African Energy Perspectives
&
Climate Change Challenges

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Outline

- Development and Climate Change Challenges in Africa,
- Energy Situation in Africa
- Opportunities in Africa,
- Measures to increase Access to Modern Energy Services
- Conclusions

Development and Climate Change Challenges in Africa

- Africa is most vulnerable to climate change mainly due to low adaptive capacity, which is directly linked to the developmental challenges facing the continent

Climate Change poses serious threat to various key areas/sectors in Africa including:

- Agriculture and food security
- Water supply
- Energy security
- Health care
- Regional security and migration
- Biodiversity

Development and Climate Change Challenges in Africa

- Africa still faces significant and serious developmental challenges despite the consistent average economic growth of 5- 6% p.a. in majority of African countries

- These challenges include:
  - Poverty reduction and jobs creation
  - Achievement of the SDGs
  - Infrastructure and industrial development

- For Africa, access to **modern energy services** is so critical to meeting its developmental challenges,

However

Conventional development patterns have often been accompanied by increased energy use and GHG emissions

Energy Situation in Africa

- Low Generation Capacity
  - Total Generation Capacity is about 170 GW
- Low Access to Electricity
  - Only about 35% of the Sub-Saharan African population has access to electricity

    N. Africa – 99% access, Africa - 45%
  - Electrification rates as low as 9 – 20% in many Sub-Saharan African countries
- Inefficient Transmission and Distribution Systems
- Highly unstable and unreliable electricity supply from the grid

Energy Situation Africa (continue)

- High Generation costs
  - Over 80% of electricity generation in Africa is from fossil fuels

    Highly vulnerable to price shocks

  - Average tariffs are US$0.14 per kWh compared to US$0.04 and US$0.07 per kWh in South and East Asia, respectively

- Low Electricity Consumption

  Per capita electricity consumption of 620 kWh (2013) in Africa is the lowest in the world average

Energy Situation Africa (continue)

Other forms of energy

- About 80% of SSA population depends on biomass for cooking
- Low efficiency in heat conversion of traditional stoves (10 – 15% efficiency)
  - Serious impacts on health and mortality (mostly affecting women and children)

- Huge dependence on animal and human labor for productive activities especially in rural areas

The Opportunities in Africa

- Growing population
- Growing needs, Demand
- Huge diversified resources
- Political commitment
- Encouraging environment

A growing Africa

- Africa's population is more than **one** billion.
- It is projected to be more than **two** billion in about 30 years, and possibly more than **four** billion by the end of the century.
- All of these people need to be fed, clothed, housed, transported, and connected by mobile phones.
- Growing domestic demand is also supported by remittances from the diaspora, affording Africans increased purchasing power.
- In 2015 alone, African migrants sent home some $64.6 bn,

Growing Needs and Limited Capacity

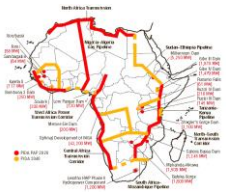
: Long-term Prospects: Outlook 2040 (PIDA)

- **Power Demand** will rise at an average **5.7% per year** up to year 2040
  - **Power demand will increase from 619 TWh in 2013 to more than 3,188 TWh in 2040**
  - **The Installed Power Generation Capacity must increase from 139 GW in 2011 to almost 700 GW in 2040 to meet demand**
- **This increased demand will require adequate Regional Energy Infrastructure.**

Growing Needs and Limited Capacity (continued)

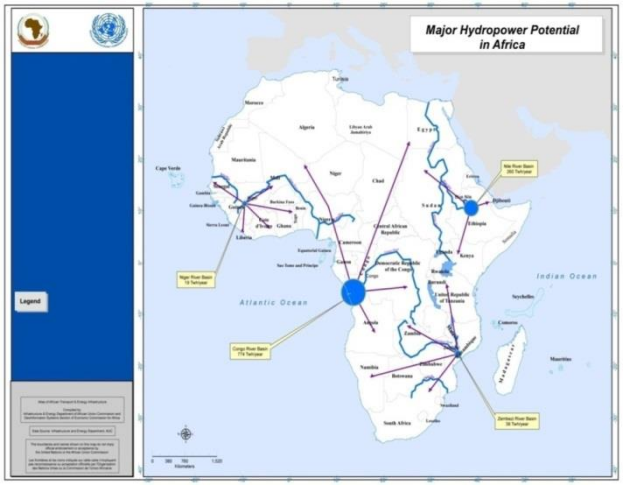
- **The investments needed will deliver more than 61,000 MW of hydro power and 16,500 km of interconnecting power lines by 2040**
- **Prior to 2020, improving Transmission and Distribution infrastructure is the priority**
- **Energy efficiency policies can save about:**
  - **139 GW in Generation Capacity by 2040**
- **System integration can save 17% of production costs over the same period**
- **Pipelines (for petroleum products and natural gas) require US$ 1.3 billion per year**

PIDA projects (Energy)



PIDA Priority Action Plans (PIDA-PAP)

- **PIDA-PAP** comprise the 15 energy projects which need to be implemented and completed prior to 2020



- The PIDA- PAP Projects
  - **9 power generation projects (hydro)**
  - **4 power transmission corridor projects**
  - **1 petroleum product pipeline project**
  - **1 gas pipeline project**

Diversified Resources (Energy)

- **Africa has significant Energy Resources to meet current and future demand**

Energy Type	Reserves/potential	Regional Distribution
Non-renewable		
Crude oil	**132.1 billion barrels**	Northern Africa: 53.2% Western Africa: 28.2% Central Africa: 16.9% Other Africa: 1.7%
Natural gas	**14.7 trillion m^3**	Northern Africa: 55.8% Western Africa: 36.1% Other Africa: 8.2%
Coal	**31.696 billion tones**	Southern Africa: 95.2% Eastern Africa:1.6% Other Africa: 3.2%
Nuclear	**Reasonably assured resources: 663,400 tones Of Uranium**	Northern Africa: 2.9% Western Africa: 36.7% Central Africa: 2.7% Eastern Africa: 4.2% Southern Africa: 53.5%

Diversified Resources (Energy)

Energy Type	Reserves/potential	Regional Distribution
Renewable Energy		
Hydro	**209GW**	Central Africa: 57% Eastern Africa: 32% Other Africa:11%
Biomass	**Woody biomass: 70 billion tones**	All regions
Solar	**Solar insolation: 1800 – 2850 kWh/m2**	Most of Africa
Wind	**Wind speeds:** **Southern Africa (6 – 8 m/s)** **Northern Africa (5 – 8.5 m/s)**	Most attractive sites in the Northern and Southern coasts
Geothermal	**15, 000 MW**	Eastern Africa

Enabling Environment

- Better political stability in a number of countries including certain major economies,
- Cooperation and endeavors of national governments,
- Supranational bodies and development agencies to initiate infrastructure projects;
- Creation of legislative and regulatory frameworks aimed at supporting infrastructure initiatives;
- Increased capacity in the sector both within government bodies and within professional service providers.

Measures to increase Access to Modern Energy Services

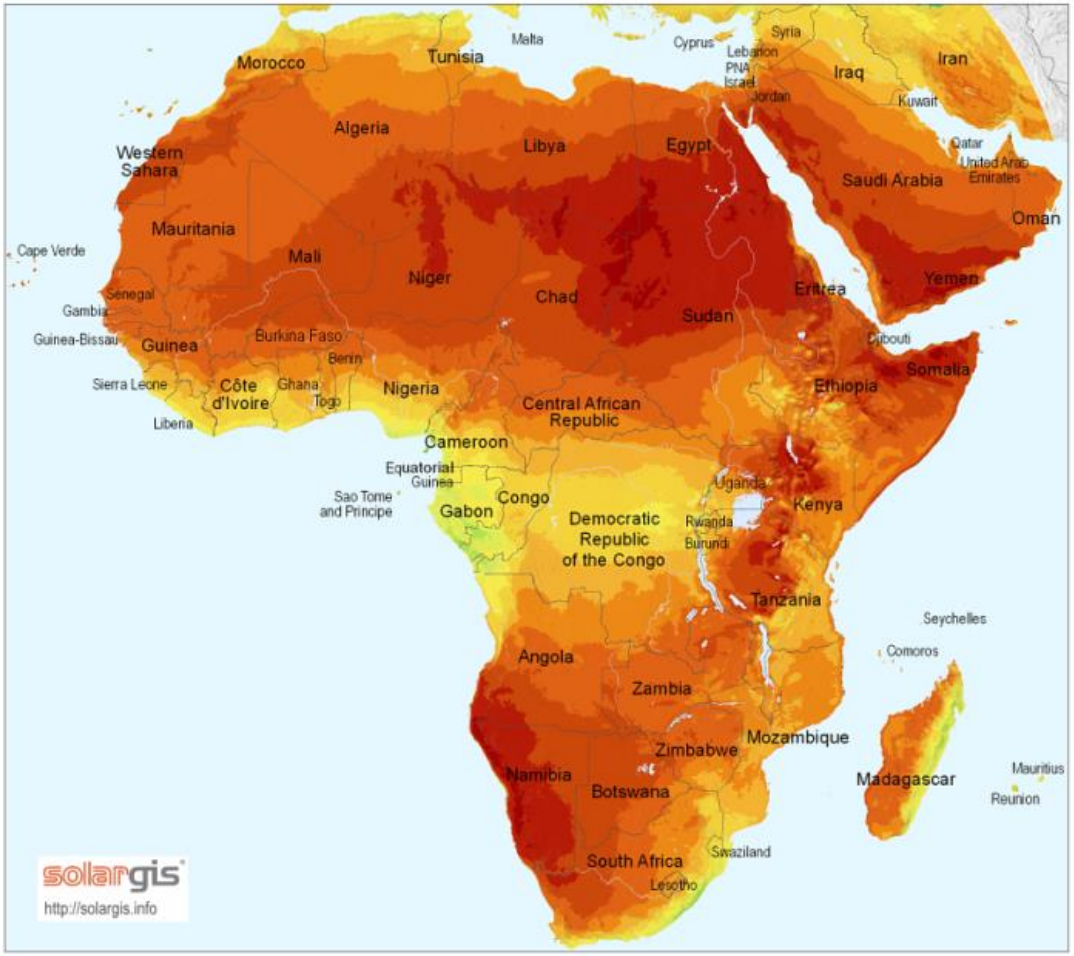
- **The real issue is how can Africa Convert its huge diversified Energy Resources into *Sustainable and Modern and affordable Energy Services* to meet Basic Human Needs as well as Productive Uses**

- **Africa under the leadership of the AU is already working on programmes aimed at improving modern energy access in Africa such as:**

- **The PIDA**
- **Africa – EU Energy Partnership**
- **The GRMF**
- **The AREI**

Global horizontal irradiation

Africa and Middle East



Average annual sum (4/2004 - 3/2010)

< 1600 1800 2000 2200 2400 > kWh/m2

0 500 1000 km


Khartoum
Gulf of Aden
Afdera-Mealeta
Tendaho
Djibouti
Tulu-Moye
Dofan
Ethiopian Highlands
Addis Ababa
Ethiopia
Corbetti
South Sudan
Somalia
Juba
Lake Turkana
Mogadishu
Lake Albert
Uganda
Bogoria-
Silali
Kenya
Kampala
Longonot
Katwe
Suswa
Nairobi
Lake Victoria
Kinigi
Gisenyi
Rwanda
Kigali

Other Initiatives on Modern Energy Access

- Other Initiatives that are contributing to Modern Energy Access in Africa include:

  - Sustainable Energy for All (SE4ALL) Initiative
  - Regional Power Pools
  - AfDB new energy deal for Africa
  - Africa 50 Fund
  - Sustainable Energy Fund for Africa
  - Africa-EU Renewable Energy Cooperation Program (RECP)
  - African Renewable Energy Fund

- Energy Expansion Agenda from Member States: Member States have programs and projects, ***developed policies and regulatory frameworks*** aimed at improving energy access in the urban and rural areas

Conclusions

- Africa is open and welcomes all development partners for win - win cooperation,

- As the need is so big, many solutions are required, opening huge market opportunities for both large-scale electricity, and also for new opportunities like off-grid, small-grid, micro-grid, rooftop or household solutions.

- Solving the energy problem in Africa is not a one-size-fits-all approach and standalone options need to be matched to the consumer.

- Regional integration is a must for Africa's development


Thank you