



ACHIEVING RENEWABLE ENERGY POTENTIAL IN AFRICA

BY

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OUTLINE



- Introduction
- Concept of RE, Energy Efficiency & Conservation (EE & C)
- Why Do we Need EE & C
- Areas of Application of EE & C
- Issues To Promote EE & C
- Energy Commission of Nigeria & EE & C
- Conclusion



1.0 INTRODUCTION



- Africa needs energy in the forms of electricity, fuels and heat, for development in the economy.
- However, sustainable development is the path to follow to eliminate poverty in the long run in the continent.
- Sustainable development must, however, be driven by sustainable energy which refers to energy supply and utilization that satisfies the need of the present without compromising the ability of future generations to satisfy theirs.



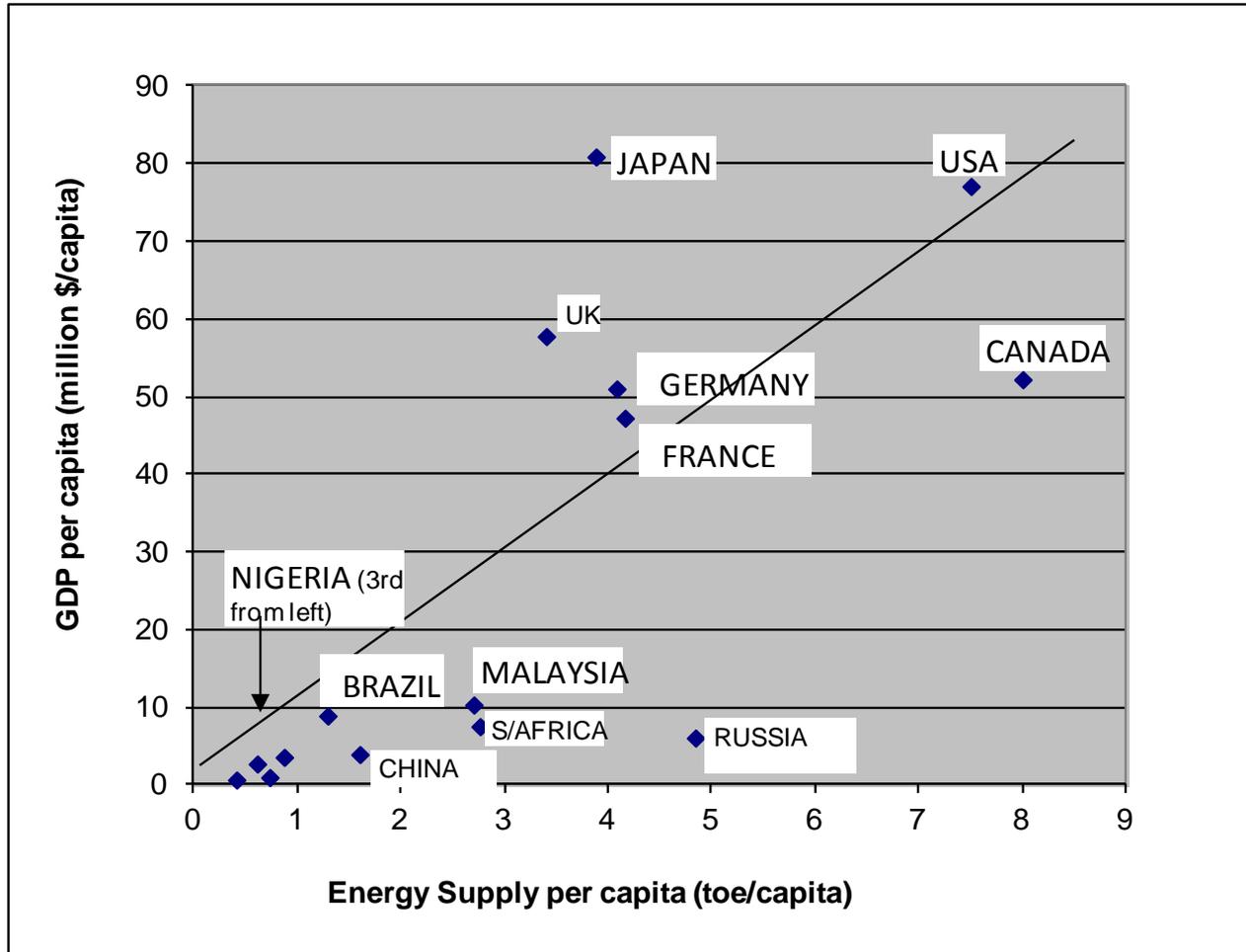
1.0 INTRODUCTION..... Cont'd.



- The United Nations Secretary General, Ban Ki Moon, initiated in 2011, Sustainable Energy for All (SE4ALL) by 2030, which stands on the pillars of:
 - ✓ Ensuring universal access to modern energy services.
 - ✓ Doubling the rate of improvement in energy efficiency & *conservation (EE & C)*.
 - ✓ Doubling the share of renewable energy (RE) in the global energy mix.
- The achievement of renewable energy potential in Africa, is therefore very essential for attaining sustainable development in Africa



1.0 INTRODUCTION.....Cont'd



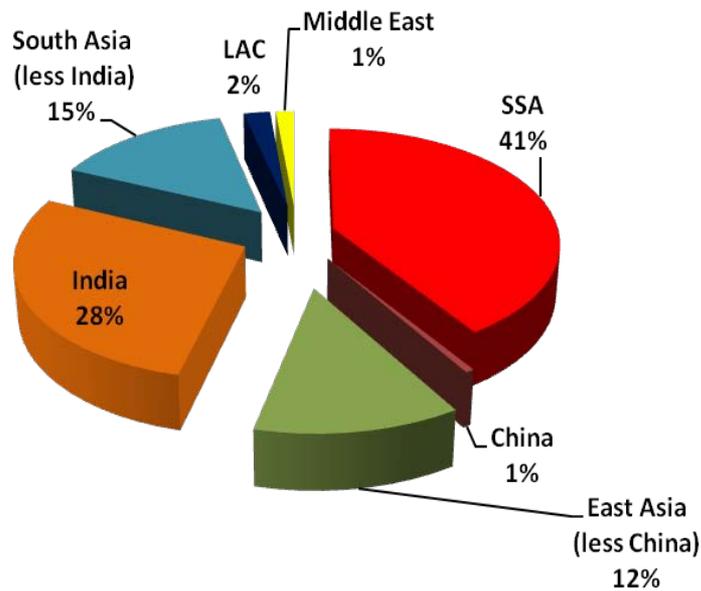
Source: IEA(2010)

Development implies:

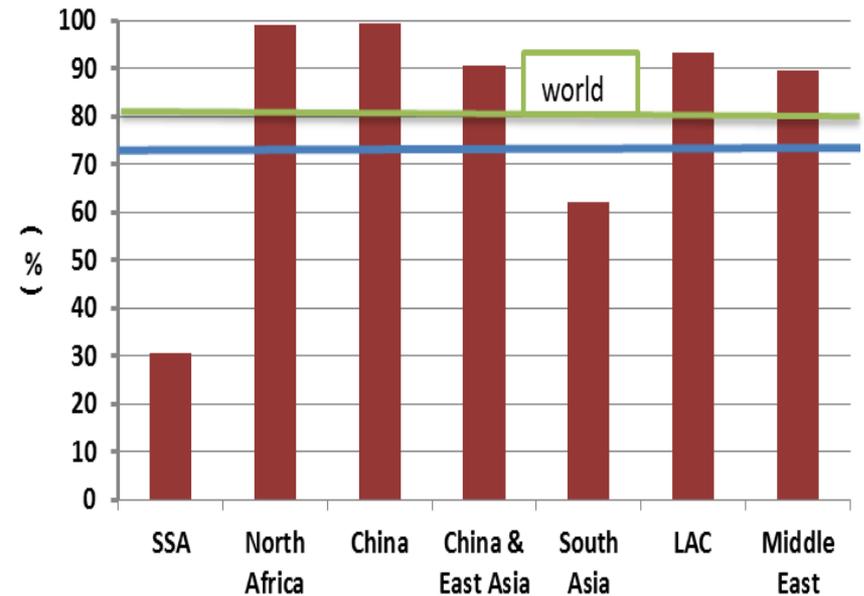
- Moving upwards along the line - Macro level
- Improvement of individuals standard of living(enhanced security, health, education, economic empowerment etc)-micro level

1.0 INTRODUCTION.....Cont'd

Distribution of people without access to electricity by developing regions (2009)



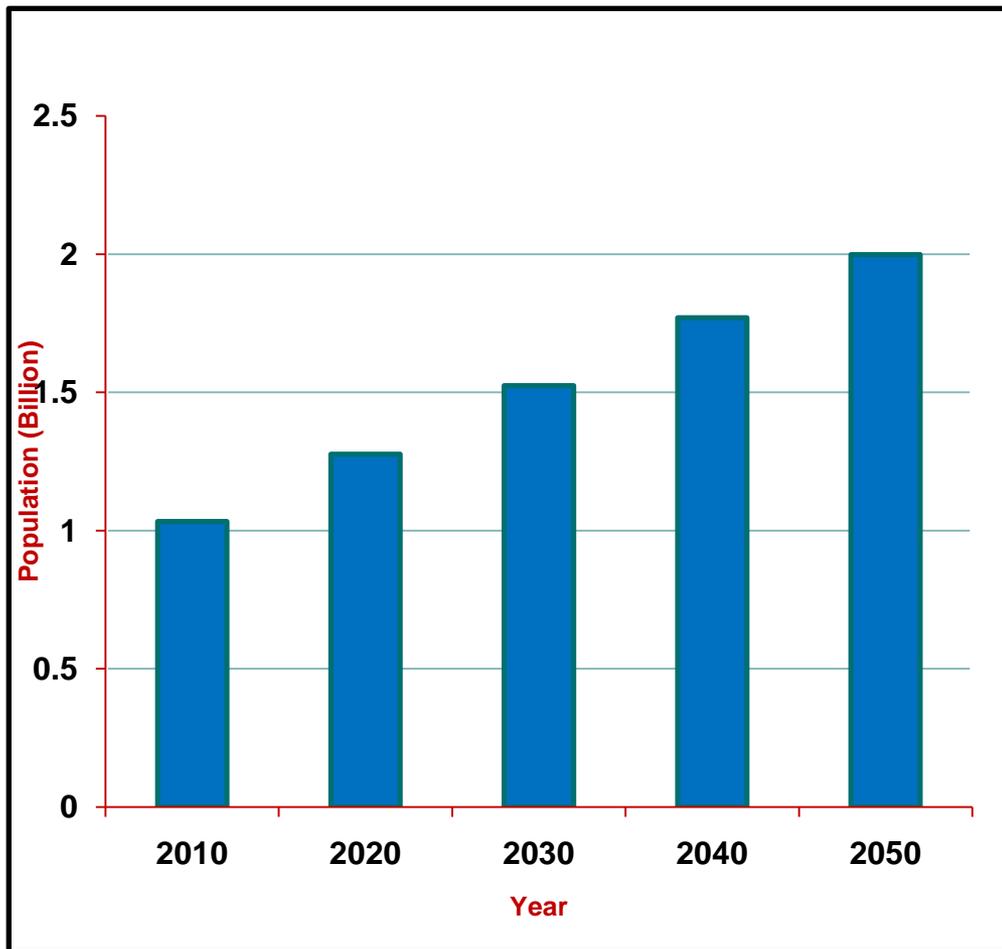
Access to electricity by world regions - 2009



Source: Dr.Fall (2013): data from IEA - WEO 2010

1.0 INTRODUCTION.....Cont'd

Africa's Population Growth (billion)



Source: AFREC, 2012

Total Population

2010	1.014 B
2020	1.318
2030	1.613
2035	1.780
2050	2.112

2.0 RENEWABLE ENERGY RESOURCES AFRICA

a) Hydropower



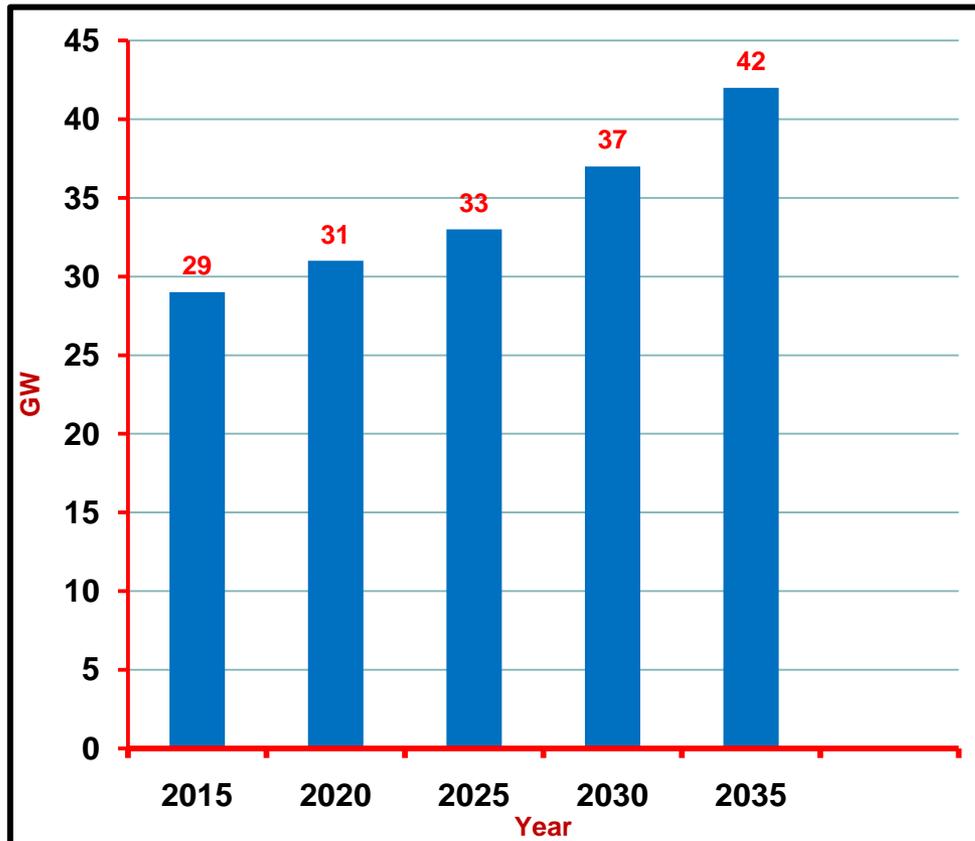
- Total available capacity: **300-GW**
- Theoretical energy: **4.0 M-GWh/Yr**
- Technical feasible: **1.75 M-GWh/Yr**
- Economic feasible: **1.0 M-GWh/Yr**
- Expolited rate: **10%**

■ Installed capacity & generation:

Year	GW	Thousand-GWh
2010	23.7	104.0
2007	21.6	97.5
2006	21.5	92.0
2005	21.7	89.6
2004	21.6	86.3
2003	21.3	82.1

2.0 RENEWABLE ENERGY RESOURCES AFRICA...

a) Hydropower



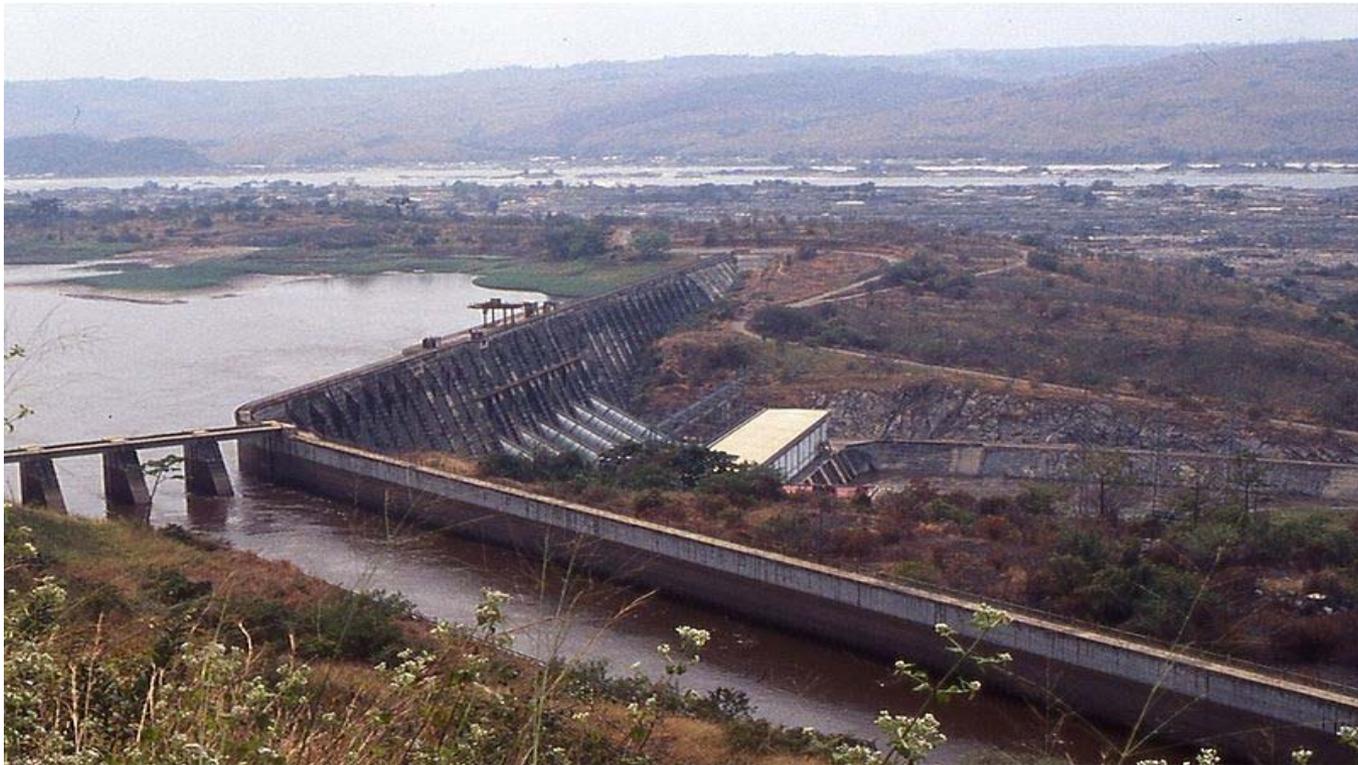
- Projected installed capacity by 2035: 42 GW
- Incremental growth: 2%
- Biggest challenge: **Sustainability**

Source: AFREC, 2012

2.0 RENEWABLE ENERGY RESOURCES AFRICA...

The Inga Dams, DR Congo:

- Inga I & II = 1,975 MW (Existing)
- Inga III = 4,500 MW (Potential)
- Grand Inga = 39,000 MW(Potential)



Inga I & II

2.0 RENEWABLE ENERGY RESOURCES AFRICA...

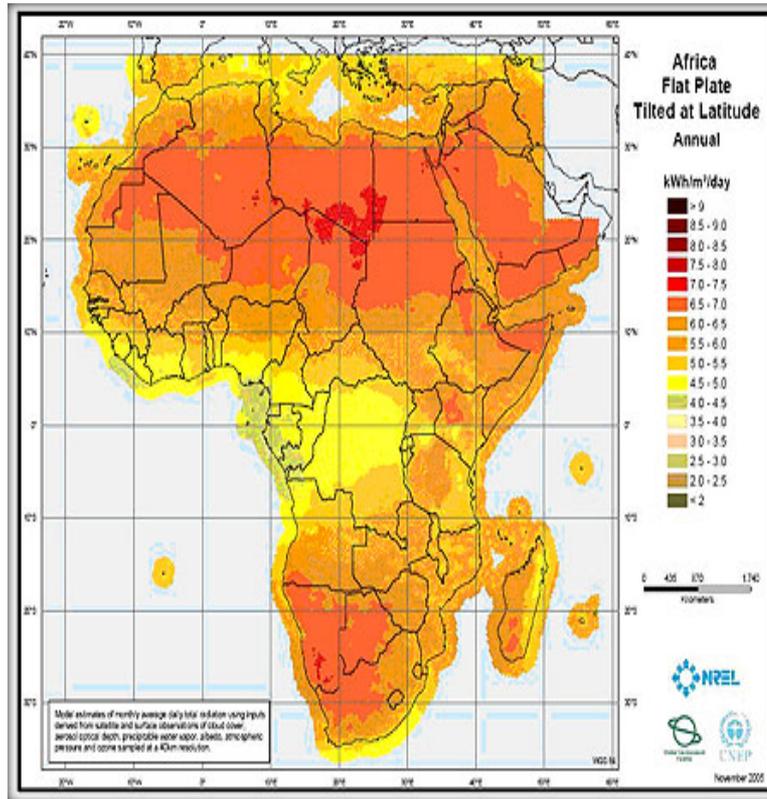
Hydropower cont'd....



Grand Inga Dam, DR Congo

2.0 RENEWABLE ENERGY RESOURCES AFRICA...

b) Solar



Source: AFREC 2010

DNI



Global Radiation

2.0 RENEWABLE ENERGY RESOURCES AFRICA...

Solar Cont'd.....

Major Solar Projects in Africa

- ✘ **Egypt:** Kuraymat Hybrid Plant, 30 MW CSP of 135 MW.
- ✘ **Algeria:** Hassi R'Mel Plant, 25 MW CSP of 130 MW ISCC.
- ✘ **Morocco:** Ain beni Mather Plant, 30 MW of 150 MW, and 500 MW with storage in Planning stage.
- ✘ **Sudan:** 250 MWCSP, and MoU signed with a French company for 2000 MW CSP.
- ✘ **Tunisia:** 3 stage road map drafted with 25 MW (2012), 100 MW (2013) and 100 MW.

2.0 RENEWABLE ENERGY RESOURCES AFRICA...

Solar Cont'd.....

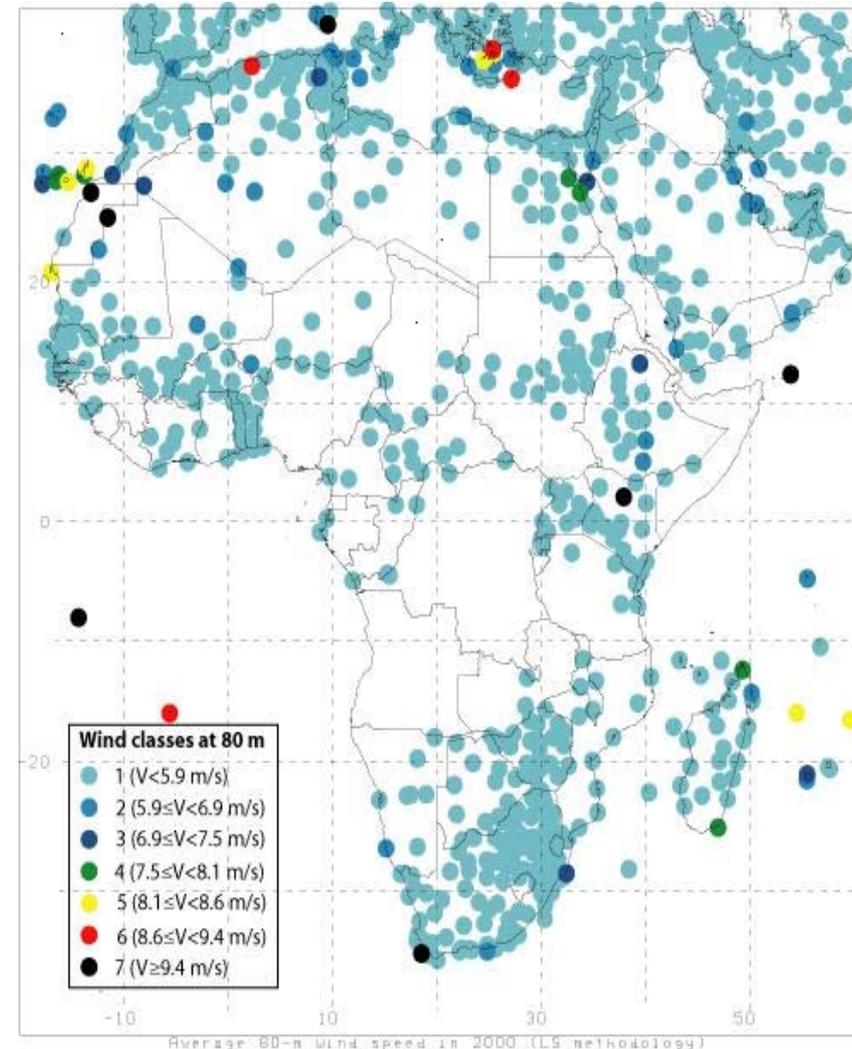
Major Solar Projects in Africa

- × **Libya:** Feasibility study under preparation for 1000 MW, with 100 MW as stage I.
- × **South Africa:** Upington Plant 100 MW CSP with storage/wind
- × **UEMOA:** Full solar electrification by 2030.
- × **ECOWAS:** Decision of 38th Ordinary Summit on Solar Energy to prepare a study for the construction of CSP Plants.
- × **DESERTEC:** Project to produce electricity from the Sahara desert and transport through a super-grid through the Mediterranean to Europe

2.0 RENEWABLE ENERGY RESOURCES AFRICA...

c) Wind

- The wind potential estimated for Africa is 10,600 TWh per year, assuming that 10% of the land area has average wind speeds exceeding 5.1 m/s at a height of 10 m. However, useable wind energy occurs in highly localized areas and therefore requires detailed assessments
- Egypt and Morocco and some coastal areas in Southern Africa have the highest wind potential in Africa (e.g. : Egypt potential : 30000 MW over 6000 km²).
- Egypt holds the most significant wind installed capacity of around: 500 MW wind farm at Zafarana at the Suez Gulf along the Red Sea, and plans to adding a total of 7200 MW by 2020.
- South Africa also plans to build 9200 MW of wind power by 2030 (IRP 2010).



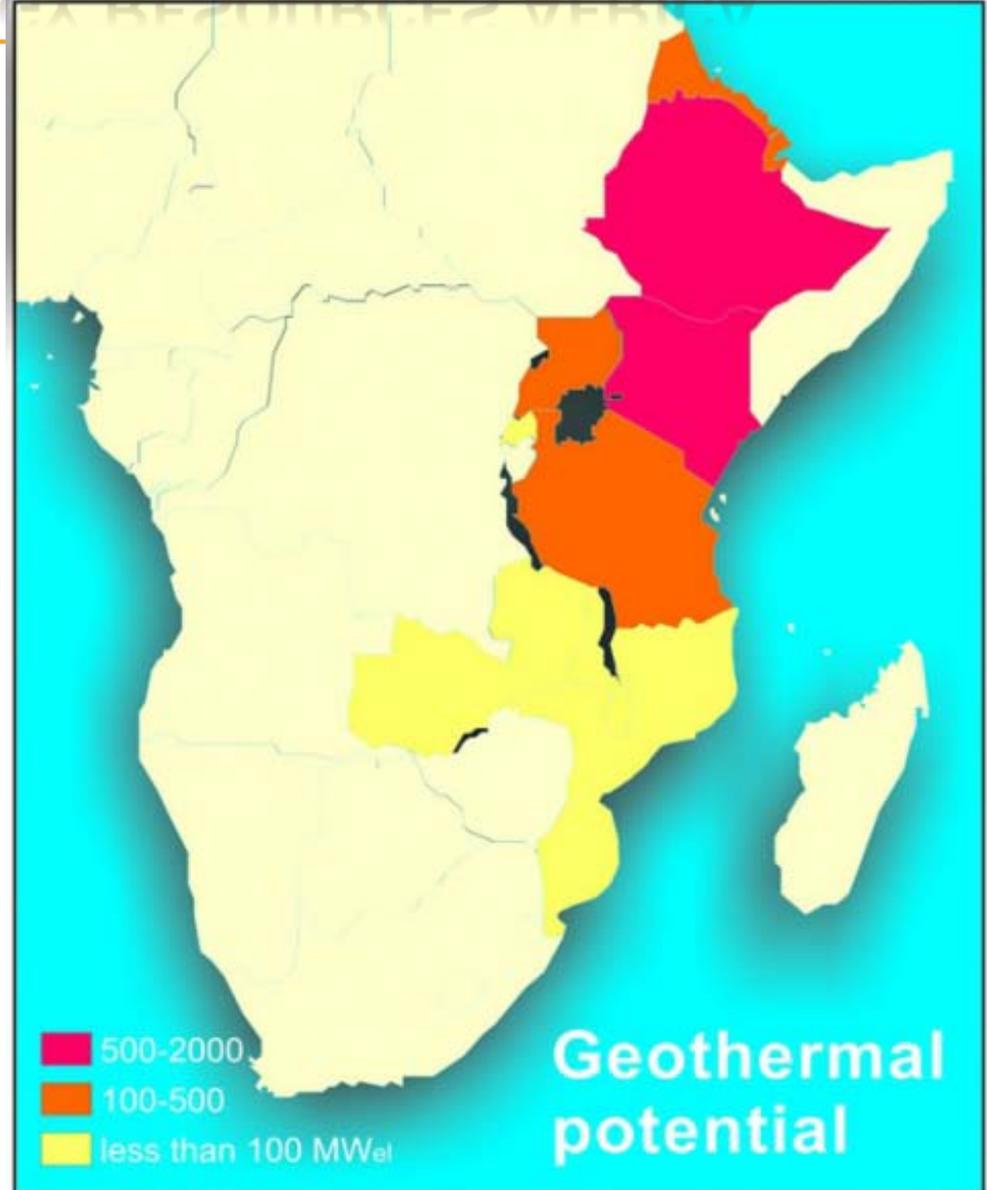
Source: www.geni.org

2.0 RENEWABLE ENERGY RESOURCES AFRICA...

d) Geothermal

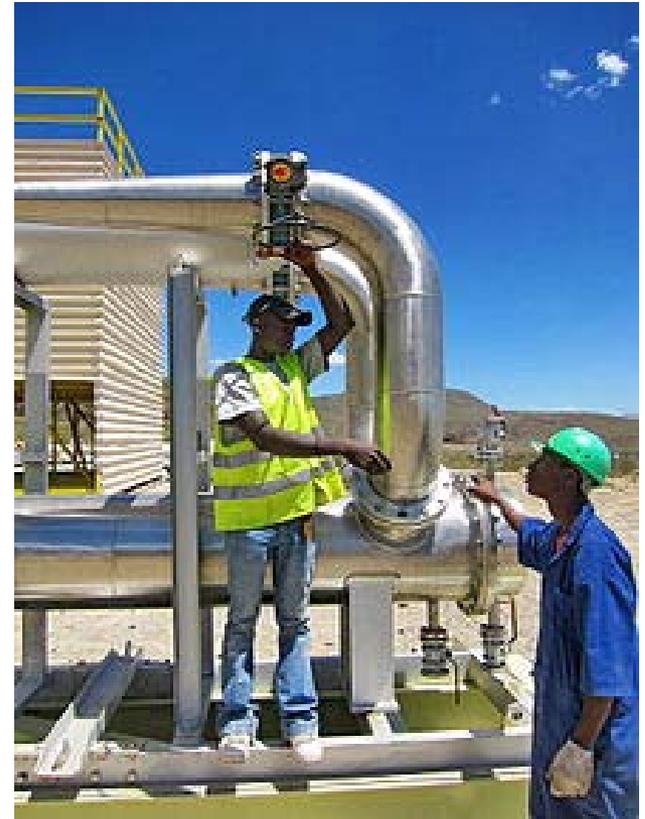
➤ **Geothermal:** Significant geothermal resources exist along the Rift Valley in eastern Africa, in Djibouti, Eritrea, Kenya, Malawi, Mozambique, Rwanda, Tanzania, and Zambia.

The geothermal energy potential in the continent has been estimated to be in the range of 2.5–6.5 GW, but at present only Kenya has exploited this resource with an installed capacity of 129 MW. Plans are at different stages to repeat this Kenyan experience in many African countries in the Rift Valley areas.



2.0 RENEWABLE ENERGY RESOURCES AFRICA...

- Olkari I = 45MW
- Olkari II = 65MW
- Olkari III = 48MW (Private)
- Plans to increase capacity by another 576MW by 2017 to cover 25% of Kenya's electricity needs



Olkari Geothermal Plant, Kenya

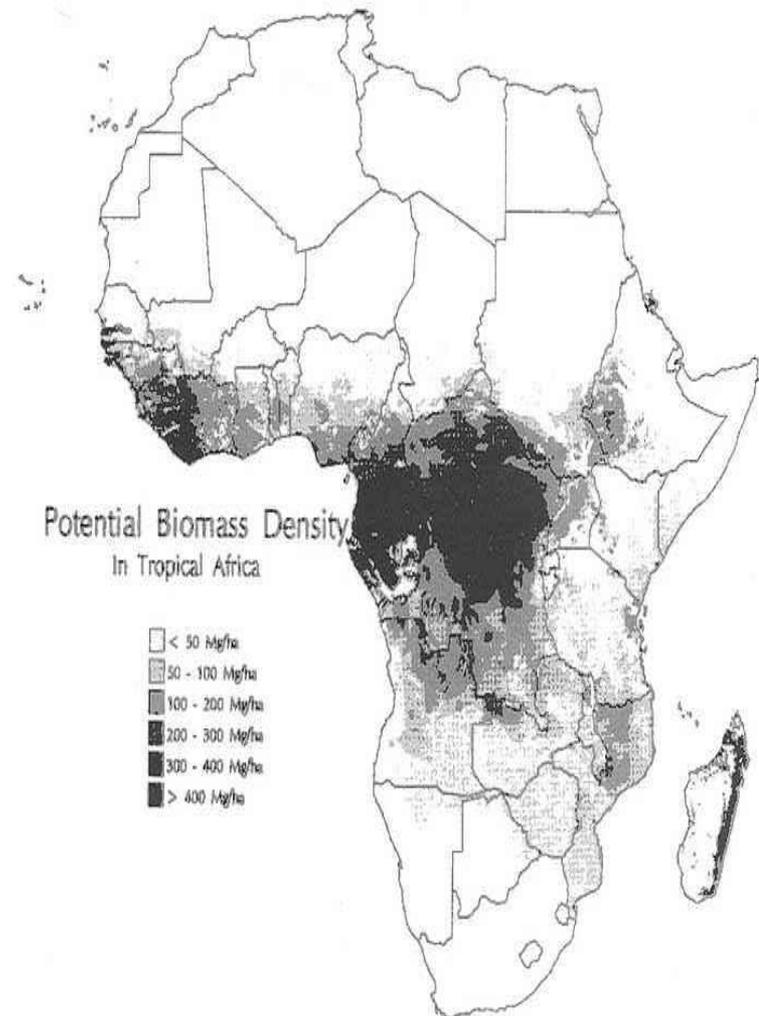
2.0 RENEWABLE ENERGY RESOURCES AFRICA...

e) Biomass & Biofuels

➤ **Biomass & Biofuels:** Africa's dense vegetation makes it rich in traditional biomass in the form of fuel-wood and other agricultural residues.

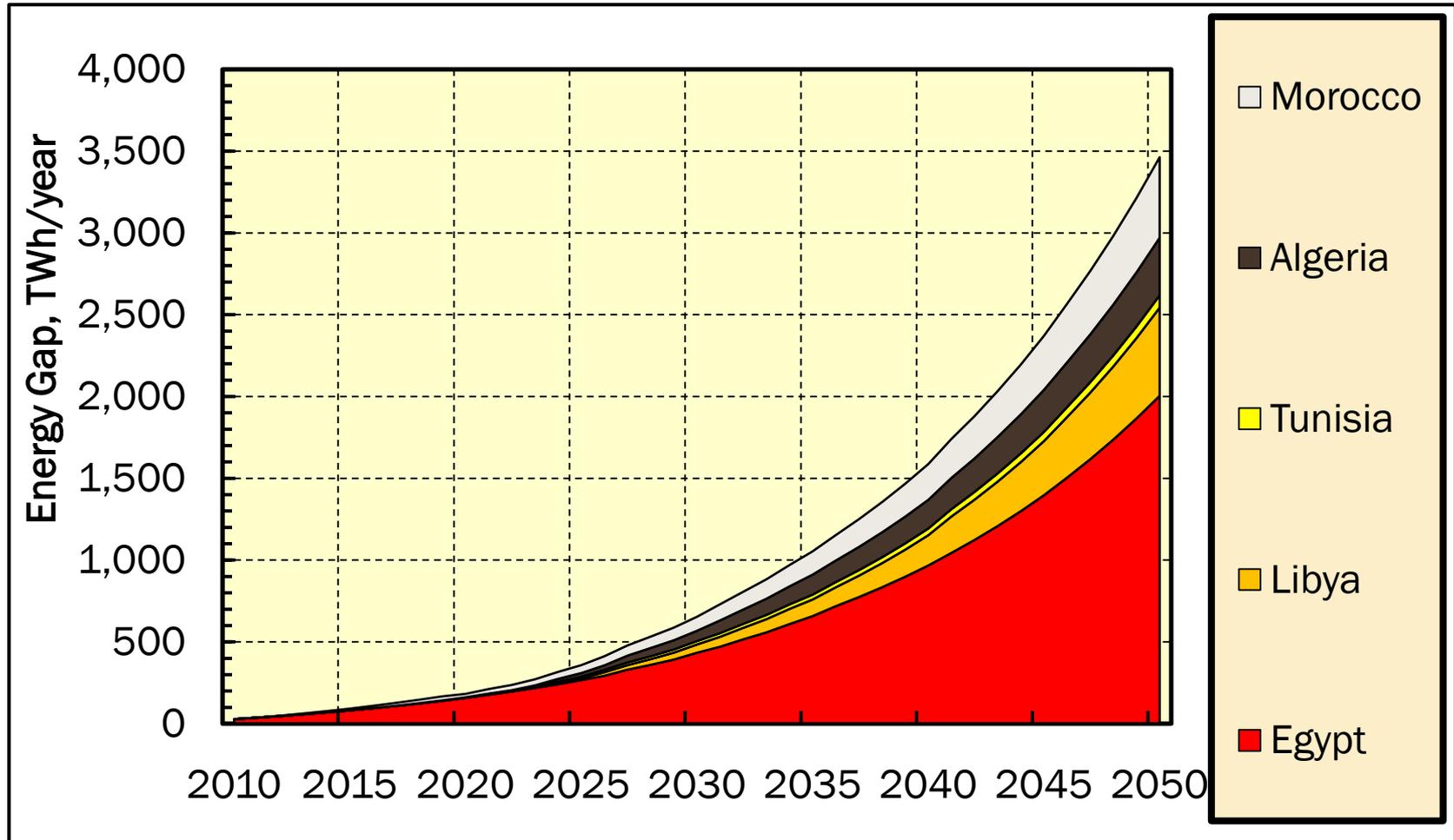
The potential of Africa's biofuels is large and far exceeds the requirements for food and basic needs for the African population. This provides for an opportunity to use agricultural and forestry to produce, in addition to food, biofuels for cooking fuels, electricity and transport, by using efficient biomass conversion technologies.

The leading African sugarcane countries are producing ethanol, electricity and sugar from sugarcane. Ethanol from sugarcane is produced as an additive to gasoline in some African countries. There is also potential for biodiesel production and use (jatropha).



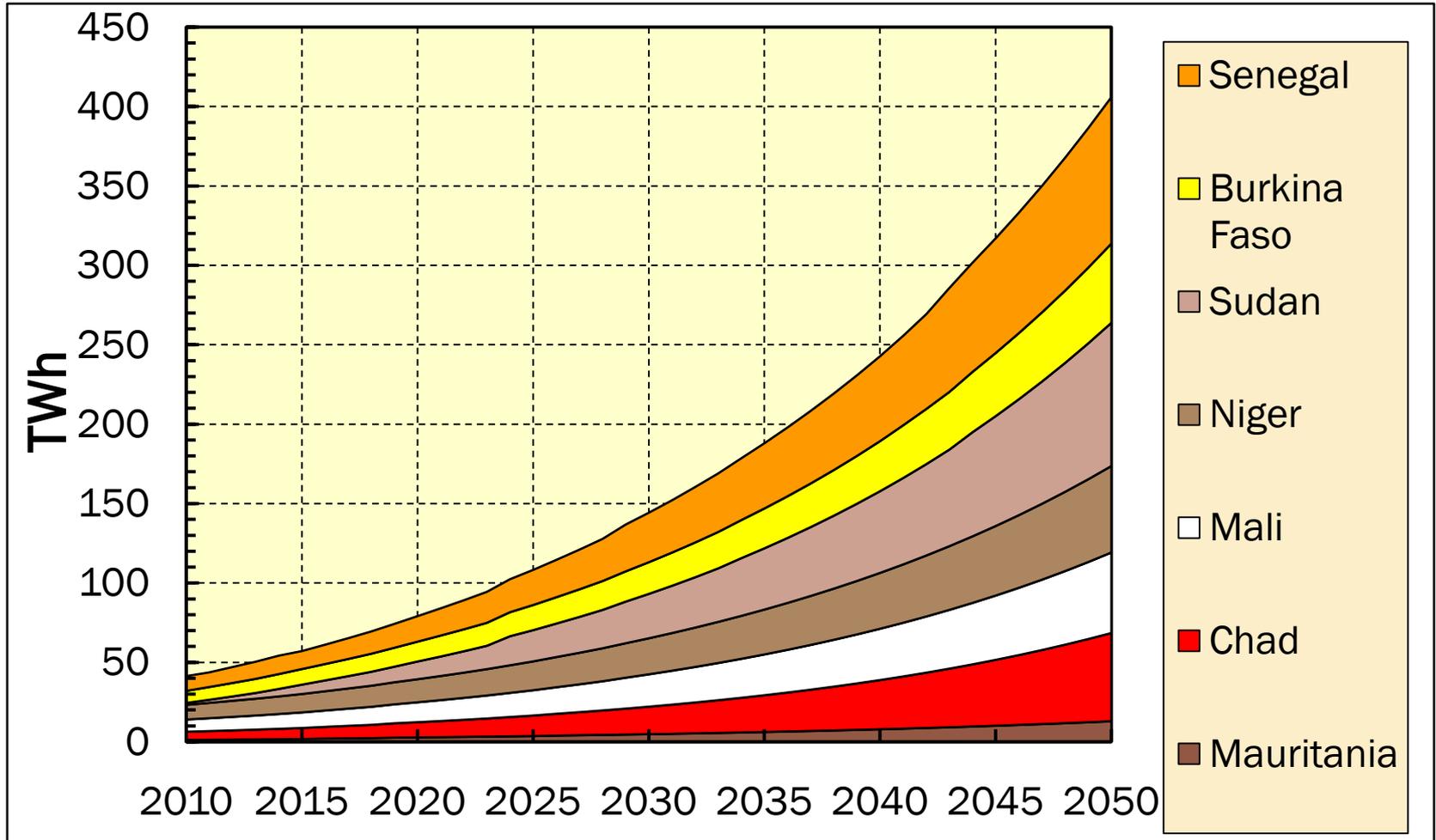
3.0 ENERGY GAP IN AFRICA

a) Energy Gap for North Africa Sub-region



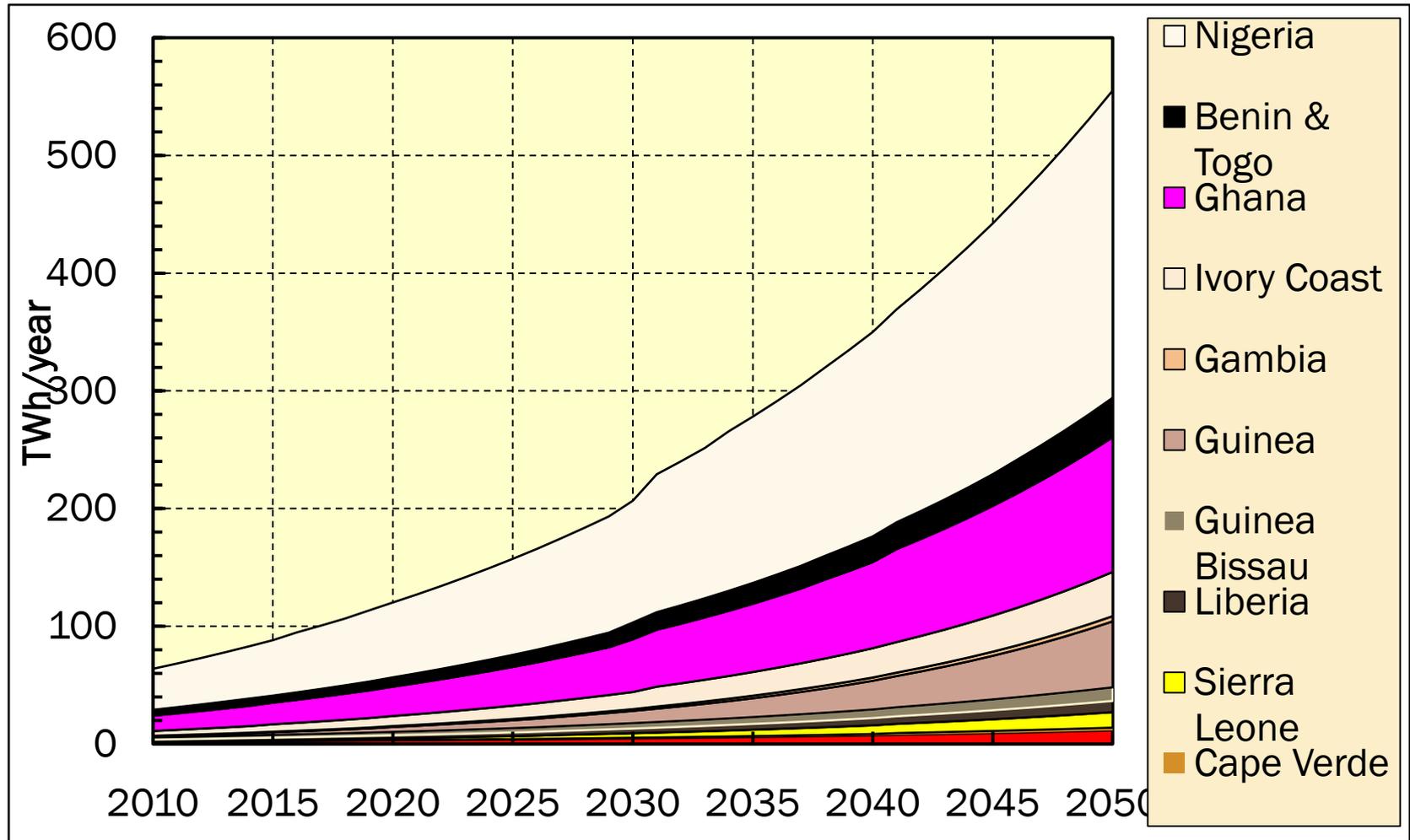
3.0 ENERGY GAP IN AFRICA.....

b) Energy Gap – Sahel Sub-region



3.0 ENERGY GAP IN AFRICA.....

c) Energy Gap – West Africa Sub-region





THANK YOU