



REDHAWK
ENERGY



Solar Power Systems

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Solar Power Systems - Oil & Gas

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RedHawk Energy Systems, LLC

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PV PowerStation

All-In-One Solution

The innovative PV PowerStation is the perfect solution for off-grid and backup applications requiring reliable power in a completely integrated package. The PV PowerStation is truly a “turnkey solution” that combines a solar array, charging and monitoring equipment, batteries, battery box, ballast and adjustable leveling supports. Systems can be configured and customized to ensure proper operation under your range of expected on-site conditions and load demands.

Applications

- Off-Grid & Backup Power
- Remote Monitoring
- Gathering Sites
- Valve Sets
- Well Heads
- Cathodic Protection
- and much more!



Key Components



Solar Array

Pre-wired and assembled sub-array is ground-mounted on a common framework with solar modules, module rails, interconnection wiring and all applicable stainless steel hardware. The tilt angle can be customized to capture the maximum solar radiation available at that site location.



Solar Controller

The solar controller is mounted and wired inside the battery box. A remote meter (pictured top right) is provided in a clear cover junction box mounted to one of the upright channels of the system for convenient system diagnostics visibility.



Batteries & Battery Box

High quality nickel cadmium & lead-acid batteries are available (see page 6 for more details) and are housed inside the battery box (pictured right). The integrated battery box features fully insulated paneling, gas-shock lift assisted lid, pre-fitted conduit entrees and four (4) slotted openings for easy forklift/cart positioning.



Ballast Blocks

Located on the four (4) corners of the system are ballast blocks and adjustable leveling jacks for securing the system to virtually any terrain.

Features & Benefits



Compact Footprint

The complete system combines a solar array, charging and monitoring equipment, batteries, battery box, ballast and leveling supports in a relatively small footprint to meet a variety of applications.



Drop, Plug & Play

Flexible design allows the system to be utilized as a permanent or temporary solution, providing reliable power whenever and wherever it's needed.



Made in the USA

Designed, engineered and manufactured in Pataskala, OH and Glen Burnie, MD.





Ground Mount

Ground mount solar power systems are a cost-effective solution for applications where space permits.

- Configured for specific geographical location and load demands
- Pre-wired and pre-assembled arrays
- Combiner boxes and main junction boxes provide convenient interconnection
- Systems include all necessary support rails, legs, bracing and mounting feet (if applicable)
- Scalable option if load demands change
- Low maintenance, long life designs = 20+ years



Mounting Options

Pole Mount

- **Retractable Pole** - Innovative mounting solution provides a safe and convenient means of mounting solar arrays to a 20' pole structure at ground level. Solar arrays are raised and lowered along the same axis via a hand-crank or power drill. Systems are fully operational, even in the lowered position.
- **Fixed Pole** - Cost-effective solution for mounting single or multiple solar arrays to a 20' fixed pole structure.
- Good fit for applications with heavy tree coverage or valleys/hills where a pole structure can clear nearby obstructions.



Roof Mount

- Mounting option utilizing often unused real estate.
- Solar arrays can be mounted flush to roof or at a desired tilt angle.
- Good fit for applications with limited space; solar system is mounted to roof of building or equipment enclosure.
- Sub-arrays are supplied pre-assembled & pre-wired for fast & easy installation onsite.
- Combiner boxes & junction boxes provide convenient customer interconnection.



Platform Mount

- Flexible mounting solution for unique applications.
- Good fit for applications with limited space (ex: coastlines); solar system is mounted to platform alongside equipment it's powering.
- Sub-arrays are supplied pre-assembled & pre-wired for fast & easy installation onsite.
- Combiner boxes & junction boxes provide convenient customer interconnection.





Batteries

Batteries play a vital role within your critical power system. We offer both nickel cadmium and lead-acid batteries as components of our solar power systems. Below are two options we currently use:

Soft Sunica.plus™ Ni-Cd Batteries

Faced with complex charge/discharge cycling patterns imposed by the unpredictability of weather, the high cycling capabilities of Soft Sunica.plus™ Ni-Cd batteries provide reliable power for solar, even in remote locations and harsh environments. These batteries are purpose designed to provide the ideal energy storage for RES (renewable energy systems) such as PV (photovoltaic) and wind power applications.

- Operation in extreme temperatures
- Long-life (20+ Years)
- Charge efficiency: performs at any charge
- Cycling - achieves 10,000 cycles at 15% depth of discharge



Firefly® Oasis Group 31 VRLA Batteries

Firefly International Energy's® Oasis Group 31 VRLA batteries utilize patented Microcell Foam Technology that is designed for repeated deep discharges and high power applications in which maximum run times are needed to very low state of charge. The technology also minimizes typical battery damage due to sulfation, has excellent low temperature performance, and significant cycle life at very high depths-of-discharge.



System Components

Battery Boxes

Temperature extremes and unwanted exposure can place stress on critical battery systems. Our innovative battery boxes are designed to shield and protect battery systems located in harsh wayside environments.

- All-Welded Aluminum Construction (Steel also available)
- Fully Insulated Paneling
- Tamper Resistant Lockable Lid
- Dual 1" Pre-Fitted Wiring Conduit Access
- 4X Lifting Eyes for Easy Placement
- Hinged Lid & Gas-Shock Lift Assist

Sizes:

- 36" L x 48" W x 24" H
 - 54" L x 52" W x 24" H
 - 56" L x 56" W x 24" H
- * Custom sizes available upon request



Controllers / Regulators

While sunlight is needed for a solar system to generate usable power, too much of a good thing without proper control leads to the overcharging of batteries. A properly supplied controller monitors the voltage of the battery bank and controls solar array outputs to prevent overcharging of critical battery systems.

Morningstar™ MPPT Controllers

Morningstar™ TriStar MPPT solar controllers with TrakStar Technology™ are an advanced maximum power point tracking (MPPT) battery charger for off-grid PV systems. The TriStar MPPT features a smart tracking algorithm that maximizes the energy harvest from PV by rapidly finding the solar array peak power point with extremely fast sweeping of the entire I-V curve. Controllers feature on-board Ethernet for a fully web-enabled interface including up to 200 days of data logging.





Hybrid Systems

Increasing Overall System Reliability

We offer a range of packaged hybrid power systems where two or more power generation systems are combined to complement each other, cover peak loads and increase overall system availability and reliability.

Solar & Fuel Cell Hybrid

The solar array, fuel cell and batteries all work together as a “hybrid” system. The solar array converts sunlight into electricity. The batteries are charged by the solar controller assembly. If the batteries are fully charged and being maintained above a certain predetermined threshold voltage by the solar array, the fuel cell sits in standby mode. When the batteries reach the lower threshold voltage level, the fuel cell system will automatically turn on. After a 25-30 minute start-up period, the fuel cell will begin charging the batteries and powering the load.

250W Fuel Cells

- Solid Oxide Design
- Powered by Propane or Natural Gas
- Fuel Efficient: ¼ lb LP/hour
- Standby Mode: runs **only** when needed
- Low Maintenance
- Eco-Friendly
- Quiet Operation
- All-Weather Performance (-40°F to 122°F)



Hybrid Options

Solar & Wind Hybrid

Solar & Wind Hybrid Power Systems are a popular option for applications experiencing varying weather conditions. Solar power systems are effective in most places with unobstructed access to sunlight, whereas wind turbines are best suited for areas which average windspeeds of 12mph or greater.

Applications meeting both criteria are good candidates for a hybrid system. For off-grid applications, an energy storage system (batteries) is used to accommodate loads that need to be powered through the night and over extended periods of inclement weather.

RP Mast Wind Generator Adaptor

The optional tilt down wind generator pole adaptor can be integrated to mount a wind generator directly to the RP Series Mast. The adaptor allows the wind generator to be placed an additional ten feet higher than the pole structure to access the best and most consistent wind available. The adaptor pivots a full 360° to clear nearby obstructions when raising and lowering.



Solar & TEG Hybrid

Solar & Thermoelectric Generator (TEG) Hybrid Power Systems combine the economics of solar with the reliability of a TEG. Solar power systems are effective in most places with unobstructed access to sunlight, while a TEG is suitable for use in all climates (hot, cold, wet, dry) and is powered by propane or natural gas. This hybrid system is typically utilized in remote site applications to increase overall system reliability in the event of unfavorable weather conditions and/or peak load conditions.

A small energy storage system (batteries) can be integrated (though not required) to cover peak loads or to provide emergency backup power. A benefit to this hybrid system is that with the addition of solar, fueling needs/costs of the TEG are reduced and overall system reliability is improved.





Engineering Services

Achieving Optimum Performance

Not all sites are created equal. Every site can have a host of unique challenges. Our vast array of design and engineering services can assist you in combating these challenges.

Is My Site Viable?

Solar power systems are effective in most places with unobstructed access to sunlight.

- Solar Radiation Data
- Daily & Seasonal Temperature Variations
- Local Weather Phenomena
- Obstructions & Shading
- Wiring Distances - Voltage Drop
- Orientation - True South

Project Stages

- Feasibility Analysis
(GEO Coordinates and/or Site Survey)
- Design / Engineering
- Material Sourcing
- Fabrication / Customization
- Pre-Installation
- Installation
- Post-Installation Training & Support



Our Capabilities

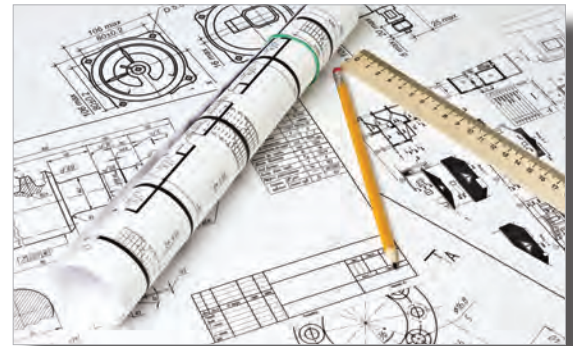
Feasibility Analysis

- Site Survey
- Shade & Obstruction Analysis
- Solar Radiation Data
- Local Weather Phenomena
- Daily & Seasonal Temperature Variations



Design / Engineering

- System Sizing Reports
- Equipment Loading & Power Draw Estimation
- CAD Drawings, Schematics, Layouts & One-Lines
- Wiring Distances - Voltage Drop
- System Orientation - True South



Sourcing / Fabrication / Customization

- Material Procurement
- Pre-Wiring & Pre-Assembly
- System Component Integration
- Custom Design (ex: PV PowerStation)
- Hybrid System Integration
- Material & Workmanship Warranties



Pre-Installation / Installation / Support

- System Cutover & Supervision Training
- Detailed I&O Manuals, Drawings & Packages
- Preventive Maintenance Programs
- Safety & Maintenance Application Training
- Replacement & Disposal Services
- Technical Support





About Us

RedHawk Energy Systems, LLC is a manufacturing and value-added subsidiary of the Arthur N. Ulrich Company. Since the early 1980's, we've designed, engineered, fabricated and deployed alternative energy systems and battery systems ranging from a few watts to several kilowatts for thousands of critical remote site, utility grid-tie and backup power applications throughout North America.

Our Solutions:

-  **Solar (PV) Power Systems**
-  **Fuel Cells**
-  **Wind Turbines**
-  **Stirling Engines**
-  **Hybrids**
-  **Batteries**
-  **Battery Boxes & Enclosures**
-  **Battery Testers & Maintenance Access.**



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