



## ENERGY CONNECTIONS

Like probably half of Australia we here at Energy Connections are excited by the promises of Tesla, its batteries pack (powerwall) and the press release that went out in early May 2015.

The energy storage idea is not new, in fact we have been installing hybrid systems (solar systems with battery storage) for over three years and off grid stand-alone systems for years before that.

The press release by Elon Musk has certainly stirred the pot, as we know with the Tesla S car tesla is at the cutting edge of technology, Tesla has developed a unique product that has nailed the EV market with the world's fastest production car and no emission's. It is of course logical and good business for tesla to get the cost of lithium batteries down as he needs the cost of the Tesla S to get down below its current \$130k odd price, in order to get a larger share of the car market.

Battery storage systems tend to have a payback period of 7-14 years (depending on a lot of factors) and so early adopters will want to seriously consider storage, as 5- 10 years is about the time line that the lithium batteries will be due for replacement.

The press release mentioned battery pricing and basic capacity but lacked a lot of other detail, for example failed to mention that the system will require a DC-AC inverter (see teslas web site). Teslas site mentions battery capacity but fails to state usable capacity, with lithium's recommended discharge of 80% what it would mean is that 7kW version would supply 5.6 watt hours of energy ie 1 kW for 5.6 hours. Another detail of the lithium and as per the specs on the site, the battery temperature range only extends to 43 degrees, with several days per year in Vic, SA, and WA (never mind the more arid parts of Australia) where the ambient goes into the mid 40,s the system assumedly won't work, in fact most lithium storage devices suffer the same problem. It might be a case that the unit will only work in colder climates and not on the hot side of the house, or some other source of reliable power will be required in extreme temperature events.

The Tesla battery is a high voltage battery and has been predominantly designed to integrate into a high voltage (300-400 volt) MPPT input of a grid tied inverter, this is an ideal way to cheaply shift solar power that would otherwise be exported to the grid at a lowly 5 cents per kw (Victoria). The basic problems with a high voltage battery and grid connect inverter are as follows.

1. Grid connect inverters are designed to export solar to the grid, be compact and bolted to the side of your house, they therefore lack large transformers and capacitors that are able to deliver high current on demand ie starting an air conditioner, pump or fridge compressor.
2. Due to the lack of surge capability and by design they are unable to support large house loads.

3. Because of the coupling to the grid connected inverter, the tesla battery will not run the house when the grid is down. By design the grid invert must shut down in a grid outage situation.

The roll out in Australia has begun and early adopters are paying to be first on board, supply of the powerwall is limited and not the price point that was originally proposed, according to a recent program on the ABC,s catalyst the installed cost of the 7 kw powerwall was \$14,000, whilst the details on what was included/excluded was not clear, what is clear is that the price for the powerwall is way above the original proposed \$3500 us at the May 2015 press launch.

Things to take on board,

1. Do you need the batteries to function when the grid turns off?
2. Do or will you have spare solar generation i.e. you currently export about half your solars generation to the grid?
3. Is the decision to install batteries strictly financial ? or do you need to have a secure supply of power?
4. When will the batteries need to be replaced? (they all do) have you gained a benefit, Before this occurs?
5. If your motivation is to be green, how green is the battery that you have chosen? Ie: is it recyclable? How much? Some? All? How? Poisonous? Explosive?
6. Is the battery you have chosen a proven technology?
7. If you need to claim under warranty what is the chance that the installer?. importer?, distributor? Manufacturer? Is around. (warranty on paper is great, it is after all just a piece of paper.)

We will certainly be watching the product and listening to feedback from early adopters and business partners to see how the distribution, warranty and performance goes. Lithium batteries are new to the world of bulk storage, they at this point have to prove themselves in what is a very demanding application. The purchase of a Home battery is not like going to the local supermarket and grabbing a couple of AA batteries, the demands are huge, the rest of the equipment highly technical. Only experienced and trained designers/installers should be engaged to size and sell a system that will be reliable and deliver the outcomes you are looking for.

We will continue to use tried and tested equipment, watch the other contenders, listen and learn, and gather all the facts and figures about lithium batteries. If they stack up, then tell everyone about it.

Regards

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