

Customer Motivation:

Pilot testing new technology to determine if it meets their requirements for long-life, low maintenance continuous-run and/or backup power for railroad wayside applications.

Type of Site:	Off-Grid Railroad Signal Control Point
Location:	Spokane, Washington
Load Profile:	325watts Continuous

Background:

Due to a recent increase of power usage at off-grid site due to PTC, the customer was in need of additional power generation to obtain the required average 325 watt continuous power draw. The existing site featured power generation from Solar PV and a small Wind Turbine, with the harnessed renewable power being stored onsite via a large 12VDC battery bank. With the recent increase in power usage and the extremely erratic availability of both wind and solar sources during the winter months the site was deemed to have insufficient power supply and in immediate need of an additional dependable power source.

To meet this need Qnergy provided a Remote PowerGen Stirling Engine (fueled by propane) as a source of additional power to charge the site's battery bank in times when the renewable power is insufficient in maintaining sufficient charge on the battery bank. As part of the pilot test Qnergy monitors and supplies periodic performance reporting of the power output as well as any site-specific testing done on this unit.



Performance Report:

July 1, 2017 to Aug 31, 2017 (Commissioning Date: June 28, 2017)

Avg Unit Electricity Production (During Oper.)	Total Period Electricity Production	Total Period Operating Hours	Total Period Power Availability (%)
3190 watt	465kW-hr	146 hours	100%

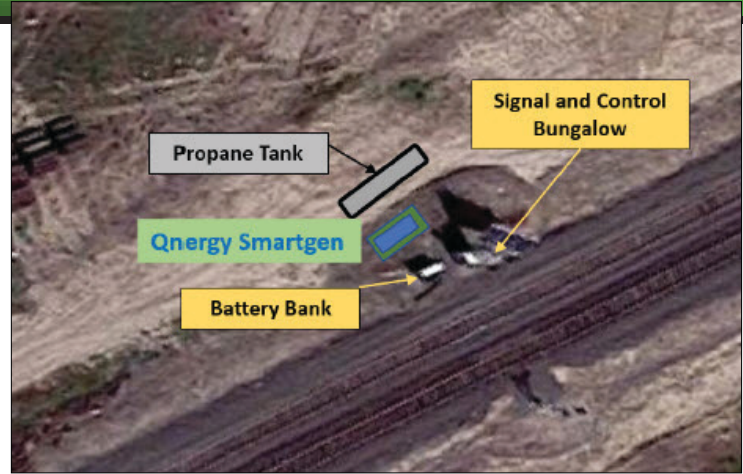


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Site Installation:

The PowerGen was installed adjacent to the railway, 15ft west of the signal and control bungalow and is connected to a 1000-gallon propane tank. The unit's 240VAC single phase electrical output is coupled directly to the main electrical input panel of the bungalow. The power panel in the bungalow distributes power to the various loads, primarily the 12VDC battery charger (in addition to 120VAC facility lighting loads).

Qnergy Free Piston Stirling Engine Technology:

Using a highly efficient thermodynamic process, Qnergy's Free Piston Stirling Engine (FPSE) can create electricity from virtually any heat source. The heat input creates a temperature differential across the engine causing the helium inside the engine to expand and contract, which in turn drives the reciprocating motion of the piston. The FPSE directly converts the reciprocating motion of the piston into electrical power via the linear alternator inside the engine.

Key Features & Benefits:

- Continuous or intermittent power for remote applications
- Powered by propane, natural gas or well gas
- Ultra quiet operation
- No lubrication required
- Remote monitoring and control
- Battery charging capability
- Hermetically sealed engine = zero maintenance
- 10-15 year design life
- Max Continuous Power: 4kW (24VDC) / 6kW (48VDC)
- Output Voltage: 24/48VDC (120/240VAC)



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