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Promoting Energy efficiency in Buildings in East Africa

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Presentation Overview

- The Mandate of UN-Habitat;
- Urbanization and urban energy poverty;
- Global Energy Challenge
- Energy use in buildings in SS Africa;
- African housing stock forecast;
- Introduction to the program on ***Promoting Energy Efficiency in building in East Africa;***
- Strategies and achievements;
- Conclusions.

The United Nations Human Settlements Program - UN-HABITAT

- UN-HABITAT is the United Nations agency for human settlements (the built environment).
- The agency is mandated by the UN General Assembly to promote:
  - ***Sustainable urban development*** and
  - ***Adequate shelter for all***.
- UN-Habitat assists local, regional and national authorities in their effort to ***increase access to decent housing***.
- *We promote energy access,* ***energy efficiency*** *and the use of* ***renewable energy*** *in urban areas.*

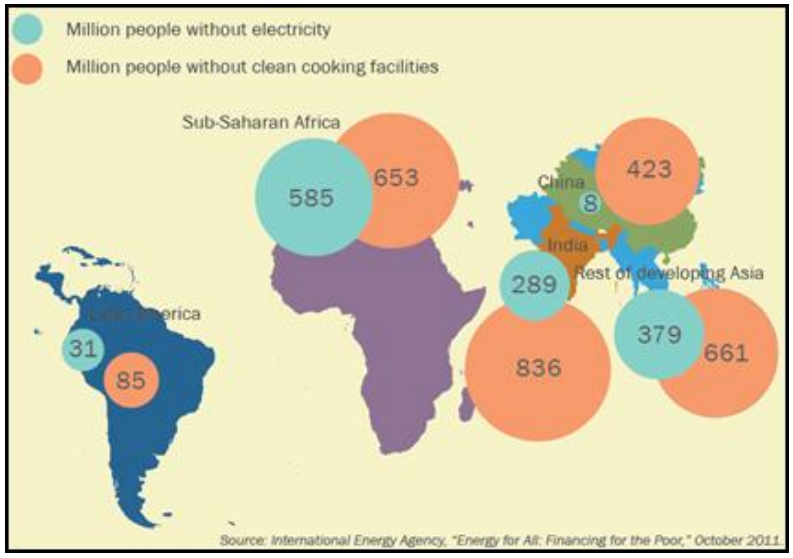
Urbanization and Urban Energy Poverty

- 10 % of the global population lived in cities in 1900;
- 50% of people lived in cities in 2007;
- 75% of the population will be living in cities in 2050.
- Today, out of the 3.5 billion people living in cities, over ***one billion live*** in informal settlements and are mainly **urban energy poor**.

Over 60 % of urban population in Africa are **energy poor.** They rely on traditional energy wood/charcoal for cooking and spend more on energy services (kerosene and electricity) compare to other citizens.

Urban energy demand increases annually by 7 %.

Global Energy Challenges



- The UN SG Ban Ki-moon's initiative "**Sustainable Energy for All**" that calls for all actors to join their efforts to:
- Ensuring **universal access to modern energy** services by 2030;
- Doubling the rate of improving in **energy efficiency**;
- Doubling the share of **renewable energy** in the global energy mix.

- 2014-2024 is the UN decade on Energy Access for All

Energy use in buildings in Sub Saharan Africa

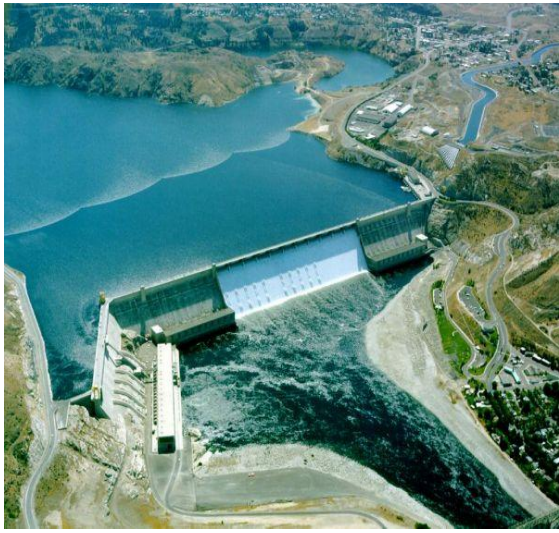
Energy used in buildings in Africa is estimated at 56% of the total national electricity consumption. Big cities consume more than 75 % of all electricity generated.

Majority of modern buildings in most African countries with tropical climates - are replica of building designs from western countries with cold and temperate climates.

Between 50-60% of power generation in the region come mainly from **hydro-power plants**.

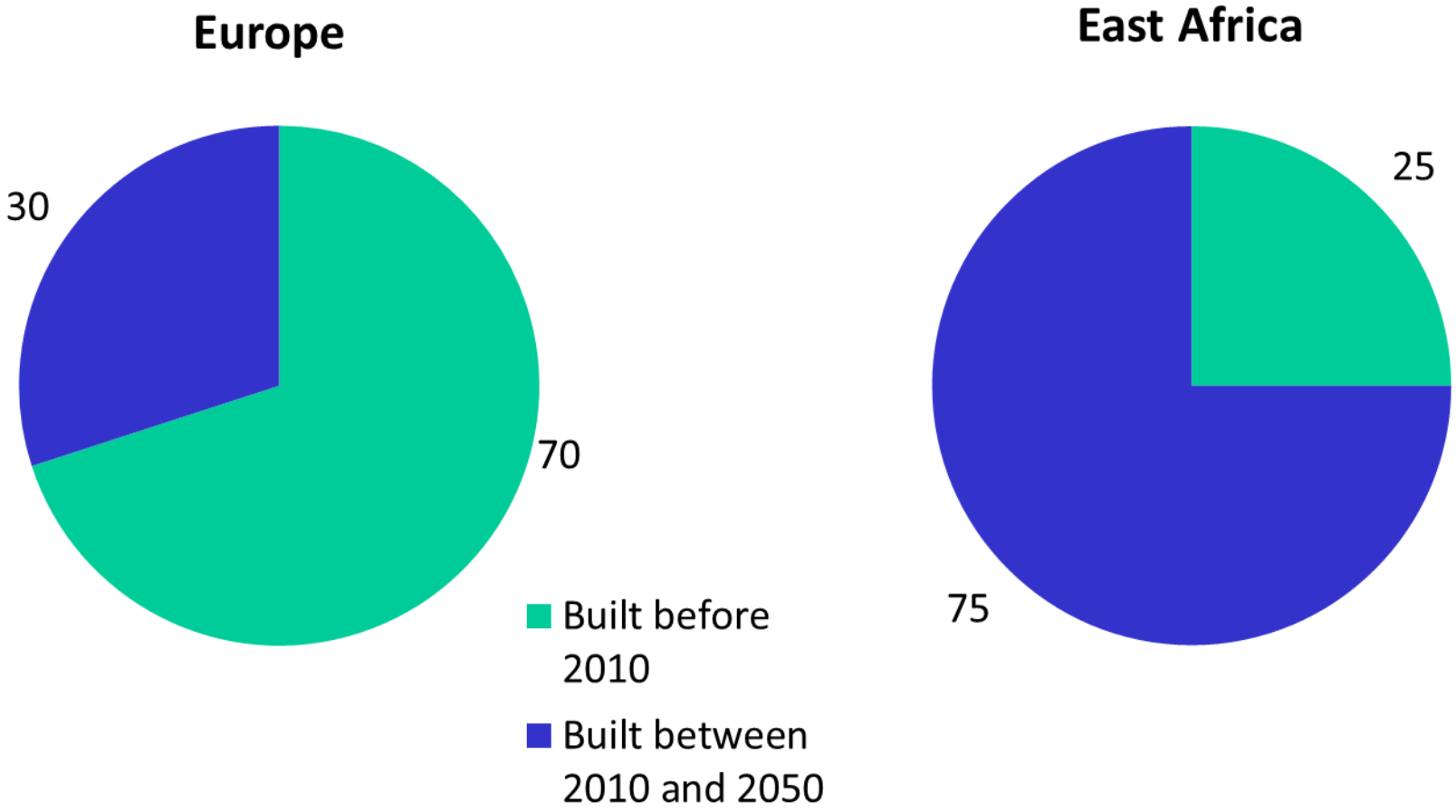
Energy generation's capacity is being stretched by *rapid* ***population growth***, *increased* urbanization, *growing* ***industries*** and ***climate change***.

Energy demand increases annually by 8% against an almost stable supply, creating a **huge energy deficit**. There is therefore, the need for energy efficiency and renewable energy.



Global Building Stock Forecast

About 80% of the buildings expected to exist in Sub Saharan Africa in 2050 have not been built.



Promoting Energy Efficiency in Buildings in East Africa

- This project is an initiative of UN-Habitat in collaboration with UNEP and the five East African countries: Kenya, Tanzania, Uganda, Rwanda and Burundi.

- The program is designed to address the energy crisis in the region through the promotion of energy conscious building designs and energy demand management.

Objectives of the Programme

- To Mainstream Energy Efficiency Measures into Housing policies, Building Codes, Housing finance and building practices in East Africa;
- To achieve considerable avoidance of GHG emissions as a result of improved energy efficient building practices.

Targets:

- **400,000 units (including government mass housing, real estates, private home etc.),**
- **100 buildings retrofitted (commercial and private sector), built under energy efficiency standards.**
- Estimated Emission Reduction in 20 years:
  Direct CO2 reduction: 3,629,996 ton;
  Indirect CO2 saving: 3,937,500 ton.

Other targets:

- Energy saving in new building by 30% ;
- Energy savings in existing buildings by 20 %;
- Improved energy efficiency in at least 30% of new buildings;
- Energy efficient building code adopted by at least 3 African countries;
- Green mortgage systems established and adopted.

Main Components

1. Baseline Data, Energy Audits and Benchmarking on Energy Efficiency (EE)in the Building Sector.

2. Adoption of Energy/Resource Efficient Building Codes in the region.

3. Awareness Raising; Capacity Building, Guidelines and training tools.

4. Appropriate Financial Framework and Mechanism for the Promotion of energy efficient Measures in Buildings.

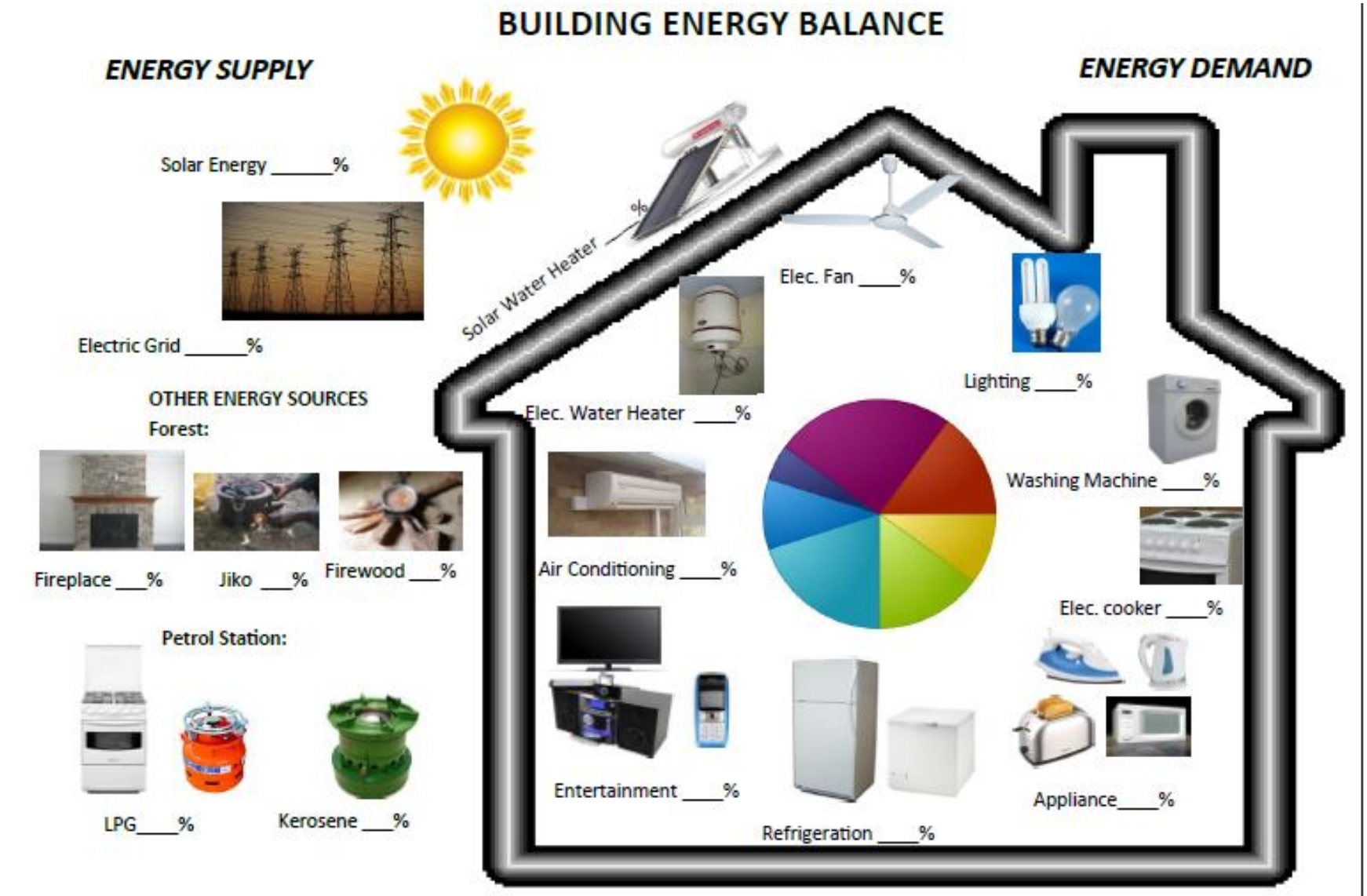
5. Integration of EE measures in **all new government housing projects**, donor funded housing projects and encourage such practices in the **private sector**.

1. Baseline data and Benchmarking on energy use in buildings

- Assess energy consumption trends in buildings.
- Conduct energy audits in residential, public and commercial buildings.
- Establish energy consumption benchmarks per categories and typologies of buildings and climatic zones.
- Identify energy saving potentials.

Eastgate: Sustainable building in Harare.

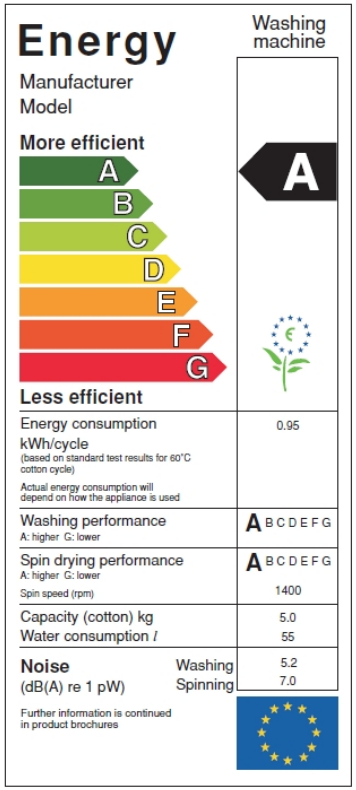
Energy audit of buildings: You Can't Manage What You Don't Measure!



Energy audit of buildings: You Can't Manage What You Don't Measure!

BUILDING ENVELOPE

BUILDING TYPOLOGY	 Informal Settlement	 Single dwell-ing (Bungalow)	 Single dwelling (Maisonette)	 Multiple Dwelling	 Commercial building	 Institution Building (School)	 Institution Building (Hospital)
BUILDING MATERIALS	Roof	 Makuti roof	 Iron sheets	 Stone coated tiles	 Clay roofing tiles		
	Wall	 Earth/ Mud walls	 Masonry stone	 Iron sheets	 Wooden walls	 Stabilised earth blocks	 Clay Bricks	 Concrete walls	 Glass and steel
BUILDING OCCUPANCY	< 5 occupants		5-10 occupants			>10 occupants	
BUILDING AREA (m^2)							
CLIMATE PROFILE	Hot and Humid	Hot and Semi-Arid/ Savan-nah and low Savannah	Hot arid	Upland/ High upland	Great lakes		



ENERGY BILLS

COST OF ENERGY

ELECTRICITY BILL

Kshs _____

LPG Bill

Kshs _____

Charcoal/ Firewood/ Biomass Bill

Kshs _____

Kerosene Bill

Kshs _____

ENERGY DEMAND

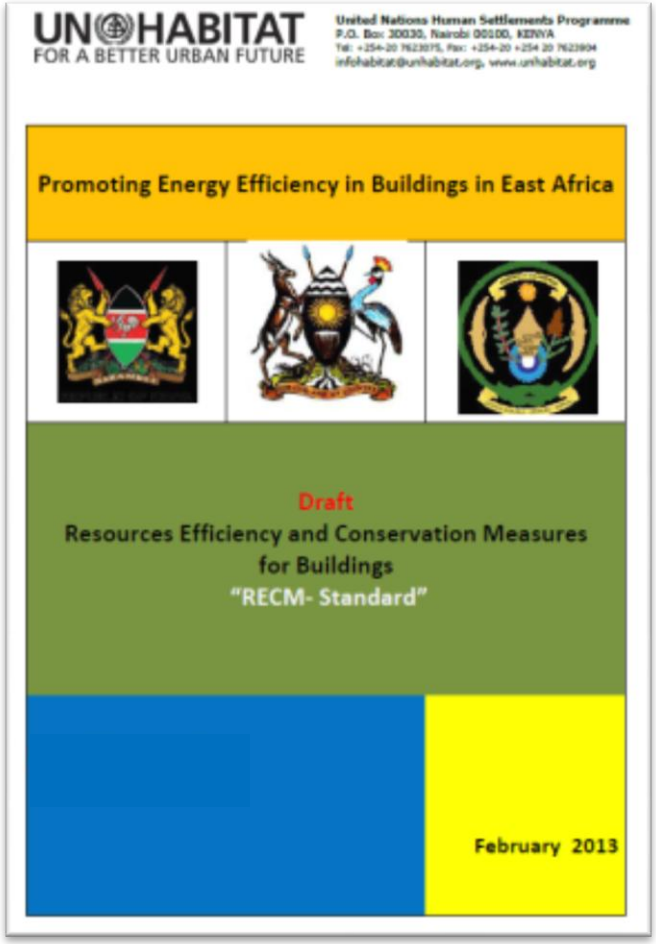
ENERGY SOURCE	MONTHLY CONSUMPTION
Electricity	kWh
LPG	Kg
Charcoal	Kg
Kerosene	Litres

2. Housing policies and regulations: building code / standards

- Review country specific housing policy to include EE measures.

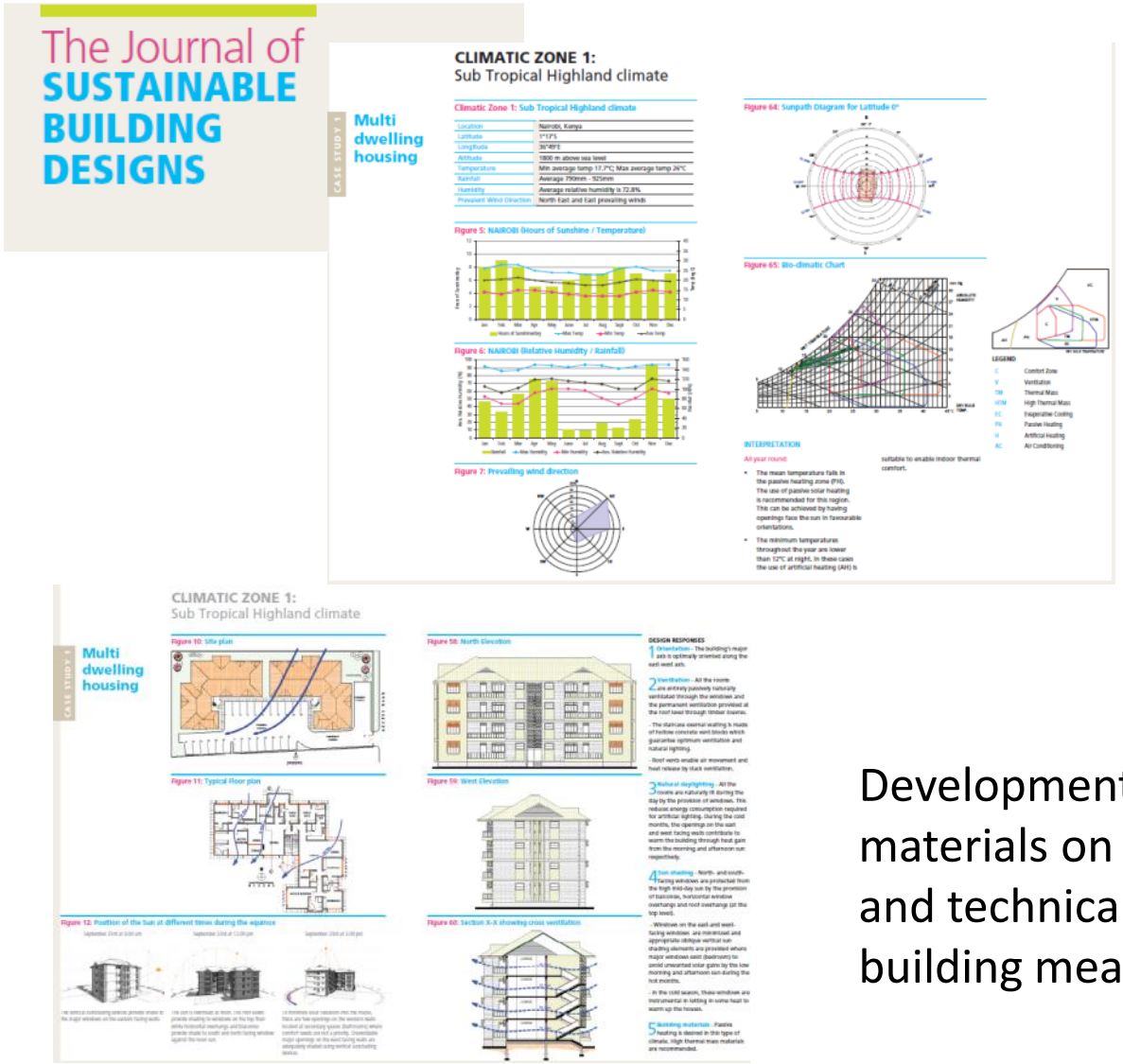
- Prepare EEB policies, session papers and by-laws for enactment, adoption and enforcement.

Energy/Resource efficient Building Code has the highest potential of saving energy in buildings over a long run.



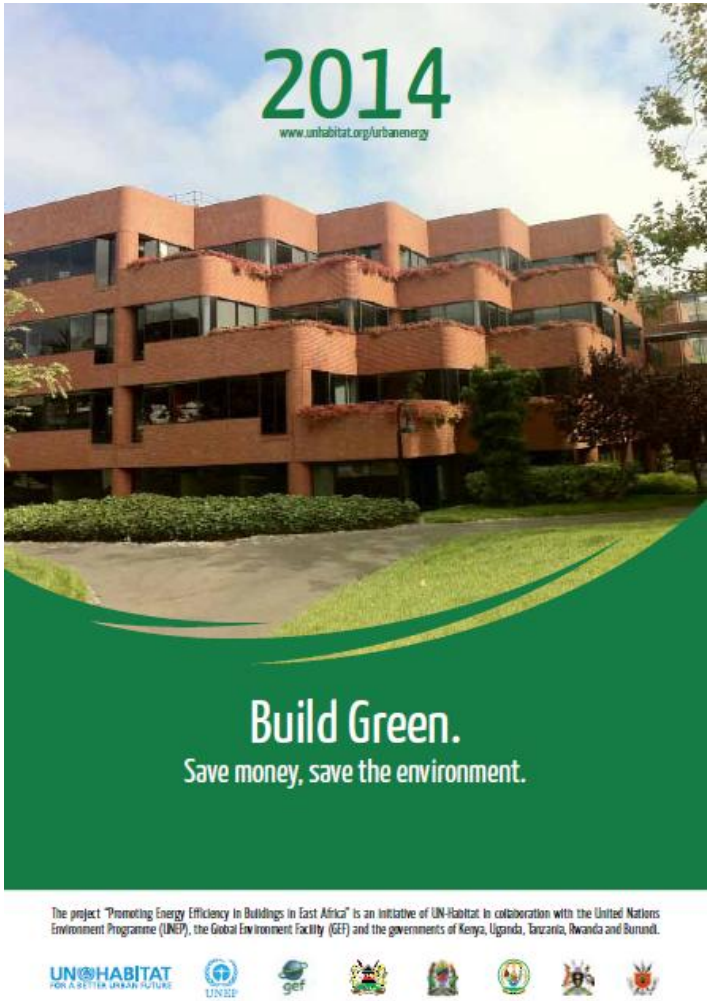
Energy Efficiency in Building Codes Workshop (EEBC) Kigali – April 2013.

3. Education: Awareness creation and capacity building in EEB



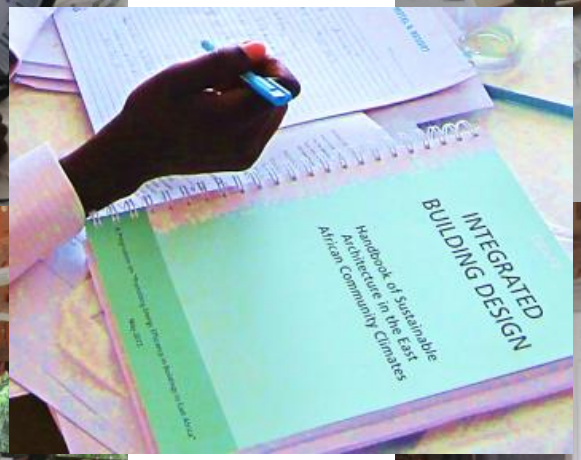
Development of tools and awareness materials on sustainable building design and technical notes to promote passive building measures/strategies.

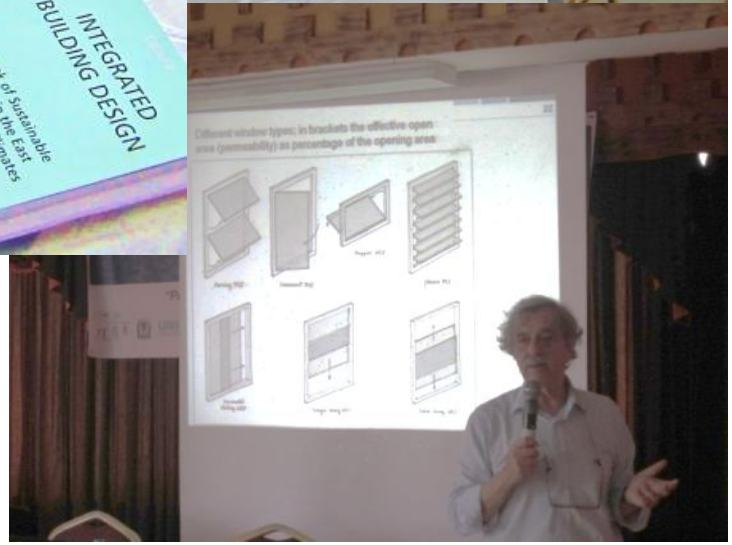
3. Education: Awareness creation and capacity building in EEB



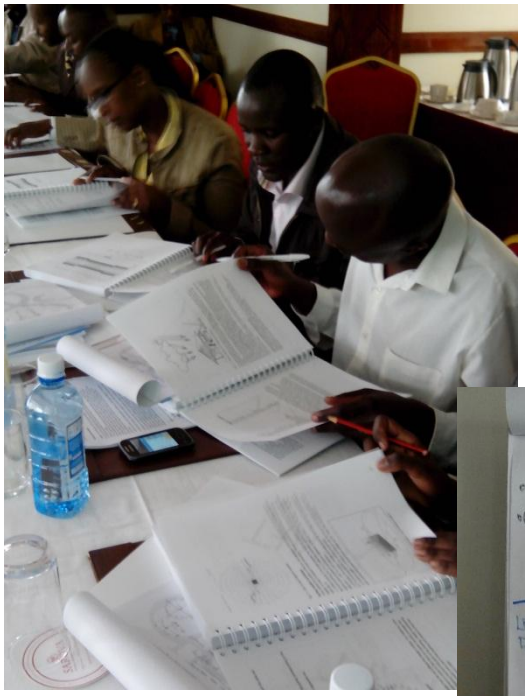
Training Workshop on Energy Efficiency in Buildings Kampala – June 2012.

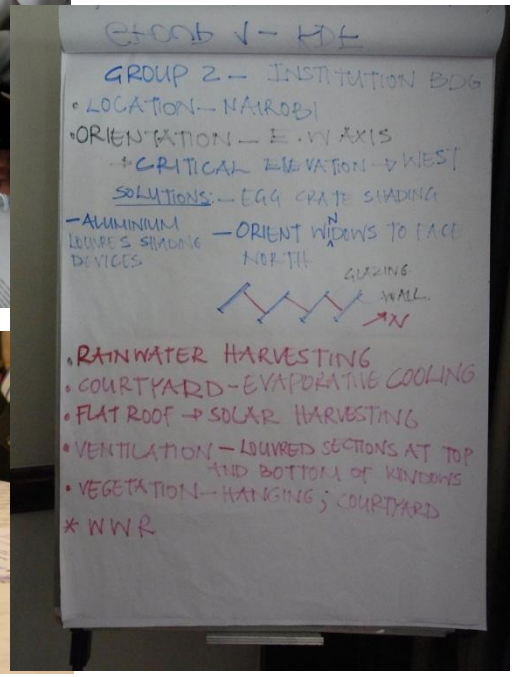
Sustainable Integrated Building Design for Tropical Countries Dar es Salaam – May 2013.





KAM Green Buildings Training Nairobi– August2013.





4. Financing instruments of EEB

- Sensitize financial institutions, investment banks, private developers and power utilities on the economic benefits of EE measures.
- Facilitate the adoption and establishment of green mortgage systems.
- Encourage governments to create **fiscal** and **administrative incentives**; subsidies program and to allocate **national budget** for promoting EEB.

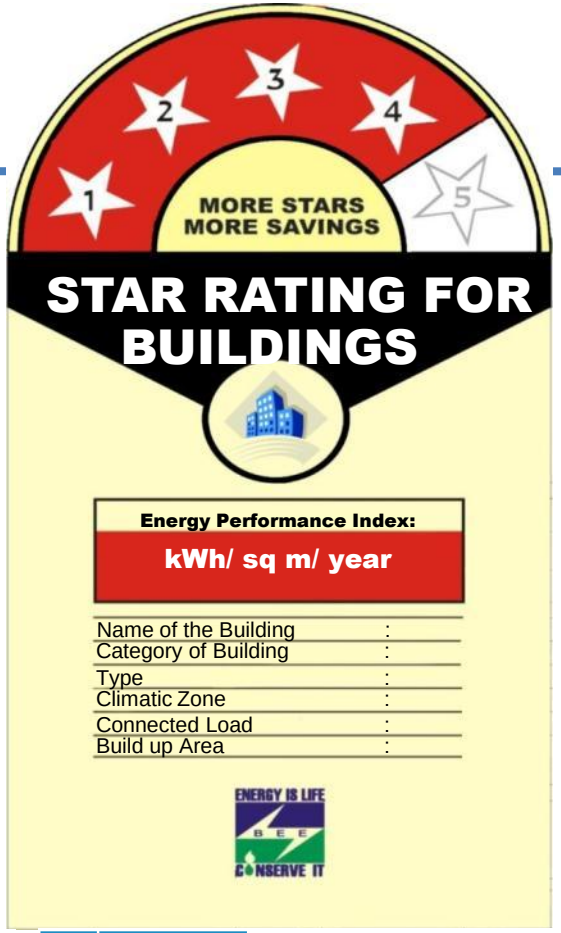
5. Demonstration projects

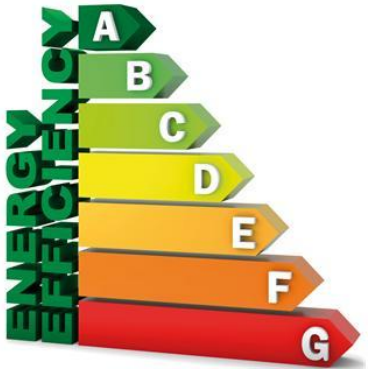
- Facilitate the construction of more EEB in the region through advocacy and capacity building;
- Ensure that majority of new buildings comply with EE principles;
- Work with governments, donors and developers to make sure that new housing projects are EE;
- Conduct practical training with real estate developers and other housing stakeholders to sensitize and provide them with technical assistance on EEB.
- Incorporated EE in all ongoing new housing schemes.

Pilot projects in Dar es Salaam Tanzania that integrate passive building design strategies

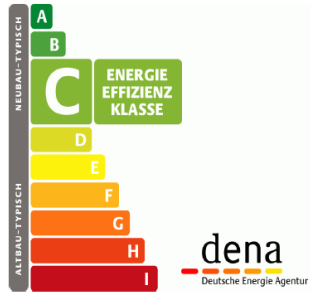
East Africa Energy Efficient Building Award (EAEEBA)

- Create a **Regional Energy Efficiency Award Systems** to acknowledge best practices and reward excellent achievement;
- Using internationally agreed green building rating systems as criteria for the award;
- Develop Green building certification system for the region.
- Facilitate the creation of other awards and competition systems on sustainable architecture.





Class	Primary energy use (kWh/m²/year)
A	0-80
B	81-110
C	111-150
D	151-200
E	201-250
F	251-300
G	301-350
H	351-400
I	401 and above



Conclusion

- A roadmap towards low carbon buildings in Africa must include the following action points:
- The establishment of a baseline on energy performance in building. This can be done through energy audit to identify saving potentials;
- Governments should set green requirements for resource efficient buildings. **Building permit** requirements should include environmental design strategies and passive building measures. **Energy efficient building code** should be adopted;
- Awareness to stimulate consumer demand for sustainable products and to promote behavior change;
- Capacity building and tools development for architects, engineers and other building practitioners on sustainable building design are needed to bridge the gap. **Universities to initiate training courses on sustainable built environment.**
- **Engage investors to finance resources efficient buildings** and appliances through green mortgage. This will help remove financial barriers;
- Engage other stakeholders such as **power utilities** to promote energy efficiency and responsive consumption.

THANK YOU FOR YOUR ATTENTION

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