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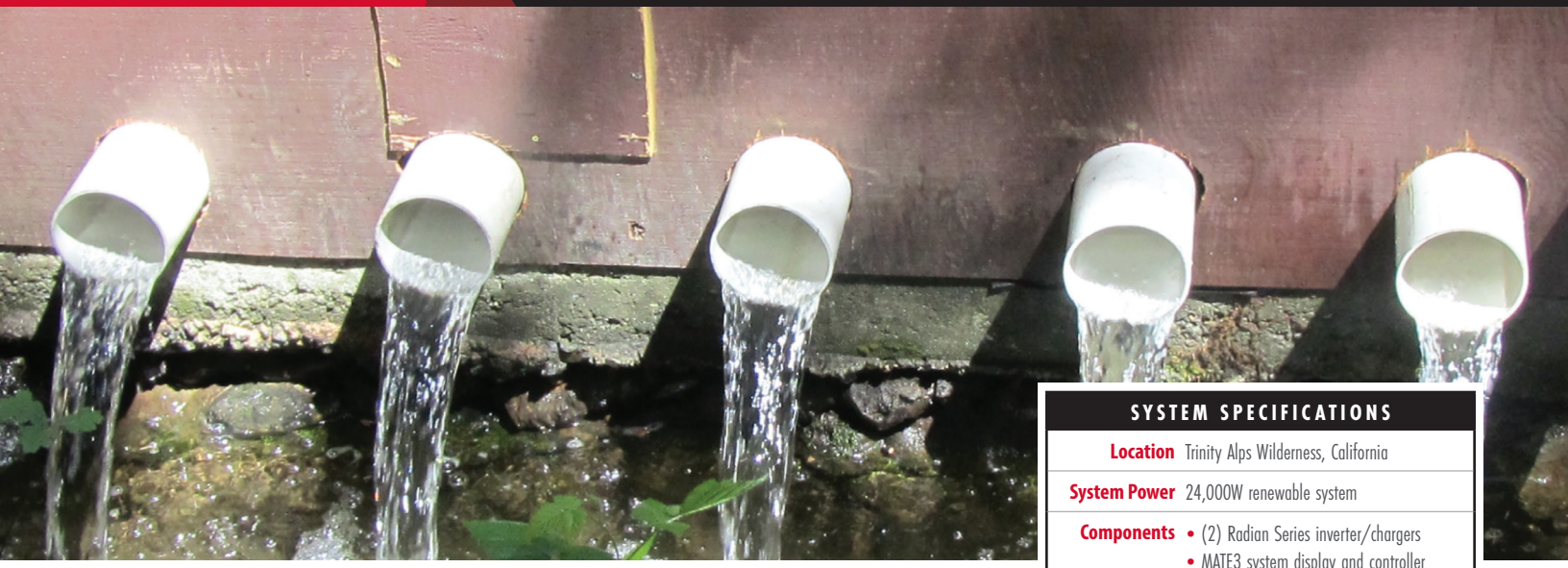
Wing Solar

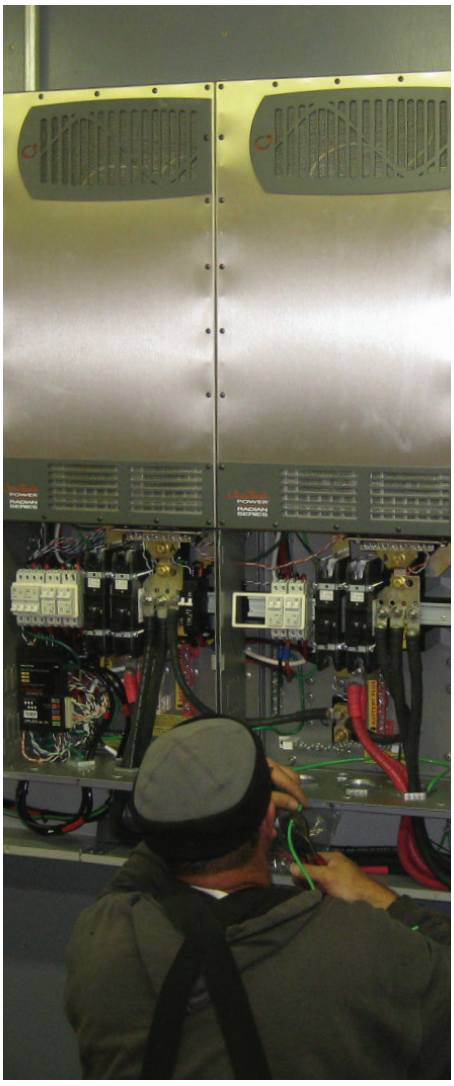
OFF-GRID CASE STUDY



SYSTEM SPECIFICATIONS	
Location	Trinity Alps Wilderness, California
System Power	24,000W renewable system
Components	• (2) Radian Series inverter/chargers • MATE3 system display and controller • HUB communications manager • FLEXnet DC monitor • Battery bank

OVERVIEW

Since 1977, Wing Solar & Wood Energy has delivered alternative energy solutions to residential and commercial customers from Sacramento to the Northern border of California. The company's six-member team builds and installs custom solar, wind and hydro energy systems. In April 2013, the owners of a private retreat near California's Trinity Alps Wilderness approached Wing Solar & Wood Energy with a problem. Almay Ranch, a secluded vacation spot for families and small groups, needed to replace a hydroelectric power system that ran inefficiently and lacked flexibility. The old system was only capable of being set to one power level between a minimum of 8,000W and the maximum 24,000W around-the-clock regardless of actual demand, which can be as low as 800W during the off-season. This resulted in brownouts when the hydro was set low and demand overwhelmed supply, blackouts late in the season during drought years which required manually switching to diesel power generation and major inefficiencies all year long but particularly during off-seasons. As built, the system required the ranch to dispose of excess, unneeded power virtually all of the time in order to have the excess capacity to handle temporary peak usage, and this "heat bleeding" system required a great deal of maintenance. Ultimately, Almay Ranch's owners turned to Wing Solar & Wood Energy for a more flexible solution.



CHALLENGE

- Install an off-grid hydropower system capable of variable electrical generation based on actual demand and to reduce water consumption
- Incorporate battery backup to ensure uninterrupted 24/7 power
- Design and build a compact system with easy-to-install and maintain components

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SOLUTION

For power conversion and control, Gary Cole at Wing Solar & Wood Energy opted for two Radian Series inverter/chargers with battery backup and a diesel generator. The OutBack Radian Series multiple, programmable auxiliary outputs and relays enable duct flow and turbine control to maintain battery voltage levels depending on electrical loads. Cole also chose OutBack Power's FlexNet DC monitor, MATE3 system display and controller, as well as the HUB communications manager, to complete the installation and ensure precision and accuracy in system monitoring, networking and control for Almay Ranch.

On the power generation side, the ranch replaced its old hydro power-generating scheme with an integrated system comprised of five micro turbines, which can respond to changing battery voltage levels as required. If the battery voltages fall to pre-determined levels, additional hydro nozzles can activate to increase power. Additionally, the diesel generator was integrated into the power system with a relay that can start the generator when more power is needed. Manual switching is not needed because the Radians handle the frequency matching and balance the load demands and battery charging. Six weeks after installation, the ranch caretaker reports that the batteries did not fall below a 97% state of charge and the generator was not needed due to the system's new design. Furthermore, the ranch was able to reduce water consumption by approximately 75%, which ensures a year-round supply of hydropower.

OUTCOME

- The secluded resort would have had to spend approximately $250,000 to run grid electricity three miles from the nearest power source to the property—the reliable, off-grid hydropower solution on-site made that expense unnecessary
- The system generates reliable power in response to energy demands, which vary widely depending on the number of guests at the ranch
- The new system uses 75% less water than its predecessor, which is essential during periodic droughts
- Previous system supplied only 78A of power, the new one supplies as much as 100A, meaning fewer brownouts during periods of highest electrical use.

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