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Promoting Energy Efficiency in Sub-Saharan Africa

Steps thus far in mainstreaming resource efficiency in building codes in East Africa

ELITH Workshop, Kampala

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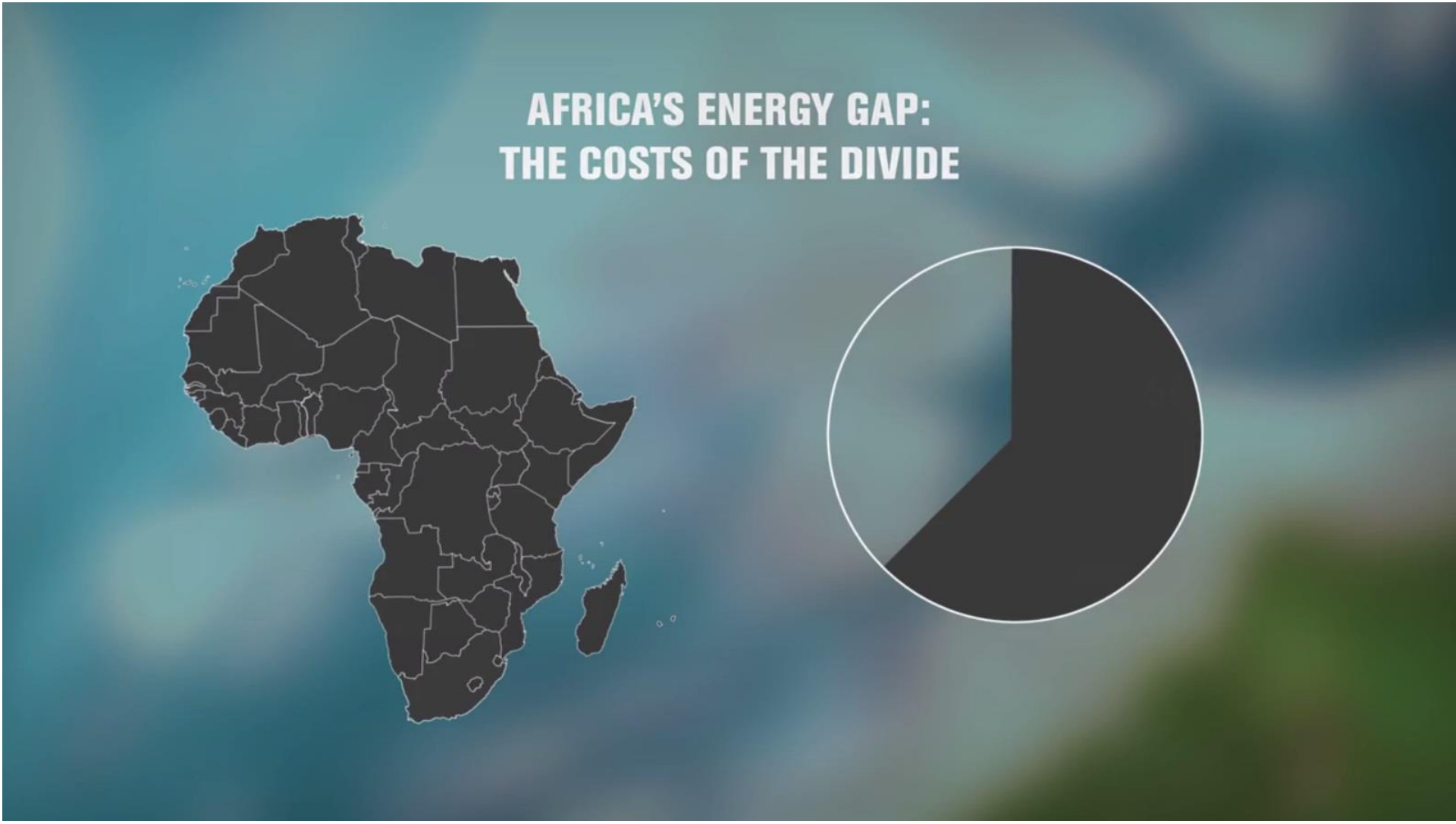
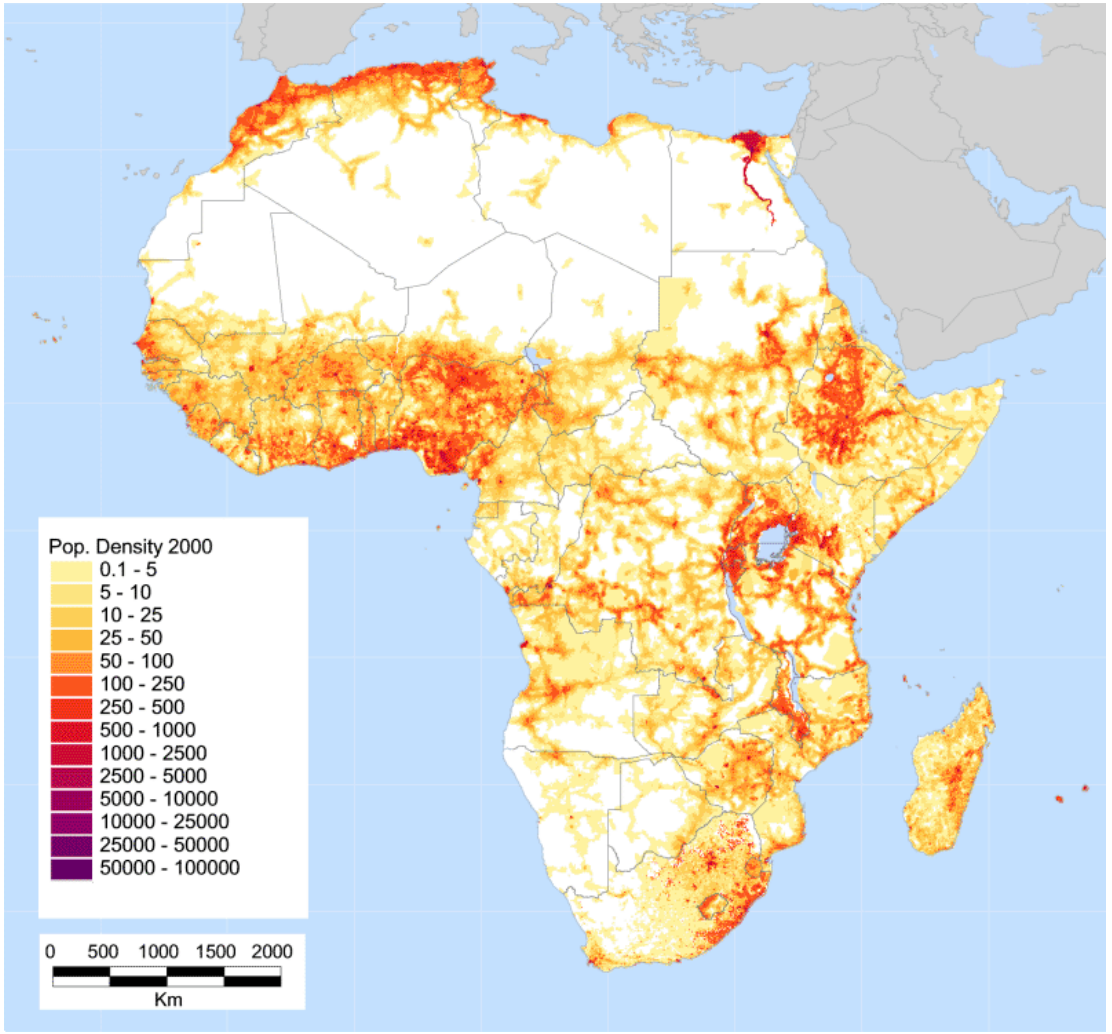
Context

2 Thirds of Africans have no access to electricity

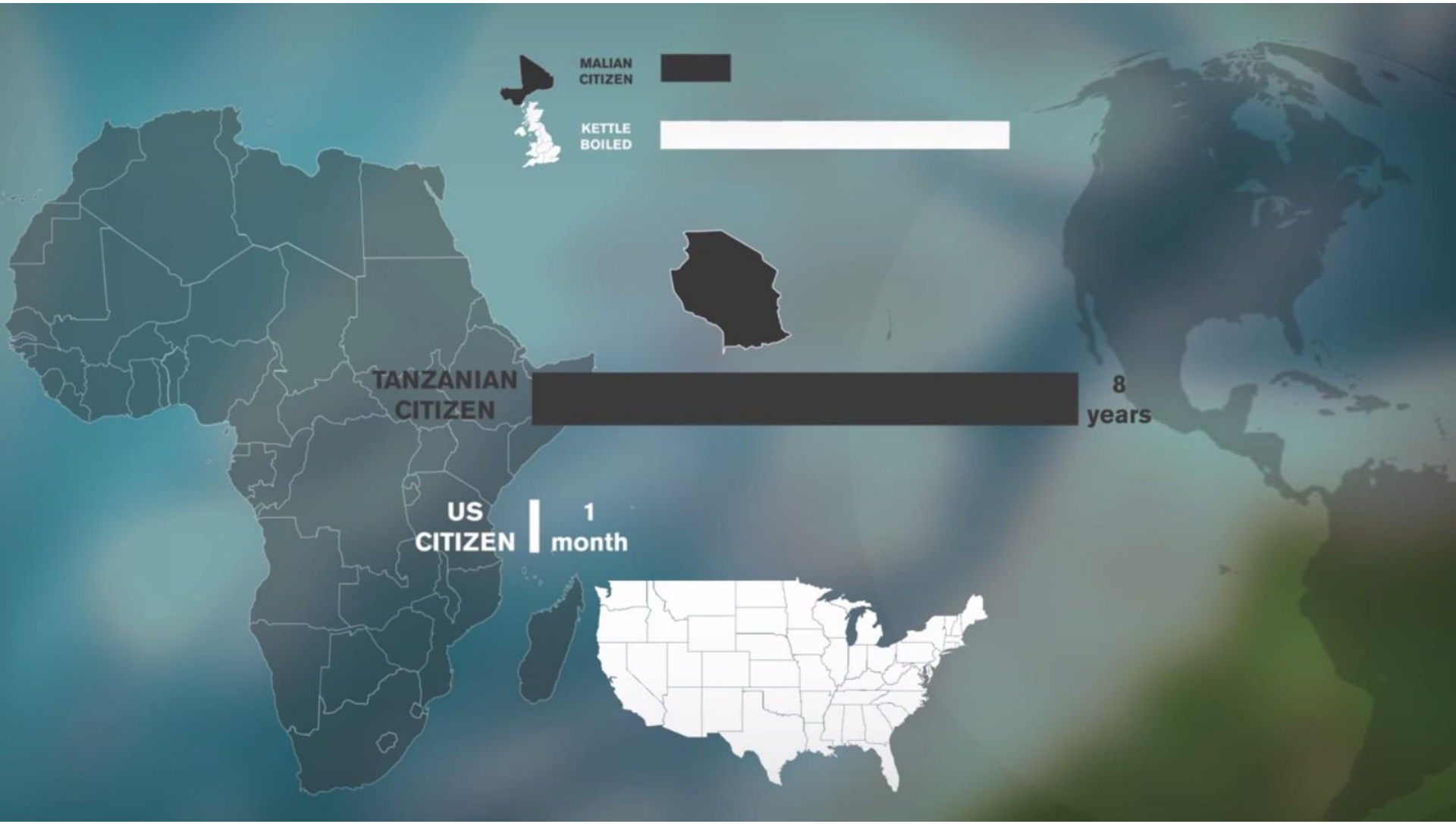


2 Thirds of Africans have no access to electricity

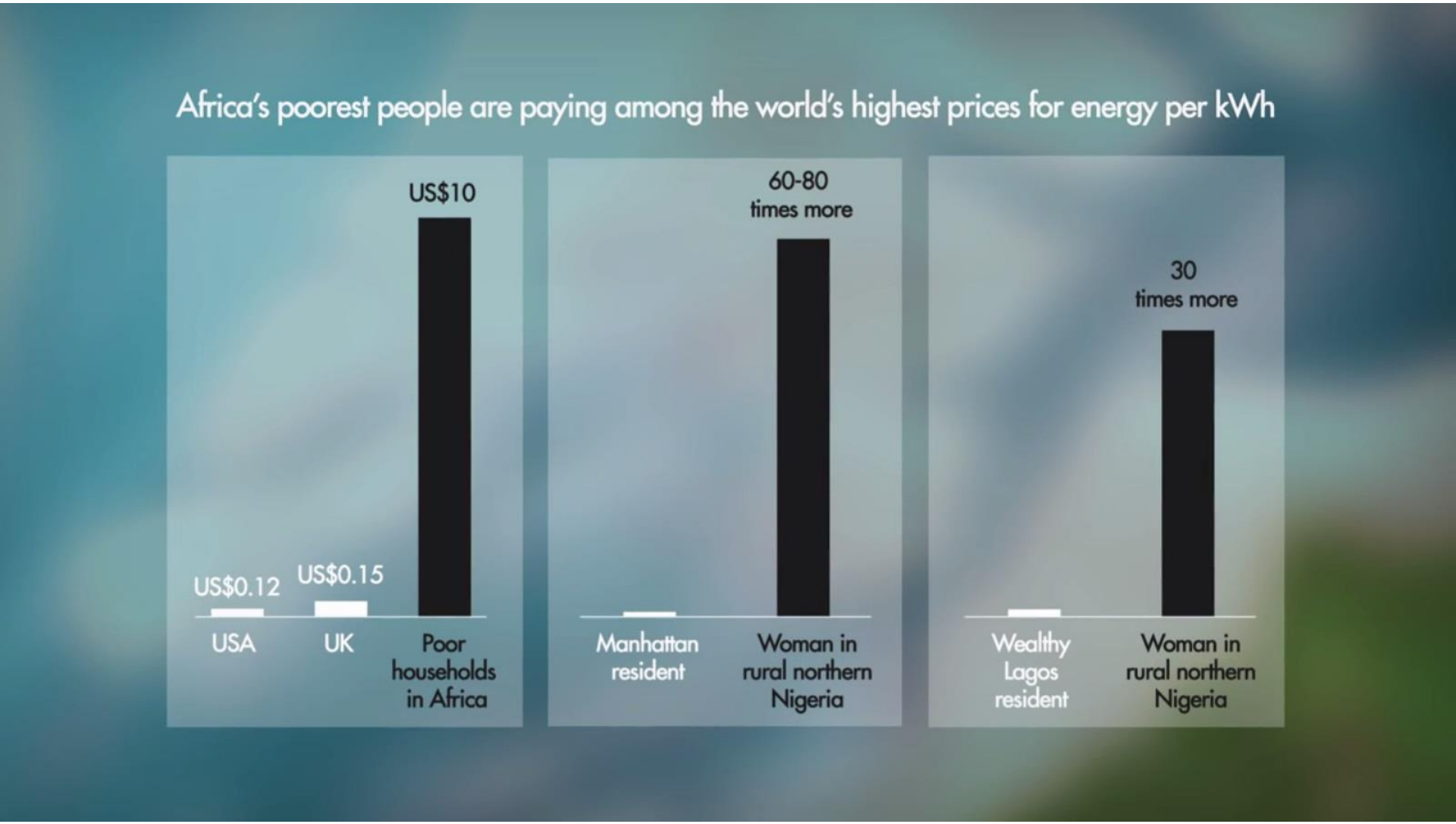
Energy use in Africa vs the rest



Energy use in Africa vs the rest



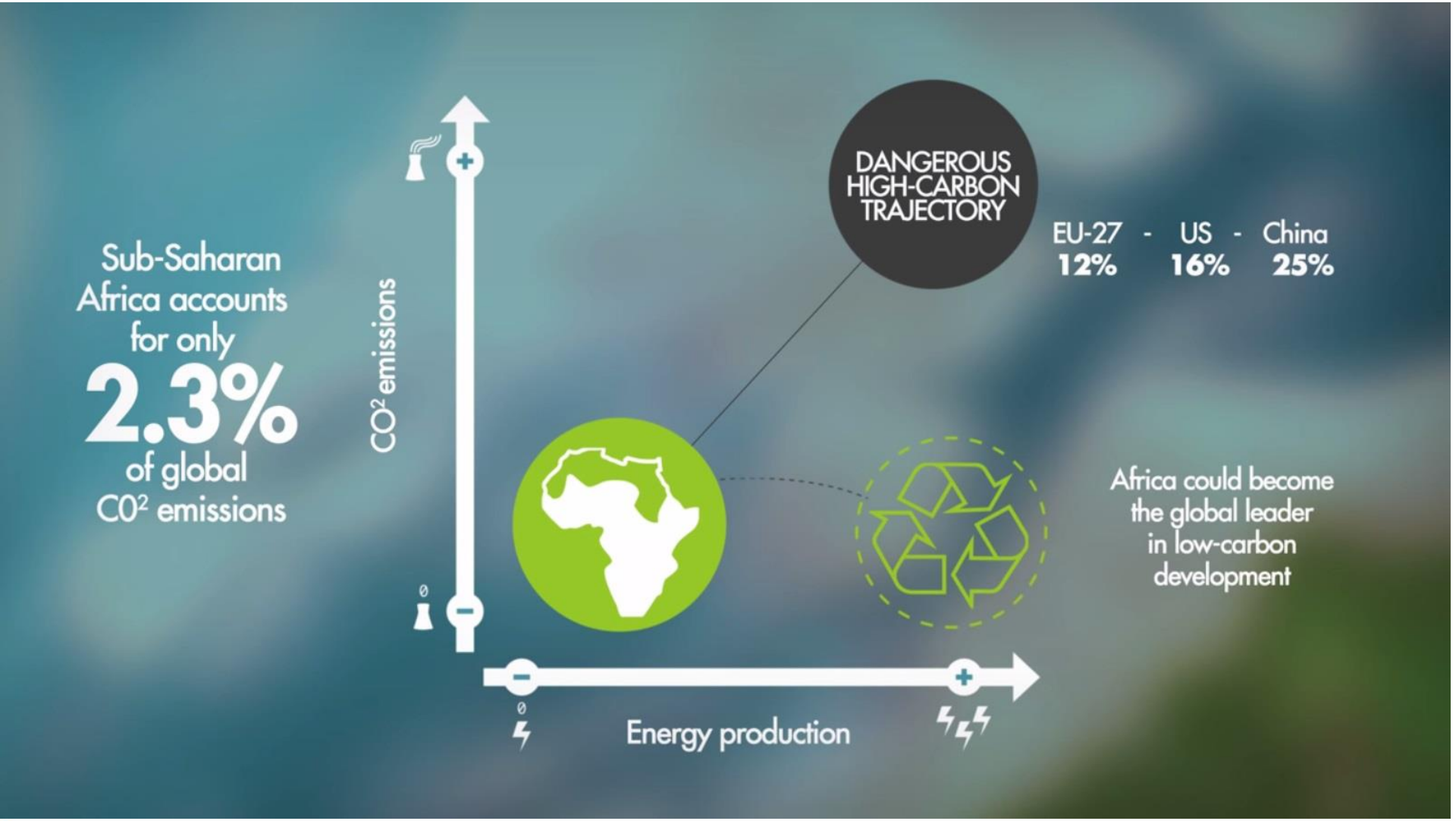
Strange but true



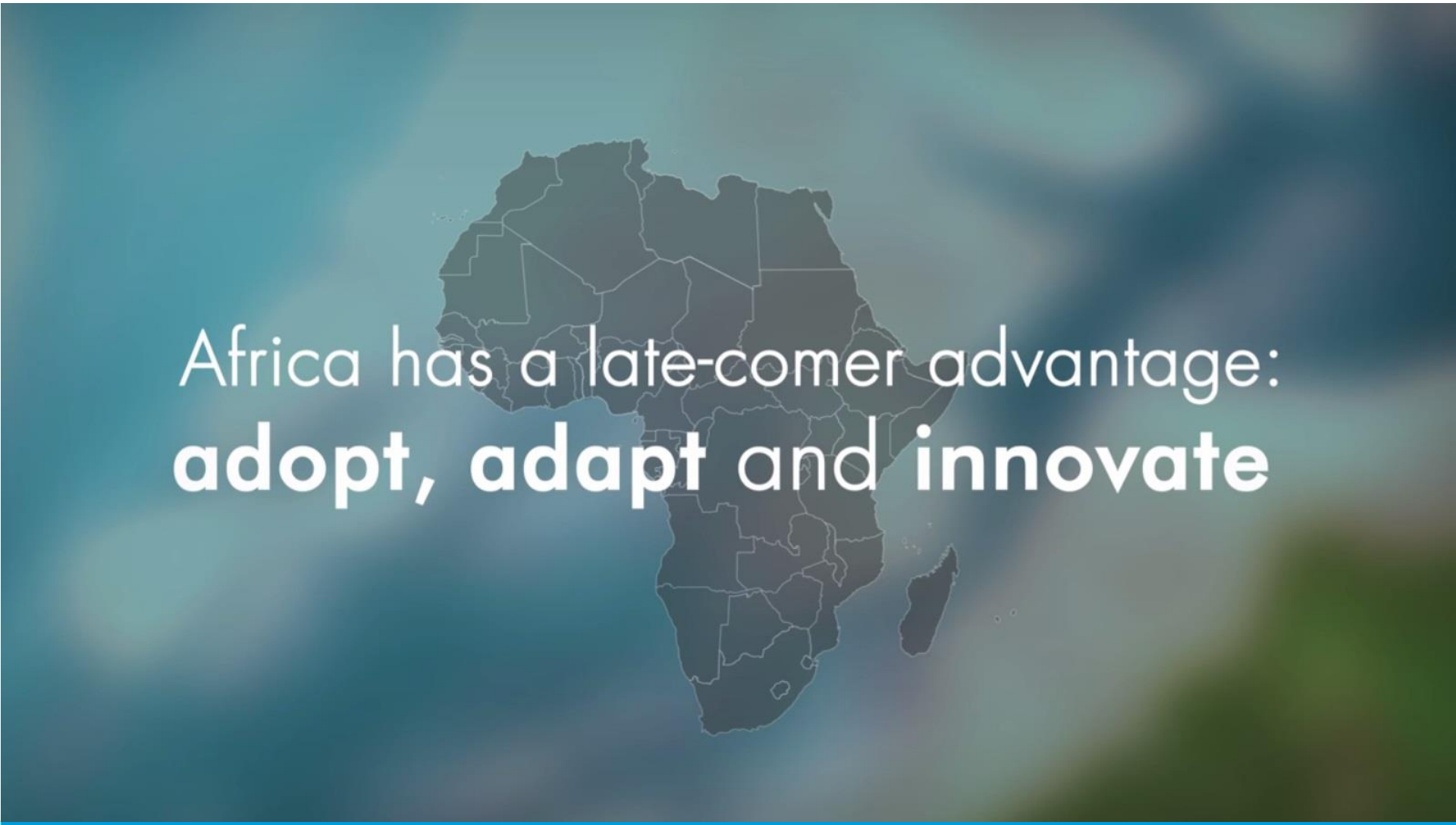
Africa vs the rest

Kenya

Africa vs the rest



Could this be Africa's chance to lead?



View Park Towers , Nairobi

Victoria Towers ,Upperhill, Nairobi

Mapeera house Kampala

Hilton Hotel, Kampala

Kigali, Rwanda

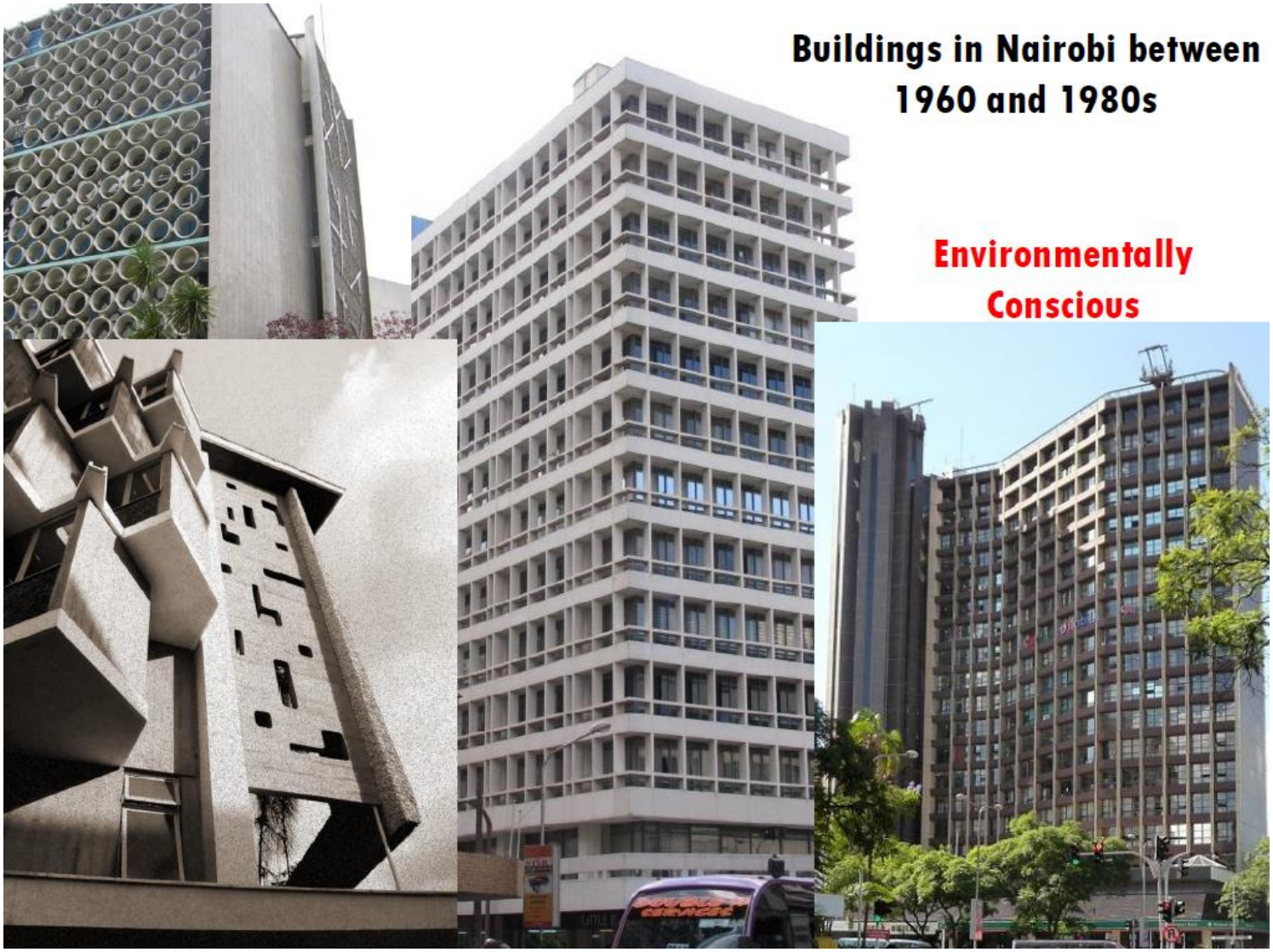
BUJUMBURA BURUNDI

The New FinBank Burundi Headquarters, Boulevard de l'Indépendance

Dar-es-Salaam, Tanzania

Why did we take this direction?

Rather than this?



Ernest May - Oceanic Hotel, Mombasa (1952-54)

Ernest May – Aga Khan School, Kisumu (1949-51)

Amyas Connell Norwich Union building (1959), Nairobi

Victor house as originally built on the left and glass cladded (2014) on the right

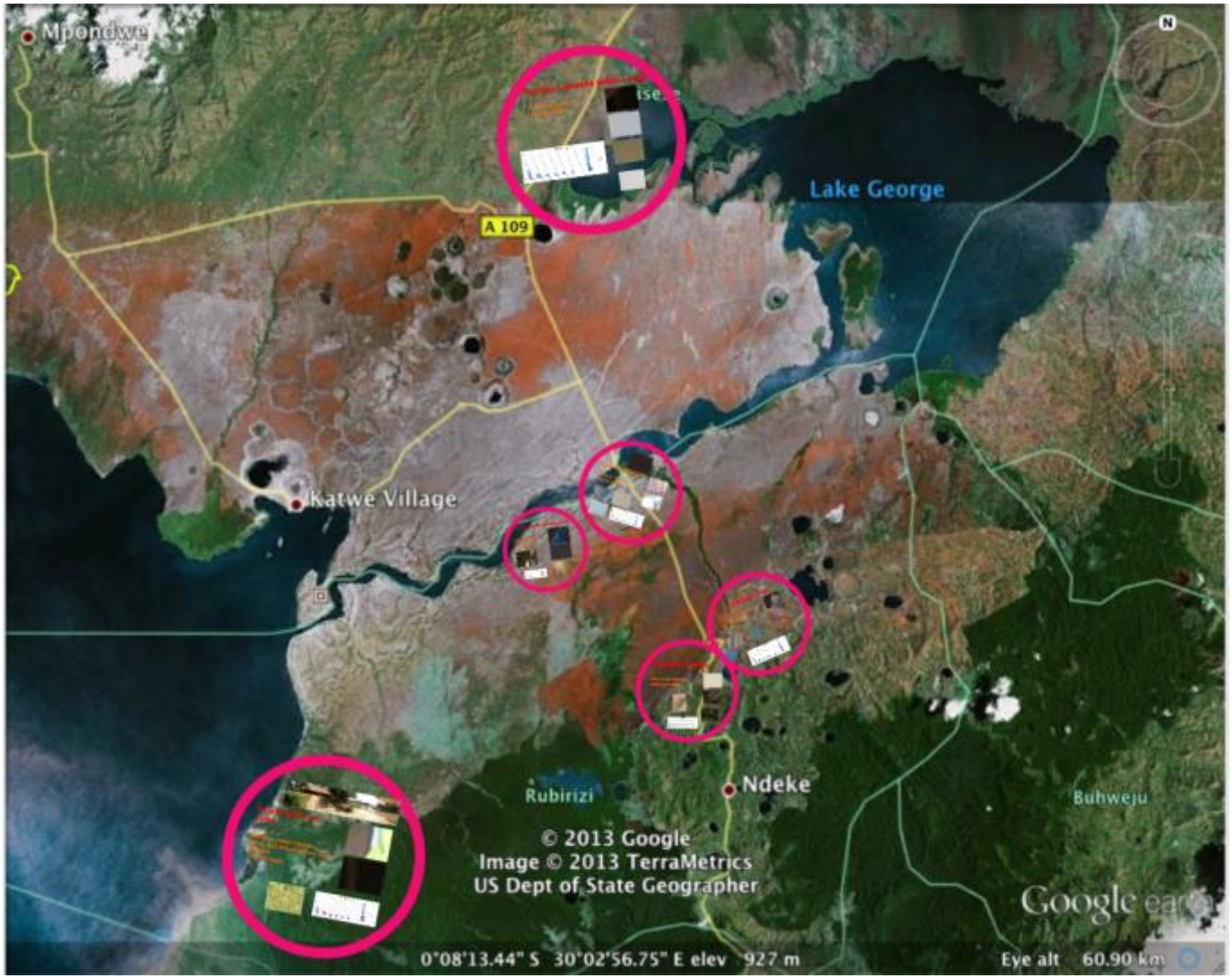
Green wash

Green wash

Disinformation disseminated by an organization, etc., so as to present an environmentally responsible public image; a public image of environmental responsibility promulgated by or for an organization, etc., but perceived as being unfounded or intentionally
misleading."

—Oxford English Dictionary

Queen Elizabeth NP, Uganda



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QE Bush Lodge

QE Bush Lodge

QE Bush Lodge

Kazinga View resort

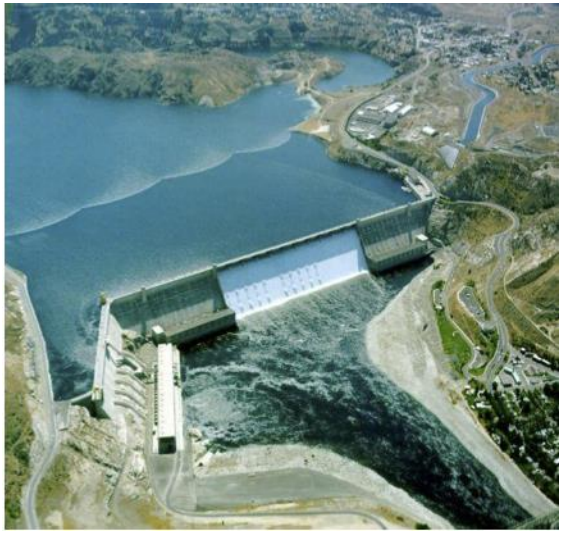
Kazinga View resort

Kazinga View resort


LET ME ADJUST THIS A BIT GREENER!

Energy Use in 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.



Promoting Energy Efficiency in Buildings in East Africa

- Developed and executed by UN-Habitat in collaboration with the governments of Kenya, Uganda, Tanzania, Rwanda, Burundi and the United Nations Environment Programme (UNEP).

- It is a five-year program (2011-2015), co-funded by the Global Environment Fund (GEF) and the five East Africa governments.

Objectives

- To Mainstream Energy Efficiency Measures into Housing policies, Building Codes and building practices in East Africa

- To achieve considerable avoidance of GHG emissions as a result of improved EE building practices.

Targets

- **400,000 units (governmental mass housing), 100 buildings retrofitted (commercial and private sector), built under energy efficiency standards.**

- **Estimated Emission Reduction in 20 years:**

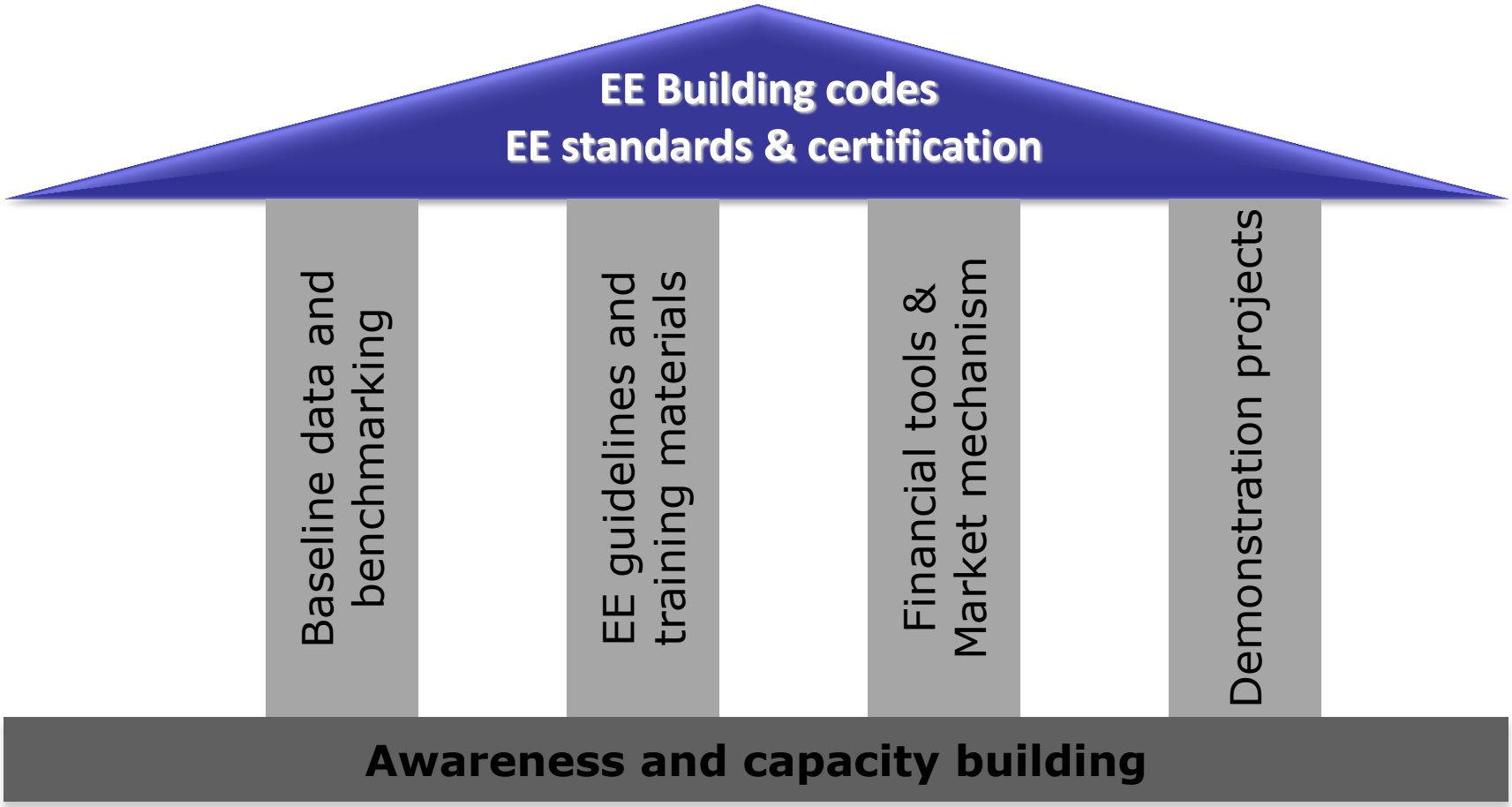
Direct CO2 reduction: 3,629,996 ton;

Indirect CO2 saving: 3,937,500 ton.

Other Targets

- Energy consumption reduction in new buildings by 30% - 50%;
- Energy savings in existing buildings by 10 % - 30 %;
- Improved indoor thermal comfort;
- Enhanced property value;
- Increased number of people with access to modern energy;
- Adoption of Energy/Resource Efficient Building Code.

Programme Components



Main steps in the development of an EEBC

- Review of the existing building regulations and identify gaps related to energy issues;
- Analyze the energy performance of the existing buildings stock through energy audits;
- Collect climatic data and classify the different climatic zones of the country;
- Develop building recommendations according to the different climatic zones.

Diagram 1: Climatic Regions of Uganda

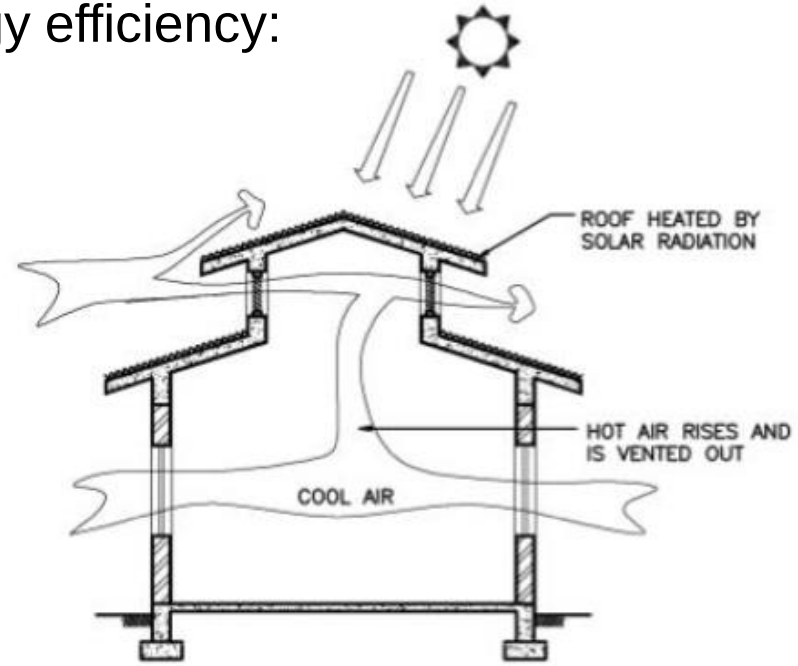
Main Climatic zones of Uganda

What should be addressed in the EEBC?

The EEBC provides the requirements that provide a better comfort to the occupants by using energy in an efficient way.
Preference is on the adoption of passive methods as oppose to actives systems.
The EEBC address the following components of a buildings:
1- Building envelop: (foundation, wall, roof, openings etc.);
2- Building systems: orientation, shape, solar protection, ventilation, lighting, cooling, heating, humidity protection, water heating etc.
3- Resources efficiency: use of renewable energies, rain water harvesting, building footprint, vegetation;

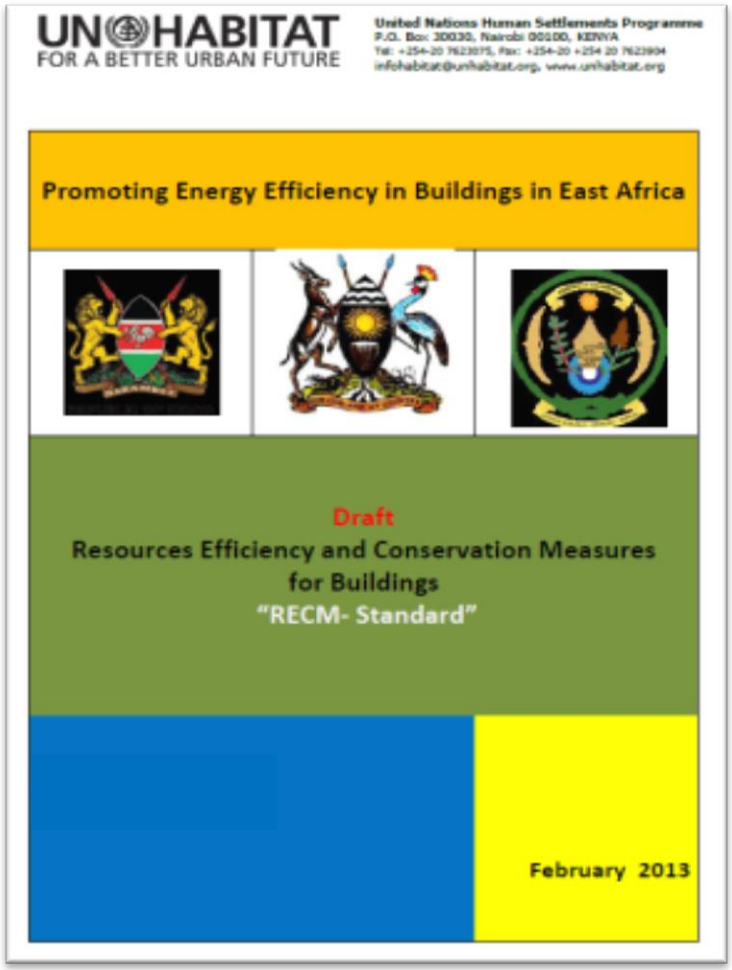
Building design prescriptions related to EEB

- The energy efficient building code addresses the following building design prescriptions that relate to energy efficiency:
- Passive design strategies
- Building orientation
- Building shape and configuration
- Building materials
- Building envelope
- Natural ventilation
- Natural lighting
- Natural Cooling
- Passive Heating



NB: For each component, minimum performance value are given and the building has to comply.

Tools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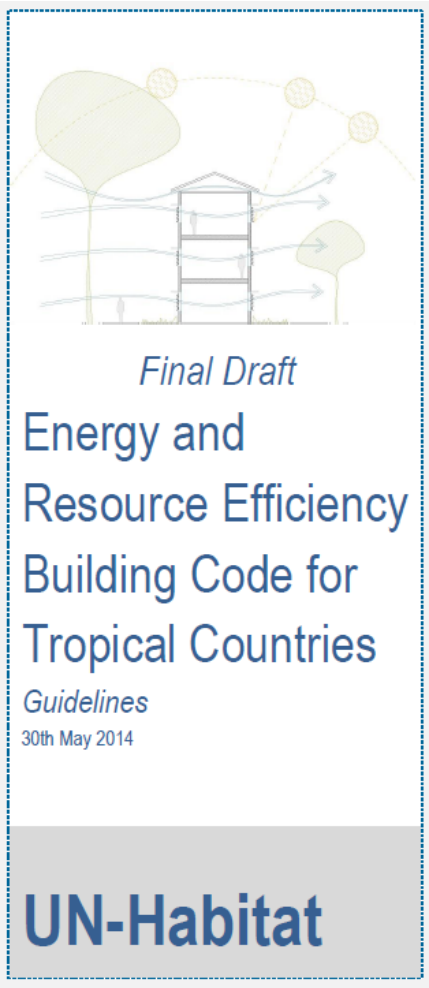
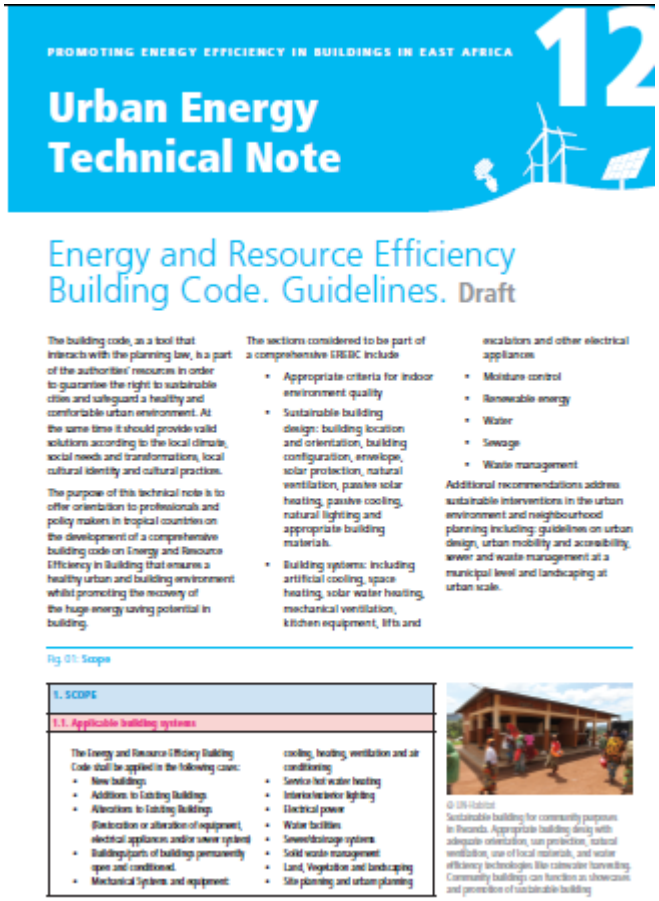
United Nations Human Settlements Programme
P.O. Box 30030, Nairobi 00100, KENYA
Promoting Energy Efficiency in Buildings in East Africa
Draft
Resources Efficiency and Conservation Measures for Buildings
"RECM- Standard"
February 2013


Final Draft
Energy and Resource Efficiency Building Code for Tropical Countries
Guidelines
30th May 2014
UN-Habitat


PROMOTING ENERGY EFFICIENCY IN BUILDINGS IN EAST AFRICA
12
Urban Energy Technical Note
Energy and Resource Efficiency Building Code. Guidelines. Draft
1. SCOPE
1.1. Applicable building systems

Workshops

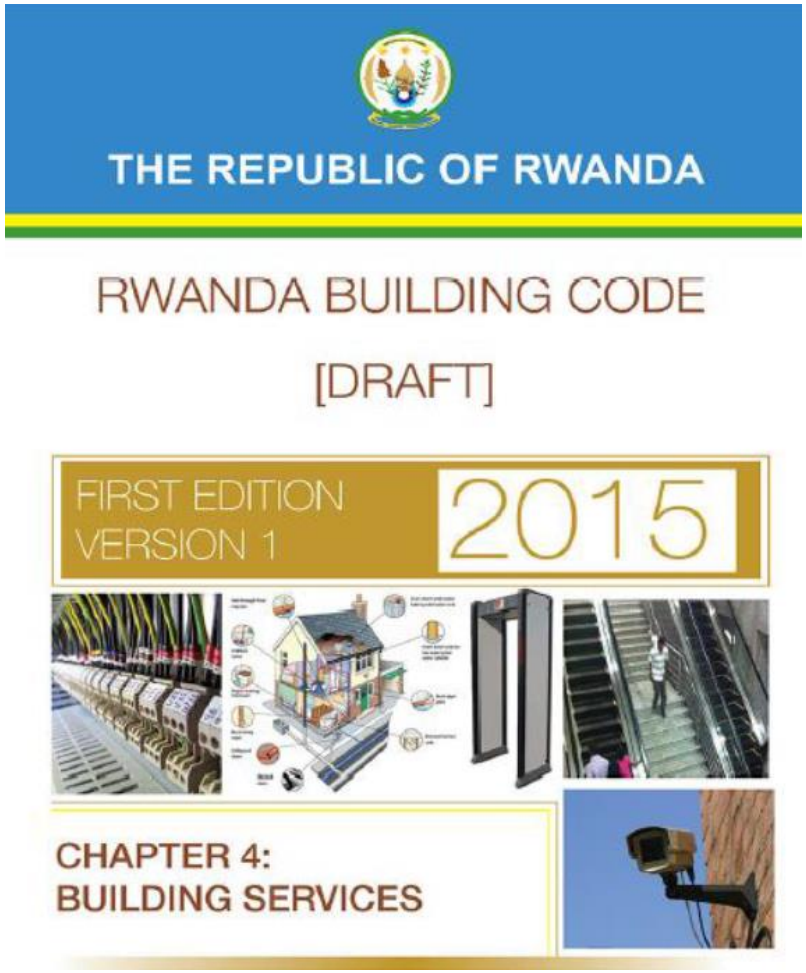
- Energy Efficiency in Building Codes workshop (Kigali 2013)

Some achievements

- Rwanda Building code adopted in July 2015 with EEB prescriptions

- Uganda, Kenya, Tanzania and Burundi still in the process

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



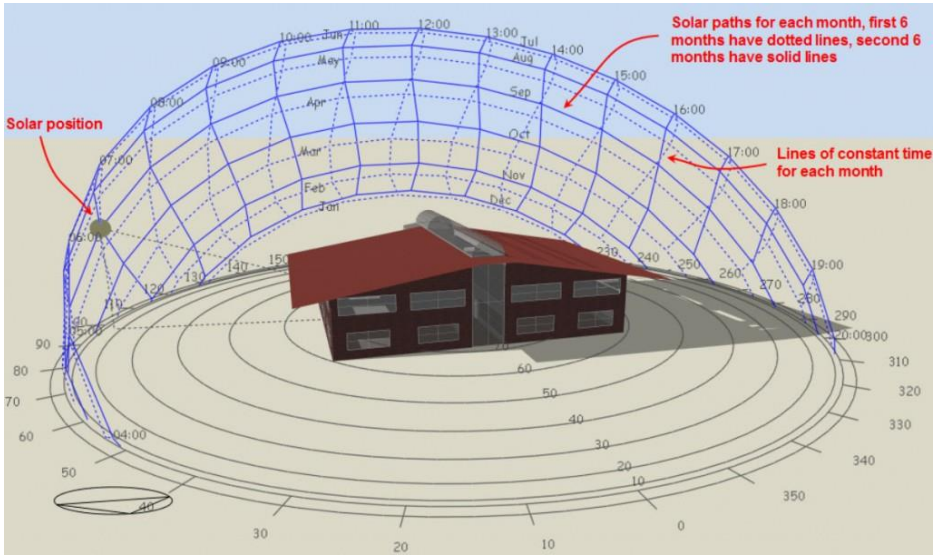
Resource Efficiency Measures: Solar Hot Water

- A- Mandatory Solar Water Heating System in the following building classes:
- Public buildings
- Residential Estate Schemes
- Hotel Schemes
- B- Residential facilities, hotels and hospitals etc. with a centralized system shall have solar water heating for 70% of the design capacity.
- C- All new residential buildings must be fitted with a solar water heating system, which amount to at least 70% of the hot water demand.
- Kenya and Zimbabwe just adopted a regulation on mandatory use of solar hot water system.

Uganda
Tanzania
Kenya
Burundi
Nigeria
Senegal
Cameroon
DRC
Gabon
CAR
Chad
Angola
Equatorial Guinea
e.t.c

Other recent developments

- University curriculum
  - The Machakos Declaration



MACHAKOS DECLARATION ON MAINSTREAMING SUSTAINABLE BUILDING DESIGN IN CURRICULA OF HIGHER LEARNING AND PRACTICE IN EAST AFRICA

Preamble

The buildings sector is the single largest contributor to global greenhouse gas emissions (GHG). It is in fact estimated that over 50 per cent of the total energy generated in developing countries is used in urban buildings alone, consuming more energy than the transport or the industrial sectors. The building sector, accounts for 38 % of greenhouse gas emission worldwide, contributing significantly to climate change.

In East Africa, construction of new or greening existing buildings is still at a nascent phase of development. The 'push' for a green future could be won or lost in technical institutions of higher learning where future professionals are developed. These future professionals need to be prepared for an inevitable future that is faced with the challenges of climate change and scarce resources. There is need to shift to new ways of doing things rather than continue with the business-as-usual approach to the way we build and future professionals are at the helm of this paradigm shift.

To address these issues and promote the sustainable building design agenda in architectural curriculum, UN-Habitat conducted a two-day workshop for senior lecturers and heads of architecture schools in the region. The workshop was held on 4th and 5th February 2016, at Maanzoni Lodge, Machakos, Kenya.

As a result of this workshop, with the combined efforts of all the deans, senior lecturers of architecture schools and architectural bodies in East Africa present at the workshop, the following declaration was written.

The Declaration

We, the Deans, senior lecturers and representatives of the following schools of architecture:

1. University of Nairobi (Kenya),
2. Jomo Kenyatta University of Agriculture and Technology (Kenya),
3. Technical University of Kenya (Kenya),
4. Kenyatta University (Kenya),
5. Uganda Martyrs University(Uganda),
6. Kyambogo University (Uganda),
7. Ardhi University (Tanzania),
8. University of Dar es Salaam (Tanzania),
9. University of Rwanda, College of Science and Technology (Rwanda),
10. Nile Source Polytechnic of Applied Arts (Rwanda),
11. University of Burundi (Burundi),
12. Light University of Bujumbura (Burundi),
13. Ntare Rugamba University (Burundi),

responsible for training and educating built environment professionals in East African countries Kenya, Uganda, Tanzania, Rwanda and Burundi, meeting in Machakos, Kenya, from 4th to 5th February 2016 to discuss the integration of sustainable building design into

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