SOLAR STIK®

Hybrid Power Systems

Saving Lives and Enhancing Operational Capability

Figure 1 - The Solar Stik 3.0 kW TQG Hybrid Power System powering ISR assets

The Summary

Transporting fuel to the most forward austere location in Afghanistan is difficult, expensive, and presents a heavy logistical burden to the Warfighter. Depending on where deployed units are operating, this can be a dangerous task. Fuel convoys to these austere Combat Outposts (COPs) and Observation Posts (OPs) must traverse harsh terrain characterized by fatal hazards that include dangerous road conditions, winter weather, landslides, vehicle failures, accidents, and insurgent attacks. More than 3,000 Army personnel and contractors were wounded or killed in action from attacks on fuel convoys in Iraq and Afghanistan from FY 2003 to FY 2007. These fuel convoys also require the Warfighter to provide security that in turn, prevents them from conducting other missions. Some COPs and OPs in Afghanistan are inaccessible by road, and as a result the military relies on aerial fuel resupply, taking critical air assets away from the fight. The primary consumer of fuel at these distant COPs and OPs are fossil fuel generators.

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-DoD Operational Energy Strategy, 2011

The Challenge

There were two critical intelligence, surveillance, and reconnaissance (ISR) assets on top of an OP that were being powered by a 5.0 kW Tactical Quiet Generator (TQG). The 5.0 kW TQG ran almost constantly with little time dedicated to scheduled maintenance because operational necessities provided limited opportunities to shut down the system. The OP provided a nearby COP with much needed ISR and Force Protection capabilities. The heavy use and lack of maintenance likely led to both the primary 5.0 kW TQG and a backup 5.0 kW TQG to be damaged beyond repair. Consequently, the operators at the site employed a 60 kW generator because it was readily available and could operate longer between scheduled maintenance.

Figure 2 - Fuel tanks for a portable generator

Figure 3 - Marine working on broken generator

The two ISR assets required the 60 kW TQG to operate at only 2.5% of its rated capacity, severely underloading the engine. This inefficient use of fuel can shorten the service life of a TQG, and power surges from a poorly running generator can damage the sensitive electronic equipment at the OP. Daily refueling and an accelerated maintenance schedule also posed additional risks by preventing Soldiers from performing their primary missions of training the Afghan Army and conducting Village Stability Operations (VSO).

The Solution

By this time, the U.S. Army had already initiated programs to analyze energy efficiency on the battlefield. The Army evaluated several alternative energy systems that could potentially reduce fossil fuel consumption in theater. One of the systems chosen and deployed to Afghanistan was Solar Stik's 3.0 kW Hybrid Power System. Army Energy Advisors replaced the 60 kW TQG powering the critical ISR capabilities at the remote OP with the Solar Stik 3.0 kW TQG Hybrid Power System depicted in Figure 4.

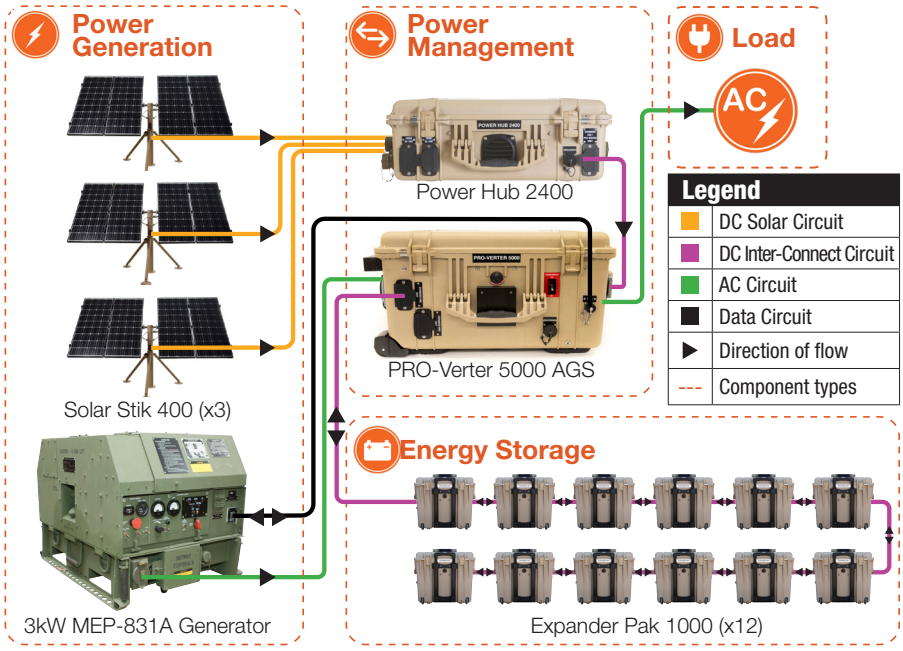

Figure 4 - The Solar Stik 3.0 kW TQG Hybrid Power System

The Solar Stik 3.0 kW Hybrid Power System is composed of rugged components that are proven to operate in extremely harsh environmental conditions and use simple principles for operation—scalability, adaptability, and autonomy. The modularity of the Solar Stik System allows for easy scaling up or down based on the load requirement, and the operator can choose the exact capabilities to meet their mission requirements. Open architecture allows for the integration of additional components often used in the field that are not native to the Solar Stik System. Batteries provide power on demand to the load, and only the exact amount of power that is required to support the load is used. The Solar Stik Hybrid Power System consists of power generation, power storage, and power management components that work in concert to ensure high overall operating efficiency and that the most operationally effective energy source is used first.

The hybrid system configuration employed at the OP to power the two ISR assets consisted of the following components:

- Three Solar Stik 360 Nano solar generators capable of up to 8.6 kWh of energy per day with good sunlight
- One DC Power Hub as a singular DC power source collection point and for solar charge control
- Ten Solar Stik Expander Paks for a total of 5–6 kWh of useful energy storage
- One PRO-Verter 3000 for intelligent power management
- One Power Distribution Module for additional AC and DC connectivity
- One 3.0 kW Tactical Quiet Generator (TQG) with auto-start modification

Figure 5 - Training taking place at the OP site

Figure 6 - The 3.0 kW TQG Hybrid Power System replacing the 60 kW Generator

"The three solar generators were capable of fully powering the ISR platforms during daytime, while the batteries provided sufficient power overnight."

The Result

Replacing the 60 kW TQG at the OP with a Solar Stik 3.0 kW Hybrid Power System provided immediate benefits to the Warfighter. The smaller hybrid power solution was capable of fully powering the ISR platforms. The 3.0 kW TQG automatically started when the batteries were discharged below a pre-determined level. When the generator was running, it ran at 100% of rated capacity, supporting the load and using the extra power to charge the batteries. The generator automatically stopped when the batteries were fully charged. This reduced the need to refuel the generator and conduct generator maintenance, thus decreasing the amount of time Soldiers spent navigating dangerous terrain and away from their primary mission. The 3.0 kW Hybrid Power System enabled self-sufficiency and provided the Warfighter with a highly robust uninterrupted power supply. It ensured the mission-critical persistent ISR was reliably available. The Solar Stik 3.0 kW Hybrid Power System also eliminated the power surges that were damaging sensitive electronic equipment.

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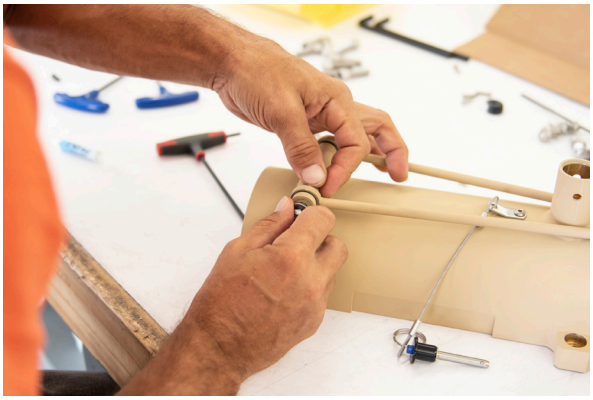

Why Solar Stik

Solar Stik is the premier manufacturer of portable hybrid power systems for military applications in the 1 to 15 kW power spectrum. It pioneered the design and manufacturing of scalable, modular system architectures used to alleviate the logistical burdens of providing power in remote, off-grid locations.

Contact

13 North Leonardi Street
St. Augustine, FL 32084
800.793.4364 (toll free)
www.solarstik.com