

SOLAR BATTERY ESSENTIALS

10 questions that can save you literally 1000's of dollars (and much disappointment!)

1. What do I want to achieve?

- Reduce my power bills further (even if you already have solar power)
- Reduce my carbon footprint or become carbon neutral
- Never have to pay a power bill again
- Security against black-outs
- All of the above



OUR ADVICE:

Establish your daily load profile and know your daily power consumption (kWh per day). Decide what energy efficiency improvements you can make to reduce consumption. Decide whether you want to store solar power 'for the next night only', or for 'one or two extra days without sunshine'.

2. How do I make best use of my existing solar power system?

- How old is my existing system? Is it still in good condition?
- Does my inverter have spare capacity or is it maxed out?
- Is the solar capacity large enough to charge a battery on top of what I use during the day? Or do I need more solar panels?
- Do I need a new (or second) inverter?

OUR ADVICE:

Check your solar power system for performance and integrity. Solar panels should live 25 years or longer, inverters 12-15 years. For a 6-10kWh battery expect to have 2-3kW spare solar capacity available for charging. A higher capacity helps with charging your battery on overcast or rainy days. When adding to an existing, well-functioning solar system, AC coupling between battery and inverter/s is the preferred option.

3. Should I remain on the grid or go off-grid?

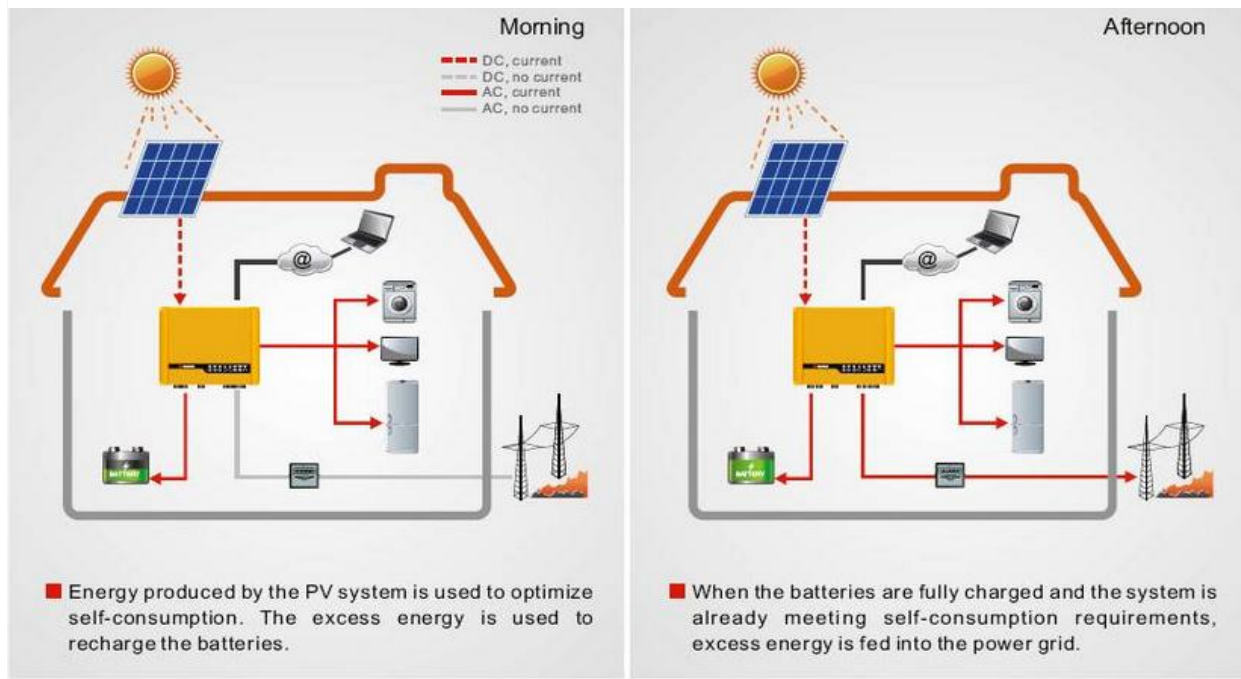
- What rate of feed-in tariff (FIT) can I get?
- Do I have another backup option other than the grid (generator, wind, creek...)?
- How much does it cost me to stay connected even if I don't use any grid power?

OUR ADVICE:

In NSW there is only NET metering (since 1/1/17). The maximum FIT available at present is 12 cents per kWh (*Enova Energy*). If you stay connected to the grid and have excess power you can export it. If you have another reliable source of backup power, and you like the idea of "doing your own thing", go "off-grid" altogether. There's always the option of using a petrol or diesel generator in extreme circumstances.

A few extra solar panels that allow you to feed into the grid at 12 cents per kWh may earn you more money than what you spend on service fees (currently \$500 to \$600 for a year) and should pay back within a couple of years.

Figure 1: The workings of a grid connected hybrid solar system (refer to separate document for detailed explanation)



4. What is the difference between inverter EPS and UPS functionality?

A battery inverter with EPS functionality will provide you with emergency power when the grid goes down, but there will be a switchover delay of 5-15 seconds. This will be too long to keep computer equipment working, so they will crash and you may incur loss of data.

UPS functionality makes sure that the inverter switches over to the battery within milli-seconds, preserving the integrity of your computers and your data.

Both type of inverters provide emergency power only to 1 dedicated circuit - you may have to ask your electrician to rewire all critical loads such as fridges, freezers, IT, basic lights, etc. to this one circuit.

5. Which inverter works with which battery? Questions to ask your installer:

- Which inverter works with my chosen battery (e.g. Tesla, LG RESU, ALPHA ESS, BYD etc.)?
- Can the inverter work together with my existing solar system, that is, can my existing solar system charge the battery (maybe together with my new solar system, if applicable)? Or do I need a new inverter?
- Does the proposed inverter provide EPS or UPS functionality?
- Is the inverter suitable for outdoor or indoor use (IP21 - indoor only; IP 55 or higher: suited for outdoor use¹)?

OUR ADVICE:

If you have an existing solar power system and plan to upgrade it - or install a second system - make sure that both systems can contribute to charging your battery.

Choose an indoor-rated battery only if you have a dry and vermin proof building outside the house but close to the meter board.

¹ In the future, government regulations MAY restrict Lithium batteries to be housed outside the residence.

6. What are the features of a good battery?

- Which technology should I buy?
- What are the main criteria for a good battery?
- How are warranties defined?
- What makes a good warranty?

OUR ADVICE:

It's hard to go past Lithium Ion batteries. The safest of the many sub-technologies under the heading "Lithium Ion" are LiFePo4 and LiNiMnCoO₂, employed among others by Tesla and LG Chem.

Several 'advanced' lead-acid batteries can compete to some degree, particularly GEL batteries and the Ecoult Ultra battery, but depth-of-discharge is an issue.

For Lithium Ion, there are 3 main criteria:

- **Depth of discharge (DoD).** The battery should allow a regular 80% of discharge.
- **Cycle life.** 6000 plus cycles over the life of the battery at 80% DoD (16.4 years if discharged and charged once per day). The battery will live for longer, but gradually reduce in capacity.
- **Cost.** The best comparison figures are 'cost per warranted kWh'. This figure should be as low as possible, ideally below 30 cents.

Warranties are provided in 2 ways: in years (usually 10 years at 60 or 70% residual capacity), or in a specified number of charged/discharged kWh (typically 20,000 or 30,000) - whichever occurs first. For example, if a 10kWh battery is warranted at 30,000kWh, it means that it is warranted for a daily discharge of 6kWh over 13.7 years, or 4kWh over 20.5 years - in these cases, the earlier occurring 10 year limit will apply.

A good warranty would cover a battery over a period of 10 years with 'normal' use. Normal use means not cycling it deeply every day, and not exposing it to extreme temperatures. With proper dimensioning and good care, a good quality Lithium battery should have a service life of 15-20 years.



7. Should I choose to have a larger battery or a larger solar power system?

OUR ADVICE:

The answer is: "IT DEPENDS". If you have a large unshaded roof and can install lots of solar panels, and if your non-solar hour power consumption is low, a large solar array will probably deliver enough power even on overcast days and still charge a small battery for the night hours.

If, on the other hand, your roof space is limited and maybe partly shaded, and you'll use a fair amount of power during evening/night hours, a larger battery with added charge from off-peak grid power may be the way to go.

8. Can I charge my battery only with solar power?

- Can I use grid power to charge my batteries if I want to?
- Does it make sense to do so?
- Which tariff should I be on?

OUR ADVICE:

Preferably, you would charge your battery with solar power. In inclement weather, that may not always be possible. If you're grid-connected, and on a Time-of-Use (TOU) tariff, you could charge your battery at night or weekends with cheaper off-peak power.

Please note that it is NOT possible to charge the battery on “Controlled Load” tariff and have it supply your entire home when discharging. It can only ever be charged and discharged on the same circuit.

9. Should I wait until batteries have become even cheaper?

OUR ADVICE:

Battery prices will come down in the same way solar panel prices have developed. However, we believe the drop in prices will slow down over years to come. While waiting for lower prices, you may miss out on saving money here and now, so in the end you may be worse off when delaying action.

We can expect power prices to rise over coming years as energy providers pass on the cost of restructuring the grid to consumers. After all, the more consumers reduce their grid-energy consumption, the higher the cost burden of the network will become for the individual user.

In the near term, solar panels are unlikely to become cheaper in a big way as the industry is consolidating. There's no reason to delay a purchasing decision. Batteries have a larger potential for cost reductions, and we may have totally different technologies in 10 years' time. However, investing now means safeguarding yourself against ever increasing energy costs.

10. How do I pick a good and trustworthy supplier / installer?

- *Who can I trust?*
- *How do I know that the installer will do a good job?*
- *What is an installer's warranty worth?*

OUR ADVICE:

Several regions in Australia have organised 'solar bulk buys' through community organisations or local Councils. The organisers of these bulk buys can be trusted to supply you with top quality products at very reasonable prices installed by reputable local installers (in contrast to 'fly-by-nighter' crews). This would be our first choice.

Local installers with a good track record are preferred to 'travelling' contractors that work wherever their work is required. Being a member of a local community suggests they are less likely to do shoddy work. It doesn't hurt, though, to ask for references of recently completed jobs.

The installer's warranty, or warranty on workmanship, is only worth something as long as the business underwriting it is around and solvent. This means that a well-established local business, not likely to go out of business, would be your preferred choice.

There are no absolute guarantees that everything will be fine - for novices and non-technical buyers participating in a bulk buy would be the best choice. Technology savvy buyers could shop around and get an equally good or even slightly better deal - but there's always a chance of it going wrong.

In any case, we at **GOODBYEGRID** are there to advise and guide our clients. For a small fee, we will assess your needs, advise on the best technology and products and evaluate any proposal you may have received.

We can also project-manage the entire project of making your home or business grid-independent.

