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Pros, Cons and Complications of Grid-Tied Battery-Backup Systems November 2022

Introduction: Fairly often these days we get requests from our clients or prospective clients who are connected to the power grid about battery-backup options. These systems are called Grid-Tied Battery Backup systems, or GTBB.

We have extensive experience with battery systems for our clients living remotely. We have also installed a number of battery backup systems for customers living on the grid— and we have seen the shortcomings of these systems. We want to be honest about these shortcomings.

Our off-grid clients usually live so far away from power lines that it is not possible to connect to them. These people are able to live without the grid because they have learned how to live within an energy budget. Even the wealthiest of our clients with giant battery systems still have to consume less power than most grid connected families have become accustomed to.

It is a serious adjustment for those that move from in town to a remote home and have to be very careful about staying within an energy budget. If you live in town and can have as much power as you want 99% of the time (when the grid is up) but then have to conserve to a great degree when the grid goes out, you can have problems making this adjustment.

Types of battery systems: There are two categories of battery backup for homes: Whole-house or segregated-loads.

Whole-house backup: The whole house back up is just what the name implies: the entire house will be powered by a battery system in the case of a grid outage. This is rarely practical for grid connected families because most grid connected homes consume too much energy for a modestly sized backup system to power. For example one Tesla power-wall can only provide 5 kilowatts of power. This is only 20 amps at 240 volts. This is just not enough for almost any home. Sure you can gang multiple power-walls or other systems, but this can get very expensive and unwieldy.

Think also about how often you lose grid-power and how major, or minor, of an inconvenience it really is. Unless your power goes out often, stays out for extended periods of time and/or you have medical equipment or an expensive wine collection, is it worth it to pay 20, 40 or 50 thousand dollars to provide power to your entire house for the times power does go out? If not, maybe a segregated-load or a generator only system is a better choice.

Segregated-loads: If you can install a small, battery-powered breaker panel with a few circuits in it running only critical appliances, you can get by with a much smaller battery backup system. Typically these circuits would power some lighting, a refrigerator, a garage door opener (if needed) and a few receptacle circuits.

Not every home is suited for installation of an additional circuit breaker panel. The new circuit breaker panel should be adjacent to the existing circuit breaker panel. If that existing panel is in a finished room, cutting through the wall to add the new panel can be tedious and expensive. If the existing panel is in a garage, the project can be much easier to accomplish.

Load shedding: Some might say that a whole-house backup with a small battery system can work if they just turn off most appliances and lights when the grid is down. This is called load-shedding. This doesn't work, for these reasons:

If there are more appliances running when the utility power is out than the battery system can handle, the battery system will shut down to protect itself. Nothing will be damaged, but resetting a modern battery system is not as easy as it should be. We have heard of clients struggling to find the instructions to do this in the dark. They have found themselves looking out the window at neighbor's homes well-lit after the utility has come back on while they sit in the dark waiting for someone to figure out how to reset the battery system. Regardless of advertising to the contrary, battery backup systems are complicated and can be finicky.

Backup power duration: It is not enough to consider how many appliances a battery system can power. You also have to think of how long the batteries will last when they are the sole source of power. The more appliances you have connected, the sooner the batteries will be depleted. You may think your solar panels will extend this period of time, but power outages often occur during cloudy weather or after dark, so you can't always count on solar. If your budget won't allow for a large battery bank your backup period could be shorter than you want. Sales people have been known to promise more backup capability and duration than a given system can deliver.

Battery types: There two basic types of batteries available: Lead-acid or lithium. Generally speaking, lithium batteries are more expensive by a factor of about 4. The benefit of lithium is they are more robust and have a significantly longer life expectancy than lead-acid batteries. Both battery types are expensive and therefore there is a tendency to undersize battery banks. An undersized battery will not run your loads for as long as you might need.

Generator considerations: A generator can extend the length of backup protection and save on battery costs. With an automated generator system, the batteries power your loads quietly until such time as they become discharged. The generator starts automatically and runs for a few hours. When the batteries are fully charged, the generator shuts off and you again have quiet backup power. We recommend propane or natural gas fueled generators because most homes already have that commodity in place. Procuring and storing gasoline or diesel is an odious task. Propane or natural gas generators emit less pollution than gas or diesel powered units. Not every lot has a suitable location for a properly sized generator. Generators can be noisy and emit carbon monoxide. The deployment of a generator should not be taken lightly.

Foregoing batteries: If one introduces a generator into the equation, it begs the question: With a generator at hand, do you really need batteries and the required electronics? With the battery system you get quiet backup, but for a finite period of time, and you pay for it. These are case-by-case decisions.

Summary: Every power backup situation requires careful consideration. Even if we lose your installation contract, we will be honest with you about the costs and complexities of pursuing a GTBB system for your home. It is often times more expensive and complicated than one might think.

If you have further questions, please feel free to contact us.

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