



Hybrid Power System

Grassy Mountain Solar Electric Installation

Hybrid Power
Case Studies



This electrical system was built and installed for a county application in Southwestern Colorado as part of a project to improve emergency communications in the area. The site is located 9700' in elevation up a narrow and steep ATV path. An 800mZ repeater radio is the major load on-site with additional DC and AC power provided for local emergency service – fire, rescue and police - communication.

The combined load of all the communications systems is just over 50kWh per day – roughly equivalent to the electrical demands of two “average” grid connected homes. Not surprisingly the mandate for this electrical system was “extreme reliability” so two sources of power generation are available at the Grassy Mountain site. A 13.86kW PV array is the prime source of energy and it is backed up by a 20kW diesel generator.

System Specifications:

Modules:

ASM 165 84Vmp 34.8Vdc

Array:

42 Strings of two modules
13.68 Kilowatts

Racking:

14 Top of pole mounts
Custom engineered to withstand
125mph wind load
14 top of pole racks each holding
6 modules (3 strings)

Combiners:

4 12 String Combiners
3 are fully populated with the
output of 4 mounting frames
1 is half populated as the system
has room for expansion

Controllers:

4 Apollo T80 MPPT Controllers
1 for each Combiner

BOS:

Argus 400 Amp Power Plant

Power Conditioning:

5 3.6kW Argus Cordex 240 to
48Vdc rectifiers
120Vac INEX 1000VA inverter
wired in parallel
1 48 to 24Vdc converter

Batteries:

48 2Vdc 2 YS-31-PS cells
6030 Amp hours @ 72 hour rate
connected in two strings of 48Vdc

Custom 400 Amp AC/DC System

System options include:

- Load breaker panels
- INEX AC inverters - 120Vac
- DC to DC converters - 12Vdc, 24Vdc, 48Vdc
- AC Generators
- A wide range of batteries customized for the application
- ADIO card allows multiple remote inputs creating a single alarm platform

The heart of the system is the Argus 400 Amp Hybrid Power Plant which integrates input from the solar chargers and the AC powered rectifiers into the DC bus. The PV array is divided into four sub arrays each feeding an Apollo T80 MPPT charge controllers – these are connected together in a master-slave network which allows them to share common settings. The slaves communicate energy harvest information to the master.

The solar system on this site is not intended to meet 100% of the power requirements, it was designed to meet 86% with the remainder of the power coming from the 20kW diesel generator which is on site. The 240Vac output of the generator is converted into 48Vdc by a bank of Argus Cordex™ 3.8kW rectifiers. The hybrid nature of this system – PV assisted by a generator – maximizes battery life and minimizes the risk of loss of load.

