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Energy storage technology will make blackouts in Africa ancient history

By Risto Paldanius

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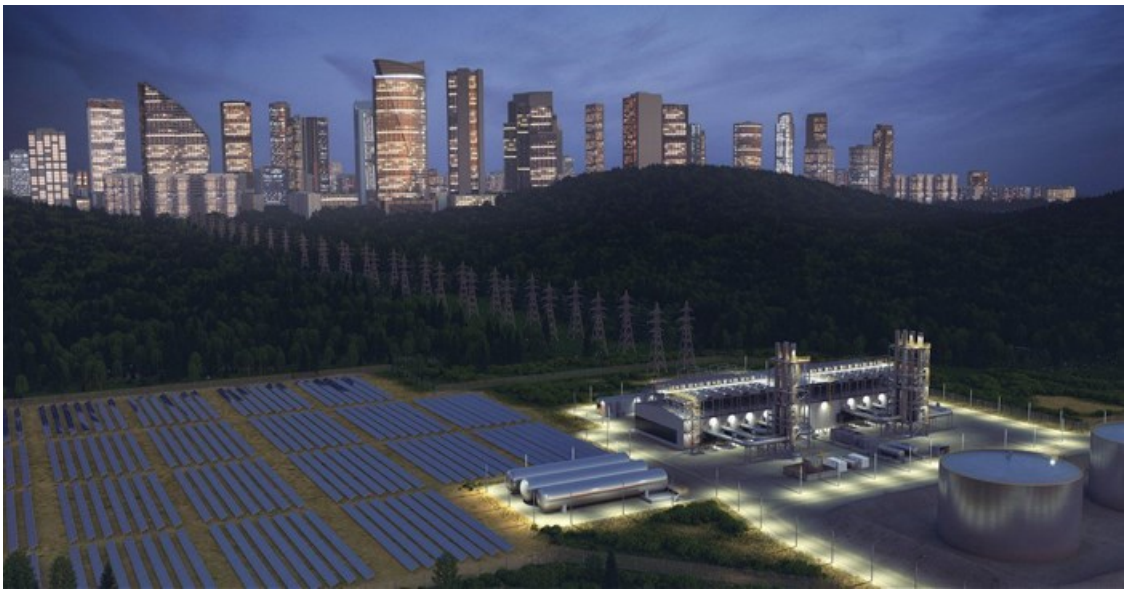
How can African countries build an electrical system that can both integrate a large amount of inexpensive, but intermittent, renewable energy, while at the same time ensure resiliency for the continent's blackout-prone grids?



This is where energy storage and flexible power plants come into play. Storage enables the integration of renewable energy on a large scale, bringing energy innovation to address the challenges presented by this developing energy hotspot.

Coping with the intermittency of renewables

Africa has one of the greatest untapped solar energy resources in the world, and with so much sunlight available, the cost of solar energy generation could easily be among the lowest in the world. But the road to get to considerable renewable energy integration could be bumpy. Most, if not all African countries, suffer from weak electrical grids, plagued with chronic power shortages and blackouts across the continent. And the social and economic ripple effects of a complete nationwide loss of power are not to be underestimated. Along with the growing demand for energy, the voices for more resilience against power disruptions also become louder.

Although renewable energy is increasingly affordable, its variability also remains a problem: the wind doesn't always blow, and the sun doesn't always shine. But the grid is built in a way that requires a consistent and equal balance between electricity supply and demand to function properly. Rising electricity demand and the increased deployment of intermittent renewable energy resources introduce an extra layer of complexity to the job of grid management.

Currently, old traditional power plants have been managing this balancing act with varying degrees of (un)success. Coal or gas turbine power plants don't have the flexibility to be switched on and off quickly, as required in response to shifting weather conditions or due to grid stability challenges. As Africa aims to integrate economical solar energy at a large scale, the inability of current grid capacity to respond to energy demand is likely to worsen unless we tackle the need for flexibility head-on.

Grid congestion as the primary cause of blackouts

The design of electricity networks in Africa has left utilities vulnerable to grid congestion issues that threaten reliability and cause blackouts. Grid congestion is a daily problem that occurs when the electricity system cannot carry enough energy to meet the demands of consumers or cannot distribute the “excess” energy. With the integration of intermittent renewable energy resources - such as solar and wind - this challenge becomes exacerbated on high renewable production periods, cloudy days or when there is no wind, potentially resulting in blackouts.

As such, energy storage technologies offer a game-changing solution for Africa. They have the unique ability to provide a buffer between supply and demand, enabling energy systems to rebalance during and after a disturbance. Moreover, storage can charge and discharge energy as required on demand, making it a key piece of the stable energy infrastructure needed to improve grid reliability and security in Africa.

There is no question that energy storage will play a central role in providing reliable electricity continent-wide. Relying on storage as the only form of flexibility, however, could be too expensive in the near-term. The lowest-cost, shortest path to a high-renewable electricity system also requires smaller flexible-generation plants. These include small, rapid-start engine power plants that can flexibility switch on and off in minutes and which can run on natural gas now and on renewable-derived fuels as it becomes cost-competitive and more widely available in the future.

Renewable energy will be at the heart of any significant energy transformation in Africa, bringing economic and environmental potential to the continent’s consumers and communities. Energy storage and flexible power plants will be its key enabler. The benefits are vast. Not only can utilities remove the expensive need to over-build energy infrastructure to ensure there is always enough power to supply to customers, they can also future-proof power generation supply, bringing the century-long age of the blackout to an end in an environmental friendly way.

ABOUT THE AUTHOR

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