Why AC coupled doesn't hold up in a blackout

Do you know the difference between AC and DC coupled connections? Is it even relevant to most people thinking of investing in energy storage? What does an AC battery do when compared with a DC version? Which is best for back-up power in a power outage? These are just some of the questions people regularly ask and why we've decided it's a topic worth discussing.

The main driver for DC over AC coupled is efficiency. At up to 99% efficiency for DC over an estimated 90% for AC Coupled, it's the obvious choice. That coupled with a lower installation cost and the flexibility you have with expandable modules. But that's not all. The differences when dealing with back-up power supply are what the make DC coupled batteries the real winners.

Back-up power is a major decider in the energy storage arena. A must for anyone living in an area with an unstable power supply. Countries, such as South Africa, have a notoriously unstable grid and their power companies rely on regular rolling blackouts or load shedding to keep the pressure off the unstable power network.

Luckily, not everyone has to deal with that level of instability. But the reality is, many countries have outdated power grids that simply weren't designed to deal with the demands of modern-day energy use. Alongside 'mother nature' and weather phenomenon, it becomes a point to consider regardless of location.

Recently, there were severe storms in the Dandenong Ranges area of Victoria, Australia. This caused chaos for many homes. Power went down for some weeks during a particularly powerful storm. Some families were lucky enough to have battery back-up supply and made good use of it. They utilised their stored power during the power outage, often helping their neighbours out too.

One family admittedly made errors in judgement and overloaded their AC battery system. By using their energy storage system to power the home as usual, they had no idea that once depleted it dropped into 'sleep' setting. With the mains power down there with no power to enable the solar PV to communicate with the battery when fully depleted. Once sleep mode is activated, the battery couldn't function until mains power is resumed. So, after only a short time, the family were without power like the rest of their neighbours. Certainly, lessons can be learned about how much energy we use in situations such as this but more importantly, choosing the right system is imperative, should back-up be a consideration.

It raises interesting questions around batteries promoted as a backup battery solution. This is where such a small thing as AC coupled vs DC coupled comes into play.

With a DC coupled battery such as the Soltaro AIO2, there are no such issues as it contains 'Black Start' functionality. As the system is a true 'complete system' there is no necessary communication with the PV and as such, the battery will continue to charge and discharge as normal throughout a blackout scenario.

We've all read or seen the advertising for the big hitters in the Solar Battery industry. Grabbing headlines and media space with a serious price tag to match. No doubt they've created demand and are generally championed by media outlets but are you paying for the expensive advertising campaign over the small details that make a difference when it counts?

Such a small point of difference can become a colossal one when your home relies on power to keep your freezer working or lights on. Luckily most homes don't have power outages that last weeks. If you're going to invest in a system, we suspect most people want to know how to maximise their energy storage system properly. Managing your power to maximise its longevity, ensuring the system you have fully supports your needs, suddenly become a very interesting topic.

AC coupling simply isn't designed to cope with longer term back up. It can function well as a temporary, but not a true solution. If back up power is a concern, you'd best avoid AC coupled systems and go with a DC coupled system that contains black start functionality.

Tesla boast their back up can function for up to 3 days. But once the battery is flat, that's the end of your back up power facility. As, once your PV stops generating and the battery completely depletes, it cannot repower and simply goes into sleep mode

until mains power is once again available.

With a DC system, you can use power and deplete the battery completely. However, once the sun starts shining and you're generating solar again, the battery remains active, storing energy and providing back up power once more.

Choose a system that doesn't need to communicate from PV to inverter to battery. A well-designed DC coupled complete system should have none of communication issues that can plague its fellow AC versions. Overall DC coupled systems are a much stronger proposition for back-up power. Do your research and think about what you'll need for the short and long term.

Energy management also plays a huge part in this scenario. If you want to really get the most from your back up power, then you must be sensible about how much power you use when the grid goes down. Continue as usual with all your power-hungry devices and your back up battery won't last as long as you'd like.

By turning off all the unnecessary or surplus electricity using devices, you'll extend your batteries power supply until your Solar PV can re-charge it the following day (or next sunny period). To some of us, this advice is obvious and would be followed without a second thought. However, for many home consumers, they don't comprehend the heavy toll that some household devices take on energy consumption, and where to make real savings when you need to.

Despite numerous campaigns, incentives, and grants to help the public lower their energy use, many still adopt a relaxed approach toward energy. By relying on the simple fact of assuming that when they 'flick a switch', power will always be available.

Simple steps to conserve your energy will save you money on your bills, but in the case of blackouts and back-up power, can be a real-life saver.

Many assume they're only ever likely to suffer minor power fluctuations. Look at the Dandenong Ranges area of Victoria. 3 weeks without power after a series of storms. Unprecedented weather with so many families having zero power throughout. Without lighting, telecommunications and refrigeration, 3 weeks must seriously feel like an eternity and has the potential to be stressful, dangerous, or frightening for the more vulnerable residents.

So, let's talk about back up power and how it relates to the future of renewables.

A fabulous example is Iceland, currently running on 100% renewable energy, making great use of hydropower and geothermal power. Costa Rica hope to become 100% reliable on renewable power this year. They are shining examples of timing, logistics combined with a steady transition period utilising their renewable energy mix.

With such globally high demand for power, back-up power will be a major consideration as the shift towards 100% renewable power comes into effect. Our grid reliance will become less important and our own power generation more relevant than ever. Storage and energy management can and will make the difference with major investment needed in the energy storage and battery sector from

the power companies to help level and smooth out demand and supply for the masses.

Some countries have noticed more blackouts as a result of such a transition. The US states of California and Texas were plagued with blackouts when they relied too heavily on solar. Despite warnings from the state's grid operator. The Nuclear plant was shut down too quickly, leaning on the solar, which once past its peak struggled to cope with the demand. There simply wasn't enough electricity to sustain the population.

There are certainly lessons to be learned from California. They pushed for the change to renewable too quickly and have admitted mistakes were made. There simply wasn't enough electricity to meet the extreme demands of the California residents. Heavy air conditioning use in addition to limited importation from other states and availability, or lack of, from power plants has given them and the rest of us food for thought about getting the balance right and considering the implications of going 100% renewable too quickly.

Understanding the supply/demand and subsequent management issues isn't just a problem for the power companies to consider. The transition to fully renewable and the switch off from more traditional energy sources needs careful planning or consumers will find the need for a solid back-up solution ever more compelling.

Self-awareness and knowledge are key players in the route to self-sufficiency and a truly renewable future. We look forward to being part of that transition and contributing something that we can all take credit for in the quest for 100% renewable energy.

Visit www.soltaro.com for more information.

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