Leapfrogging

Leapfrogging in the energy sector in Africa: The potential of renewable energy

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Renewables can revolutionise electricity access in Africa in a way not dissimilar to fracking in the US and by empowering locals rather than those further away. It is coming to Africa in three forms, namely:

- distributed local systems using renewables, mostly solar, wind and geothermal,
- the improvement and distributed installation of electricity storage systems, such as new types of batteries, and
- new technologies such as hydrogen and waste-to-biomass conversion.

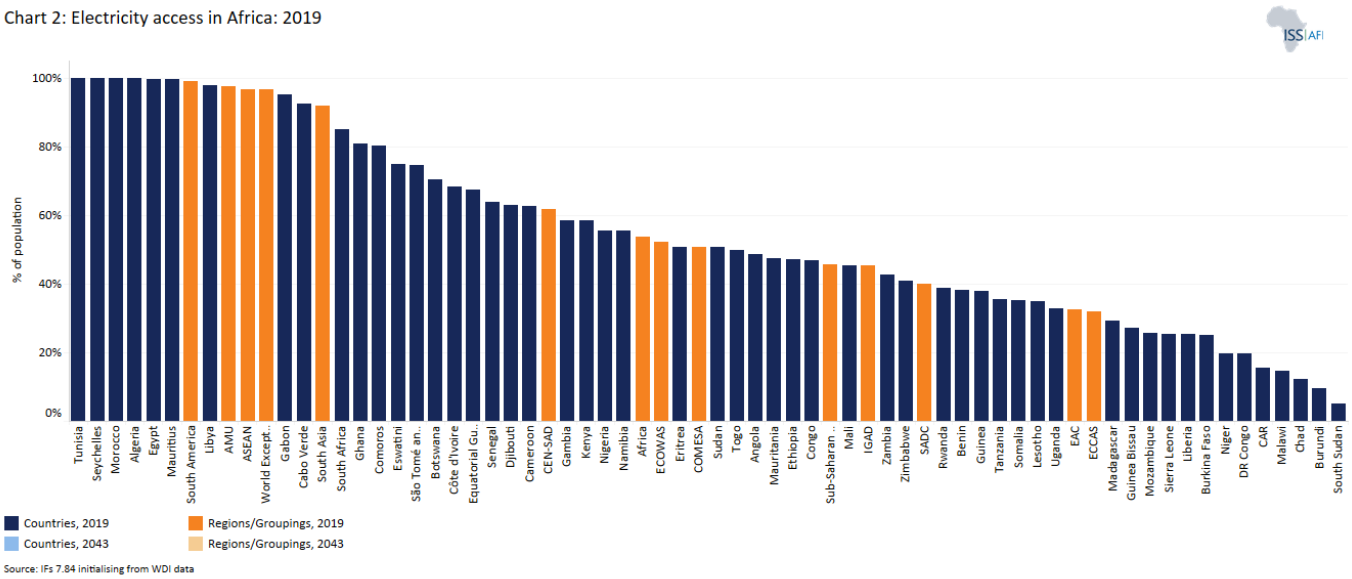
In much of Africa, electricity is often an unaffordable luxury, even where connections exist. The average retail price for electricity in Africa varies hugely. It can be as high as US$4.90/kWh in Liberia due to the high cost of running a backup generator during regular power shortages or as little as US$0.24 in Ethiopia.

Electricity con-sumption per person in large African countries (for instance, Ethiopia, Kenya and Nigeria) is less than one-tenth of that in Brazil or China. In poorer countries like Mali, a typical household uses less electricity in a year than someone in London uses to boil a kettle each day.

High electricity prices and intermittent supply mean that many African households don't access electricity from a central system. Those homes with an electricity connection often find the supply inconsistent and expensive. Lack of electricity also acts as a strong disincentive to private investment, especially in sectors where a dependable supply is crucial such as cold storage in the distribution of food from farm to consumer or minerals beneficiation and manufacturing. As shown in Chart 2, in 2019, only about 54% of Africa's population had access to electricity; this is in contrast to about 92% in South Asia and over 98% in South America, the other two developing regions that we benchmark against. The rapid electrification of the African continent would improve human development and economic prospects. On the Current Path forecast, more than a quarter of Africans would still not have electricity access by 2043.

Among its obvious economic benefits, affordable, reliable electricity eliminates the need to use traditional fuels inside the home for cooking, heating and lighting, thereby reducing the potential for respiratory ailments and allowing children to study longer at night. It would speed up education, improve health and allow for farming and micro-manufacturing.

Chart 2: Electricity access in Africa: 2019



Off-grid solutions could reach consumers in rural areas without the hefty expense of large coal, oil or gas-powered power plants linked to the hinterland through massive transmission lines and complex distribution systems. In sub-Saharan Africa, almost 60% of the population lives in rural areas. Rural electricity access in Central Africa was roughly 7% in 2019, in West Africa, it was 26%, and slightly better for East and Southern Africa. The average for sub-Saharan Africa is about 26%, whereas for highly urbanised and developed North Africa, it is at 97%.

In this context, mini-grids powered by the sun and wind independent of the larger national grid could provide many opportunities. These technologies can also be deployed much more rapidly than traditional electrification methods.

Globally, Bangladesh and Laos are two countries widely cited as having expanded electricity access particularly rapidly. Bangladesh increased access by about 50 percentage points in roughly 20 years, while Laos increased it by approximately 60 percentage points in 25 years. Kenya has made even more rapid progress.

Remotely deployed renewables are already bringing about major shifts in how Africa will provide electricity to its people. What could prove to be transformative, allowing cooking, space heating and energy-intensive economic activity is a breakthrough in energy storage technology, particularly inexpensive, fast-charging high-capacity batteries for electric vehicles and grid storage such as with anode-free sodium solid-state battery technology. Currently, electricity grids that include a large component of renewables have to allow large redundancies (surplus capacity) to meet demand on a guaranteed basis (so-called base-load capacity).

Among other things, distributed energy from renewables will facilitate the rapid expansion of communications and the Internet. These are important enablers for leapfrogging across dimensions as diverse as education and infrastructure.

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Dr Jakkie Cilliers is the ISS's founder and former executive director. He currently serves as chair of the ISS Board of Trustees, head of the African Futures and Innovation (AFI) programme at the Pretoria oce of the Institute, and is an extraodinary professor at the University of Pretoria. His 2017 best-seller Fate of the Nation addresses South Africa's futures from political, economic and social perspectives. His three most recent books, Africa First! Igniting a Growth Revolution (March 2020), The Future of Africa: Challenges and Opportunities (April 2021), and Africa Tomorrow: Pathways to Prosperity (June 2022) take a rigorous look at the continent as a whole.

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