



Background

Tiaan Kruger Boerdery is a prominent agricultural enterprise located in the scenic Loskop Valley and Roedtan areas of Limpopo, South Africa. Known for its award-winning operations, the farm produces a wide range of crops including citrus, maize, potatoes, soya, cotton, tobacco and peanuts. In addition to crop production, the business is also involved in livestock farming.

Energy plays a critical role in Tiaan Kruger Boerdery's operations, particularly for irrigation and the movement of water to various storage dams. However, the region faces an unstable power grid with frequent outages. These disruptions severely impact the farm's irrigation systems, which rely on complex PLC-controlled pivots. Each outage requires the systems to be manually reset, often resulting in 2–3 hours of lost productivity.

Objectives

With the key main objective being to overcome these challenges and enhance their energy resilience, New Southern Energy (NSE) was contracted to design and build a solar energy solution tailored to the farm's needs. The system was procured through an outright purchase, allowing the business to take full ownership of the renewable infrastructure and benefit directly from long-term energy cost savings and independence.

Because of the farm's advanced irrigation equipment, implementing a Battery Energy Storage System (BESS) required a fully seamless transfer of energy during grid instability. NSE delivered a comprehensive solution, including the development, construction, and now ongoing operations and maintenance of the site, ensuring that Tiaan Kruger Boerdery continues to thrive despite the region's energy challenges.

The BESS plays a dual role:

1. Ensuring seamless energy transfer during grid instability to protect sensitive irrigation infrastructure and eliminate downtime.
2. Enabling tariff arbitrage on the Ruraflex tariff, by storing solar or off-peak energy and offsetting high-cost peak energy usage—maximizing cost savings and operational efficiency.

Quality management

Careful planning and logistics were key to delivering the energy system at Tiaan Kruger Boerdery, located around 250 km from the nearest urban hub. Despite weather-related challenges, such as flooding that cut off site access, New Southern Energy completed the project on time and to spec.

The system connects to the grid at 11kV and includes a fully enclosed inverter station along with a battery setup housed in a modified shipping container equipped with fire suppression.

Combined with solar PV, a generator, and water heating, the setup will ensure reliable, sustainable power for the farm's remote operations



↑ Inverter station

Solar solution

In order for the TKB Farm to reduce its reliance on traditional electricity, and benefit from the long-term savings of solar energy, a grid-tied renewable energy system was designed. The system now supplies the farm with 63% of its energy with the least possible impact on the environment.

The 1011.52 kWp | 1375kVA | 2431 kWh BESS system features 1854 x JASolar 545Wp panels which convert sun radiation into electrical energy, as well as 9 x Sungrow String inverters and 2 x Sungrow SCUD 1375 Battery inverters and 10 x 243.1 kWh SolarMD Battery Stacks.

This BESS solar system integrates with a Solar MD 2.431 MWh BESS solution and a 590Kva generator to ensure a seamless supply of power to this site.



↑ 1,1 MW Ground mounted Installation

System performance

The site was completed in April. 2024. The system has produced 1528 MW in its first year. Similar production numbers are expected annually in future.

The system's performance is monitored and controlled through a master controller, which can also communicate with the inverters. All of the data is logged and saved in cloud-based storage. Furthermore, the performance can be monitored in real time via a smart phone app.



The plant is currently overperforming by 3.26% compared to simulated value.



↑ MV Station

Operations and Maintenance

New Southern Energy manages the operations and maintenance of this solar plant. The system's performance is monitored daily and should any faults occur, technicians are dispatched to rectify it swiftly.

The panels are kept clean at all times to ensure optimal performance.