GRID TIE SYSTEMS WITHBACKUP POWER - 7

AEE Engineered Systems with Battery Backup

These Grid-Interactive Renewable Energy Systems give you energy independence without leaving you in the dark when the grid goes down. They enable you to demonstrate your personal commitment to a renewable energy future. With these grid-interactive systems, backup AC power is made available in the event of a utility outage, providing reliable power and peace-of-mind. An average conversion efficiency of 89% to 91% using the California Energy Commission (CEC) test protocol provides greater savings and a shorter time period for system payback than previous designs.

Battery Backup Grid Interactive systems come with modules, array wiring, combiner boxes, roof mounting structures, inverters/control systems with all required over-current protection and disconnects (Your specific installation or utility may require additional AC disconnects). They require a 48 volt battery bank to operate. The size of the battery determines the amount of backup power available during power failure. Use the worksheet on the next page to determine battery bank size. Battery backup systems qualify for the California Energy Commission incentives and the Federal Tax Credit.

Grid-Interactive Systems with Inverters Installed Indoors (Batteries not included)

PV Watts	Module Quantity	Module Brand & Watts	System CEC Watts	Inverter Model	Backup Watts	Output VAC	Item Code	Price
460	4	Evergreen 115	375	Outback PS2 System with One GVFX3648	3600	120	10.6723	$7,620
2760	24	Evergreen 115	2252	Outback PS2 System with One GVFX3648	3600	120	10.6727	$20,717
5520	48	Evergreen 115	4503	Outback PS2 System with Two GVFX3648	7200	120/240	10.6731	$40,501

Grid-Interactive Systems with NEMA 3R Inverters for Outdoor Installation (Batteries not included)

PV Watts	Module Quantity	Module Brand & Watts	System CEC Watts	Inverter Model	Backup Watts	Output VAC	Item Code	Price
460	4	Evergreen 115	375	Outback PS1 System with One GVFX3648	3000	120	10.6745	$7,948
2760	24	Evergreen 115	2252	Outback PS1 System with One GVFX3648	3000	120	10.6749	$20,884
5520	48	Evergreen 115	4404	Beacon Power M5 Inverter	5000	120	10.6753	$38,910

Battery Packs for Systems Above

Watt Hours Storage to 80% Discharge	Battery Quantity	System Amp Hours	Battery Model	Battery Rack	NEMA 3R Outdoor	Item Code	Price
3750	4	98	MK S31-SLD-G	Outback PS1 Battery Enclosure (w/ PS1 only)	Yes	10.6781	$1,586
7500	8	196	MK S31-SLD-G	Outback PSR Battery Rack	No	10.6783	$2,889
7500	8	196	MK S31-SLD-G	Outback PSR Battery Rack w/ 3RK Cover	Yes	10.6785	$3,038
11250	12	294	MK S31-SLD-G	Outback PSR Battery Rack	No	10.6787	$4,017
11250	12	294	MK S31-SLD-G	Outback PSR Battery Rack w/ 3RK Cover	Yes	10.6789	$4,166

8 - BACKUP SYSTEMS SIZING WORKSHEET

Grid Connected Inverters with Battery Backup

Utility intertie systems with battery backup are configured differently and are much more complex than battery-less intertie systems. They really need to be custom designed. If you need a back-up system, consult with your dealer to determine all of the system components that you will need. You can use the following steps to determine the multifunction inverter size and the battery capacity that your system will require.

Following steps 1-5 on page 4 will determine the size of the PV array needed to provide all or part of the generated power required. Calculate the inverter size and battery capacity needed using the worksheet below. The Beacon Power M5 is a 5,000 watt Grid Tie / Battery Backup inverter. The Outback PS1-3048 is a 3000 watt complete systems for Grid Tie and Battery Backup. These inverters are ready to use with the addition of a PV array and 48 volt battery bank.

Outback also makes inverters and switchgear that can be assembled into larger Grid Tie / Battery Backup systems.

Step 1 **FIND THE POWER REQUIREMENTS (WATTS) FOR THE APPLIANCES YOU NEED TO POWER DURING A BLACK-OUT**

Make a list of the loads and appliances that you absolutely need to power during an outage. Only list the essential items since the system size (and cost) will vary widely with power needed. The wattage of individual appliances can usually be found on the back of the appliance or in the owners manual. You can use a Kill-a-Watt meter for better measurements (page 79). If an appliance is rated in amps, multiply amps by the operating voltage (120 or 240) to find watts. **Add up the wattage** of all the items on your list to arrive at the total amont of watts that you need to run all at the same time. This will determine the size of the multifunction inverter that you will need.

Step 2 **DECIDE THE BLACKOUT DURATION YOU WANT TO BE PREPARED FOR**

Power outages last from a portion of an hour to a day (or more). Again, this decision will greatly affect the system size and cost, so it is more cost effective to stay on the conservative side.

Step 3 **FIND THE AMOUNT OF STORED POWER REQUIRED**

Multiply the power requirements (in step 1) by duration in hours (in step 2). The result will be in watt-hours. For instance, if you need to power 1000 watts of appliances for 2 hours, you would need to have 2000 watt-hours (or 2 kWh) of stored power.

Step 4 **CALCULATE THE POWER STORAGE NEEDED**

Multiply the figure arrived at in step 3 by 1.7. In the example, 2 kWh X 1.7 = 3.4 kWh of stored power needed.

Step 5 **CALCULATE BATTERY CAPACITY NEEDED**

Divide the power storage requirement needed from step 4 by the DC voltage of the system (usually 48V, but somtimes 24V) to get battery amp-hour (AH) capacity. See the battery section for more information on batteries. Most back-up systems use sealed batteries due to their greatly reduced maintenance requirements, and because they can be more easily placed in enclosed battery compartments.