University of Nairobi

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FOR A BETTER URBAN FUTURE

8TH ANNUAL EAST AFRICA WORKSHOP & EXHIBITIO

Transition towards low carbon buildings in Africa:

Promoting Energy and resources Efficiency in Buildings in East Africa

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UN-Habitat

Presentation Overview

- Energy use in buildings in Africa
- Global housing stock forecast
- Introduction of the program on ***Promoting Energy Efficiency in Buildings in East Africa***
- Achievements
- Conclusions

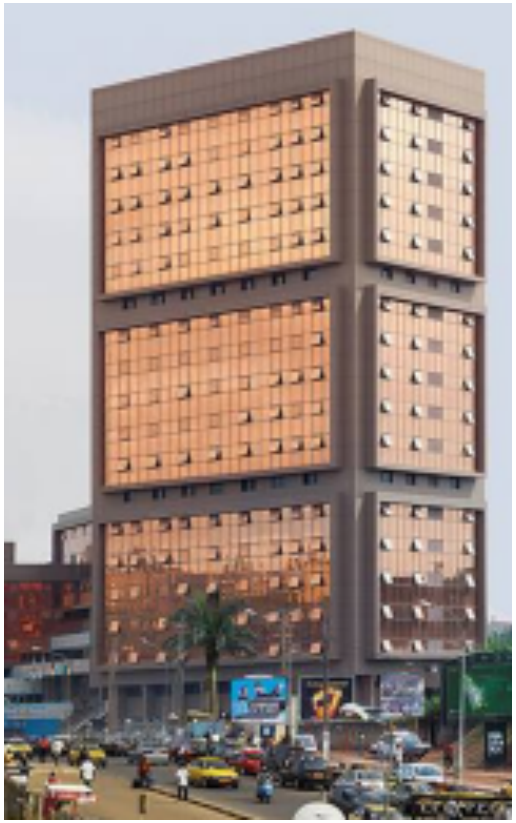
Energy use in buildings in Sub Saharan Africa

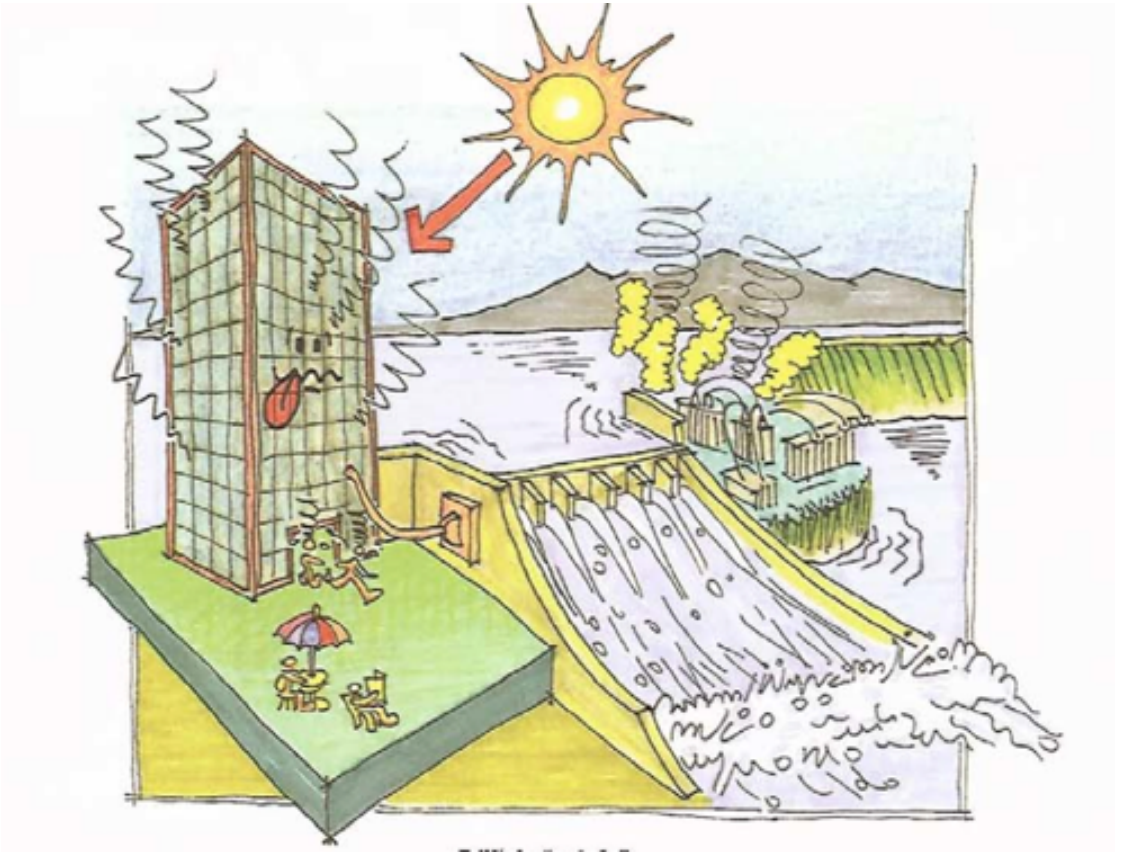
Majority of modern buildings in most African countries with tropical climates - **are replica of building designs from western and developed countries** with cold and temperate climates.

Modern cities are **fossil fuel driven cities**.

Very few **urban planners** take into consideration **bioclimatic elements or passive methods** in their new urban plans. New buildings are aligned along main roads, rivers and the resulting settlements are **high energy dependent**.

Energy use in buildings in Sub Saharan Africa





Energy used in buildings in Africa is estimated at **56% of the total national electricity** consumption.

Over 70% of energy is consumed in cities alone and in some cases, more than 50% of the national energy is used in the capital city alone.

Rapid Urbanization: Housing shortage and inadequate housing

- Housing deficit is estimated globall
  at one billion.
- There is a mismatch between the supply and demand for housing:
- **Adequate** shelters are **unaffordable!**

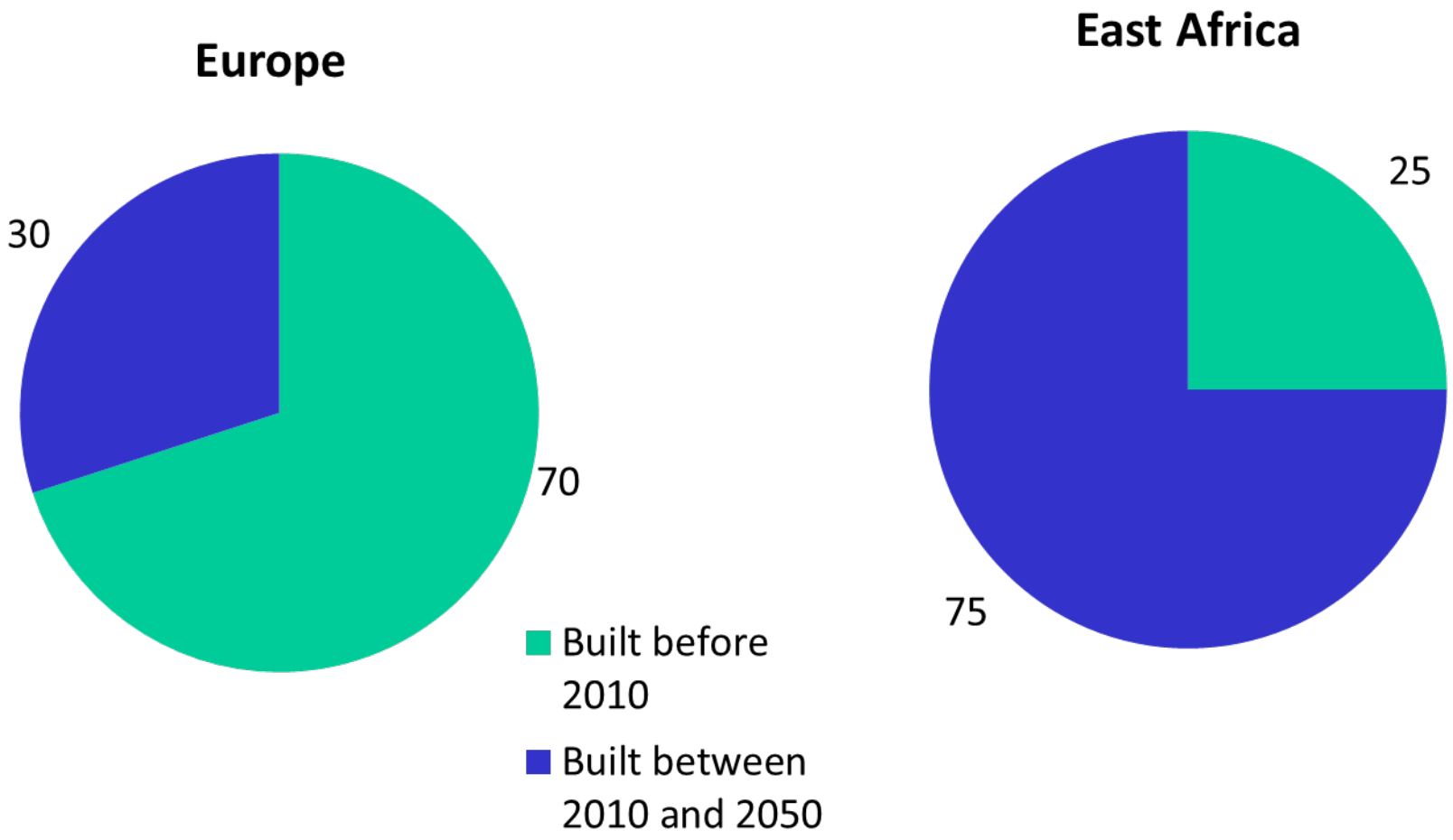
  and

- **Affordable** shelter are **inadequate.**

Rapid provision of housing on large scales that are not always environmental friendly.

- Mass housing with poor environmental considerations:
- Poor orientation, no sun shading devices, poor ventilation and day lighting, poor use of building material;
- No green spaces and open.
- Emphasis is put on **quantity** and not **quality.**

Global Building Stock Forecast



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.

Regional program on Energy Efficiency in Building in East Africa.

The components of the program are:

- Baseline Data, Benchmarking on EE in the Building Sector and Energy Audits.
- Formulation and Adoption of Energy Efficiency Codes in Buildings: EE standards & certification.
- Awareness Raising; Capacity Building, EE guidelines and training tools.
- Appropriate Financial Framework for the Promotion of EE Measures in Buildings.
- Incorporate EE measures on all government housing projects, and 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 Saving Potentials.

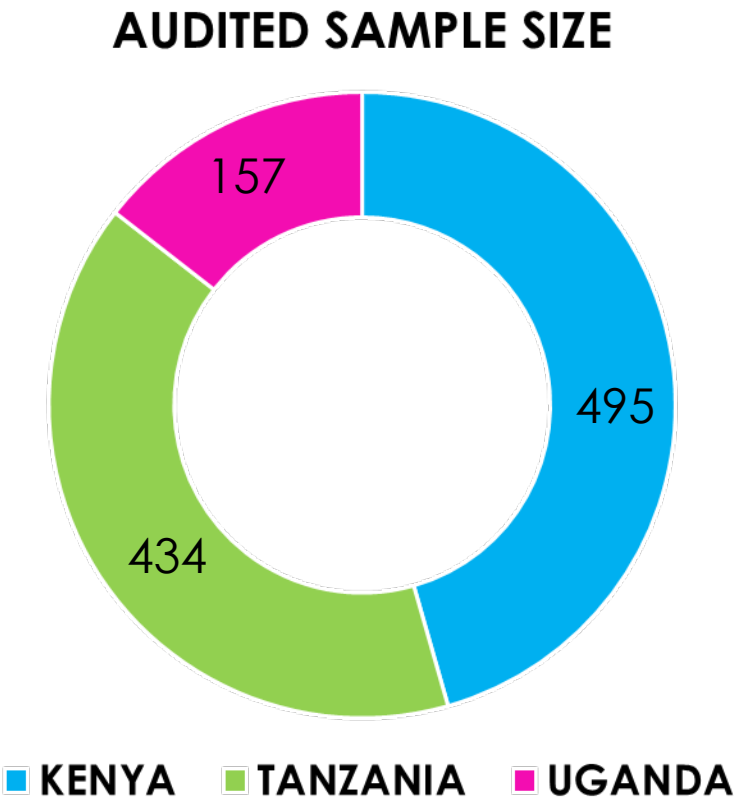
Eastgate: Sustainable building in Harare.

Achievements

Audited

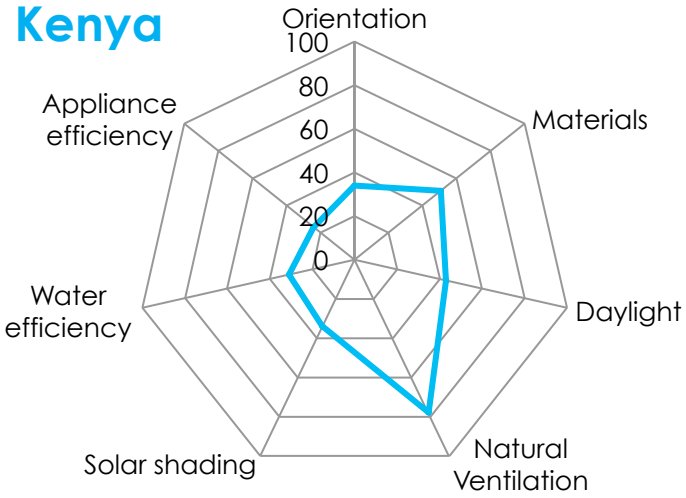
1,086

Housing Units

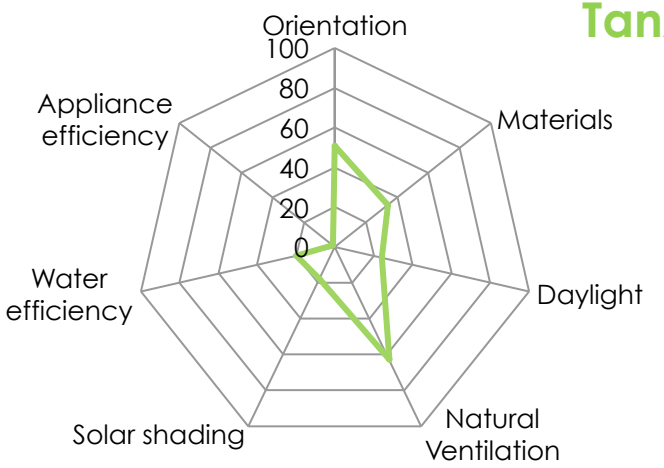


Audit findings: Current situation

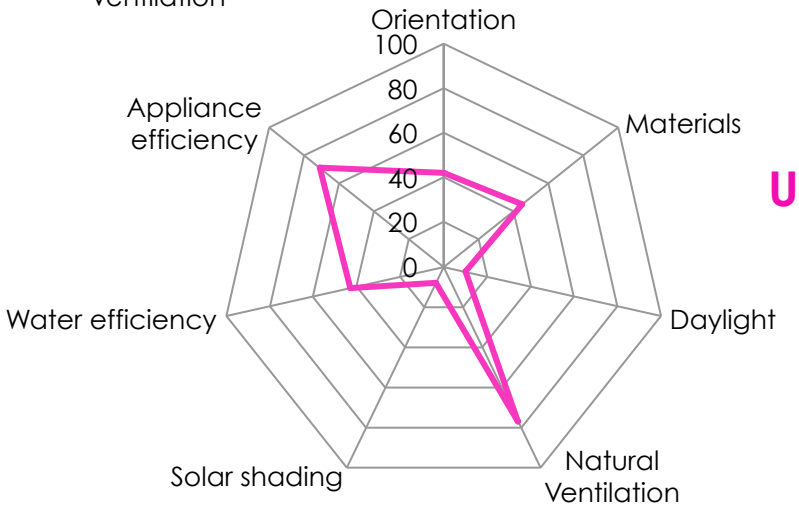
Kenya



Tanzania



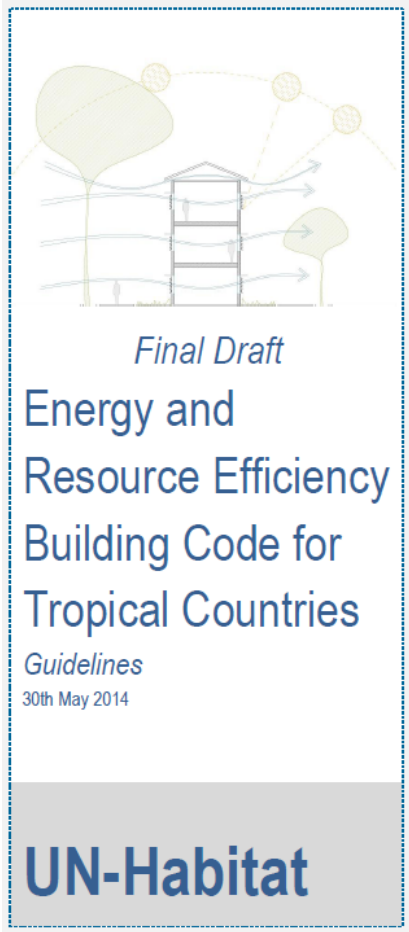
Uganda

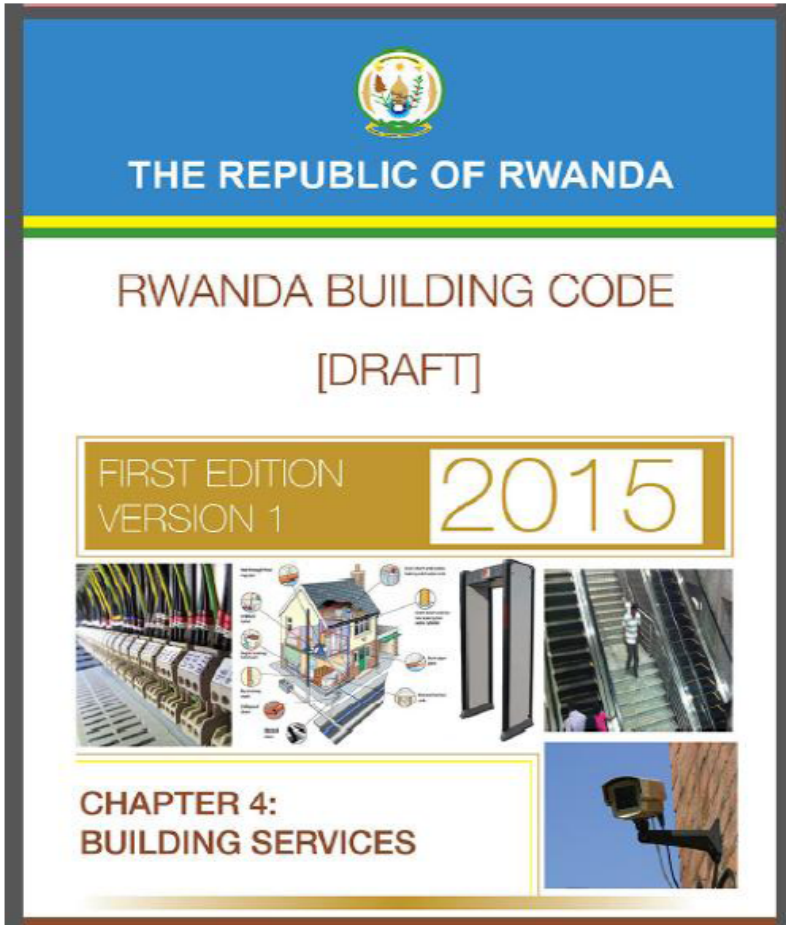


Sample size:
1,086 Buildings

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.

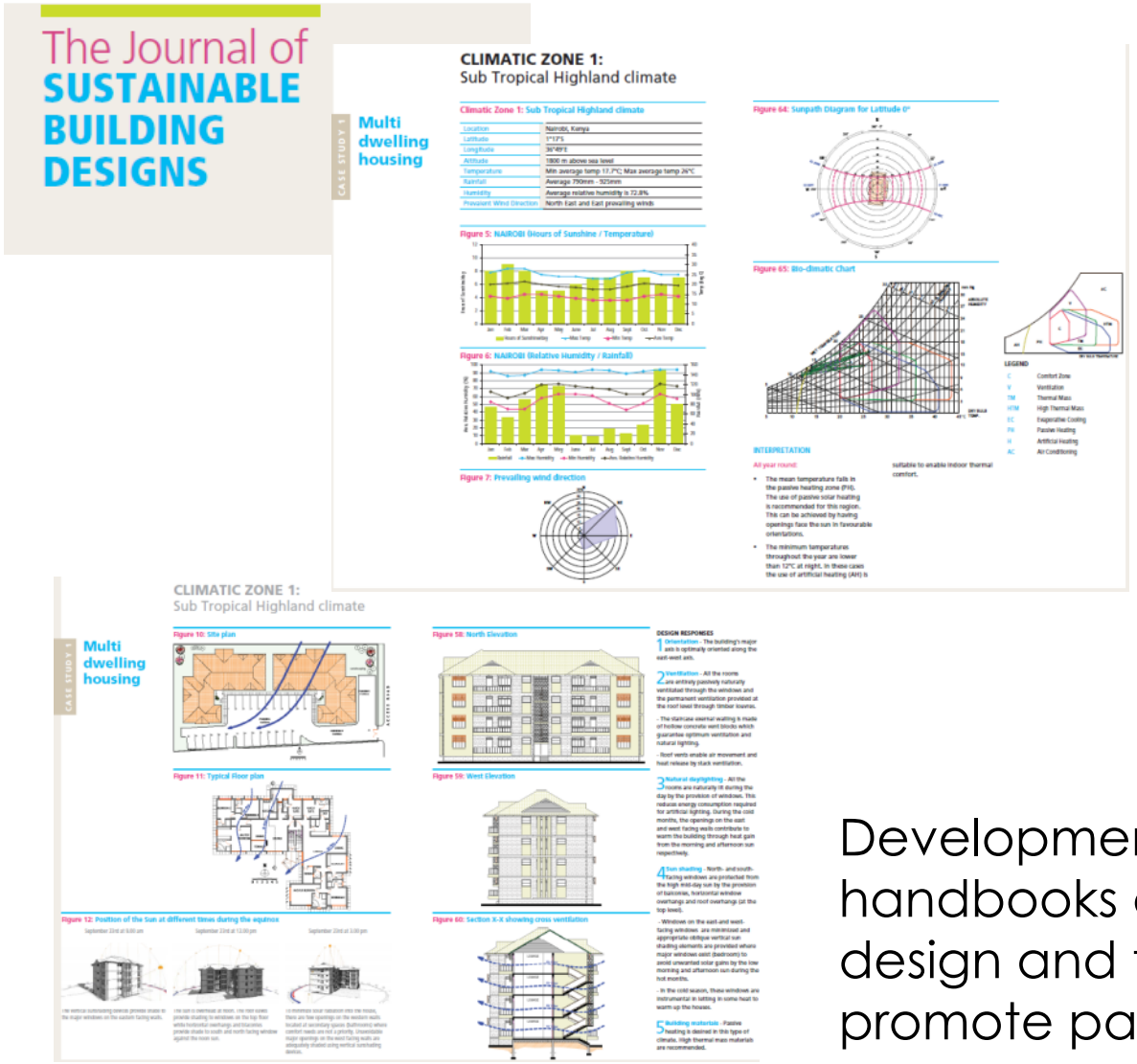
The project organised workshops and provided technical advises to Kenya; Uganda, Rwanda, Burundi and Tanzania on Energy efficient BC.

Recommendations for building code amendment

1. Environmental friendly design incorporating green building concepts and regulations (**passive building design as per climatic zone**);
2. Use of climate adapted and **sustainable building materials**;
3. Use of **energy efficiency appliances** such as mandatory use of Solar Hot Water (SWH), lighting, air conditioning and ventilation, HVAC
4. Water efficiency: **mandatory rainwater harvesting**, water reuse and recycling;
5. **Renewable energies** (mandatory use of solar PV in nonresidential building > 300m2 for lighting and other electrical appliances);
6. Sustainable site planning: **sewage separation and treatment**; waste management; land/vegetation and landscaping; drainage, urban layout and street orientation; erosion prevention etc.
7. Energy management and conservation for buildings through **Energy Certification of Buildings**
8. Procedures for **building inspection** and **penalties** for non-compliances

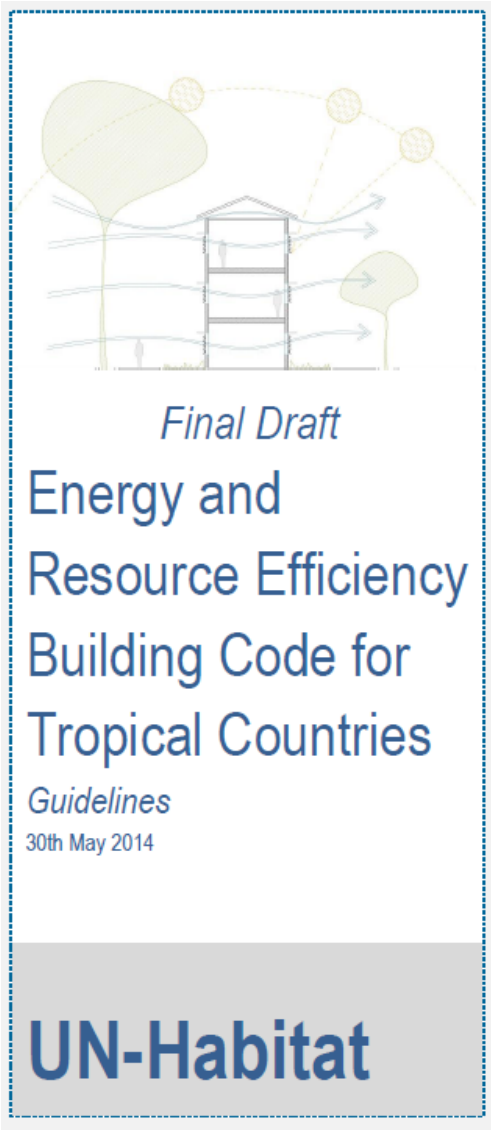
Energy Efficiency in Building Codes Workshop (EEBC) Kigali – April 2013.

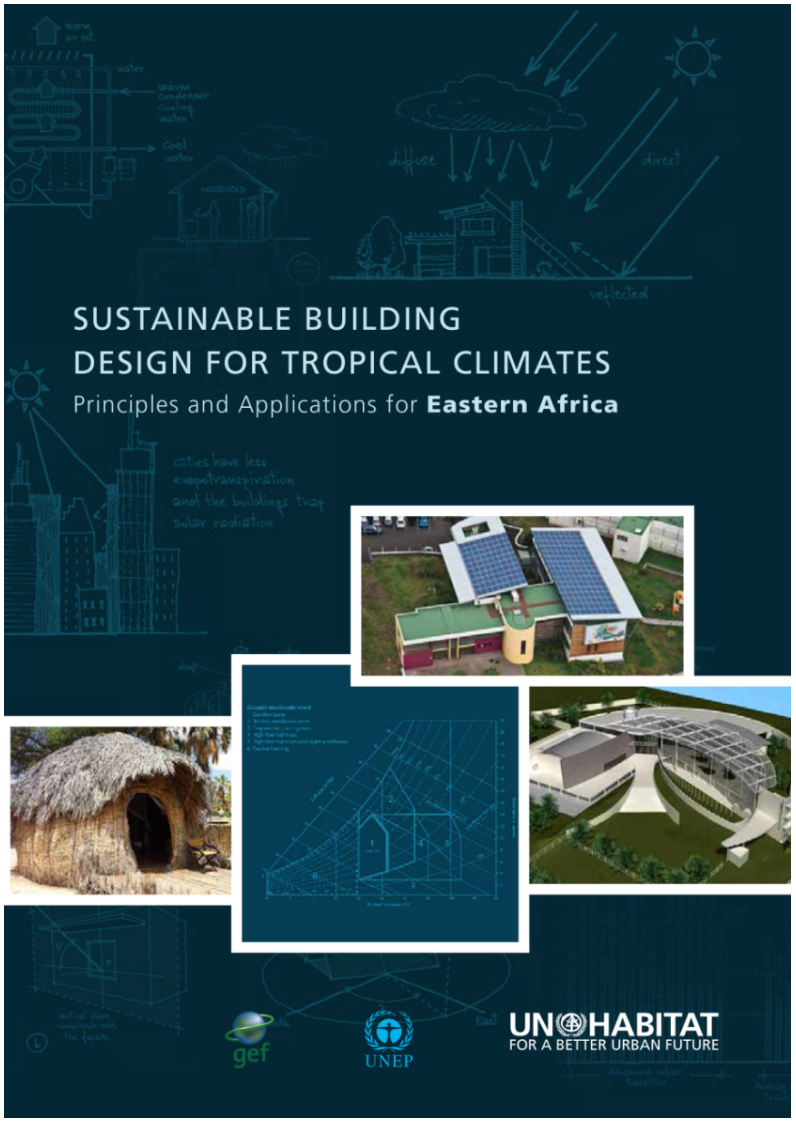
3. Education: Awareness creation and capacity building in EEB



Development of tools such as handbooks on sustainable building design and technical notes to promote passive building measures.

3. Education: Awareness creation and capacity building in EEB





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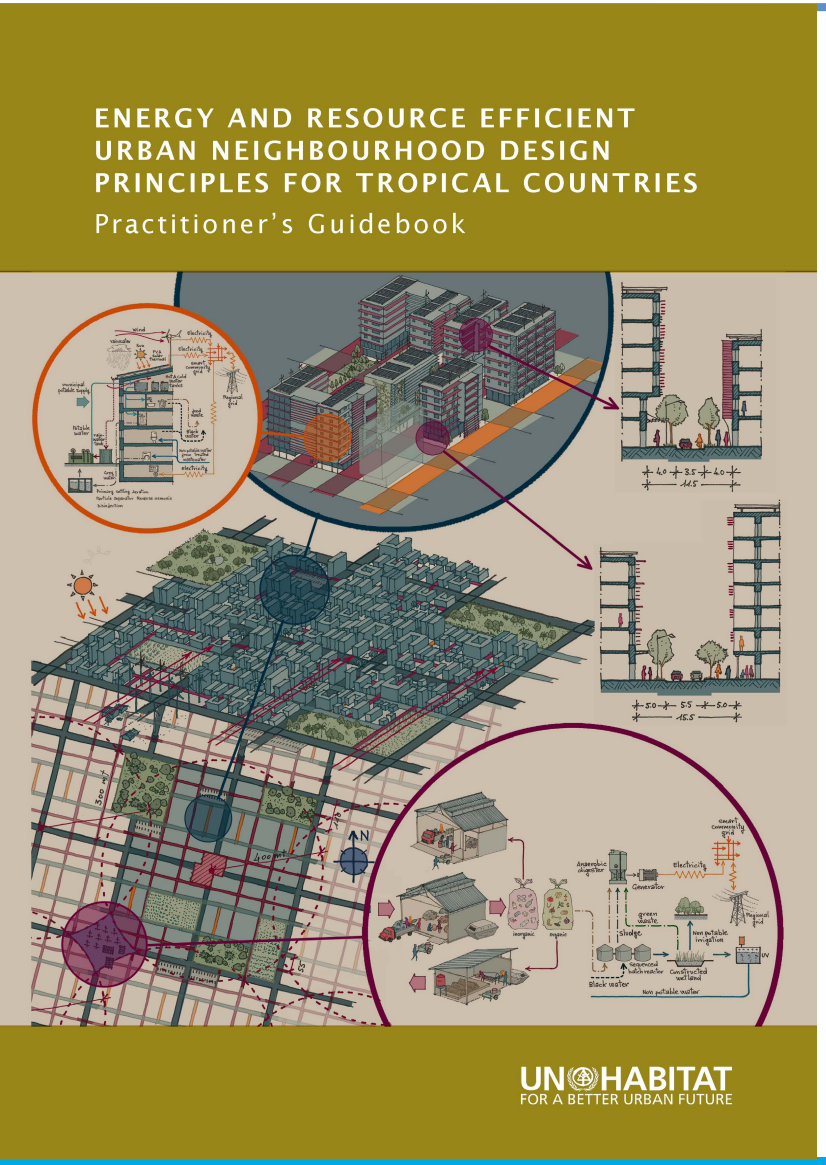

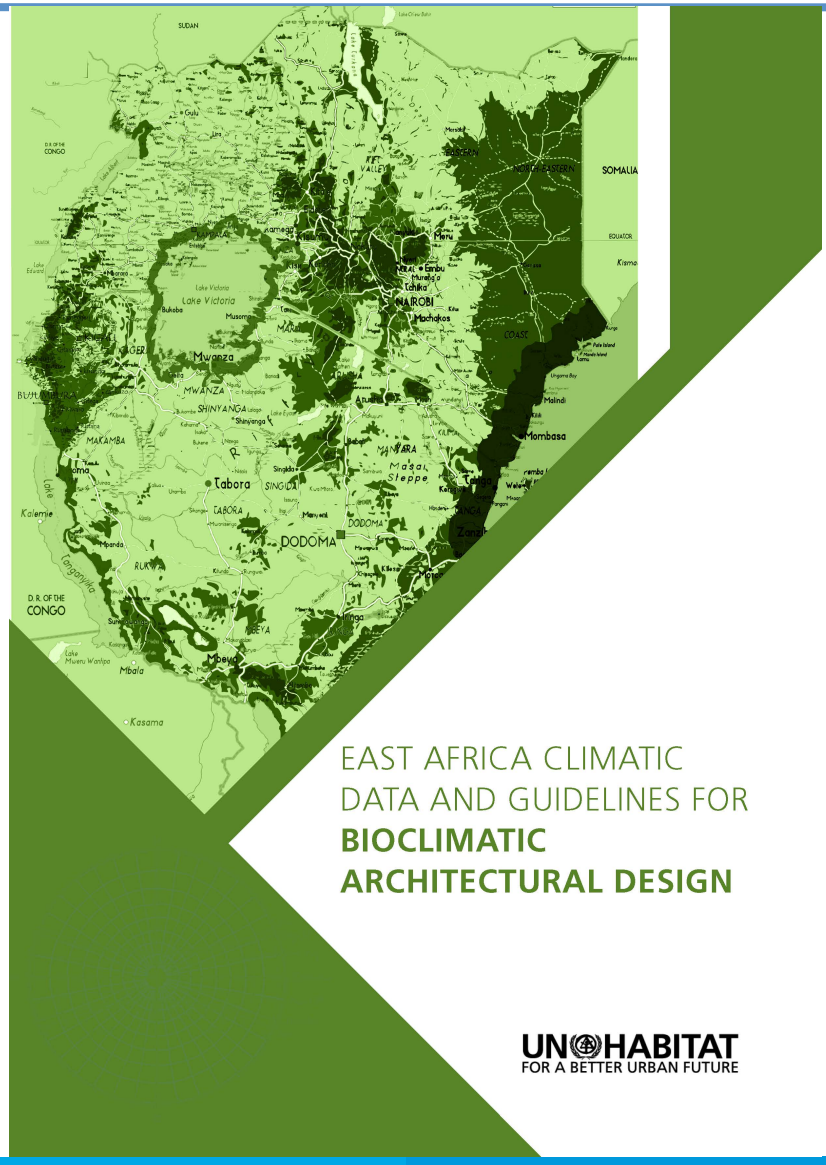

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3. Education: Awareness creation and capacity building in EEB

SUSTAINABLE BUILDING FINANCE:
A PRACTICAL GUIDE TO PROJECT FINANCING IN EAST AFRICA

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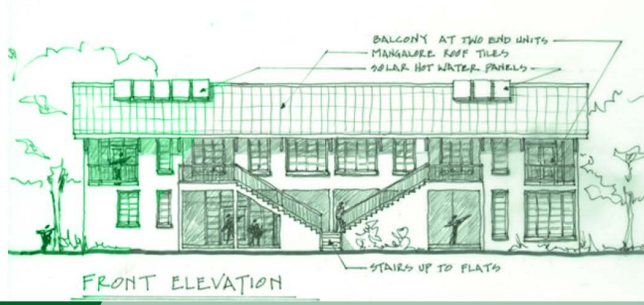
GREEN FINANCE MODELS:
ASSESSING FINANCE PRODUCT CAPACITY TO LOWER BARRIERS TO GREEN BUILDING IN EAST AFRICA



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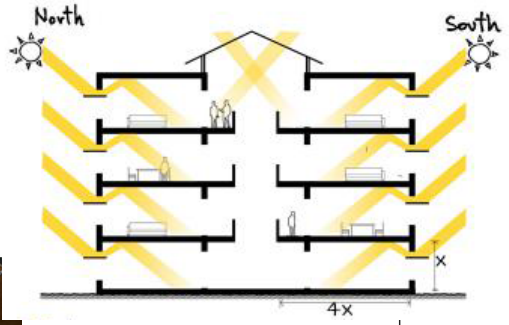
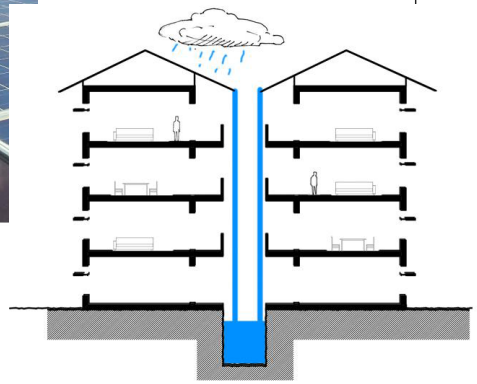
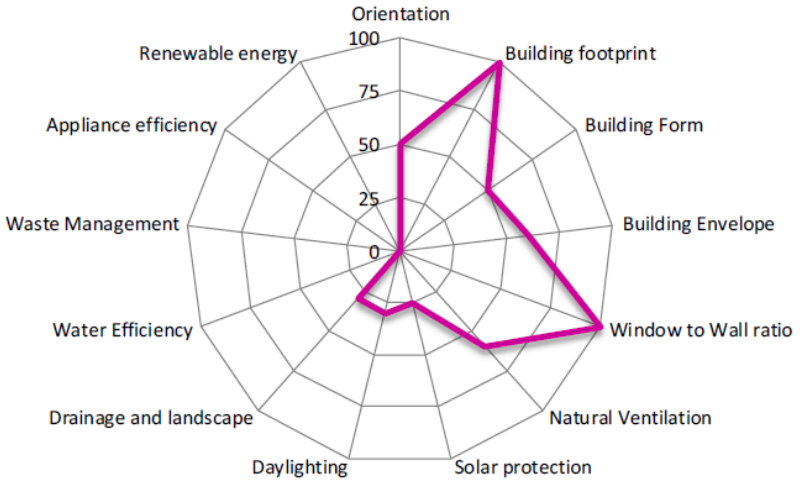
Green building principles and a Radar table to assess the sustainable performance of the building

BUILD GREEN

Charter for Sustainable Building, Neighborhood Design and Urban Mobility in Tropical Countries







)	– 25	Sustainable design measure not considered
5	– 50	Sustainable design considered but not effective
0	– 75	Sustainable design measure considered and effective
5	– 100	Sustainable design measure considered and combined with secondary function / i

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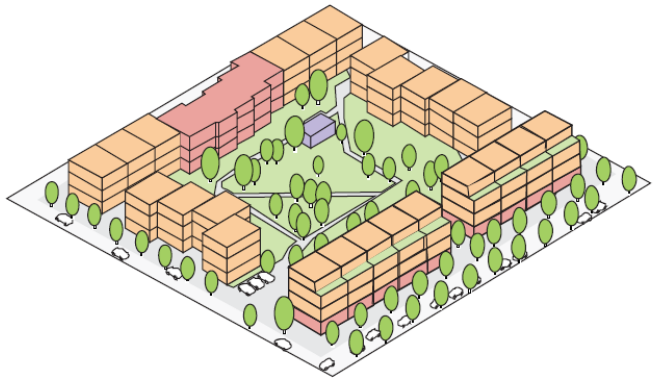
gef

www.unhabitat.org

www.eebea.org

Green building principles and a Radar table to assess the sustainable performance of the building

- 1- Adequate allocation of open spaces for streets; public spaces and basic services. (**50% for the built and 50 % for open spaces**)
- 2- **Mixed land use** combining (economic and residential activities)
- 3- **Social mix** (integration of affordable houses and services)
- 4- **Adequate density and compact patterns** (an average of 150p/ha)
- 5- **Connectivity** (linking different cities spaces)



Trainings and workshops conducted

Over

500

Stakeholders trained

- ✓ Built environment practitioners
- ✓ Developers
- ✓ Students of architecture
- ✓ Journalists

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

Curriculum development Workshop– February 2016

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Universities Adopted UN-Habitat's Handbook on **Sustainable Building Design for Tropical Countries** as a tool of instruction.

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.

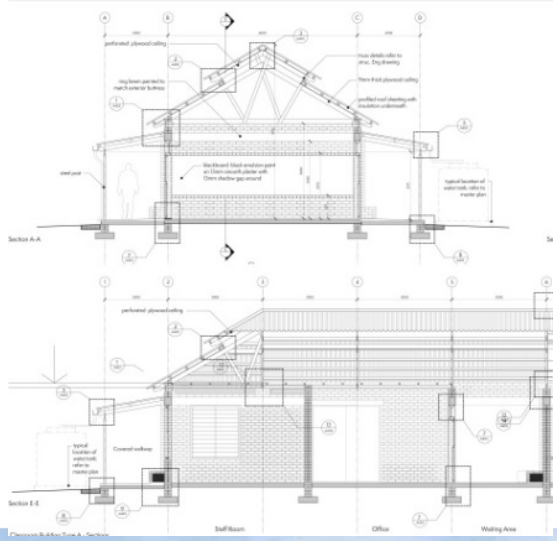
Pilot projects in Dar es Salaam Tanzania that integrate passive building design strategies

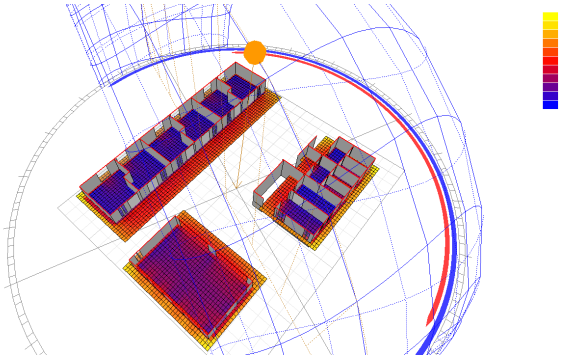
Technical advice

Influenced 10,000 housing units directly

Influenced approx. 5000 units indirectly

Mostly government projects, developers and building owners





Cities as energy *prosumer* producer and consumer of energy: Energy transition

75 % of energy are consumed in urban areas. Cities are endowed with huge renewable energy potentials: solar, wind, biomass, hydro etc. Cities should produce at least 10 % of their energy needs from solar energy.

Ngong Hill Wind farm near Nairobi 24 MW

Solar farm near Kigali 6 MW

Cities as energy *prosumer* producer and consumer of energy: Energy transition

Use of solar rooftop in the city of Santa Barbara in the USA.

Conclusion

- This project is an ideal platform for promoting resources efficiency and green building concept in the housing sector in East Africa.
- The program has an integrated approach whereby all stakeholders are involved: from architects, building practitioners, decision makers, home owners, end users etc.;
- Tools are produced to assist architects in their new building design ;
- *Energy efficient building code* are also being promoted.
- The different passive building principles are being ***integrated in the building permit approval process***.
- Removal of **financial barriers through the creation of affordable line of credits** will accelerate the uptake of green building in the region.

THANK YOU FOR YOUR ATTENTION

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