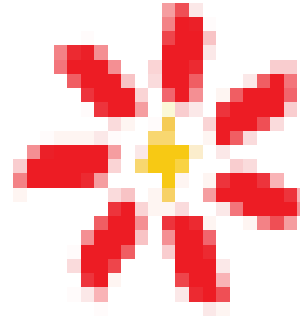


Africa Electricity Symposium

June 25 - 27, 2025



Africa Electricity Symposium

Global Energy Trends

Reforms, Policy, and Law

Venue: Mestil Hotel
Kampala, UGANDA

By: Patrick Mwesige





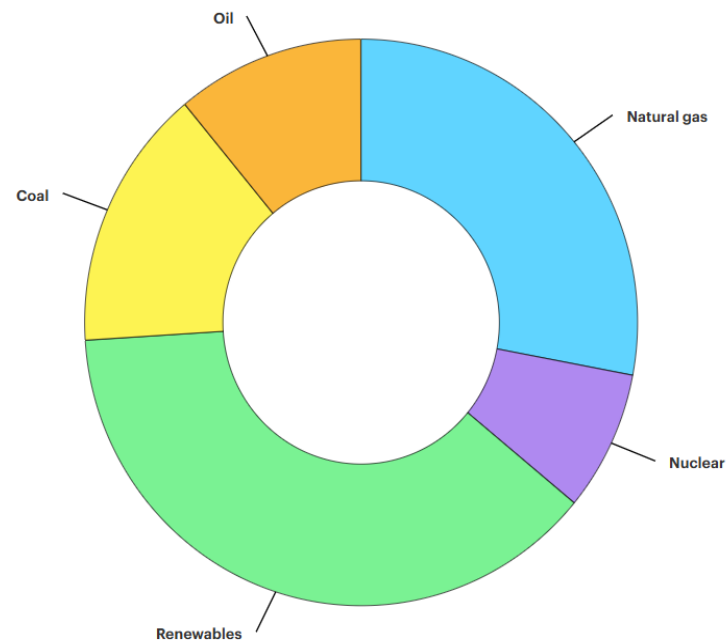
Content Outline

1. Introduction
2. Global Power Sector Trends
3. African Continental Status
4. Africa Generation & Technology Trends
5. Key Policy & Regulatory Reforms
6. The Electricity Access Challenge
7. Growing Market-Based Approaches
8. Concluding Observations



1. Introduction

- ❖ Global Energy demand is growing 2.2% in 2024, faster than 2013-2023 (*IEA Report 2025*)
- ❖ Electricity demand is growing even faster, 4.3% in 2024, driven by adverse weather and increasing efforts for electrification
- ❖ Renewable Energy surge – RE importance is growing globally, the huge Solar advances are on track and remain critical.
- ❖ Fossil fuels still make a major contribution, especially Coal and Gas, particularly in non-OECD and other emerging economies
- ❖ *New technological innovations like electricity for the sprawling global Data Centers and EV charging systems are growing drivers*



Sources feeding the Increasing Demand by Technology (IEA)

1. Introduction

- ❖ Africa's economy is growing very fast. 9 of the 20 World's fastest-growing economies in 2024 will be in Africa (*IMF WEF Report, April 2024*)
- ❖ Meeting the exponentially rising power demand for C&I, Households, and lately mobility in an economically sustainable manner not only safeguards but also improves livelihoods
- ❖ Africa's rich RE resource endowment is undeniable; thus, the urgency for sound planning and timely execution to ensure the right energy mix is critical.
- ❖ Current trends suggest that by 2030, the electricity supply should have tripled to cope with the projected growth momentum



Tanzania is Rising (*The Economist* Nov. 2024)

1. Introduction

- ❖ In the past, RE interventions have been undertaken for environmental reasons, but they are progressively becoming the most economically competitive option; herein lies the opportunity.
- ❖ While only about 29% (238TWh) of the African electricity supply in 2023 was from RE, the picture could significantly > 50% by 2030
- ❖ The IRENA report of 2015 indicated that this requires an annual USD 70bn investment (USD 45 bn for Generation and USD 25 bn for T&D)
- ❖ *Almost 600 million people in SSA do not have access to electricity, and the AfDB and World Bank Mission 300 initiative seeks to connect 300 million*



Distributed Energy Resources (DER) growing



2. Global Power Sector Trends

- ❑ **Decarbonization** – With Renewable Energy becoming the buzzword, countries are looking to accelerate the deployment of REs, the key issue has been;
 - *At what cost and who is financing?*
 - *Does the RE technology available meet my capacity requirements?*
 - *What's the lead time to switch?*
 - *Financial feasibility e.g., cost of BESS for utility scale Solar? ROI issues? Tariffs?*

What are your biggest challenges in progressing toward a net-zero carbon goal by 2050? (Select all that apply)

Source: Black & Veatch

41.1% Funding

39.7% Availability of technology to get to net zero

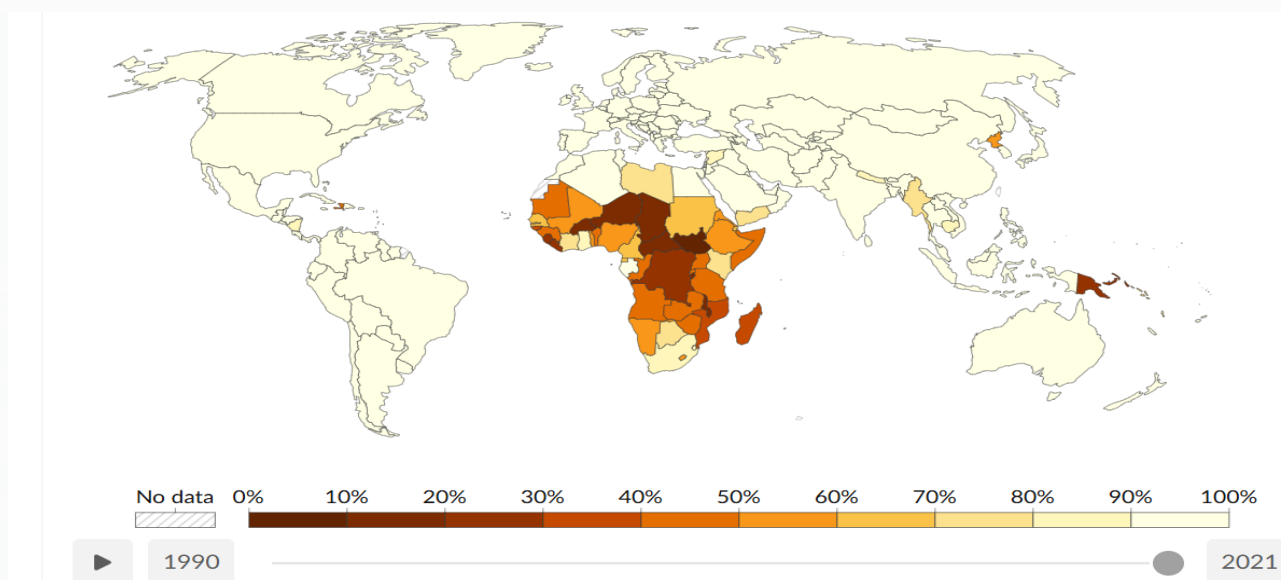
33.6% Rate of return on investment

32.7% Grid resiliency/reliability

18.7% Other

2. Global Power Sector Trends

- ❑ **Electrification** – means two different things between developed economies and the least developed.
- ❖ In the former, it is about the EV transition; cars, trucks, and buses given that by 2019 ICE mobility contributed to 29% of Green House Gas Emissions(GHGE)- hence how to make utilities and networks EV charging responsive?
- ❖ On the other hand, in SSA, it's about how to increase Access to electricity given the <50% electrification rates, (600m people in the dark). See map (World Bank)



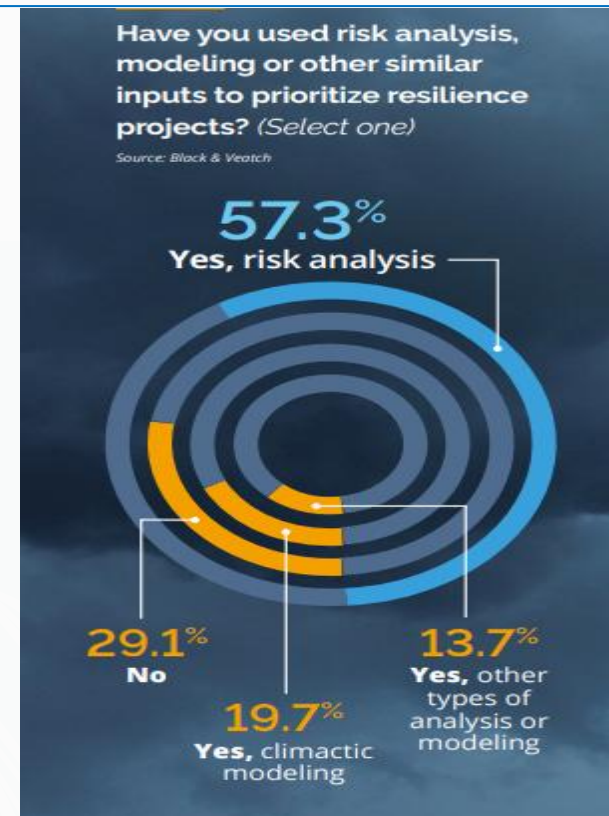
2. Global Power Sector Trends

- ❑ **Climate Adaptation** – focused on developing Power systems for the Contemporary Climate-end2end embedding climate risk and resilience quotients in ESI value chains.
- ❖ Conducting system climate risk and resilience assessments and developing mitigations
- ❖ Climate risk modeling and Network analysis;
- ❖ Employ mitigation measures to factors that degrade asset performance while balancing risk and cost.
- ❖ Smart grids, Self-healing technologies, embedded BESS, Dynamic load balancing, (a Digital Era)

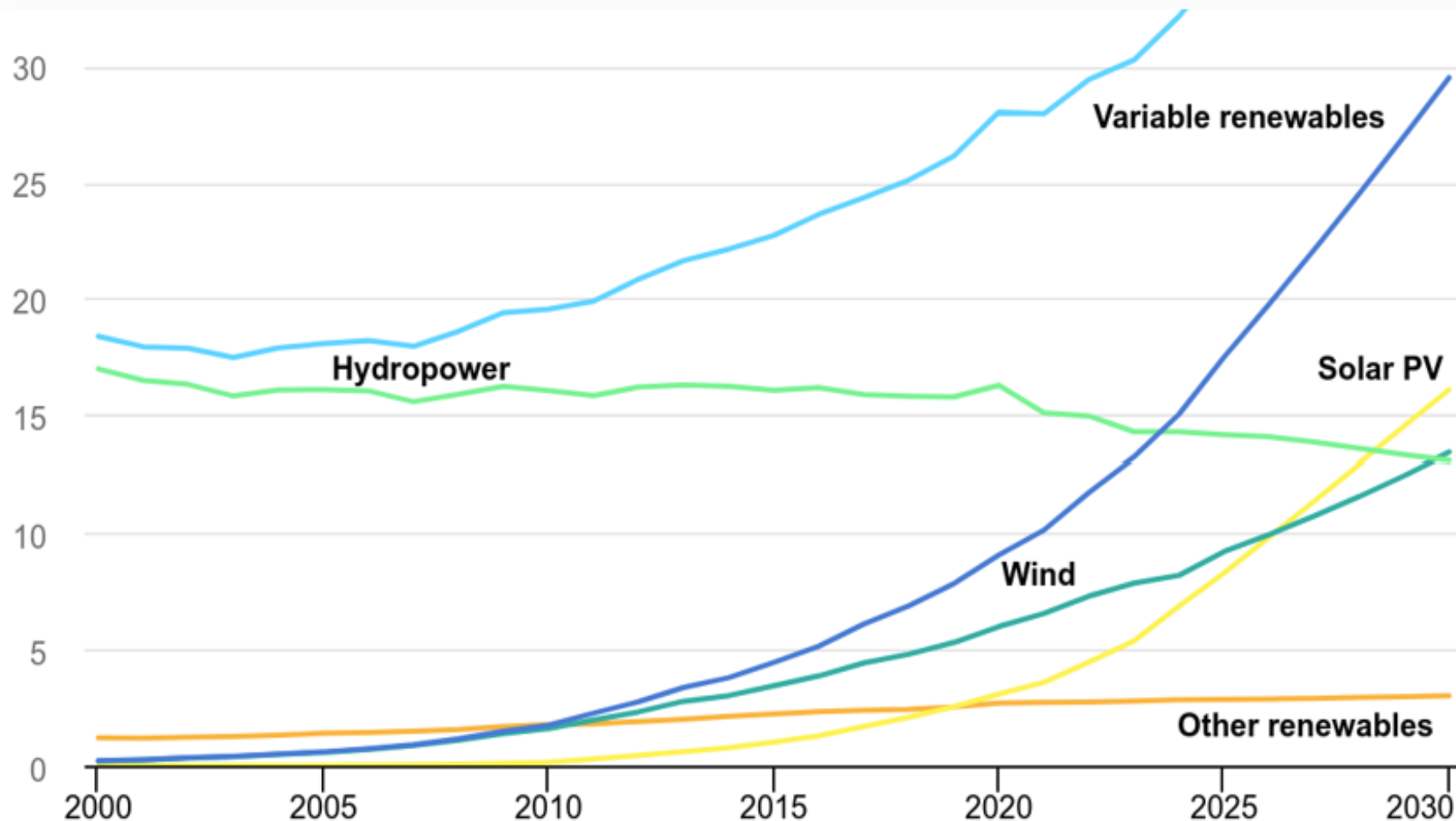


Common Issues;

- *How long will it take for service restoration after a climate disaster?*
- *Cases - hurricanes, floods, rising water levels, adverse hydrological conditions?*



2. Global Power Sector Trends



Source: IEA 2025

2. Global Power Sector Trends

2023 vs 2024 comparison of key energy and climate figures for G20 countries

G20 countries account for 80% of global energy consumption

Figures in orange: data for 2024

Figures in blue: data for 2023



+3.2%

+3.4%

Economic growth in line with its historical trend

At purchasing power parity

2010-19: +3.5%



+2%

+2.5%

Energy consumption is growing faster than its historical pace

2010-19: +1.4%



+1.1%

+1.9%

CO₂ emissions* are increasing again

2010-19: +1.2%

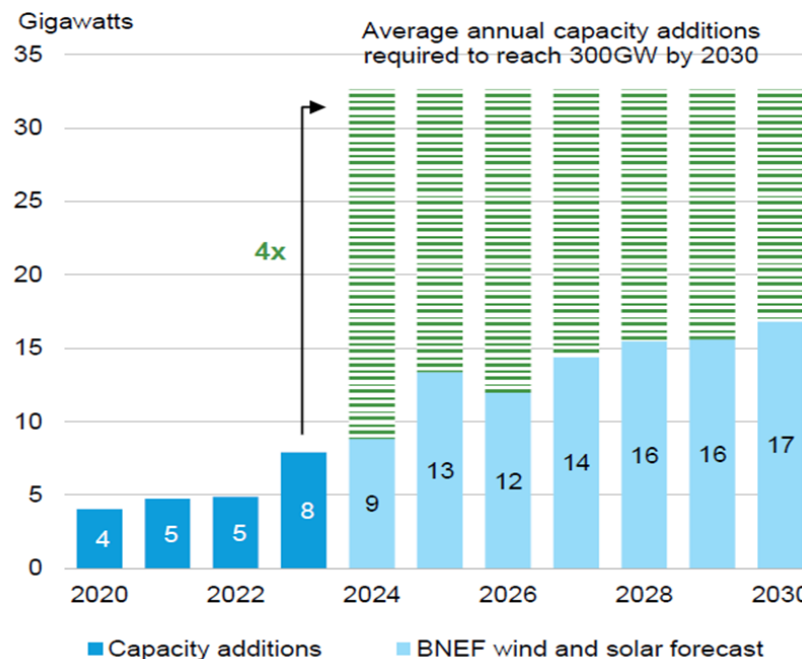
*CO₂ emissions from energy combustion (> 80% of CO₂ emissions)

Source: Enerdata Global Trends 2025

3. Africa Power Continental Trends

- ❖ The African Union has set a target of developing 300GW capacity of Renewable Energy by 2030 from 72GW (Dec 2023)
- ❖ With twin overarching goals of accelerating Decarbonization and Electricity Access
- ❖ RE capacity grew by 4.2GW in 2024 (7.2GW:2023), but for the 2030 goal to be a reality, we need 32GW capacity additions annually
- ❖ Africa attracted US\$15 bn in RE investment in 2023, but this was only 2.3% of the global total
- ❖ Egypt, Morocco, Kenya, and South Africa host >66% of these RE deployments (Wind, Solar, Geothermal)

Net renewable energy capacity additions, versus additions needed to meet the African Union's 2030 target



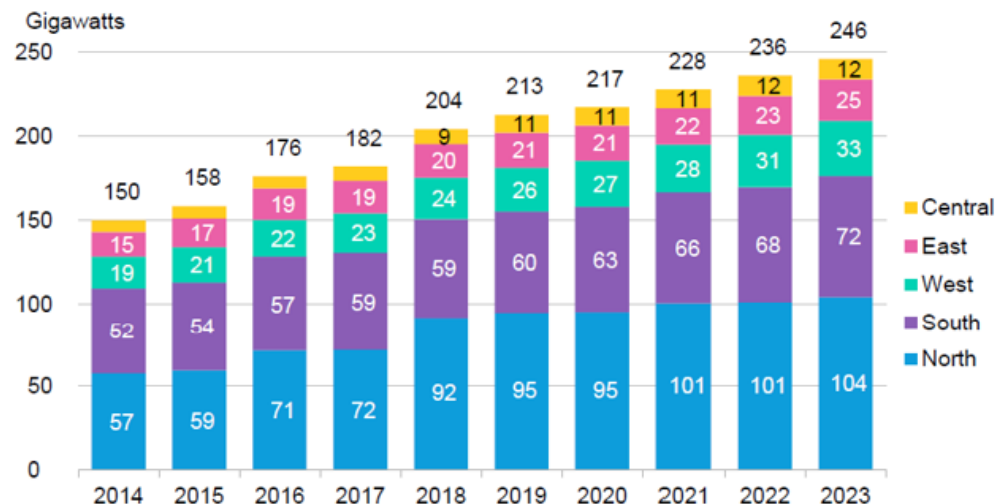
Source; Bloomberg NEF Report 2024

4. Generation Capacity Trends

- ❖ Africa had a total 246GW capacity by 2023 having grown by 64% in 10 yrs in which 104GW (42%) is in the North – mainly Egypt, Morocco & Algeria
- ❖ Southern Africa – had 72GW, therefore, North and Southern hold >70% i.e., the picture has not changed in 10 years
- ❖ By contrast here you have a concentration of countries with higher Access rates of >85% while the other regions largely lag on average <50% Access rates

✧ *Given the AU continental target of adding 300GW by 2030 and the growth trend in the last 10 years, what have been the challenges? How can these be overcome?*

Installed capacity by region, Africa

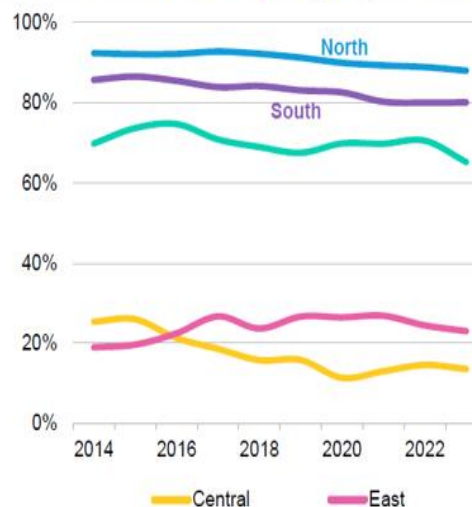


Source; Bloomberg NEF Report 2024

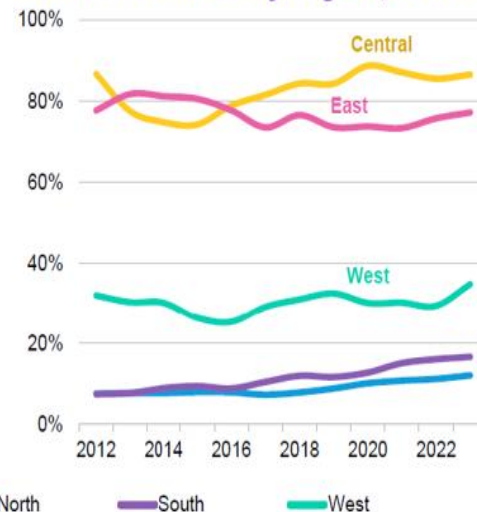
4. Generation Capacity Trends

- ❖ Africa's RE capacity has grown to 76.4GW in 11 years
- ❖ In this existing RE capacity, the bulk was Solar in SA, Morocco (wind) & Geothermal in Kenya, and to an extent, Hydro in Uganda
- ❖ North and South Africa dominate the fossil capacity, while East and Central Africa the low carbon
- ❖ Africa is still punching below its potential weight given its RE resources and natural endowments

Share of electricity generation from fossil fuels by region, Africa



Share of electricity generation from renewables by region, Africa

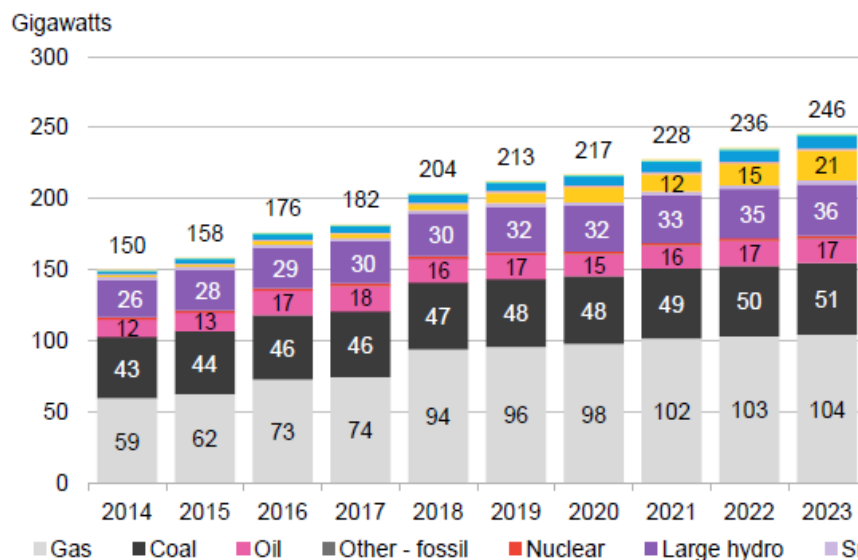


* *Key challenges identified;- Policy and Regulation, Limited progress in competitive auctions, and appropriate Financing*

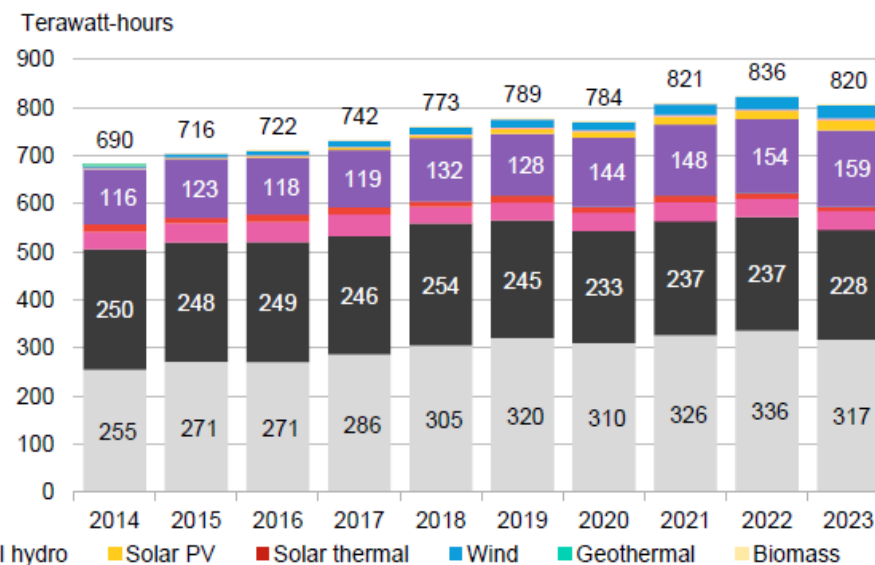
4. Africa Technology Trends

- ❖ In the 246GW continental capacity, 70% is still from fossil fuels a slight drop relatively from 76% in 2014. However, in absolute terms, there has been a doubling of RE from 34GW to 74GW by 2023
- ❖ In energy terms, RE sources contributed 29% of the 820TWh from about 17% in 2014, in absolute terms, it has more than doubled (120TWh)

Installed capacity by technology in Africa



Annual power generation by technology in Africa



Source: BloombergNEF. Note: 'Large hydro' is assets above 50 megawatts. 'Other – fossil' includes plants that use more than one fuel or fuels other than coal, oil and gas.

4. Africa Technology Trends

- ❖ Africa still has significant reliance on Gas (Egypt, Algeria) and Coal (SA, Botswana) these represent more than 70% of existing capacity
- ❖ While Africa's RE capacity has grown to 72GW in 10 years but remains slow and low vis-à-vis the 330GW target
- ❖ Solar and Wind technologies have advanced tremendously in the last 15 years. There is hope that in this phase BESS will be the unlocking magic to blow-wide the Utility-Scale Solar options, *(the wheels of innovation are spinning!)*



✧ *Let us have a conversation about how countries and utilities are shaping plans and committing resources to drive the next continental leap!*

5. Key Policy + Regulatory Reforms

COP Initiatives (COP 30 Brazil)- Energy Transition – the JET Partnerships, especially in North and Southern Africa

National Climate Responses – developed/revised Renewable energy policies- Onshore wind power (Germany growing by 150%), China 278GW Solar/80GW wind accounting 69%/70% global growth

Grid Open Access regulations – Regional regulatory Harmonization anchored by regional markets –WAPP, ERRA, EAPP, SAPP to facilitate power exchange and trade

In Uganda, the amended Electricity Act 2022 and subsequent supporting regulations- migrating from the Single Buyer Model

Permitting connections & Interconnections- promotion of DRE initiative, Net Metering Regulations, and growth of Prosumers

Establishment of Regional Regulators – ERRA, IRB, and the strategic intents of RERA in the SADC region



The Kenya's Alkaria Geothermal Plant

5. Key Policy + Regulatory Reforms



Establishing regional interconnection policies, harmonization protocols, pricing, and standards



Developing regional infrastructure master plans, e.g., the SAPP, Joint member projects/transboundary like the Rusumo Power plant, potential from UTIP



Continent-wide initiatives like the Mission 300 programme (AfDB & World Bank) and National Energy Compacts to accelerate Access to RE and Clean Cooking solutions



Innovative connection policies that target the vulnerable (social protection) and Productive Use of Energy (PUEs) to improve the financial sustainability of utilities/mini grids



Integrating incentives in fiscal policies like Tax rebates/exemptions for RE investments – Regional performance shows isolated, short-lived, & Inconsistent applications

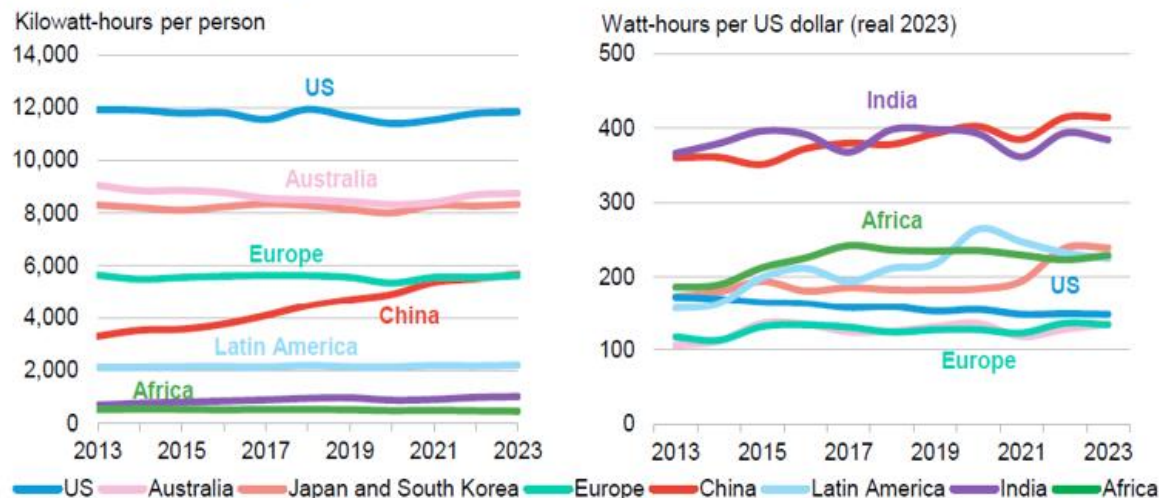


The Karuma Power Plant

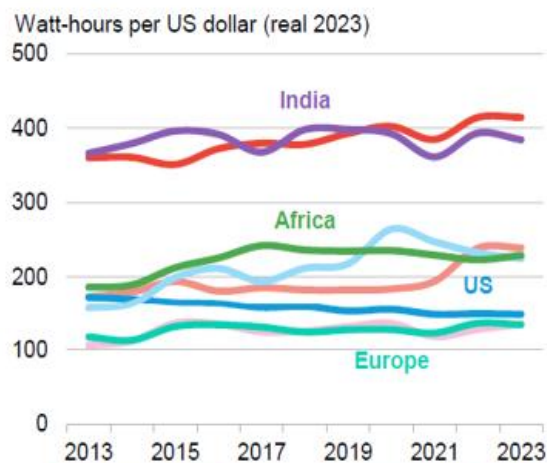
6. The Electricity Access Challenge

- ❖ The Access challenge rhymes with the picture given by per capital consumption using the global scale analysis, with Africa at the bottom
- ❖ Electricity intensity of GDP reduces as economies migrate from manufacturing-driven to services. India + China's positions illustrate it well
- ❖ Within Africa, the intensity is high in the Southern followed by the Northern. The low scale of the rest does not represent a shift to service-driven economies but rather confirms the low Access status and thus low industrialization

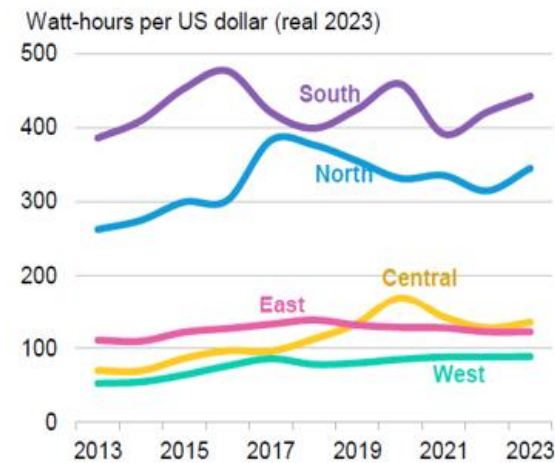
Electricity consumption per person by region



Electricity intensity of GDP by region



Electricity intensity of GDP by Africa sub-region



7. Growing Market-Based Approaches

- ✧ Policy makers and regulators allow critical private sector/market-oriented guidelines, regulations, and agreements to be blended
- ✧ Examples include – Publication of Feed-in Tariffs and Auctions to promote cost efficiency, service quality, and VFM
- ✧ Incentive schemes for increasing PUEs connections coupled with employment targets, e.g, cost recovery benefits
- ✧ Development of Energy Efficiency programmes supported by competent institutional arrangements
- ✧ Performance Improvement Programmes (PIP) with a clear incentive framework (Energy Compacts in M300)
- ✧ Promoting regional power trade- pricing and standards, and equalization protocols (Regional Regulatory initiatives
- ✧ Integration of Smart Grids, Customer-facing/touching facilities, and Regional Sector Databases/repositories



Grid Solar - Kabulasoke Plant, Uganda

✧ *Africa's electricity challenge is majorly precipitated by lack of effective planning and investment in new power Gen. T & D capacity, which is worsened by breakdowns and serious maintenance lapses of the existing, aging plants, transmission, and distribution network facilities; therefore, the need to adopt the systematic **Infrastructure Asset Management Discipline***

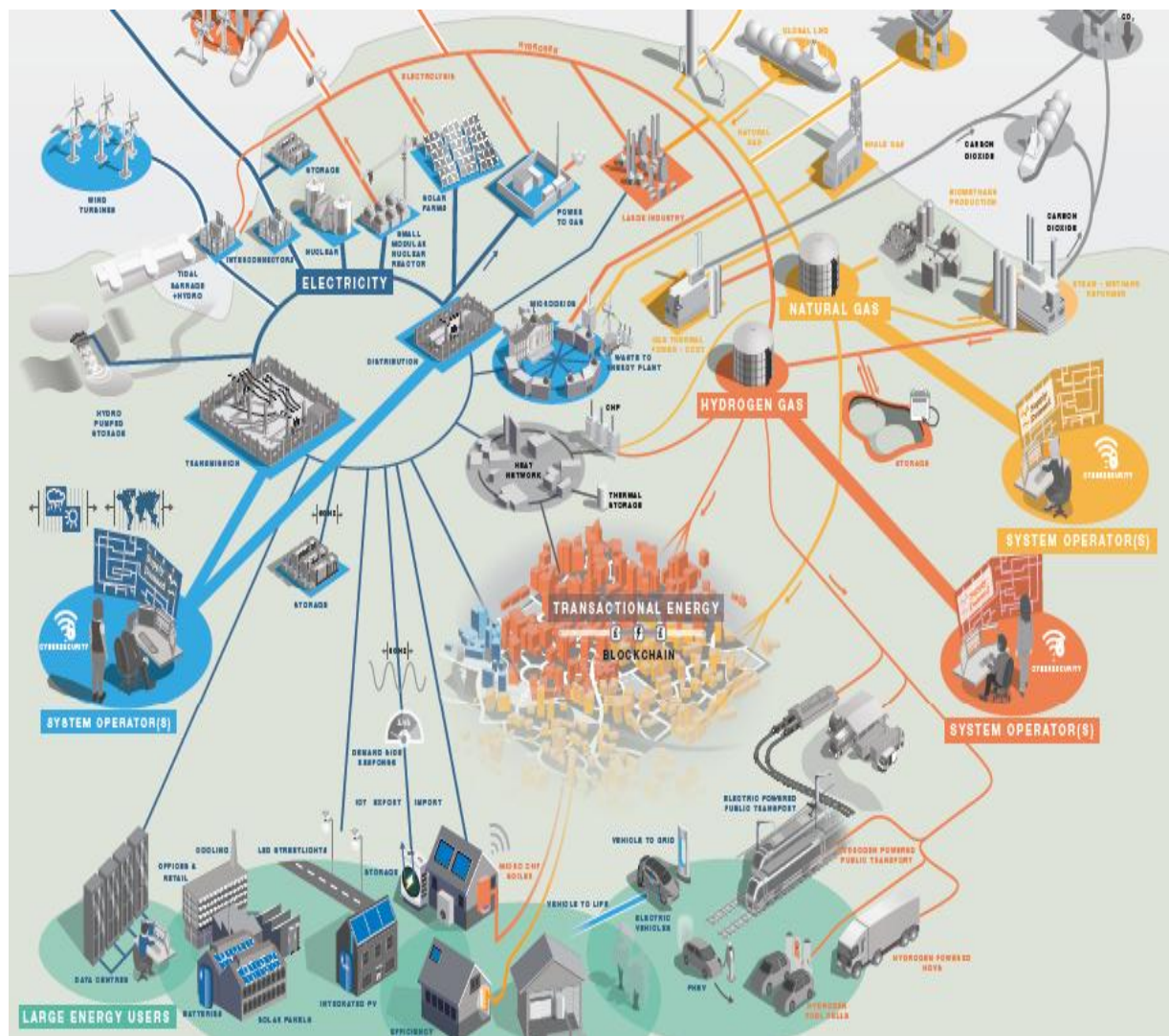


8. Concluding Observations

- ✧ There is a strong global push towards climate change mitigation- Renewable energy, Energy efficiency, and technological innovation
- ✧ A growing recognition of the need to optimise resources, undertake investments at scale, thus increasing the affordability and sustainability dividend- Power exchange & Trade
- ✧ The discussion of “a Just Energy Transition” will remain relevant in the medium term, and the performance of the various countries in their JET partnerships
- ✧ Geopolitical vulnerabilities reduce the appetite for effective policy execution and scare off investible funds
- ✧ Africa has a significant performance gap in expanding investments in RE and undertaking Access projects on scale
- ✧ Emerging Technologies, RE, and innovations in smart grids, data exchange, AI, have the potential for the sector to transform



The Kakira Bagasse Plant Controls



Enabling Decarbonization – 2050 ARUP, UK

**Merci
Beaucoup!**
*for your
Attention and
Participation*