

## GRID-INTERACTIVE SYSTEMS

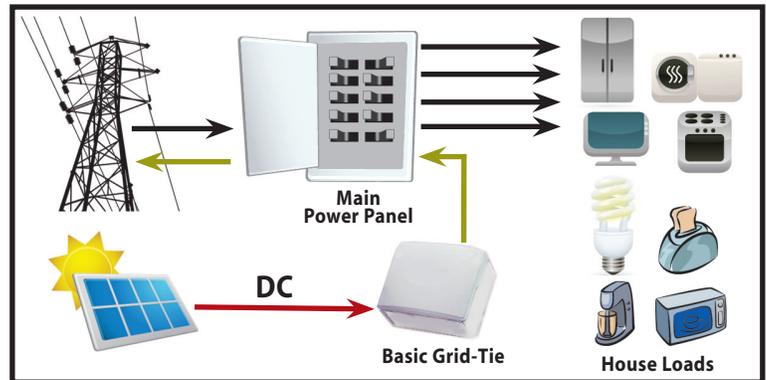
When determining a renewable energy system, there are two main types of Grid-Tie Systems to consider:

1. Basic Grid-Tie
2. Grid-Tie with Battery Back-up also recognized as Grid-Interactive

### Basic Grid-Tie System

A basic Grid-Tie system generates electricity when the sun shines, supplying power to your home and sending any excess power back to the utility. DC power produced from your solar array is converted by the Grid-Tie inverter into AC power, which is then sent to your main electrical panel to be used by your household appliances. Any excess power generated is sold back to the utility through "net metering" to reduce your electric bill.

An advantage of this system is it is relatively inexpensive to install. A key disadvantage is the system does not operate when the grid fails. These systems do not provide power to your home during a power outage.

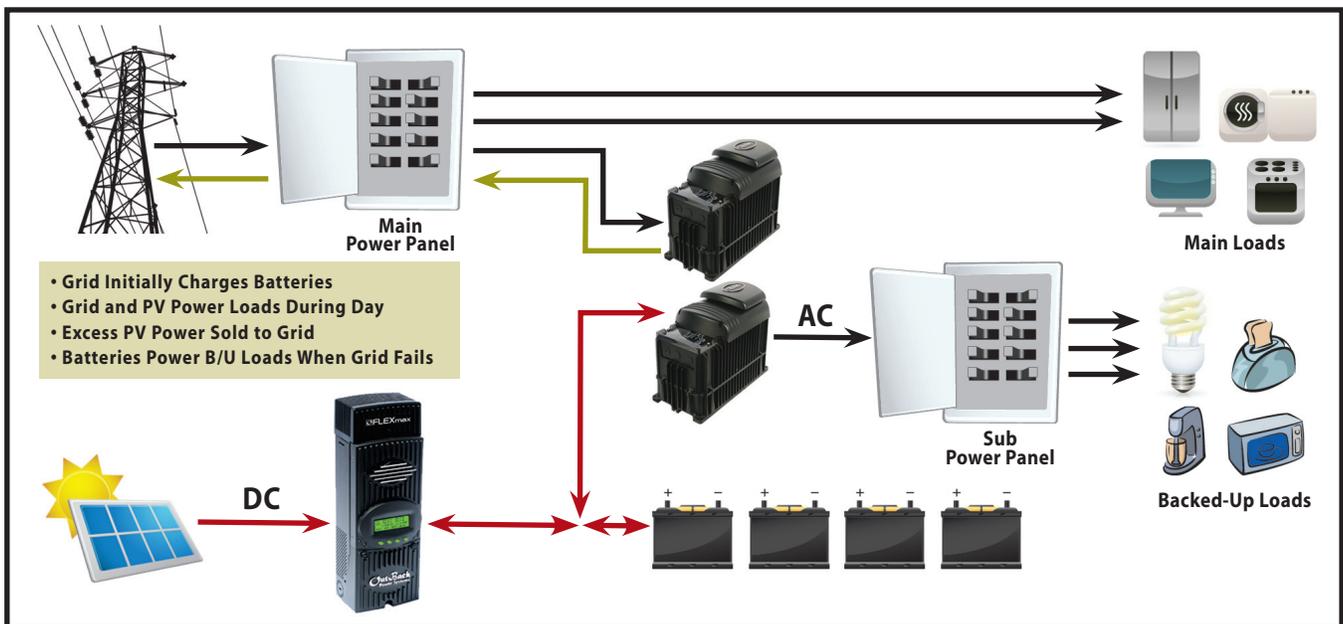


A basic Grid-Tie system generates power when the sun shines and the grid is operational; it does not provide back-up power.

### Grid-Tie with Battery Back-Up (Grid-Interactive)

Just like a basic Grid-Tie system, a Grid-Interactive system generates electricity when the sun is shining, and supplies power to your house while selling any excess power back to the utility to reduce your electric bill. Like the basic Grid-Tie system, the system does not "sell" to the grid if there is a power outage.

However, the PV energy system continues to operate during a grid outage. The batteries provide quiet, uninterrupted back-up power for sub-panel loads such as refrigerators, lights, pumps, and computers, while your PV array continues to produce power and charge the batteries during the day. When the grid is restored, the inverter/chargers help recharge the batteries to their full state of charge while the grid powers all AC loads. Once the batteries are recharged, the system returns to normal operation.



Grid-Tie system with battery back-up generates power when the sun shines and the grid is operational. It also provides power to essential backed-up loads during a power outage.

## How does a Grid-Interactive system work?

A Grid-Interactive system uses battery power storage to provide back-up during utility outages. (See previous diagram).

1. Power from a renewable energy source (typically a solar array) is run to a Maximum Power Point Tracking (MPPT) charge controller (solar only). With our FLEXmax™ family of charge controllers, the temperature-corrected VOC of your array can be up to 150 VDC. A charge controller is a device that regulates the charging of the batteries. Its primary function is to prevent overcharging of your batteries which can be damaging to your battery bank.
2. Power runs from the charge controller to your battery bank. Battery bank voltages are typically 12V, 24V or 48V; 48V is usually the most preferable voltage. In most Grid-Interactive systems, AGM or gel batteries are typically used.
3. Power runs from the battery to the GFX or GVFX Pure Sine Wave Inverter/Charger where the DC power is converted to AC power. AC power goes to both the main panel (where excess power can be sold back to the utility) and to a sub-panel or secure load panel which has loads to be backed-up during a utility outage.
4. Sub-Panel;  
Circuits requiring back-up must be moved from the main panel to the secure load panel. OutBack inverters allow up to 60 amps of power per inverter to be passed through from the main panel to the sub-panel.

	SYSTEM TYPE	
	Battery-less Grid Tie	Grid-Interactive
Sells Power Back to the Grid	✓	✓
Lowers Utility Bill	✓	✓
Works During a Utility Power Outage		✓
Provides UPS Quality Backup Power		✓
Wind Turbine and Micro-Hydro Compatible		✓
Works with Multiple DC Sources		✓

## Using OutBack Grid-Interactive Products in Conjunction with Honda EU Generators for Extended Run Times

In applications that require more than one to two days of run time without utility or solar power, OutBack recommends using Honda EU generators in conjunction with our Grid-Interactive products to charge batteries. The solar energy system reduces generator run-time and fuel use, and the recharged batteries will provide quiet power at night.

## How long does it take to install a Grid-Interactive system?

With the new fully integrated SmartRE Grid-Interactive system, typical installation time is 3-4 hours. The unpredictable part of most installations is moving the backed-up circuits from the Main Panel to the Secure Load Sub-Panel which can cause installation times to be longer.

## How do Grid-Interactive systems and Basic Grid-Tie systems compare in cost?

A basic Grid-Tie Solar Energy system typically costs \$8-\$10 per watt. A Grid-Interactive system typically costs \$9-\$12 per watt (or more) depending on the size of the battery bank required. A secure variable in the cost of the system is the size of the battery bank.

## How long will the batteries last? How much maintenance is required?

Sealed lead acid and AGM batteries, which are typically used in Grid-Interactive applications, last an average of 10 years in a Grid-Interactive application. There is little to no maintenance involved, which is why this type of battery is popular.

## How much run time on batteries can I expect?

Typical battery banks for Grid-Interactive systems range in size from 4kWh to 20kWh, ranging from several hours to a few days.

## Can I power my entire home?

Usually this isn't feasible unless a home uses very little power. Large power consumption devices such as heaters and air conditioners are not recommended to be powered by the systems discussed. Spot coolers and some newer, energy efficient room air conditioners can be supported. We recommend only backing-up important loads, such as lights, TV, refrigerator, and well pumps, to maximize run time.



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