



CSL # 868816

P.O. Box 721
Nevada City, CA 95959
530-273-4422
www.SustainableEnergyGroup.com

Independent Power Systems Becoming More Popular

With the first taste of winter coming to our community there's increasing interest in independent power systems. Last winter's snowfall and corresponding power outages have not just increased generator sales, it has really spiked interest in solar power systems with battery backup. In this column of Going Green we'll look at some examples of what you can do in terms of emergency electric power systems (other than generators), with and without solar.

My own household has what's called a "grid-tie, battery backup solar power system", and it was a real blessing last winter! We were without PG&E for a week or more on several occasions but hardly even noticed. Almost all of our circuits are tied into what's called a "critical load" or "protected loads" electrical panel. The panel is powered by our inverter. For the uninitiated, an inverter connected to batteries changes the DC (direct current) battery power into AC (alternating current) power for the home. If it weren't for the few circuits that aren't connected to our inverter we wouldn't have even known PG&E was down!

There were about three days in a row when the sun didn't shine, but I kept my eyes on our system's digital display and, before the battery voltage got too low, I fired up our little 2000 watt Honda generator and ran it through a gallon of gas. That one gallon of gas powered the house and charged the batteries at the same time. And that was all the gas - and generator run time - we had to deal with last winter. In sharp contrast, the rest of my neighborhood had generators humming away 24/7 for days on end. Fortunately for us, we could only hear them when we went outside!

Whenever the sun is shining our system sends any excess power back to PG&E for a substantial credit. Whenever PG&E does go down my household switches to battery power. Our power needs are automatically and instantaneously switched over to our grid-tie solar system with battery backup. This is a great system to have because even generators with automatic transfer switches have a delay between the power going off and the generator coming online. Generators also require maintenance, fuel and - did I mention they make a lot of noise?

We've had our system for about eight years now so it has since paid for itself in electricity savings. Our latest bill, for a years worth of PG&E power, just came in the mail and we owe them \$69. That's right, we only needed to buy about \$69 worth of power for an entire year after "Mr Sun" took care of most of it. On average our annual power bill is zero. For example we had two year in a row with a negative \$50 PG&E bill, it just depends on our usage and how much sun we get throughout the year. I always like to mention that half of our family transportation "fuel" also comes from our system, as I've been driving an electric vehicle for going on 14 years now!

We're also seeing some interest in similar systems but without solar. In other words, a bank of deep cycle batteries tied into an inverter/charger but no solar panels. With systems like these the batteries are all "topped off" when the power goes out, so the power needs of the house are automatically and instantaneously switched over to the backup system. The generators we use for backup during more extended power outages can either be small, manually operated units (like mine) or larger automatically-controlled units like we do for some clients. But a generator only becomes necessary after PG&E's been down for two to three days or more if the battery bank is sized properly.

There are a multitude of benefits to systems like these. In addition to uninterrupted power, it's not necessary to run a generator 24/7 with systems like these. The problem with most generators is they use a lot of extra fuel,

especially when the power needs of the home are small, which they typically are relative to most generators. When tied into an inverter with batteries, however, they only need to run occasionally and, in doing so, can use a lot less fuel, run more efficiently and make a lot less noise! And propane generators, which are increasingly popular these days, aren't recommended for long run times, so maintenance costs are reduced when they're tied into a battery backup system.

There is a downside to any sort of battery backup system, however, and that's the batteries. In general they'll last five to seven years, sometimes longer depending on how they're maintained. They can cost from \$1,000 to \$2,000 or more to replace. The replacement costs vary quite a bit depending on a variety of factors, but for most systems this is a good rule-of-thumb range.

The higher capacity "flooded" lead-acid batteries that we use most often also require some maintenance. The little caps on the top of each battery must be removed so water can be added periodically, but I estimate I spend about an hour per year taking care of that. There's a handy little "filler jug" available at most auto parts stores for around \$10-\$15 that makes the job very simple. For people that don't want to deal with battery maintenance we can always use a sealed battery, like the ones I've used in my electric vehicles, but they don't hold as much power.

Of course the systems we've installed without solar can, in the future, have solar added. With the cost of solar panels continuing to drop, this is a nice alternative for people that can't afford solar and just want a solar-ready uninterruptible power system for now. But on the flip side, given the Federal Tax Credit covers 30% of the total net cost of a solar power system, getting solar panels as part of the package - even if it's just a small number of panels - makes better economic sense. By doing so you're saving 30% of the cost associated with the entire system, batteries included. That's why an increasing number of our solar power customers are choosing battery backup systems instead of the (more common) "grid-tied only" systems. For those of you unfamiliar with the difference, grid-tie only systems don't work without PG&E on (ie, the solar panels won't generate any power during a power outage).

Past articles have shown that solar power systems for households with average PG&E bills of \$125/month or more provide a return on investment of 10% to 25%; the larger the bill the higher the return. Compare that to the return from other investments these days! So whether it's a straight grid-tied solar system or solar with battery backup, it's a great investment in an economy with so very few (if any) good investments available. And with battery backup, most people won't even need a generator when the power goes out!

Ray Darby is President of Sustainable Energy Group Inc., a Grass Valley company offering energy efficiency and solar services for residential and commercial buildings, from comparing the alternatives through installation and servicing of energy systems of all types. You can reach him at 530-273-4422, via email RayDarby@SustainableEnergyGroup.com, or visit their web site at www.SustainableEnergyGroup.com.