Energy Transition and COVID-19 Pandemic – The Case of Sub-Saharan Africa*

By

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Presentation at the Conference of the Energy Committee of the World Federation of Engineering Organisations (WFEO), 6-7 October, 2021

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COVID-19 and Sub-Saharan Africa

- **Sub-Saharan Africa was the part of the World that was very negatively impacted by the COVID-19 pandemic lockdown. This was because in many of the nations:**
  - **The economies that were weak went into recession**
  - **Many of the citizens almost starved to death as the lockdowns deprived them from the daily incomes they rely upon**
  - **The 30% of the nations that rely on income from sale of oil and gas were most negatively impacted by the pandemic**

- **The recovery plans of most Sub-Saharan African nations is first to significantly strengthen their power sectors with due consideration to Energy Transition in line with UN's SDG 7 (clean energy) and SDG 13 (climate change consideration).**

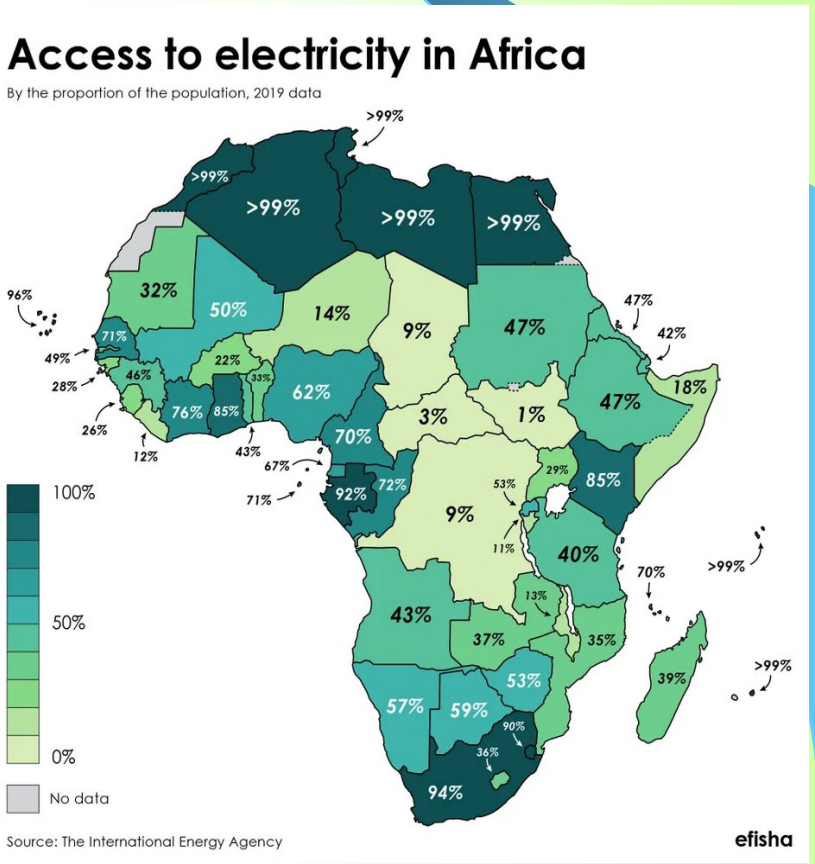
- **Most Sub-Saharan African nations have come up with what can be described as Economic Recovery and Growth Plans that are based on:**
  - **Tapping on large-scale agriculture and agro-allied industries**
  - **Setting up large-scale mines and mineral processing plants**
  - **Setting up manufacturing industries in areas they have comparative advantages**
  - **Significantly improving their tourism sites**

- **The critical role of engineers in strengthening African electricity supply industries as well as in modern agricultural practices, in mining and manufacturing in addition to the development of tourism sites cannot be overemphasized.**

Energy Access in Africa: Resources, Challenges and Opportunities

- Africa today is the continent with the worst energy poverty with about 680 million Africans living without access to electricity.
- According to the IEA, while currently the world average electricity consumption per capita is about 2,600 kWh that of sub-Saharan Africa is only 500 kWh!
- And while the world average electricity access is 87% that of sub-SaharanAfrica is only 43%.

- The top 12 African nations that have made commendable efforts in their electricity access rates are:
  - Mauritius with 100% access
  - Tunisia with 100% access
  - Egypt with 99.8%
  - Algeria with 99.1%
  - Morocco with 99.0%
  - Seychelles with 99.0%
  - Cape Verde with 96.1%
  - South Africa with 94%
  - Gabon with 92%
  - Eswatini with 90%
  - Ghana with 85%
  - Kenya with 85%



Energy Access in Africa: Resources, Challenges and Opportunities….Cont'd

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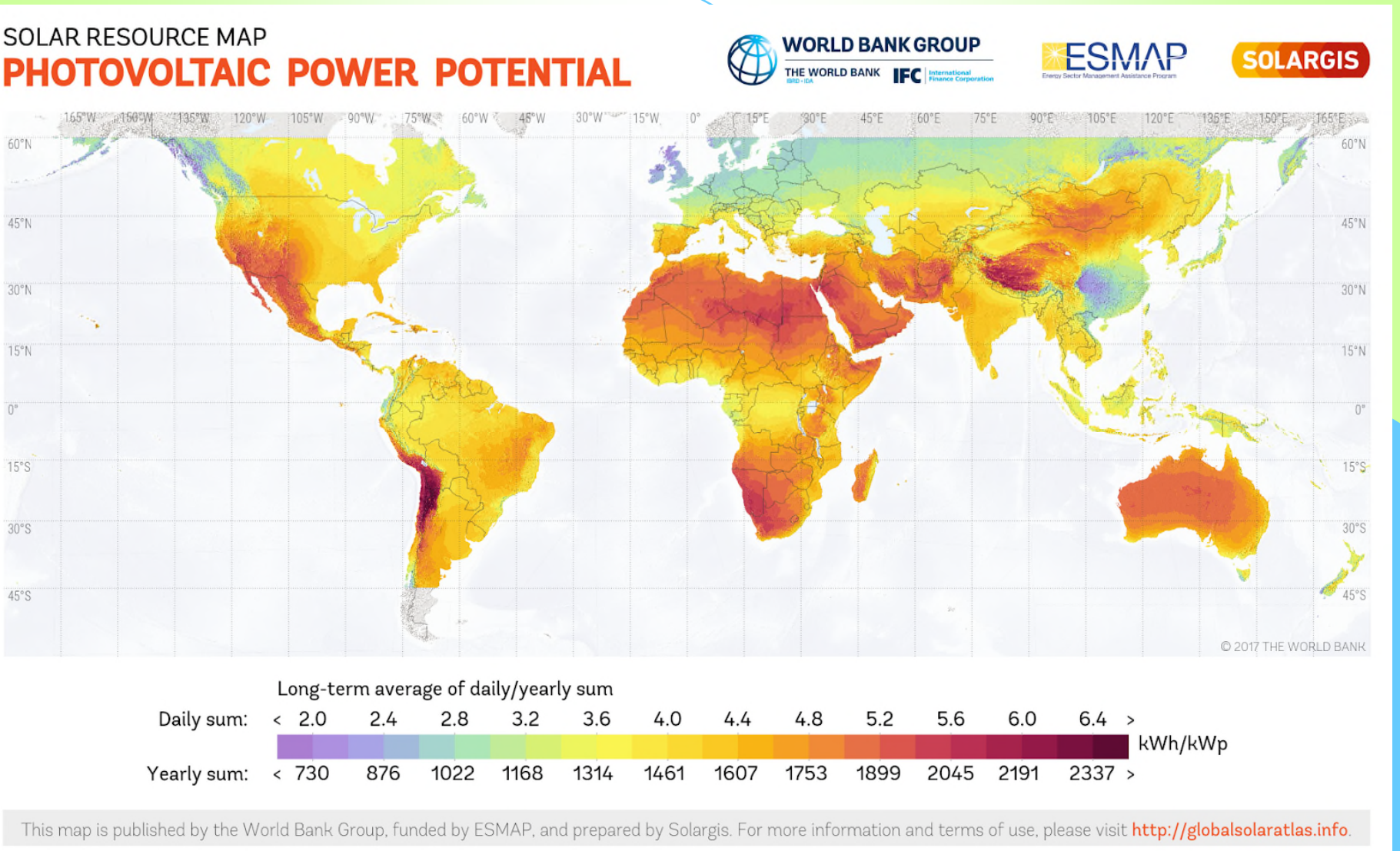

Energy Access in Africa: Resources Issues, Challenges and Opportunities....Cont'd

Challenges:

- **Inadequate energy infrastructure on ground and its low local contents.**
- **Inadequate indigenous human and manufacturing capacities.**
- **Shortage of funds for the investments in energy development.**
- **Inadequacy of appropriate national energy policies, plans and laws as well as regulatory mechanisms.**
- **Lack of good governance and mutual confidence amongst African States.**

Opportunities

- **Africa with a huge population of more than 1 billion people is a very large market for energy developers.**
- **Demand for energy would continue to rise due to demand for improved energy services in Africa. This would require heavy financial investments in energy infrastructure. Opportunities for businesses in the energy sector are and would therefore abound.**
- **Opportunities exist for national and regional cooperation.**

THE WAY FORWARD

To ENERGISE AFRICA for meaningful socio-economic growth will require sub-Saharan African nations, in particular, to:

- Produce a comprehensive scenario-based energy demand projections using modern energy modeling tools.
- The tools should be used on short, medium and long term time horizons covering the major economic sectors.
- An example of this is the 2050 Pathway Calculator which was recently used to determine the energy demand of Nigeria.

The Energy Commission of Nigeria used the 2050 Pathway Calculator energy modeling tool initially developed by the UK's Department for Energy & Climate Change, modified with Nigerian socio-economic parameters, to determine the nation's energy demand in MWyr as shown in the table below:

Sector	2010	2015	2020	2025	2030	2035	2040	2045	2050
Transport	-	-	238	298	357	417	476	536	596
Industry	3,557	4,357	5,309	6,426	7,076	10,444	15,497	22,692	33,372
Cooling	5,156	8,255	11,526	14,984	18,641	22,513	26,615	30,964	35,579
Lighting, appliances & cooking	4,345	8,053	13,979	25,706	36,979	49,129	60,008	70,837	82,405
Total	**13,159**	**20,665**	**31,053**	**47,413**	**63,054**	**82,503**	**102,597**	**125,030**	**151,951**

THE WAY FORWARD.....Cont'd

- Produce comprehensive energy supply strategy based on:
  - The outcome of the scenario-based national energy demand projections on all the economic sectors namely: industrial, transport, services and household
  - The United Nation's Sustainable Energy for All Initiative that calls for:
    - * Universal access to modern energy services by 2030
    - * Doubling the share of renewable energy in national energy mix by 2030
    - * Doubling the energy efficiency thereby reducing energy intensity by 2030
  - Support the trans-boundary projects of the African Union Commission under the aegis of the New Partnerships for African Development (NEPAD) which cover large-scale hydropower projects and regional interconnections.
  - Support regional energy projects that are being conceived and implemented by regional groups like ECOWAS, ECCAS, EAC, SADC and AMU.
  - Utilise reports of studies of the World Energy Council such as Issues Monitor and Energy Leaders Summits.
  - Embrace Elements of Integrated Resource Planning.

The Way Forward…..Cont'd

- **Integrated Resource Plans (IRPs):**
  - **Are roadmaps that large utilities use to plan for power generation acquisitions over 5, 10, 20 or more years.**
  - **IRPs examine foreseeable future resources with regard to transmission lines, substations, power plants, end users and utilities as well as operators responsible for transmission and distribution of electricity.**
  - **IRPs provide means of assessing the cost effectiveness of supply options as well as promoting enhanced transparency in in electricity supply transactions.**

- **A good IRP should be:**
  - **Fully integrated, comprise of conventional and renewable energy supply technologies and provide for energy efficiency as well as import/export of electricity.**
  - **Prepared by an all encompassing group of core energy planners, economic development planners, population growth experts, power plant operators and environmentatlists, amongst others.**

The next step for sub-Saharan African nations is for them to adopt the Global Energy Transition

The Way Forward….Cont'd

Energy Transition

- **Having noted that the SDGs as agreed upon by the UN and Paris Climate Change Talks of 2015 were unlikely to limit global temperature rise to 1.5 °C, the IEA produced the Roadmap to Net Zero CO_2 emissions by 2050.**

- **Global temperature rise arising largely from combustion of fossil fuels is the principal cause of global warming which if not curtailed will lead to devastating consequences with massive global floods, droughts, increased fire threats and disruption of agricultural productions along with scarcity of drinking water.**

- **African governments should faithfully implement the African Union's Agenda 2063 which was adopted in 2013 and which mandates African nations to produce and implement their Nationally Determined Contributions (NDCs) for abating Climate Change.**

- **Essentially, the NDCs should significantly focus more on renewable energy for electrification and electric vehicles in the entire transportation value chain.**

The Way Forward…..Cont'd

Renewable Energy Strategies

- **The African Business edition of September 2020 posited that even though there is a very visible increase in the uptake of renewable energy projects in Africa that can even be improved by the following steps:**

  - **Although there has been significant fall in renewable energy costs globally as occasioned by the favourable comparisons of their LCOE figures, such figures could even be lower if RE manufacturing plants are established in Africa.**

  - **Adoption of the South African Renewable Energy Independent Power Procurement Programme (REIPPP) which has even been adopted as global benchmark by many developed nations will go along way in entrenching good governance and transparency in African project development.**

  - **African governments should faithfully implement the African Union's Agenda 2063 which was adopted in 2013 and which mandates African nations to produce and implement their Nationally Determined Contributions for abating Climate Change.**

  - **Along the same vein, the AU's commitment to support joint projects of two or more countries along with regional interconnections has been highlighted.**

  From the foregoing the best RE strategies will involve local production of the components along with the auction-based financing scheme and as much as possible projects can be jointly developed, operated and maintained by two or more neighbouring nations.

The Way Forward…..Cont'd

The Place of Gas

- With intensive exploration activities over the past two decades about 14 sub-Saharan African nations are producers of oil and gas which contributes substantially to their export earnings.

- Although the global energy transition initially being promoted by the UN's SDGs and now by the 2050 Net Zero Agenda are strongly advocating the abandonment of fossil fuels nearly all the oil and gas rich African nations have vowed to continue using their gas.

- Taking Nigeria, which has gas reserves of more than 200 Trillion Cubic Feet which is the largest in the region as an example, its position is as follows:
  - Declared the years 2021-2030 as the decade of gas
  - Declared that its reserve to production of 128 years imply that opportunities for development of gas infrastructure and gas-based industries are vast and untapped.
  - Got the National Assembly to pass the Petroleum Industry Bill and which the President has just signed into law. It will harmonise and update the several petroleum Acts and make Nigerians to have more benefits from the sector.

The Way Forward…..Cont'd

The Place of Gas

The recent policy declaration of Nigeria also involved the following:

- **Fossil fuels remain relevant; maximizing domestic utilization to power the economy.**
- **Government takes a proactive carbon-reduction position, driving massive uptake in renewables investments and facilitating the much-desired regulatory & policy reforms.**
- **Commercialization/elimination of gas flaring.**
- **Resilient gas demand, as it becomes the strongest–growing fossil fuel for the nation.**
  - ✓ **Gas for Power**
  - ✓ **Gas for Transport (CNG, Autogas, etc.)**
  - ✓ **Gas for Industry & Chemicals**

- **The other 13 sub-Saharan African nations are expected to take positions similar to what Nigeria has done.**

The Way Forward…..Cont'd

Power supply plan or Electricity Generation Expansion Plan (EGEP), in MWyr, with Enhanced Renewable Energy based on the 2050 Pathway Calculator Demand

Sector	2010	2015	2020	2025	2030	2035	2040	2045	2050
Natural gas	2,099	5,596	13,522	18,775	18,775	18,775	18,775	18,775	18,775
Coal	-	-	-	2,998	9,069	9,069	9,069	2,998	2,998
Self Generation	12,641	18,085	14,267	16,347	12,768	2,115	-	-	-
Biomass	-	-	899	1,799	2,248	3,598	5,396	6,606	8,405
Nuclear	-	-	-	799	1,519	2,958	5,676	10,953	21,186
Wind	-	-	420	839	1,259	1,679	6,426	10,509	14,928
Hydropower	1,139	1,139	1,943	2,740	3,544	4,341	5,145	5,942	6,745
Small Hydropower	32	32	32	523	768	1,013	1,258	1,504	1,749
Grid Connected Solar PV	-	-	1,232	3,301	19,800	23,006	29,545	43,917	57,067
Concentrated Solar Power for the Grid	-	-	1,997	3,998	5,995	7,995	9,993	11,993	13,991
Off-Grid Solar PV	3	105	2,281	3,721	5,158	16,387	25,765	37,364	42,591
Electricity imports/export	(60)	(60)	(60)	(60)	1,378	2,816	4,254	5,692	7,130
Total	**15,854**	**24,897**	**36,533**	**55,780**	**74,181**	**93,754**	**121,302**	**155,253**	**195,565**

The Way Forward….Cont'd

Togo Launches 50 MW Solar PV Plant Commissioned in June 2021

The Way Forward…..Cont'd

310 MW Lake Turkana Wind Energy Project in Kenya

- **365 wind turbines each rated at 850 kW was commissioned in July 2019**
- **The associated overhead electric grid distribution system and a high voltage sub-station are connected to the grid**
- **Compare this with the 10 MW Wind Project in Katsina State**

The Role of Engineers

- **The post COVID-19 economic recovery and growth plans of Sub-Saharan Africa cannot materialise unless Engineers are fully involved in all the steps. This is because:**
  - **Engineers will be the ones to design the various electricity plants especially the Energy Transition ones and they will produce the implementation roadmaps.**
  - **As the EGEP of nations like Nigeria will have some sizeable carbon footprints, Engineers will work with other specialists to design CCS plants and forestry plantations to serve as the needed carbon sinks.**
  - **Engineers will be needed in ensuring that efficient modern agricultural production along with the establishment, operation and maintenance of agro-allied industries are undertaken.**
  - **Engineers will need to plan, design and operate both open-cast and underground mines and the mineral processing plants that are essential to add value to the mined ores that are available in huge quantities in all parts of Africa.**
  - **Engineers are the ones to build and equip African tourism sites with round the clock electricity, water and internet facilities.**
  - **Engineers are the ones to head manufacturing plants for the production of anti-COVID vaccines, personal protective equipment, breathalysers and related items.**

Conclusions

- **COVID-19 pandemic has clearly shown Sub-Saharan African nations that they need to take serious measures to significantly develop their economies such that future pandemics will not take their citizens to near starvation and will not allow their economies to slip into recession.**

- **The first action is for the nations to significantly expand their electricity access in line with global energy transition trends along the lines of UN's SDGs and also in line with their respective NDCs which most of them have already submitted to the UNFCCC.**

- **The unstoppable energy transition will lead to the gradual fall in demand for oil and gas and this means that the sub-Saharan African nations that depend largely on the income from the sale of the commodity must tap from other sources like agriculture, mining, manufacturing and tourism.**

- **Engineers have pivotal roles in both the strengthening of the energy sectors in line with global energy transition as well as in tapping from other sources of foreign exchange for the sub-Saharan African nations in addition to the production of the items needed to better manage future pandemics.**

THANK YOU

AND

GOD BLESS