

Customer Motivation:

Seeking an ultra-reliable solution to power a remotely located intermediate signal and PTC location alongside a river.

| | |
|----------------------|--------------------------------------|
| Type of Site: | Off-Grid Railroad Signal & PTC Tower |
| Location: | Wickliffe, KY |
| Load Profile: | 136Ah/day at 12VDC |

System Sizing Basis:

The system was sized using a load profile estimate below totalling 136Ah/day at 12VDC. Based on the load profile the solar system alone (with no additional losses factored in due to shading) offers a high-degree of reliability and average array to load ratio (ALR) of 2.04. Minimum ALR of 1.44 occurs in December. The system battery bank provides 7.8 days of no-sun reserve capacity in-line with the potential maximum number of no-sun days for the region per NASA Surface Meteorology data. A supplemental Solid Oxide Fuel Cell system has been included to offer an even greater degree of system reliability. The Solid Oxide Fuel Cell operates via voltage sense wiring tied directly to the battery bus with configured turn “ON” and “OFF” levels to ensure that the battery does not fall below a specified voltage threshold. Telematics software provides remote monitoring and alarm notifications for designated maintainer/supervisor personnel.



1060W Solar System w/RP Series Retractable Mast

| Load Description | Load Detail | Duty Cycle %(hrs) | Total |
|--------------------------------|---------------------|-------------------|---------------------------|
| Signal Lamps (est) | 3.6A (1.8 per bulb) | 33% (8 hrs) | 28.8Ah/day |
| PTC Radio | 1A | 100% (24 hrs) | 24.0Ah/day |
| WMS Transair DTS-2000 (active) | 1.7A | 33% (8 hrs) | 13.6Ah/day |
| WMS Transair DTS-2000 (idle) | 0.6A | 67% (16 hrs) | 9.6Ah/day |
| Electrocode 4/5 (typical) | 2.5A | 100% (24 hrs) | 60.0Ah/day |
| Total Daily Load: | | | 136Ah/day at 12VDC |



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RHCaseStudyRRFCCN-PTC

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Solar Power System

The R1060 Solar Power System was designed using high quality components and combined in a manner to ensure proper battery charging under the range of expected on-site conditions and customer loads. The system features our patented 20' RP Series Retractable Mast which allows personnel to raise and lower the mast via a hand-crank or power drill for safe and convenient installation, maintenance and troubleshooting.

Solar Charge Controller

Regulation of the Solar output is provided by Dual Morningstar TriStar 60 MPPT controllers with backplate, meter and AAR terminal blocks. The controller is housed inside the Battery Box and prevents the overcharging of the batteries.

Batteries

The system battery bank consists of (2) parallel strings of (10) cells of Saft Sunica.plus 660AH Ni-Cd Batteries. Saft Sunica.plus Ni-Cd Batteries feature excellent high and low temperature performance, abuse tolerance and very low maintenance.

Battery Box

A 56"L x 56"W x 24"H All-Welded Aluminum Battery Box provides excellent year-round protection for the system batteries. The Battery Box features fully insulated paneling, pre-fitted conduit access and a tamper resistant lockable lid.

Solid Oxide Fuel Cell

The Ultra-USSI P250i Solid Oxide Fuel Cell provides extended run backup power protection to the Solar Power System during periods of inclement weather. Powered by propane, the P250i sits in standby mode until the batteries dip below a certain pre-determined threshold voltage. After a 25-30 minute startup, the P250i will charge the batteries and power the load. Telematics monitoring provides real-time and historical operational visibility to reduce site trips and maximize uptime.



1060W Solar System w/RP Series Retractable Mast



(20) SUN+660 Batteries & Battery Box



P250i Solid Oxide Fuel Cell



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