Energy efficiency in Sub-Saharan African cities
Towards the Covenant of Mayors in Sub-Saharan Africa
Workshop in Nairobi, Kenya, Hotel Intercontinental
26th-27th October 2015

Building and city energy uses

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Presentation Overview

- Urban Energy Challenges: Rapid urbanization
- Urban Energy Challenges: Cities are major consumers of resources;
- Urban Energy Challenges: Inefficient Building designs
- Opportunities: Energy Efficiency and Renewable E.
- Opportunities: District Energy System (DES)
- Opportunities: Municipal Energy Strategy (MES)
- UN-Habitat Approaches and methodologies;
- Conclusions.

Urban Energy Challenges: Rapid Urbanization

- The rapid **urbanization** is taken place in all African countries followed by **increasing demand for modern energy; infrastructures; basic services; housing; consumer products etc.**
- **The energy demand** increases annually by **7%.**
- Slow increased of the energy supply**.**
- **Mismatch between the demand and supply of energy.**
- Majority of people still relies on **biomass energy** for cooking.
- **Over 50 %** of national energy is generated from imported fossil fuels to **bridge the energy gaps. High energy cost.**

Urban Energy Challenges: Rapid Urbanization

- Urbanization without planning!
- Urbanization without basic services!
- Urbanization without industrialization!
- 50% of the urban population in Africa without access to modern energy!
- Between 30 – 60 % of the urban population live in informal settlements.

Urban Energy Challenges: Cities are major consumers of resources

- Cities occupy **3 % of the Earth's** surface
- Cities in developed world consume more than **75 %** of the total national **energy**;
- Cities in developing world consume over **80 % of total energy**;
- Cities are responsible of **70 % of GHG** emission;
- Cities generate around **70 % of national GDP** and are the drivers of national economy.
- Cities **generate more wastes,** much of which are not recycled;
- **Over 50% of** the world population lives in cities. This will reach **75% in 2050**.

Urban Energy Challenge.: Energy demand

No consideration for **energy efficiency**:

- **Architecture and buildings** that are not adapted to their respective climates,
- **Wastage of electricity** and other energies sources (fossil fuel, biomass) through **old and inefficient appliances**,
- **Power transmission losses**, (20 – 30 %)
- **Soaring energy demand**: World energy consumption forecast to triple by 2050

Absence of adequate urban planning:

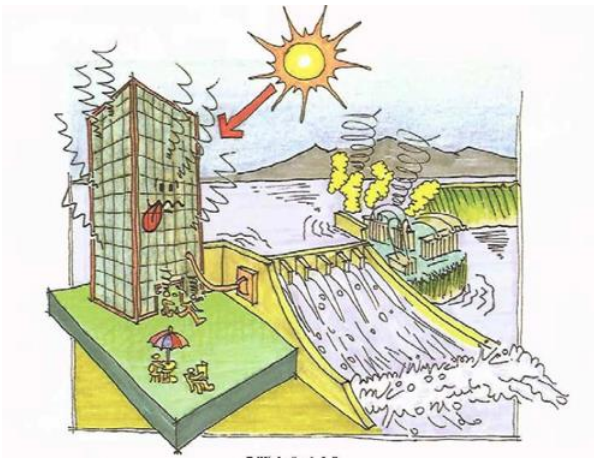
- **Urban sprawl with low density development** leading to **high energy demand** and need **for private cars**
- Traffic congestion and blockage and wastage of **valuable time in traffic.**

Urban Energy Challe.: Inefficient Building designs

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

Across African cities, with **tropical climates,** majority of modern buildings **are replica of building designs** in western countries with cold and temperate climates. This result in **huge energy wastage in buildings.**

Modern buildings are poorly designed and consume more energy than necessary.



Opportunities: Energy Efficiency and Renewable E.

Untapped Energy Efficiency (EE) and **Renewable Energy Resources**:

- Huge **untapped RE** potentials such as: solar, wind, biomass, water, geothermal etc.
- Unprocessed **municipal waste**;
- Decreasing **cost of renewable energy technologies**. The cost of solar energy technologies has decreased by nearly 60 % in the last 7 years;
- Increasing availability of **innovative financing mechanisms** for RETs.

Technology innovation (R&D):

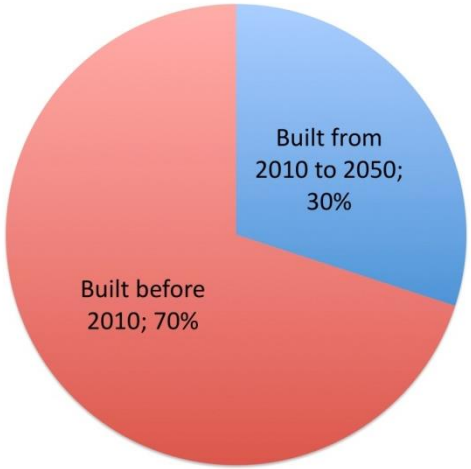
- More **efficient appliances** are available,
- Efficient **energy generation** equipment developed.

Housing deficit and building forecast in Sub-Saharan African

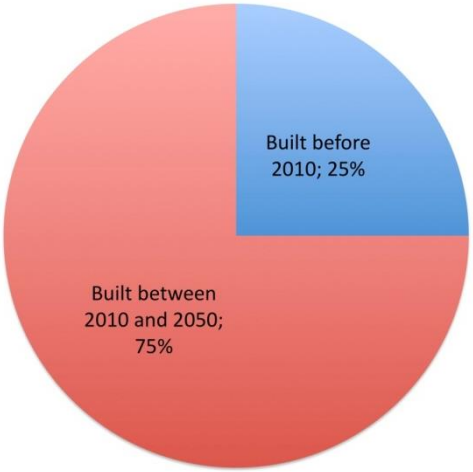
- The annual housing need in Kenya is **estimated at 200,000 units** per year. Less than 50,000 units are built annually with a deficit of 150,000 units. This is the same trend in other African countries

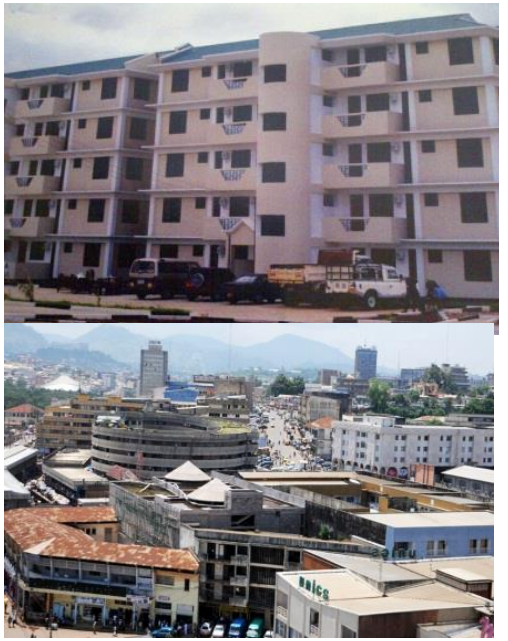
Building stock forecast

Europe



East Africa





Opportunities: At the cities level

Adequate urban planning:

- Plan for **density and compact city**,
- Avoiding zoning and **promote social and economic mix**,
- Allocate at least **40% of space for streets, basic services and other public spaces**,
- Promote **public transport.**

Energy Demand Management:

- Energy efficiency in **buildings**, **industry**, **transport** etc. (**there is a potential of 50% energy savings**)

The Green Economy.

- Proper **development of EE and RE potentials** could transform cities into **energy producers**.

Opportunities: District Energy System (DES)

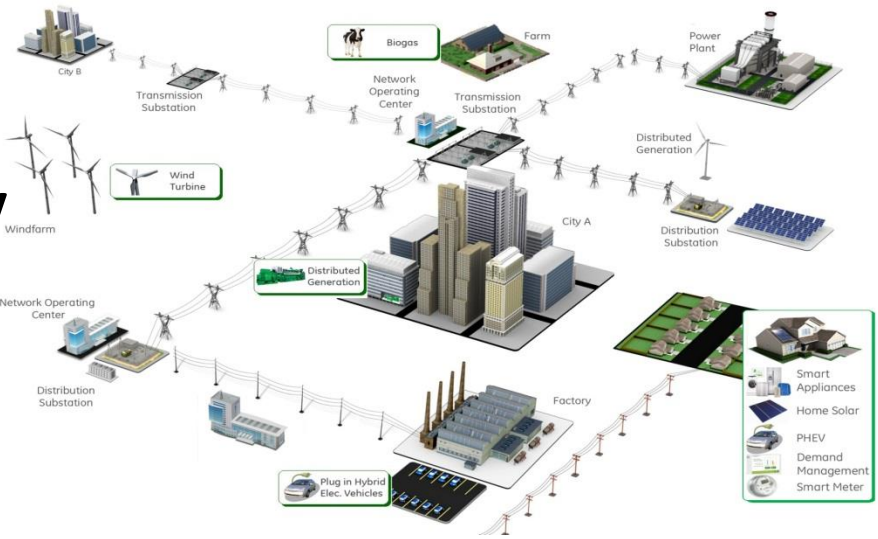
The District Energy System (DES) **moves away** from the **traditional centralized power** production, transmission and distribution system where **power utility companies** are the only supplier of energy to consumers.

In the DES, there are a multiplicity of actors:

Consumers are also producers and they all trade energy as a good.

The **smart grid provides** an optimal use an management of both energy demand and supply.

District energy system addresses the energy issues in a **holistic manner**.



Opportunities: Municipal Energy Strategy (MES)

As **demand for energy increases** due to rapid **urban population growth** and **economic development**, local governments are phased with **energy challenges**: increase demand, less supply, **high cost of imported energy**, pollution, climate change, environmental degradation etc.

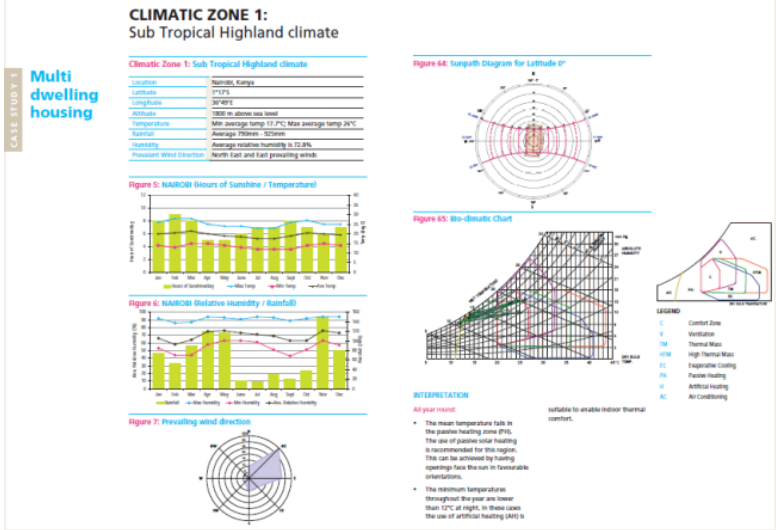
UN-Habitat is currently developing an guideline on **Municipal Energy Strategies** to assist local governments **to plan in advance and manage their energy needs**.

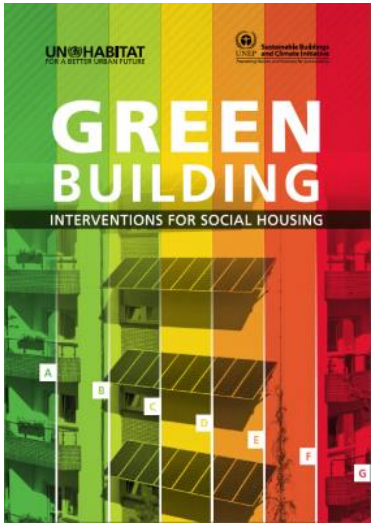
MES is based on the following criteria:

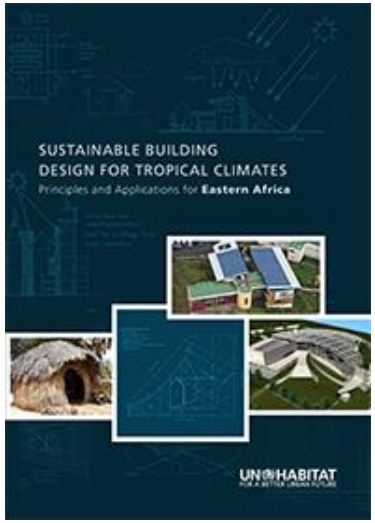
- **Proper mapping of both energy demand and supply** (development of energy balance);
- **Urban energy planning**;
- **Energy generation** within municipal boundaries;
- Development of **energy demand managements**
- Formulations of mandatory regulations and by-laws.
- Establishment of a **municipal energy office**.

UN-Habitat Approaches and Methodologies in the promotion of EEB

1. **Establishment of a baseline**: Energy audits and formulation of EEB benchmark according to the climatic zones.
2. **Policies**: EE Building Regulations / Standards; EE building code.
3. **Awareness and capacity buildings:** for green building strategies.
4. **Financial mechanisms:** tax incentives; green mortgage.
5. **Demonstration and pilot projects**: integration of sustainable buildings design in new building projects.







East Africa experience in EEB

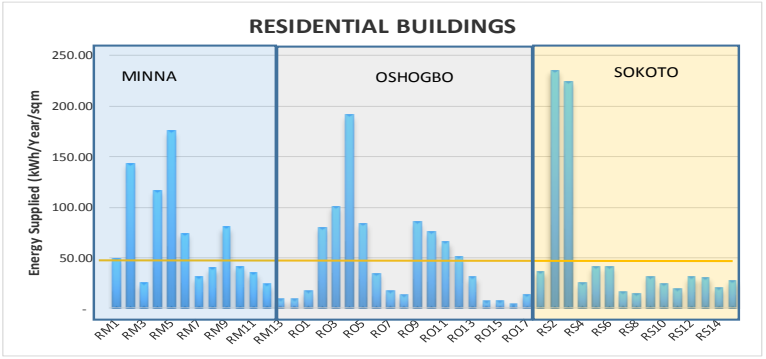
Project on Promoting Energy Efficiency in Buildings in East Africa: Kenya, Tanzania, Uganda, Rwanda and Burundi.

The objective is: to mainstream energy efficiency measures into housing policies, building codes and building practices in East Africa, and to achieve considerable avoidance of GHG emissions.

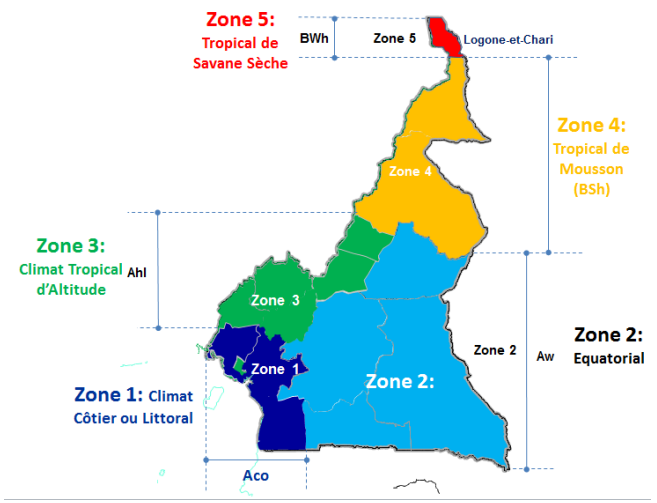
West Africa experience in EEB

Mainstreaming energy and resource efficiency into building codes in Senegal, Nigeria and Cameroon.

- The **analysis of all buildings policies** and regulations in the three countries have revealed that bioclimatic and passive building strategies **are absent**.
- The concept of **resources efficiency** (water, energy and land) are not taken into consideration.
- There are initiatives on eco-housing green buildings, but there is a lack of a strong legislative instrument.



Energy Consumption Profile of Residential Buildings



Main Climatic zones of Cameroon

Low Emission Urban Development Strategies (Urban-LEDS)

- Urban LEDS is a climate change mitigation project funded by EC.
- Main objective: **Enhance the transition to low-emission urban development in cities in emerging economy countries**: **Brazil, India, Indonesia**, **South Africa**
- Supported by **experienced European cities**
- Project implemented in collaboration with ICLEI.
- The project defines a **pathway to transition a community to a low-emission**, green and inclusive urban economy.
- This pathway **is integrated into city development plans** and processes.

URBAN LEDS
URBAN LOW EMISSION DEVELOPMENT STRATEGIES

I·C·L·E·I Local Governments for Sustainability

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Conclusion

- There is **a growing demand for sustainable energy systems in urban areas** for socio-economic development .
- There are a lot of **untapped potentials in terms of EE and RE**;
- Solutions to promote urban energy system exist.
- District energy system provides an holistic approach to the sustainable used of energy in cities.
- **Energy demand management** for both buildings and cities is one of the solutions.
- Local governments need to put in place their **Energy Strategies for short to long term and develop an action agenda. Sufficient** resources should be allocated for their development and implementation.
- Local governments should set green requirements for resource efficient buildings. **Building permit requirements** should include environmental design strategies.
- Cities in Africa can generate part of their energies needs!

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FOR A BETTER URBAN FUTURE