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Pitsana Mills: Ground-Mounted PV System with Generator Integration

“A Case Study in Innovation and Efficiency”

In an era where sustainable energy solutions are becoming more critical than ever, the recent completion of a 1 049 (DC), 875kW (AC) ground-mounted photovoltaic (PV) system integrated with generator support highlights the ingenuity and flexibility of modern solar energy systems. Designed to seamlessly blend renewable energy with traditional power generation, this project at Pitsana Mills amplifies how renewable and conventional energy can work together to meet demanding energy needs.



Pitsana Mills was established in 2004 and is located in Gauteng. The name Pitsana originated from Setswana word “Pi-tsa-na” that means a small pot.

Key Components of the System:

The PV system incorporates industry-leading components to ensure efficiency, reliability, and adaptability. Here's a snapshot of the system's core components:

- **Sivula Third-Party Plant Controller:**
This advanced controller manages the integration between the solar PV system and two 500kVA diesel generators, ensuring smooth operation and consistent power delivery to the site. It dynamically adjusts to varying energy demands while maximizing solar utilization.
- **Solar Panels:**
The system features 1,792 Canadian Solar 585W panels, providing a combined DC capacity of 1,048.32 kWp. These high-efficiency panels are engineered to perform optimally even under challenging environmental conditions.
- **Inverters:**
Seven 125kW Sungrow grid-tied inverters convert the DC power generated by the solar panels into AC power for onsite use.



Overcoming Challenges: The 330m Cable Run

One of the most significant engineering challenges in this project was the extensive 330m DC cable run between the solar farm and the grid-tied inverters. This required:

- **220m of Underground Trenching:** Carefully planned and executed trenching ensured that the cables were safely buried to protect them from environmental damage while minimizing energy losses.
- **110m of Overhead Cable Runs:** In areas where trenching was impractical, the team built 6m high overhead cable trays to securely run and fasten the DC cables to maintain human and equipment safety standards as well as system integrity.

To mitigate the potential for energy losses over such a long distance, high-quality, low-resistance DC cables were selected, and detailed engineering calculations were performed to ensure compliance with voltage drop limits.

Seamless Generator Integration:

The integration of the generators with the PV system was a critical aspect of this project. The Sivula plant controller ensures that when the diesel generators operate due to unscheduled outages; the PV system maintains the loading on the generators at a minimum of 35%, reducing diesel usage and minimizing carbon emissions. During normal operation, solar energy is the primary power source, with site utility acting as back-up during periods of low sunlight or increased load demand.



This ground-mounted PV system demonstrates how renewable energy solutions can be tailored to meet complex power needs. The integration of the Sivula third-party plant controller and backup generators showcases the flexibility of solar technology, while the innovative approach to the challenging cable run highlights the project team's commitment to delivering high-quality, practical solutions.

By combining clean energy with traditional generation, this project paves the way for a more sustainable and reliable energy future.