



Homemade solar storage battery

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Thinking about installing batteries to go with your solar panels? No matter if it's an off-grid mountain cabin or a battery back-up for your grid-connected homes, the basic process for planning designing your own DIY battery bank is fairly straightforward, but can be a bit confusing your first time around.

Below are the basic steps to planning and designing your own DIY battery bank to complement your solar installation. To make the planning process a bit easier to understand, we've included a running example throughout the article. Simply find the italics throughout each section to follow-along!

Use the information below as a starting point, but when the time comes to really start planning your DIY battery bank, be sure to check out a few books on the subject at your local library, browse relevant online articles and videos, and join a couple online forums for guidance and help with any questions you have!

The first step in designing your DIY battery bank is calculating how much electricity you typically use -known as your electricity load. There are two methods to calculate your load:

As you can imagine, this process takes time and there are a lot of numbers to keep track of, so be sure not to rush this step! The size of your entire battery bank will be based on these calculations, so you need to make sure they are as accurate as possible!

To help you keep track, use a spreadsheet like Microsoft Excel or Google Spreadsheets (which is free with Gmail!). There are also many online tools to help you in this process, including calculators from websites like Wholesale Solar and Affordable Solar.

Example: Let's say we have a small off-grid mountain cabin. The space heater, water heater, and stove are propane, so only a few key items need electricity. Along with the LEDs, blender, and laptop above, we'll also have to power our cell phone, fans, TV, and clothes washer. Our usage probably looks something like this:

Our total load for each day is 1.22 kWh and about 36.6 kWh a month. Just to note, this is a VERY small cabin with only a few electrical appliances! For reference, the average kWh usage per month for grid-connected homes in the US is 900 kWh!

Batteries allow you to store the electricity your solar installation generates for later use, and after you find your daily electrical load, you need to decide how many days of backup power you want. Most homeowners choose between 1 and 4 days, though this depends on your needs and weather.

Example: We'll choose 3 days of back-up power, meaning our battery system needs to provide at least 3.66 kWh (1.22 kWh per day multiplied by 3 days) for those days when it's rainy or cloudy.

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To make the process a little more confusing: battery capacity is measured in amp-hours - not watt-hours or kilowatt-hours like the electricity generated by your solar installation. Lucky for us, finding amp-hours is easy! Simply divide watt-hours by the voltage of the solar installation. Off-grid solar installations can be 12 volt, 24 volt, or 48 volt - the voltage you choose depends on your installation's size, location and layout, and needs.

Hold on though, there's one more step. If you discharge the batteries down to their full capacity, you can hinder their ability to fully charge in the future. Because of this, battery manufacturers recommend only using a portion of the available battery, usually only 25% to 50% for lead-acid batteries (the most common type of battery for solar). Of course, only using a small fraction of your batteries' power is annoying, but just consider all the batteries an investment. If you only discharge your batteries down to 25% or 50%, they'll provide you with years of reliable service.

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