

Hybrid Power System

Grassy Mountain Solar Electric Installation in Colorado



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 at an elevation of 9700' up a narrow and steep ATV path. An 800Mz repeater radio is the major load on site with additional DC to AC power provided for local emergency services including fire, rescue and police communication.

The combined load of all the communication 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 system was “extreme reliability” so two sources of power generation were specified at the Grassy Mountain site. A 13.86kW PV array is the prime source of power and a 20kW backup diesel generator.

The heart of the system is the 400A 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.

System Specifications	
Modules:	ASM 165 84Vmp 34.8VDC
Array:	42 strings of two modules, 13.68kW
Racking:	(14) pole-mount racks holding 6 modules (3 strings), custom engineered to withstand 125MPH wind load
Combiners:	(4) 12 string combiners, three are fully populated with the output of four mounting frames, one is half populated as the system has room for expansion
Controllers:	(4) Apollo T80 MPPT controllers, one for each combiner
Balance-of-System:	Argus 400A power plant
Power Conditioning:	(5) 3.6kW Cordex 240 to 48VDC rectifiers, (1) 120VAC INEX 1000VA inverter wired in parallel, (1) 48 to 24VDC converter
Batteries:	(48) 2VDC 2 YS-31-PS cells (6030Ah @ 72hr rate connected in two strings of 48VDC)

The solar system on this site was designed to meet 86% of the site’s power requirements with the remainder of the power coming from the onsite 20kW diesel generator. The 240VAC output of the generator is converted into 48VDC by a bank of 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.



Progression Photos

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Remote mountain top installation



Mandate for installation was extreme reliability



Custom engineered to withstand 125MPH wind load



14 top-of-pole racks each hold 6 modules



Features an Agrus 400A hybrid power plant



Hybrid system includes a 20kW diesel generator and 48VDC battery bank



Solar power contributes 86% of required load



Configuration maximizes battery life and minimizes risk to load



Alpha engineers provided on site commissioning and customer training