# Framework document for the ECOWAS directive for Energy Efficiency in Buildings

## Table of contents

## 1. Considerations

The energy system of West Africa is facing serious interrelated challenges of energy access, energy security and climate change adaptation and mitigation. Furthermore, the ECOWAS Region has an energy deficit that hampers social and economic development, and affects particularly low-income population groups.

To address these multiple challenges, the 43rd Ordinary Session of the ECOWAS Authority of Heads of State and Government, which held in Abuja, Nigeria from July 17 – 18, 2013 renewed its commitment to the provision of access to sustainable energy services in West Africa by adopting the ECOWAS Energy Efficiency Policy (EEEP) as well as the ECOWAS Renewable Energy Policy (EREP).

As part of the ECOWAS Energy Efficiency policy, a specific target has been agreed upon by ECOWAS Member States regarding the development and adoption of region-wide efficiency standards for buildings (e.g. building codes). Energy efficiency criteria, for new buildings as well as for existing buildings undergoing major refurbishment, should incorporate the principles of tropical architecture and urban planning standards.

Energy efficiency in buildings is a key element of sustainable development in West Africa. The transformation of the buildings sector is a long-term undertaking. A range of policy instruments, such as regulatory measures, financial instruments, awareness raising and capacity building, is necessary for this process to be effectively implemented.

The ECOWAS Energy Efficiency Policy (EEEP) includes flagship energy efficiency initiatives in key areas of work. The ECOWAS initiative of energy efficiency in buildings is part of this package of initiatives. The ECOWAS Initiative on Energy Efficiency in Buildings aims to promote reliable and affordable energy services in buildings by building on national activities and creating an added value through activities at the ECOWAS level.

In the context of this initiative, the development and adoption of an ECOWAS directive on energy efficiency buildings is an essential measure for the implementation of ECOWAS-wide energy efficiency standards for buildings. The national transposition will be supported by the codes and regulatory frameworks etc. already existing in ECOWAS member states. That is to say,….(list of national frameworks, TO BE COMPLETED)….

## 2. Objective of the ECOWAS directive on energy efficiency in buildings

The main objective of the ECOWAS directive for energy efficiency in buildings is to promote the improvement of energy efficiency in buildings in ECOWAS Member States.

Energy efficiency requirements in building codes ensure that energy efficiency is taken into account at the design phase and can help to realise potentials for energy efficiency in buildings. The building code defines norms and standards for the energy performance of buildings based on the climate zone in which they are located.

Specifically, this ECOWAS directive will define:

a. Common general framework for the calculation of energy performance of buildings
b. Minimum requirements to the energy performance of new buildings

c. Minimum requirements to the energy performance of existing buildings subject to major renovation and requiring planning approval
d. Minimum requirements of renewable energy sources in new and existing buildings subject to major renovation and requiring planning approval
e. Energy certification of buildings
f. Implementation of the ECOWAS framework on energy efficiency in buildings

## 3. Definitions

For the purpose of this ECOWAS directive on energy efficient buildings, the following definitions shall apply:

a. **primary energy consumption'** means gross inland consumption, excluding non-energy uses;
b. **'final energy consumption'** means all energy supplied to industry, transport, households, services and agriculture. It excludes deliveries to the energy transformation sector and the energy industries themselves;
c. **'energy efficiency'** means the ratio of output of performance, service, goods or energy, to input of energy;
d. **'energy savings'** means an amount of saved energy determined by measuring and/or estimating consumption before and after implementation of an energy efficiency improvement measure, whilst ensuring normalisation for external conditions that affect energy consumption;
e. **'energy efficiency improvement'** means an increase in energy efficiency as a result of technological, behavioural and/or economic changes;
f. **'energy service'** means the physical benefit, utility or good derived from a combination of energy with energy-efficient technology or with action, which may include the operations, maintenance and control necessary to deliver the service, which is delivered on the basis of a contract and in normal circumstances has proven to result in verifiable and measurable or estimable energy efficiency improvement or primary energy savings;
g. **'building':** a roofed construction having walls, for which energy is used to condition the indoor climate; a building may refer to the building as a whole or parts thereof that have been designed or altered to be used separately; buildings' definition includes individual houses and multi-family houses, commercial buildings, public buildings;
h. **'energy performance of a building':** the amount of energy actually consumed or estimated to meet the different needs associated with a standardised use of the building, which may include, inter alia, water heating, cooling, ventilation, use of daylight, shadowing systems and components, as well as electricity consumption for lighting and other uses as computer, domestic appliances, etc. This amount shall be reflected in one or more numeric indicators which have been calculated, taking into account insulation, technical and installation characteristics, design and positioning in relation to climatic aspects, solar exposure and influence of neighbouring structures, own-energy generation and other factors, including indoor climate, that influence the energy demand;
i. **´VAC system´**: the equipment, distribution systems and terminals that provide, either collectively or individually the processes of ventilating or air conditioned to a building or a portion of a building;
j. **'Solar thermal'**: use of solar thermal energy to produce heat, for instance for produce hot water, or to provide cooling services;
k. **'Informal building'**: Traditional buildings or buildings built without legal authorisation;

l. '**Building envelope'**: it includes walls, roof, the bottom floor, windows, doors, all the elements that limits the inside and the outside of the building.
m. **'Useful floor area'**: floor area of dwellings measured inside the outer walls, excluding cellars, non-habitable attics and, in multi-dwelling houses, common areas
**n. Major renovation:** Renovation affecting the walls , roof and the bottom floor(for example wall insulation), the system (for instance a change of the air conditioning system) but also the addition of a new room with a useful area of more than 12 m2.

**4. Building envelope**

The provisions of the directive will be applicable to the bottom floor, windows, doors and all the elements that limits the inside and the outside of the building.

**5. Applicable building systems and equipment**

The provisions of the ECOWAS directive on energy efficiency in buildings shall apply to:

a. Systems and equipment, including ventilation and air conditioning (VAC) and their regulation systems
b. Water heating
c. Interior and exterior lighting
d. Appliances (electrical appliances, office equipment)
e. Electric power and motors

**6. Safety, health and environmental codes take precedence**

If the ECOWAS directive for energy efficiency in buildings is found to conflict with safety, health and environmental codes, the safety, health and environmental codes take precedence.

**7. Common general framework for the calculation of energy performance of buildings**

The energy performance of buildings should be calculated on the basis of a methodology, which may be differentiated at regional level, that includes, in addition to thermal insulation other factors such as air-conditioning installations, application of renewable energy sources and design of the building. A common approach to this process, carried out by qualified and/or accredited experts, whose independence is to be guaranteed on the basis of objective criteria, will contribute to introduce transparency for prospective owners or users with regard to the energy performance in the property market.

ECOWAS Member States shall apply a methodology, at national or regional level, of calculation of the energy performance of buildings on the basis of the general framework **set out in the Annex**, taking into account standards or norms applied in Member State legislation.

This methodology shall be set at national or regional level. The energy performance of a building shall be expressed in a transparent manner.

**8. Exemptions**

The provisions of this ECOWAS framework on energy efficiency in buildings do not apply to:

- Buildings used for military purposes, except residential areas for military personnel, that will follow the directive
- Buildings that do not use electricity and/or fossil fuels, etc.

### 9. Exemplary role of public buildings

Public buildings shall act as leading examples for energy efficiency. Member States shall take measures to ensure that for new buildings and in existing buildings that are subject to major renovation with a total useful floor area over 500 $m^2$ occupied by public authorities and by institutions providing public services to a large number of persons the following measures are taken:

- Energy efficiency measures are incorporated into the planning and construction
- An energy performance certificate is issued and is placed in a prominent place clearly visible to the public
- The technical, environmental and economic feasibility of decentralised energy supply systems based on renewable energy is considered and is taken into account before construction starts.

### 10. Information and awareness raising

Member States may take the necessary measures to inform the constructors, owners and users of buildings as to the different methods and practices that serve to enhance energy performance. Upon Member States' request, ECREEE, on behalf of ECOWAS, shall assist Member States in staging the information campaigns concerned, which may be dealt with in regional programmes.

### 11. Training and qualification of experts[1]

Only qualified professionals should be allowed to provide advice on how to improve the energy performance of buildings, and only qualified professionals should be allowed to produce the supporting documents according to the energy building code.

ECOWAS Member States may take the necessary measures to train and qualify personnel as to the different methods and practices that serve to enhance energy performance of buildings. Upon Member States' request, ECREEE, on behalf of ECOWAS, shall assist Member States with regional training and qualification programmes to educate and build capacity among public authorities and stakeholders.

### 12. Minimum requirements for the use of renewable energy sources

Rules and obligations for minimum requirements for the use of energy from renewable sources in new and renovated buildings can lead to considerable increases in the use of energy from renewable sources. This includes but is not limited to demand of hot water (in which case the installed production should be equivalent to 60% of the demand for hot water).

- Solar thermal energy for demand of hot water

[1] Qualification recognised by a diploma and a professional activity or only by a professional activity.

Member States shall, in their building regulations and codes require the use of minimum levels of energy from renewable sources for service water heating in new buildings and in existing buildings that are subject to major renovation (if hot water is used) in the following categories[2]:

- Hotels
- Public buildings that have the need for hot water
- Commercial buildings that have the need for hot water
- Residential, domestic buildings: detached houses that have the need for hot water
- Health centres, maternities, school kitchens
- Industries (e.g. agro-food industries that have the need for hot water)

The required solar thermal contribution for the new buildings and renovated ones should be of at least 60% (of hot water energy consumption).

This requirement of 60% of renewable energy production can be satisfied with other renewable energy sources than solar thermal, as wind production, biogas, PV, etc.

In doing so, proper quality assurance measures must be foreseen, including quality parameters for the products, installation and maintenance, as well as a clear inspection and sanctioning regime.

### 13. Monitoring and verification of energy efficiency in buildings

The main purpose of M&V is to validate that energy efficiency measures in buildings provide the expected results in terms of energy efficiency improvements. This is done by measuring (or estimating through the check-list given in annex) the savings generated from any type of energy efficiency project, including major renovations, retrofits, facility improvements, and operational and behavioural changes.

With support of ECREEE, Member States shall undertake actions to build systems for Monitoring and Verification of the ECOWAS framework on energy efficiency in buildings. These M&V systems must be harmonised across ECOWAS member states.

### 14. Enforcement and incentive systems

Energy efficiency elements incorporated into the building codes shall be enforced in the same system as other requirements in the building codes. The building codes need to clearly specify the responsibilities of the different professionals involved in the construction of the building in ensuring that energy efficiency measures are incorporated.

The energy efficiency of a new building must be declared by the architect (or the builder or the technical responsible) before construction based on estimates of the total energy consumption (or the building should apply the check-list given in annex II). The relevant authority will make the permit of construction contingent on compliance with the minimum requirements of energy performance for the building. Penalties and fines for non-compliance must be defined by the responsible national authorities. ECOWAS member states are encouraged to set up incentives such as the exemption of

[2] Provided a connection to a water grid is available.

the property tax for buildings or putting in place a certificate of conformity authorizing the sale of the building.

For informal buildings sector, the responsible national authorities should define actions to increase awareness of inhabitants.

### 15. Inspection of buildings during and after construction

The responsible national authorities should implement inspection of buildings, on samples or any other pertinent method. Penalties and fines for non-compliance must be defined by the responsible national authorities.

### 16. Review and update of requirements

Requirements for energy efficiency in buildings shall be reviewed at regular intervals, which should not be longer than five years and, if necessary, updated in order to reflect technical progress in the building sector.

### 17. Further steps to advance the ECOWAS framework on energy efficiency in buildings

- Organise a series of stakeholder meetings to discuss proposed efficiency requirements, collect feedback, and encourage institutional buy-in.
- Training and information workshops to educate and build capacity among stakeholders.
- Support government activities to ensure enforcement of requirements.
- Develop and introduce innovative instruments to finance energy efficiency in buildings.

## 18. Annex I: Climate

The building envelope requirements are based on the climatic zone in which the building is located. Based on the characteristics of climate, the thermal comfort requirements in buildings and their architectural form are different in different climatic zones.

## 19. Annex II: Checklist

## 20. Annex III: calculation of energy consumption