient buildings in West African countries, while ensuring minimum thermal comfort requirements.

#### ***Building Energy Efficiency, Ivory Coast***

The Laboratoire du Bâtiment des Travaux Publics (LBTP) in Ivory Coast has carried out numerous actions on building energy efficiency (many with international support), often focusing on energy use in public buildings.

Energy efficiency criteria can be incorporated into the building envelope, air conditioning systems, lighting, electrical equipment (such as lifts and motors, etc.) and water heating. Energy efficiency criteria, for new buildings as well as for existing buildings undergoing major refurbishment, should incorporate the principles of tropical architecture and have a clear link to urban planning. Enforcement of building energy standards should be strengthened.

For municipal authorities, energy use in buildings is a major institutional challenge, since much of urban growth is unplanned, and since most housing is built by the informal sector. Most buildings are built and owned by private actors. The construction industry is almost entirely in private hands. Thus, improving energy performance in buildings can only be accomplished through means to incite owners to insist upon, and builders to use, energy efficiency design and equipment.

<sup>13</sup> In French: Programme International de Soutien à la Maîtrise de l'énergie

<sup>14</sup> Use of renewable energy sources in buildings – solar water heaters, solar air conditioning, PV – is treated in the ECOWAS renewable energy policy.

Public action	Buildings Sector
<i>Energy efficiency policies and tools</i>	<ul style="list-style-type: none"> <li>• develop implementation guidelines for building owners and construction industry.</li> <li>• draft and implement building codes, tailored to local conditions and construction practices, that require or encourage a high level of energy performance in new buildings.</li> </ul>
<i>Capacity for improving energy efficiency</i>	<ul style="list-style-type: none"> <li>• capacity building for building and construction authorities in ECOWAS member states, for implementation and enforcement (inspection, certification) of energy efficiency criteria in building codes.</li> <li>• training for building professionals to comply with the energy efficiency standards in the building code, through use of bio-climatic technologies.</li> <li>• collaboration with research institutions policies, methods, techniques and evaluation of energy efficiency in buildings.</li> <li>• development of local industries to produce building materials and equipment for high efficiency buildings.</li> <li>• showcase bio-climatic architectural adapted to local climate conditions, through demonstration projects.</li> </ul>
<i>Awareness of energy efficiency</i>	<ul style="list-style-type: none"> <li>• involvement of key stakeholders: national and local authorities, building and construction industry, suppliers of construction materials, associations of architects and engineers, universities and research centres etc.;</li> <li>• raise awareness among decision makers, emphasizing the financial benefits of energy efficient buildings, beginning with large public and private institutions: banks, ministries of education, social housing etc.</li> <li>• raise awareness among the general public about energy efficiency measures in buildings and benefits of tropical architecture</li> </ul>
<i>Financing for sustainable energy</i>	<ul style="list-style-type: none"> <li>• use fiscal tools to encourage energy efficient buildings;</li> </ul>

### **Water, sanitation and waste**

Water, sanitation and waste disposal have close links to energy<sup>15</sup>:

- **water supply and waste water treatment require pumping.** Indeed, electricity for pumping, one of the biggest cost elements in water supply, has great potential for energy savings. Conversely, water utilities are among the largest clients of the power sector.
- **waste can be a source of energy.** Municipal waste and waste from water treatment can be sources of energy, for example, through the capture and use of methane from waste disposal sites, producing energy and eliminating significant quantities of this powerful greenhouse gas. Carbon financing can thus contribute to the economics of waste disposal<sup>16</sup>.
- **water demand management measures can reduce energy consumption.** Reducing use of water through more water efficient technologies can conserve both water and energy. For instance, in the agriculture sector, micro-irrigation technologies can minimize use and reduce losses, thus consuming less energy for pumping. This can be especially significant in countries relying on desalination plants<sup>17</sup> for their water supply.

<sup>15</sup> The term "water and energy nexus" is often used to refer to these interlinked issues.

<sup>16</sup> The regional renewable energy policy treats this issue in detail.

<sup>17</sup> Desalination technologies require large amounts of energy, typically 3-15 kWh/m3.



Public action	Water, sanitation and waste
<i>Energy efficiency policies and tools</i>	<ul style="list-style-type: none"> <li>• carry out energy audits in water utilities.</li> <li>• investigate the energy potential in waste disposal sites.</li> <li>• support the introduction of water use efficient technologies in the agriculture and domestic sectors.</li> </ul>
<i>Capacity for improving energy efficiency</i>	<ul style="list-style-type: none"> <li>• capacity building to increase energy efficiency within municipal water supply systems.</li> </ul>
<i>Awareness of energy efficiency</i>	<ul style="list-style-type: none"> <li>• promote educational programmes to save water in schools and other public institutions</li> <li>• awareness raising concerning water and energy systems.</li> </ul>
<i>Financing for sustainable energy</i>	<ul style="list-style-type: none"> <li>• develop partnerships between water utilities, municipalities, financial institutions and service contractors.</li> <li>• develop innovative financing mechanisms to implement efficiency in water delivery.</li> </ul>

### ***Public street lighting***

Lighting streets in cities makes them safer at night, particularly for women. It encourages longer hours in services activities, and fosters social cohesion. Nevertheless, providing street lighting is a financial challenge for cash strapped municipal authorities. Street lighting is a typical "public good": everyone benefits, but it is not easy to find payment schemes for the service.

Energy efficient streetlights - for instance using sodium vapour lamps, or new LED systems - can facilitate the provision of this service, by greatly reducing the long-term electricity costs.

Public action	Public street lighting
<i>Energy efficiency policies and tools</i>	<ul style="list-style-type: none"> <li>• conduct pilot demonstration projects for energy efficient street lighting system (e.g. combination of solar power with LED technology) in partnership with lighting manufacturers.</li> <li>• plan procurement efforts to provide energy efficient street lighting.</li> </ul>
<i>Capacity for improving energy efficiency</i>	<ul style="list-style-type: none"> <li>• strengthen the capacities of municipal authorities to conduct technical and economic evaluation of public street lighting projects.</li> </ul>
<i>Awareness of energy efficiency</i>	<ul style="list-style-type: none"> <li>• awareness raising for municipal authorities about innovative energy efficient public street lighting technologies and business models.</li> </ul>
<i>Financing for sustainable energy</i>	<ul style="list-style-type: none"> <li>• investigate the economics of introducing EE street lights.</li> <li>• explore public lighting performance contracting models through ESCOs.</li> </ul>

### **3.3.2. World class industry and service sectors**

West African economic growth has accelerated in the last decade. Continuing this progress will require that the region's economies expand their industrial and service sectors, so as to become less dependent on exports of unprocessed raw materials from mining and agriculture.

Competition in world markets is stiff, particularly with the rapid rise of East Asian economies. In order to become major actors, West African industries will have to make increasing efforts to constantly modernise production methods, to design innovative products and to become more efficient, notably in the use of energy. Some energy saving measures in industry and services can be almost cost free, requiring only improved maintenance, or better organisation of the production process. Other measures require major investments. For the latter, specific energy efficiency financing instruments have proved their worth.

Capacity building is of great importance for the millions of women and men engaged in productive activities. Allowing women full access to training in improved practices is of particular importance, both from an energy viewpoint and from a gender equality viewpoint.

### ***Energy efficient industry and small scale production***

EE is a key building block in modernising industry. First, and most obviously, energy is an important cost factor, particularly in energy intensive industries such as food processing, cement and building materials, or metallurgy. Beyond the pure cost aspect, achieving energy efficiency can be part of a more global process of modernisation, to achieve highly efficient, high quality production processes to produce and deliver the high quality goods required by world markets. The role played by EE in the rise of the industrial sector in China is a striking example of the synergy between energy savings and world-class industry.

The **agro processing sector** is of particular importance in West Africa, since it requires large amounts of both heat and mechanical processing. Energy efficiency measures, integrated into a broad effort towards modernisation, would help create long value chains, producing processed goods of high value, rather than unprocessed raw materials. The impacts would be positive both for industry, and for the upstream agricultural sector. Small-scale production - textiles, leather, wood, metal, ceramics, etc. - could also benefit from efficient production tools.

Public action	Industry and small scale production sector
<i>Energy efficiency policies and tools</i>	<ul style="list-style-type: none"> <li>• implement energy management benchmarking and award programmes.</li> <li>• pursue voluntary energy efficiency agreements between industry and government, through agreed upon target for energy savings.           <ul style="list-style-type: none"> <li>• promote the use of cogeneration.</li> </ul> </li> </ul>
<i>Capacity for improving energy efficiency</i>	<ul style="list-style-type: none"> <li>• provide incentives and qualify personnel for energy audits.</li> <li>• train industry staff in energy efficiency measures.</li> <li>• facilitate the supply of clean and efficient energy services, for instance with the support of cleaner production centres.</li> </ul>
<i>Awareness of energy efficiency</i>	<ul style="list-style-type: none"> <li>• create awareness raising and decision support mechanisms.</li> </ul>
<i>Financing for sustainable energy</i>	<ul style="list-style-type: none"> <li>• adapt fiscal mechanisms and energy tariffs to encourage energy saving.</li> <li>• assist financial institutions and banks in the creation of financial instruments for industrial energy efficiency.</li> <li>• promote energy service performance contracts (ESPC) through ESCOs.</li> </ul>

### ***Energy efficient services, including the hospitality industry***

Modern economies rely equally on industry and on services. In West Africa, the transport and hotel sectors are the biggest service sector users of modern energy services, and have a huge potential for energy savings<sup>18</sup>.

Given the value of tourism to some of the ECOWAS economies, and the great potential for growth in tourism<sup>19</sup>, a specific effort to improve energy efficiency in tourism could prove to have great impact. In fact, in many ECOWAS countries, hotels are among the largest single users of electricity. Conversely, electricity is a major cost factor for hotels, accounting for over 10% of the cost of a hotel stay in large establishments. The most promising EE measures in hotels include:

<sup>18</sup> See paragraph on "Transport", above.,

<sup>19</sup> The 2012 official World Tourism Day (WTD), Gran Canaria, Spain, 27 September 2012, focused on "Tourism and Sustainable Energy: Powering Sustainable Development".

- optimising air conditioning, by using heat pumps, solar powered air conditioning, as well as room presence detectors. Alternatives to air conditioning - evaporative coolers, ground cooling tubes, ventilation - can often be used;
- bio-climatic architectural methods, that reduce air conditioning needs, and make better use of natural lighting;
- optimised hot water production, including solar water heating;
- co and tri-generation, to simultaneously produce cooling, hot water heating and electricity.

For hotels in urban areas, large standby generators can be optimised to provide load sharing with power utilities, through specific feed in arrangements with grid operators.

Public action	Hospitality industry
<i>Energy efficiency policies and tools</i>	<ul style="list-style-type: none"> <li>• support the establishment of energy management programmes.</li> <li>• develop benchmarking and award programmes.</li> <li>• offer tools to help measure energy performance, set goals, track savings, and reward improvements.</li> </ul>
<i>Capacity for improving energy efficiency</i>	<ul style="list-style-type: none"> <li>• provide advisory services on cost effective energy efficiency measures.</li> <li>• organise specific training and technical support for EE in hotels.</li> </ul>
<i>Awareness of energy efficiency</i>	<ul style="list-style-type: none"> <li>• conduct targeted awareness raising campaigns on energy efficiency aimed at hotel managers and hotel associations.</li> </ul>
<i>Financing for sustainable energy</i>	<ul style="list-style-type: none"> <li>• develop financial instruments accessible to hotel owners for the implementation of energy efficiency measures.</li> </ul>

### 3.3.3. High performance household appliances and equipment

Household energy use is of particular importance in the West African context. Use of wood and charcoal for cooking in households accounts for approximately 80% of primary energy use in the region. Furthermore, households account for over half of electricity use. Finally, making household energy use more efficient is at the heart of efforts to make modern energy services affordable for the region's households. Since household appliances are widely traded across borders, regional authorities have an essential role to play by creating regional energy labels and performance standards.

#### ***Safe and affordable cooking***

Since cooking accounts for such a large proportion of energy use in West Africa, efficient cooking and boiling of water is a major energy efficiency issue. Safe and affordable cooking requires a combination of a fuel and a corresponding stove. The fuel should be clean burning, with a sustainable supply chain. The stove must be efficient and smoke free in operation. In West Africa, the following avenues have shown promise:

- improving the efficiency of the traditional wood and charcoal cooking energy value chain. The main energy efficiency interventions concern the wood to charcoal conversion process, and the manufacture and distribution of improved, high efficiency stoves<sup>20</sup>.
- developing new biomass energy cooking value chains. This includes pellets, briquettes, biogas, as well as liquid fuels produced from agricultural or forestry wastes.
- promoting LPG fuel and stoves. LPG cooking is highly efficient, since as much as 50% of the energy in the fuel can be effectively transferred to the food being cooked, as compared to as little as 3 to 10% for traditional "3 stone fire" cooking with wood<sup>21</sup>.

<sup>20</sup> The ECOWAS Renewable Energy Policy includes suggestions on how to make wood a renewable resource, through sustainable forest management methods.

<sup>21</sup> It is perhaps useful to recall, that although LPG is a fossil fuel, cooking with LPG emits less Green House Gases than poorly burned wood. Indeed, poorly burned wood emits both CO<sub>2</sub> and large quantities of powerful warming gases such as methane, NO<sub>2</sub> and black carbon. A typical meal cooked on a 3 stone

- promoting solar cookers. These devices have proved pertinent in some areas, for instance schools that cook meals in the middle of the day.

Public action	Safe, affordable and sustainable cooking
<i>Energy efficiency policies and tools</i>	<ul style="list-style-type: none"> <li>adopt regional standards for stove technologies.</li> <li>country evaluations to determine the nationally appropriate actions.</li> </ul>
<i>Capacity for improving energy efficiency</i>	<ul style="list-style-type: none"> <li>exchange of best practices on technologies, techniques and approaches.</li> <li>support for testing and research centres with regional outreach.</li> <li>research on biomass fuel production and supply.</li> <li>support for national action plans on bottlenecks in biomass fuel supply.</li> </ul>
<i>Awareness of energy efficiency</i>	<ul style="list-style-type: none"> <li>awareness raising for stove builders and household users.</li> </ul>
<i>Financing for sustainable energy</i>	<ul style="list-style-type: none"> <li>carbon financing can be mobilized</li> </ul>

The ECOWAS initiative for safe, affordable and sustainable cooking is described in section 4.3 below.

### ***Energy saving lighting***

Lighting is the single biggest use for electrical energy in West Africa. Furthermore, achieving higher efficiency lighting is a relatively simple measure, requiring that incandescent lamps be replaced with high efficiency lamps.

In addition to energy saving lamps, lighting controls - such as detectors of human presence - that automatically turn lights on and off according to need can save considerable amounts of energy. Optimal use of natural daylight, letting in light but keeping out heat, can greatly reduce the need for artificial light (see paragraph *Energy efficient buildings, building codes*").

The viability of efficient lighting programmes depends on proper information to the public, as well as quality assurance to guarantee that new lamps function for long periods of time, even when subjected to voltage variations that are common in West Africa.

The proper disposal of used light lamps is an environmental issue of importance<sup>22</sup>.

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fire emits over 800 gCO<sub>2</sub> equiv of GHG, of which over half is in non CO<sub>2</sub> GHGs, as compared to less than 200 gCO<sub>2</sub> equiv for a meal cooked with LPG. <http://www.scribd.com/doc/31339153/Cooking-in-Developing-Countries-Fuel-Consumption-and-GHG-Emissions-User-Acceptance>

<sup>22</sup> Fluorescent lamps, including CFLs, contain mercury.

Public action	Energy efficient lighting
<i>Energy efficiency policies and tools</i>	<ul style="list-style-type: none"> <li>Develop technology-neutral mandatory Minimum Energy Performance Standards (MEPS) and labels for non-directional household lamps harmonized across all ECOWAS countries;</li> <li>Develop complementary policies and mechanisms to support MEPS (for example, distribution programs, fiscal incentives, on-bill financing etc.) and promote efficient lighting products.</li> </ul>
<i>Capacity for improving energy efficiency</i>	<ul style="list-style-type: none"> <li>Establish a robust and harmonized monitoring, verification and enforcement system and lighting test laboratories capable of ensuring enforcement and compliance with MEPS and the quality of lighting products;</li> <li>Establish an environmentally sound management system for recycling and disposal of spent lamps.</li> </ul>
<i>Awareness of energy efficiency</i>	<ul style="list-style-type: none"> <li>Conduct educational campaign on benefits of energy saving lighting products and the importance of recycling spent lamps.</li> </ul>
<i>Financing for sustainable energy</i>	<ul style="list-style-type: none"> <li>Carbon and donor financing will be mobilised to reduce the cost of improved lamps for users.</li> </ul>

The ECOWAS initiative on energy efficient lighting is described in section 4.1 below.

#### ***Energy efficient refrigerators, air-conditioners and ventilators***

Cooling equipment - refrigerators, air conditioners, freezers, ventilators, evaporators - is the second most important class of electricity using devices, in terms of energy consumption. It also holds great potential for energy savings. Currently cooling equipment is mostly imported: outdated, used equipment imported from Europe; low quality, low performance equipment imported from East Asia. Therefore, the use of energy efficient cooling systems needs to be promoted and enforced through Minimum Energy Performance Standards (MEPS).

Public action	Energy efficient refrigerators, air-conditioners and ventilators
<i>Energy efficiency policies and tools</i>	<ul style="list-style-type: none"> <li>encourage "passive" bio-climatic architectural methods to reduce the need for "active" cooling (see "Energy efficient buildings").</li> <li>regulate markets, through labels, minimum energy performance standards, testing and certification. Phase out obsolete, energy inefficient equipment.</li> <li>conduct market assessments to understand the current products, importers and manufacturers in the ECOWAS markets.</li> <li>design an ECOWAS Energy Efficiency Label.</li> <li>long term monitoring and verification of impact of standards and labels.</li> </ul>
<i>Capacity for improving energy efficiency</i>	<ul style="list-style-type: none"> <li>test and certify equipment to verify performance and accuracy of labelling.</li> <li>encourage local production of energy efficient cooling equipment<sup>23</sup>.</li> <li>develop collaboration between national energy and standards bodies.</li> <li>build a network of actors within the ECOWAS region.</li> </ul>
<i>Awareness of energy efficiency</i>	<ul style="list-style-type: none"> <li>raise the awareness of buyers, so that they understand the idea of life cycle costs, and the savings possible through energy efficient equipment.</li> <li>provide reliable information on energy costs through labelling.</li> </ul>
<i>Financing for sustainable energy</i>	<ul style="list-style-type: none"> <li>"environmental" financing through reduction of emissions of Green House Gases and Ozone Depleting Substances, so that the higher price of efficient equipment does not constitute a barrier.</li> </ul>

Standards and labels can play a key role in this context. The ECOWAS energy efficiency initiative on Standards and Labels is described in section **Error! Reference source not found.** below.

<sup>23</sup> This is an issue that Energy Ministers could discuss with their colleagues responsible for industrial policy.

## 4. Action Plan: Energy Efficiency Flagship Initiatives

EE has enormous short term potential to contribute to public policy objectives, as well as to SE4All objectives. In order to seize the opportunities offered by increased energy efficiency, ECOWAS has adopted energy efficiency objectives, and a strategy based on public institutional measures for: **policies, capacity building, awareness raising** and **EE financial mechanisms**. The nature of these institutional measures, to be effective, must be adapted to each specific energy-using sector. Indeed, the stakeholders, operators and users of different energy value chains are quite different. For instance, the policies and capacity building for the building sector will be quite different from those necessary for the transport sector, or for cooking.

Thus, in order to ensure that regional and national EE institutional measures are operational, they will be adapted to specific energy value chains, include all the economic operators and stakeholders involved, and will cover policies, capacity building, awareness raising, as well as technical and financial instruments. In the short term, ECOWAS will launch Flagship Initiatives for three energy value chains:

- Efficient Lighting;
- Achieving High Performance Distribution of Electricity;
- Safe, Sustainable and Affordable Cooking.

Furthermore, two initiatives will focus on transversal issues, applicable to all EE actions:

- Standards and Labelling (S&L) Initiative;
- Climate Finance for renewable energy and energy efficiency;

These initiatives have been identified as priorities, because they are immediately applicable and operational. The "lighting" and "distribution" initiatives focus on specific technologies that offer a big short term potential for savings, and for which strong private and public partners have pledged support. The "Cooking" initiative addresses a vital issue for all households. These priority initiatives aim both at realising the short term potential for savings, as well as putting into motion a process that will facilitate medium and long-term efforts on the overall EE programme defined above in the paragraph describing "Objectives of the energy efficiency policy".

It is expected that once this EE savings process has been launched in several ECOWAS countries, other initiatives will be developed, for instance on:

- cooling equipment, including refrigerators and air conditioners;
- energy efficiency buildings;
- industrial energy efficiency, including electric motors, motor driven systems, steam, etc;
- transport energy efficiency;
- cooperation among ECOWAS Universities in the field of energy efficiency;
- regional production of energy efficient equipment.

### ***Short and long term efforts***

While many measures rapidly pay for themselves, the types of efforts necessary vary between sectors. In some areas - for instance high efficiency lighting, electricity distribution, high efficiency electric motors - major savings can be achieved in the short term, with relatively simple measures on the part of public authorities and private energy users. In other areas - for instance buildings or urban transport - it will take time and considerable political effort to raise the awareness of users and to put into place the necessary administrative tools that facilitate capturing these savings.

## 4.1. Initiative on Efficient Lighting

Lighting is the single biggest use of electricity in West African households. The transition to energy efficient lighting is a straightforward and cost-effective approach to significantly reduce the energy consumption and improve the quality of life of citizens. Limited expenditures from public authorities on an integrated policy approach would provide a rapid payback to consumers and also help utilities and government manage demand on the electricity grid.

Over 60% of the population of the ECOWAS countries does not currently benefit from access to electricity. A compatible and coherent policy strategy for off-grid lighting is also needed.

### **Benefits of transitioning to efficient lighting**

According to the preliminary estimates developed by [the UNEP/GEF en.lighten initiative](#), by transitioning to efficient lighting, West Africa could obtain annual energy savings of about 2 TWh, approximately 6 % of the total electricity consumption. These savings could allow the electrification of more than 1 million households.<sup>24</sup> Regional annual financial savings from transitioning to efficient lamps total could exceed 150 million euros, yielding an amortization time of 3 months on average.

### **Work Programme**

#### **Energy efficiency policies and tools**

- Develop technology-neutral mandatory **Minimum Energy Performance Standards (MEPS)** and labels for non-directional household lamps harmonized across all ECOWAS countries;
- Develop complementary policies and mechanisms to support MEPS (for example, distribution programs, fiscal incentives, on-bill financing etc.) and promote efficient off-grid lighting products.

#### **Capacity building**

- Establish a robust and harmonized monitoring, verification and enforcement system and lighting test laboratories capable of ensuring enforcement and compliance with MEPS and the quality of off-grid lighting products;
- Establish an environmentally sound management system for recycling and disposal of spent lamps.

#### **Awareness raising**

- Conduct educational campaign on benefits of energy saving lighting products and the importance of recycling spent lamps.

#### **Financing.**

- Carbon and donor financing will be mobilised to reduce the cost of improved lamps for users, estimated at 125 M€ for the region to replacement all existing incandescent lamps, and to finance institutional support, estimated at 0.5 to 3 M€ in each country.

### **Institutional Structure**

- **ECREEE** would lead the initiative, under the political umbrella of ECOWAS;
- The **ECOWAS Ministries of Energy, Environment, Finance, Trade and Industry, Standardization Agencies and Utilities** would be actively involved;
- Partners of the initiative would include: **UNEP/GEF en.lighten initiative, UNDP, GEF, World Bank, lamp manufacturers, Lighting Africa, Regional Development Banks, the Club of ER agencies, etc.**

<sup>24</sup> The average annual household electricity consumption is assumed to be 2000 kWh/year and the average house occupancy is taken as 6 persons per household.

## 4.2. Achieving High Performance Distribution of Electricity

Many West African power companies face enormous challenges in providing quality energy services, or expanding coverage to new users. Transmission and distribution system losses are one of the causes of this situation. Currently, losses in power distribution in the ECOWAS countries – both through inefficient equipment as well as in unpaid for consumption – vary from 15% to as much as 40% of power generated.

Reducing these losses to under 10% of generation is technically and economically feasible. This would release over 1 400 MW of power for new uses and new users, helping the region achieve universal access to modern energy, improve energy security, as well as accelerate economic growth and social progress. It would reduce annual GHG emissions by 2 MtCO<sub>2</sub>equiv.

### Economic, financial and technical feasibility

Successful programmes on efficiency in distribution have been carried out in Ghana and Nigeria. The **technical measures** that are used help to provide high quality, reliable service, and improve relations with customers:

- optimised billing - for instance through pre-paid meters;
- regular inspection of lines to remove illegal, unsafe connections, and to encourage all users to become paying customers;
- preventive maintenance for all components of the distribution system;
- high voltage distribution systems, that improve power quality and reduce theft
- power factor correction to reduce losses.

With countries putting into place appropriate electricity tariffs, the **economics** of improved efficiency in distribution are highly favourable, with return on investment from 20 to 40%.

### Institutional Structure

- **ECREEE and WAPP** would lead the initiative, under the political umbrella of ECOWAS.
- The ECOWAS **Electricity Distribution Companies** would be members of the Alliance.
- Partners of the Initiative would include: **European Copper Alliance; Electricité de France; ADEME; AEA**; equipment manufacturers.

### Work Programme

#### **Energy efficiency policies and tools**

- **Country evaluations** to determine the nationally appropriate policies and actions.
- **Benchmarking**, in order to fix targets and measure progress;
- **Support for national action plans** by providing technical assistance, and by facilitating finance.

#### **Capacity building**

- **Exchange of best practices** among the regional distribution companies.

#### **Awareness raising**

- Focus on power utilities, regulators and political authorities responsible for the power sector.

#### **Financing**

- Structured project financing will be mobilised, to be reimbursed through the savings from reduced losses, for infrastructure investments estimated at 500 M€ over 10 years for the region. Initial diagnostic studies, for 50 k€ to 200 k€, could be supported by project preparation facilities.

### 4.3. Safe, Sustainable and Affordable Cooking

Cooking is a vital need, since most of our nutrition comes from cooked food. Nevertheless, most West African households cook with wood or charcoal, on open fires or inefficient stoves, that:

- **are unsafe:** Women and children exposed to smoke suffer from respiratory diseases. Women may be exposed to danger when they have to go out to collect wood for cooking.
- **are costly:** Many households spend as much on fuel for cooking as they do on food.
- **are unsustainable:** Where sustainable forest management is lacking, cutting of wood for fuel can be a link in the chain of land degradation and deforestation.
- **are an obstacle to social and economic progress for women.** Women and girls who must collect wood are excluded from schooling or revenue generating activities.

#### Achieving safe and affordable cooking

In West Africa, the following avenues have shown promise:

- improving the efficiency and sustainability of the traditional wood and charcoal cooking energy value chain through sustainable forest management, improved charcoal conversion, and clean and high efficiency stoves.
- developing new biomass energy cooking value chains. This includes pellets, briquettes, biogas, as well as liquid fuels produced from agricultural or forestry wastes.
- promoting LPG fuel and stoves. LPG cooking is clean and highly efficient.
- promoting solar cookers, pertinent in some areas, for instance schools.

#### Institutional Structure

The cooking initiative would be a joint action between ECREEE and CILSS. Technical partners - GIZ, AEA, ENERGIA, GERES, GACC, SNV - will be invited to participate.

#### Work Programme

Focus will be on increasing efficiency and sustainability of biomass based cooking energy.

##### **Regional Components:**

###### ***Energy efficiency policies and tools***

- **Adopt standards** for stove technologies.

###### ***Capacity building***

- **Exchange of best practices** on technologies, techniques and approaches
- **Support of selected testing/research centres** with regional outreach.
- **Research** on biomass fuel production and supply.

##### **National Components:**

###### ***Energy efficiency policies and tools***

- **Country evaluations** to determine the nationally appropriate actions for cooking.

###### ***Capacity building***

- **Support for national action plans** addressing bottlenecks in biomass cooking fuel supply.

###### ***Awareness raising***

- Focus on stove builders and household users.

###### ***Financing***

- Carbon financing will be mobilised, to aid consumers in paying for improved stoves (total cost estimated at 150 M€ for the region). From 1 M€ to 5 M€ per country will be necessary for training and capacity building, and for the organisation of the supply chain for sustainable fuel supply.



#### 4.4. ECOWAS Standards and Labelling Initiative

Energy efficiency standards and labels for appliances and energy equipment are powerful tools for market transformation, removing energy intensive products from the market. Labels empower consumers to make informed, sound choices when purchasing appliances and energy equipment. Energy efficiency standards make sure that the products coming into the market comply with a minimum energy efficiency level, and contribute to the creation of a regional market for efficient equipment. The Initiative requires strong political commitment, a holistic long-term approach and the involvement of a broad range of stakeholders. Benefits include:

- Mitigation of electricity peak loads and related costs from power cuts and load shedding.
- Decreased capital investment needs in electricity generation plants and related transmission infrastructure. Savings could be used for grid extension and access programmes.
- Reduction in the fossil fuel consumption in existing power plants and related emissions.
- Savings in the energy bills of final consumers, thus increasing their welfare.

#### Main components of the ECOWAS Standards and Labelling Initiative

Initially, the initiative will start with the implementation of standards and labels for light lamps, refrigerators and air conditioners, and will later be extended to other appliances and equipment. The main components of the initiative are as follows:

- Regional cooperation on the development of ECOWAS regional standards and labels for energy efficient appliances and energy equipment;
- Regional approach on product efficiency rating systems and on the definition of multiple tiers of product performance;
- Regional cooperation on standardized testing and certification of equipment to verify performance and accuracy of labelling;
- Awareness raising for national authorities, manufacturers and the general public;
- Capacity building of main stakeholders and training and qualification of staff.

#### Institutional Structure

- **ECREEE** would lead the initiative, under the political umbrella of ECOWAS;
- National **standards bodies** and further relevant institutions will be key actors;
- Partners of the Initiative would include: European Commission, UNDP, Super-efficient Equipment and Appliance Deployment (SEAD) initiative of the U.S Department of Energy, Collaborative Labelling & Appliance Standards Program (CLASP), Austrian Energy Agency, ADEME, European Copper Alliance, and major electric equipment manufacturers.

#### Work Program

##### **Energy efficiency policies and tools**

- Development of minimum energy performance standards;
- Design of an ECOWAS Energy Efficiency Label;
- Long term monitoring and verification of the effects of standards and labels.

##### **Capacity building**

- Building a network of relevant actors within the ECOWAS region;
- Development and implementation of pilot appliance labelling projects;
- Establishment of procedures and facilities for energy performance testing;

##### **Awareness raising**

- Launching of awareness raising campaigns and training of relevant stakeholders;

##### **Financing**

- Institutional support, estimated at 0.5 to 3 M€ in each country, plus 2 M€ at the regional level, will be necessary. This could be combined with the lighting initiative.



## 4.5. Financing sustainable energy

Several financial mechanisms are available to support the development of Renewable Energy and Energy Efficiency measures and technologies in the ECOWAS region.

- In 2012, 15 Clean Development Mechanism (CDM) projects were registered in the ECOWAS countries, allowing the yearly saving of 6 million tCO<sub>2</sub>eq (CER). Two projects in Nigeria account for more than 4 million of tCO<sub>2</sub>/year and come from recycling gas from oil extraction.
- 9 voluntary projects are also registered under the Gold Standard (VGS), all on efficient cook stoves dissemination and represent 550 000 tCO<sub>2</sub>eq/year.
- NAMAS (*Nationally Appropriate Mitigation Actions*) consist in a sectoral approach of GHG Emission Reduction for the developing countries.
- So far, 5 ECOWAS countries have announced their Nationally Appropriate Mitigation Actions (Benin, Côte d'Ivoire, Ghana, Sierra Leone and Togo).

### Economic, financial and technical feasibility

Climate Finance is a real lever for ECOWAS countries in the renewable energy sector (Hydro power, Wind Power, Solar power), energy efficiency (electric devices, industrial processes, cooking) and methane emission avoidance (waste management). Carbon markets or NAMAs in the future will allow large-scale dissemination of these technologies. However, the complexity of those processes requires:

- knowledge of the technical requirement of carbon projects or NAMAs at the investor level and at the implementers (Governments; Companies) level.
- financial forecast for a minimum of 20 years, combining dissemination targets, Emission Reduction accounting, financial cash flow follow up;
- institutional schemes to allocate the carbon revenues and insure a fair and efficient distribution.

### Institutional Structure

- **ECREEE** would lead the initiative, under the political umbrella of ECOWAS.
- The African Bank of Development (AfDB) and the Banque Ouest Africaine de Développement (BOAD) would be members of the Alliance.
- Partners of the Initiative would include: **ADEME**, **GERES**, the **Designated National Authorities (DNA) of ECOWAS countries**

### Work Programme

#### **Energy efficiency policies and tools**

- **Country evaluations** to determine the opportunities for the mobilisation of Climate finance along the different energy sectors (NAMAs, Carbon project);
- **Benchmarking**, in order to fix targets and measure progress;
- **Support for the formalization of NAMAs** by providing technical assistance;

#### **Capacity building**

- **Exchange of best practices** among the investors and carbon project implementers;

#### **Awareness raising**

- **Communication of the results and publications.**

#### **Financing**

- The purpose of this initiative is to facilitate financing for all other EE actions.

#### 4.6. Investment Plan for Energy Efficiency Flagship Initiatives

The following table summarises estimates for the institutional support and capital investments necessary for the Flagship Initiatives.

	<i>Institutions, capacity, studies</i>	<i>Capital investments</i>
Efficient Lighting	0.5 to 3 M€ in each country.	125 M€ for light lamps, to be paid for by consumers and through carbon financing.
Achieving High Performance Distribution of Electricity	50 k€ to 200 k€ for diagnostic studies.	500 M€ over 10 years, in investments "additional" to business as usual, principally through structured project financing on the basis of savings from reduced losses.
Safe, Sustainable and Affordable Cooking	1 M€ to 5 M€ per country, for training and capacity building.	150 M€, for improved stoves, and supply chain for sustainable fuel supply. Financed by consumers and through carbon credits.
Standards and Labelling (S&L) Initiative	0.5 to 3 M€ in each country, plus 2 M€ at the regional level. To be combined with the lighting initiative.	
Financing sustainable energy	100 k€ to 500 k€ for capacity, plus additional activities as part of projects.	

## List of acronyms

AAA	Accra Agenda for Action
ACP	Group of African, Caribbean and Pacific countries
ADA	Austrian Development Agency
ADEME	French Environment and Energy Agency
AEA	Austrian Energy Agency
AEEP	Africa-EU Energy Partnership
AfDB	African Development Bank
AFD	French development agency, <i>Agence Française de Développement</i>
AFREC	African Energy Commission
AFUR	African Forum for Utility Regulators
AMADER	Agence Malienne pour le Développement de l'Energie Domestique et l'Electrification Rurale
ASN	Association Sénégalaise de Normalisation
AUC	African Union Commission
BEST	Biomass Energy Strategy
BOAD	Banque Ouest Africaine de Développement
BRT	Bus Rapid Transit
CDM	Clean Development Mechanism
CER	Certified Emission Reduction
CFL	Compact Fluorescent Lamps
CILSS	Comité permanent Inter-Etats de Lutte contre la Sécheresse
CLASP	Collaborative Labelling & Appliance Standards Program
DFID	UK Department for International Development
DGIS	Netherlands Directorate General for Development Cooperation
DNA	Designated National Authorities
DSM	Demand Side Management
EC	European Commission
ECOWAS	Economic Community of West African States
ECREEE	ECOWAS Centre for Renewable Energy and Energy Efficiency
EDF	European Development Fund
EE	Energy Efficiency
EEO	Energy Efficiency Obligations
EEEP	ECOWAS Energy Efficiency Policy
EIB	European Investment Bank
EITI	Extractive Industries Transparency Initiative
ENDA TM	Environnement et Développement du Tiers Monde
EnDev	Energising Development
en.lighten	UNEP/GEF initiative to accelerate market transformation to efficient lighting technologies
EORE	ECREEE Observatory for Renewable Energy and Energy Efficiency
ERERA	ECOWAS Regional Electricity Regulation Authority
ESCO	Energy Service Company
ESD	Energy Services Directive of the European Commission
ESPC	Energy Services Performance Contracting
EUEI PDF	European Union Energy Initiative - Partnership Dialogue Facility
GEF	Global Environmental Facility
GERES	Groupe Energies Renouvelables, Environnement et Solidarités
GHG	Greenhouse Gases
GIS	Geographic Information Systems
GIZ	German Technical Cooperation
ICA	Infrastructure Consortium for Africa
IEA	International Energy Agency
IEPF	l'Institut de l'énergie et de l'environnement de la Francophonie
IPEEC Initiative	International Partnership for Energy Efficiency Cooperation Initiative

IRENA	International Renewable Energy Agency
KfW	German Development Bank
LED	Light Emitting Diodes technology
LPG	Liquefied Petroleum Gas
MDGs	Millennium Development Goals
MEPS	Minimum Energy Performance Standards
MTEP	Million-ton equivalent of petroleum
MW	Megawatt
NAMA	National Appropriate Mitigation Actions
NEPAD	New Partnership for Africa's Development
NIPs	National Indicative Plans
ODA	Official Development Assistance
OECD	Organisation for Economic Co-operation and Development
PIDA	Programme for Infrastructure Development in Africa
PPP	Public-Private-Partnership
PRSPs	Poverty Reduction Strategy Papers
R&D	Research and Development
RD&D	Research, Development and Demonstration
RIPs	Regional Indicative Plans
SAVE	Energy Efficiency Programme of the European Commission
S4All	Sustainable Energy for All
Sida	Swedish International Development Agency
S&L	Standards and Labelling
UEMOA	Union Economique et Monétaire Ouest Africaine
UNDP	United Nations Development Programme
UNEP	United Nations Environmental Programme
UNIDO	United Nations Industrial Development Organization
UPDEA	Union of Producers, Transporters and Distributors of Electrical Power in Africa
USAID	United States Agency for International Development
WAPP	West African Power Pool
WHO	World Health Organization