

### Customer Motivation:

Seeking a low-maintenance backup power system to assist the existing Solar Power System during the winter months at a remotely located Railroad Signal/PTC site in rural West Virginia.

Before the PowerGen 1200 was installed the customer was using portable gas generators to keep the site up and running during the winter months. While portable gas generators are widely available and relatively low cost, they require frequent attention and maintenance. The customer had to regularly send service personnel out to the site to refuel the generator, change the oil and even swap out generators over the course of a few months. The customer knew they needed a low maintenance, long-term solution.

### PowerGen 1200 Series

Pioneered in space and designed for rugged and remote operation, Qnergy's PowerGen 1200 Series Stirling Engine Generator seamlessly integrates with the existing Solar Power System to provide reliable backup electrical power supply to this Railroad Signal/PTC location in rural West Virginia. Based on Qnergy's no-maintenance and highly reliable PCK series Stirling Engines, the PowerGen 1200 is powered by propane to generate clean, dependable power up to 1.2kW to feed battery charging and ancillary equipment.

### Stirling Engine Technology

Qnergy's Free-Piston Stirling Engine (FPSE) generator can transform virtually any heat source into electricity. Once heat is applied to the FPSE the heat exchangers maintain a temperature differential across the engine causing the helium to shuttle back-and-forth inside the engine, expanding and contracting. The oscillating helium drives the linear reciprocating motion of the piston, which by means of an integral linear alternator, directly converts the reciprocating motion of the piston into electrical power.

The Qnergy engine has fewer moving parts than traditional kinematic Stirling Engines, and no direct-contact points that cause wear and require lubrication. The PowerGen 1200 is truly a maintenance-free solution that offers 80,000+ hours of reliable performance, two key features that make it an ideal and cost-effective backup power source for this remote Railroad Signal/PTC location.

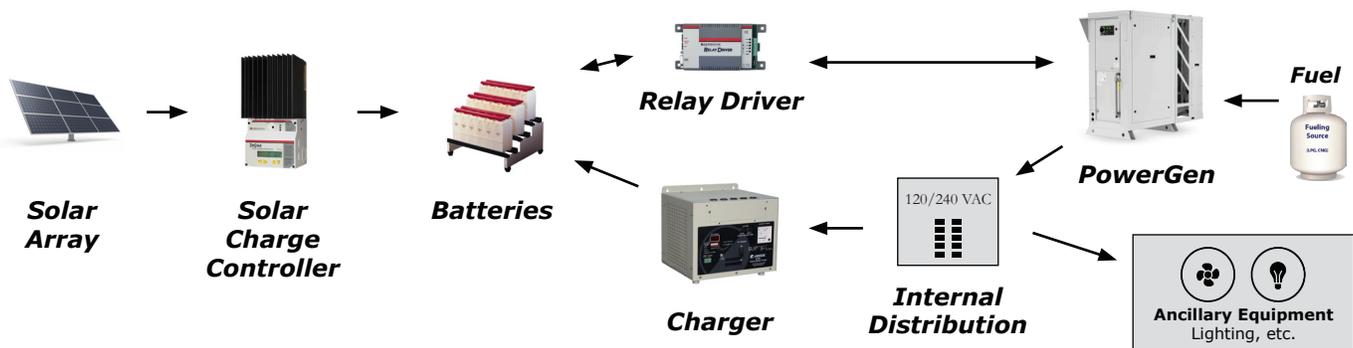


# Case Study

## PowerGen 1200 Providing Backup Power to Railroad Signal/PTC Location in West Virginia

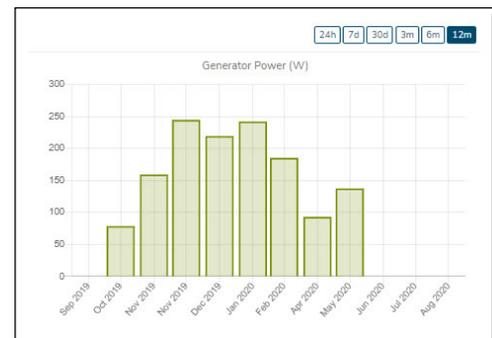
### System Overview

The PowerGen 1200 is well suited to provide backup power to the existing Solar Power System to charge batteries. When batteries dip below a certain lower threshold voltage, the PowerGen will be triggered to start via a relay driver. The PowerGen's standard 120/240 VAC output feeds into the sites distribution panel to feed a charger to charge batteries and/or feed power to ancillary equipment. Fueling requirements and runtime of the PowerGen are greatly reduced when used in a solar hybrid configuration as the PowerGen is only periodically called upon during winter months and/or times of limited solar production. Once batteries are fully charged, the PowerGen will return to standby mode.



### Standby Operation

In this application, the PowerGen 1200 is often in standby mode. A 30W Solar Panel and Regulator are provided to charge the systems internal 80Ah battery while the unit is in standby. This system also includes a battery trigger module, should the internal battery voltage drop below a predefined level, the PowerGen 1200 will automatically start.



### Remote Monitoring

The PowerGen 1200 is equipped with Qnergy's SmartView Remote Monitoring System. This web based monitoring solution allows the end user to view real-time and historical operational data on their desktop computer, laptop or smartphone.

**RedHawk Energy Systems, LLC**  
10340 Palmer Rd., S.W.  
Pataskala, OH 43062