



Banking, Finance & Projects

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SOUTH AFRICA

- Battery energy storage systems have become a core technology used to resolve challenges experienced by the African renewable energy market



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Battery energy storage systems have become a core technology used to resolve challenges experienced by the African renewable energy market

The modern world presents modern problems that have proven to be incompatible with solutions of the past. Modern transmission grids were not designed to accommodate decentralised renewable energy systems requiring substantial investment in transmission and distribution infrastructure. Africa is no different. Africa's energy transition faces both generation and transmission challenges.

This alert explores the basic questions of what a battery energy storage system (the system) is and the key performance parameters applicable to these systems.

At a high level, a battery energy storage system is a large-scale asset comprising lithium-ion batteries which store electricity derived from various energy sources like gas, nuclear, wind and solar to provide an on-demand power supply. It is effectively a clean, convenient and cost-efficient method of storing electricity for its supply, discharge and use.

Key technical advantages offered by such systems when forming part of a renewable energy solution for embedded (behind the meter) or grid-tied facilities include that they:

- Swiftly addresses grid challenges like under voltages, overloads and reactive power deficits by injecting or absorbing power, effectively alleviating network congestion during peak periods and significantly reducing technical losses.
- Efficiently absorb excess energy generated during low-demand periods, mitigating grid congestion and instability issues. Instead of curtailing energy output (an instruction by a system operator to limit energy generated by a facility), which results in energy wastage, the systems provide a more economically viable solution by storing this excess generated energy.
- Offer a solution to adjust the energy generated, which can be critical for grid stability, responding to supply and demand fluctuations, minimising outages, and ensuring reliable power delivery.
- Manage peak demand by discharging stored energy during high consumption hours, reducing grid strain and the need for costly peak power plants.





These systems are a relatively new technology deployed in South Africa, in response to the broad energy and grid infrastructure challenges, but are swiftly integrating to form a well-established market. This is evident through (i) Eskom's distributed battery energy storage systems project, which involves the development of a 360 MW storage system (equivalent to 1440 MWh, with four hours of storage) at various Eskom distribution sites in several provinces (Western Cape, Eastern Cape, Northern Cape and KwaZulu-Natal) (BESS Programme), similar to Eskom's Renewable Energy Independent Power Producer Procurement Programme; and (ii) the increased participation of financial institutions providing financing for installing the systems.

The key performance parameters for the systems include (but are not limited to) capacity, efficiency and availability benchmarks.

Capacity

Capacity relates to the total amount of energy stored and discharged by the system. It relates to the energy output that the system can distribute, and it poses a direct effect on revenue potential. The larger the system and its capacity, the greater the amount of usable energy it can store. This is the energy that a battery can release after it has been stored. The capacity is typically measured in watt-hours (Wh).

Availability

Availability plays a pivotal role in ensuring that the system delivers its contracted energy requirements during the span of its usage. It refers to the guaranteed period in time when the system is operational and

ready to discharge and deliver its contracted energy. This measures the total time the system is capable of a full or partial dispatch, adjusted for planned and forced usage. Most utility-scale contracts require a yearly Energy Availability Factor of between 93% and 98%.

Round-trip efficiency

Round-trip efficiency (RTE) represents the percentage of energy taken from the grid that is fed back into the grid after storage. A higher RTE means there is less energy lost during the charge and discharge cycles of the system. A system that achieves a higher RTE rating is therefore preferable to one that would produce a lower result.

The transition of such systems from an emerging to a core technology is now apparent in South Africa's energy landscape. This is evident through, among other things, Eskom's decision to establish its BESS Programme and lender appetite to provide funding for these installations alongside solar and wind renewable projects. The advantages of these systems are clear and are not just about generating energy without relying on fossil fuels. They also include the need to provide immediate solutions to the critical challenge of protecting the grid and acute transmission challenges. Despite the demand for such systems, key performance parameters apply in relation to capacity, availability and round-trip efficiency of each particular system. For lenders and project developers alike these performance parameters underpin the technical and commercial rationale for the installation and financing of the system.

Tsele Moloi and Aphiwe Qata

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Our BBBEE verification is one of several components of our transformation strategy and we continue to seek ways of improving it in a meaningful manner.

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