BATTERIES: WHAT YOU NEED TO KNOW

Batteries are measured by two values: kW (kilowatts) and kWh (kilowatt hours):

kW is the measure of power output, that is the rate of discharge, while **kWh** is the measure of the storage capacity (liken this to the size of fuel tank in your car).

When comparing different battery units it is important to know that some battery manufacturers quote **total capacity** AND **usable capacity**. Always use **usable capacity** in your comparisons.

There are two different battery architectures: DC coupled & AC coupled, and both have their place.

DC coupled battery systems rely on a hybrid solar / battery inverter to manage both the solar system and battery unit.

The big advantage of DC coupled is the efficiency; solar (DC) to battery (DC) has very little energy loss and there is only one conversion (DC to AC) from either solar or battery to power the home's loads.

There is a down side though, if for example your hybrid inverter is rated at 5kW AC output and your load is 6kW, the combination of both solar and battery can only deliver 5kW and the remaining power needed comes from the grid.

AC coupled battery systems have a built-in inverter to both charge and discharge the battery. They are generally solar 'agnostic' and will work with most solar systems (great for retrofitting a battery to existing solar system).

The big advantage of AC coupled is when dealing with large loads. For example, if you have a 5kW solar inverter and a 5kW battery inverter you can power up to 10kW of loads.

The downside of AC coupled is the system round trip efficiency. Solar energy (DC) gets converter to household power (AC) to power your loads. The surplus energy goes through the battery inverter (from AC to DC) and then back again (DC to AC) to power your loads at night. This can lose up to 10% of the energy along the way.

A secondary function of some battery units is to provide back-up power during a grid outage. Contrary to popular belief, not all battery systems can provide power during an outage. Some have only limited capability (eg to run your fridge or lights).

Some battery units such as Tesla Powerwall 2 have excellent back-up capability and can potentially power your whole home while the grid is down.

Another thing to understand is diminishing capacity: All batteries, irrespective of their chemistry will lose storage capacity (kWh) over time. The more energy that goes through a battery per day, the faster the capacity will diminish. A larger battery (relative to your usage) will provide for you longer than a small battery.

Unlike a fuel tank, a battery's capacity also changes with how fast you take energy out. For example, a 10kWh battery may only deliver 8kWh if the discharge rate is high, whereas it could deliver 11kWh if the discharge rate is very slow.

This effect is known as 'C-rating', the measurement of current in which a battery is charge or discharged at.

Still got questions about which battery is best for you?

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