Submission - Electricity and Other Legislation (Batteries and Premium Feed-in Tariff) Amendment Bill 2017

This submission is provided by:

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[redacted]

I am an SBS consumer who installed a battery (in May 2017) to maximise self-use of my solar output. It has always been my intention to withdraw from the SBS following the installation of a battery. I am motivated by climate considerations - not SBS income. I have requested Energex to move me to the retail FiT effective from March 2017 meter reading.

That said, I feel strongly that other SBS consumers should be able to install a battery to maximise self-use of their solar output **without** losing SBS eligibility for the reasons explained in this submission. The provisions of the draft bill seem to over-regulate what SBS consumers can and can't do, when the solution may be to monitor and manage the State's SBS liability using information that Distributors already collect and use.

If clarification is required feel free to contact me on [redacted] or via email: [redacted]

Thank you for the opportunity to provide feedback on the draft legislation.

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It is accepted that the government's intention is to prevent the cost of the Solar Bonus Scheme (SBS) from blowing out, because of potential unfair use of energy storage and/or additional generation by SBS consumers that was not foreseeable when the SBS began in April 2009.

The draft Bill takes a prescriptive approach by ruling out various scenarios that may unfairly exploit the SBS without also considering what may be reasonable and fair within such scenarios. The focus on preventing a blow out in the State's SBS liability has narrowed the Government's thinking and resulted in over-regulation.

The Government should allow SBS consumers the same freedom that other electricity consumers have to manage their energy bills and to take advantage of innovations in energy generation and storage according to their personal values, strategic thinking and financial circumstances.

Energy Storage

Energy storage was prohibitively expensive when the SBS began in April 2009, but prices have fallen and are expected to continue to fall significantly. When the increasing price of electricity from the grid is considered, it will not be long before electricity consumers adopt solar and energy storage as a way of containing escalating energy costs.

The financial case for an SBS consumer to install energy storage may not be there yet, but it may well exist before the SBS expires in 2028. The draft Bill fails to recognise that economics is not the only motivation in play. People's circumstances and personal values influence their need for return on investment.

It is reasonable for an SBS consumer to install energy storage **solely** to maximise self-use of solar output (from their qualifying generator), to participate in a virtual battery arrangement, or as part of demand response. Using energy storage in this way will **reduce** exports from the qualifying generator and hence, the State's SBS liability, and bring many other benefits to the entire electricity market.

Such usage is **not** contrary to "the intent" of the SBS and should be encouraged by Government policy. For now, such usage may be a decision based on personal values and / or strategic thinking rather than hard-headed economics.

It is easy to detect those SBS consumers who use energy storage in a manner contrary to "the intent" of the SBS. There will be a spike in solar export meter readings that will be obvious to the Distributor who can then investigate and act. Distributors already use this method to detect SBS consumers that take unfair advantage of the SBS.

As it stands the draft Bill prohibits a most beneficial and continuous use of energy storage that would reduce the States SBS liability. It allows SBS consumers only **intermittent** and **low-value** uses of energy storage (e.g. uninterruptible power supply for the premises during a blackout).

This unfairly locks over 220,000 SBS consumers out of the energy storage market and is a roadblock for the many benefits distributed energy storage can provide to the entire electricity market during the **10 years** starting 15 June 2017 until 31 December 2028. We have seen these benefits demonstrated by the Hornsdale Power Reserve in South Australia throughout the summer of 2017-18.

Energy Storage Buffering to and from the Grid

An energy storage system needs time to react when large loads start up and shut down e.g. fridge motor cycling on and off.

Assuming solar is unavailable, on appliance start-up, energy is imported from the grid to meet any shortfall between what the battery and its inverter can provide and what the appliance needs. There is no concern with these imports.

On appliance shutdown, there is residual energy taken from battery that needs to be taken care of. The safest way is to export this energy to the grid (rather than say, dumping it as heat). These exports may be a concern as they are not catered for in the draft Bill.

This buffering behaviour occurs **day and night** and prevents lights flickering, brown outs, and voltage drop when large appliances start up etc.

In my situation, such imports amount to about 0.5 kWh per day (not a concern for the draft Bill). I have no figures on such exports but would imagine it to be about the same as the imports. For my five kW system 0.5 kWh per day equates to only 2.5% of average daily exports. It should be noted that my energy storage system is charged from the qualifying generator so overall exports have reduced by at least 3 kWh per day (or 15% of average daily exports).

Whatever the outcome of the consultation process the finalised Bill must not compromise the safe operation of an energy storage system. The finalised Bill should allow buffering to the grid of such minor exports from an energy storage system.

Oversizing the inverter

The addition of panels to a solar generator (beyond the inverter rating i.e. oversizing) should **only** be done under the management of an accredited solar installer working with the manufacturer(s) of the solar panels and inverter. The owner of the solar system must first obtain expert advice regarding solar system warranty and house insurance implications.

Assuming the above has been established, it is reasonable for an SBS consumer to add panels to their qualifying generator when their circumstances change and they wish to make greater self-use of their (albeit increased) solar output (from their qualifying generator) during daylight hours. Such changes in circumstances may include the birth of a baby, or additional occupant(s) in the house, or purchase of major appliance such as air conditioning or electric vehicle etc. Oversizing the qualifying generator in such circumstances is reasonable provided there is little or no increase in exports and hence, the State's SBS liability. Again, such oversizing may be a decision based on personal values and / or strategic thinking rather than hard-headed economics.

Again, it is easy to detect those SBS consumers who use inverter oversizing in a manner contrary to "the intent" of the SBS. There will be a spike in solar export meter readings that will be obvious to the Distributor who can then investigate and act. Distributors already use this method to detect SBS consumers that take unfair advantage of the SBS.

Energy efficiency

It is reasonable for an SBS consumer to reduce energy use. This in no way conflicts with “the intent” of the SBS. These reductions in energy use may result in a permanent, and possibly significant, increase in exports going forward. It would not be hard to reduce energy use and increase exports by 500 kWh in a season (especially summer) by implementing a combination of the below.

- Decommission major appliances e.g. air con, strip heater, spare fridge.
- Replace inefficient appliances e.g. air con, fridge, TV, lighting (encouraged by Queensland Government).
- Increase the use of off peak tariffs e.g. hot water system booster, pool pump, air con.
- Shift AC loads from daytime to night-time e.g. dishwasher, ironing clothes.
- An occupant (e.g. child) moves out of the house.
- Go on holidays and leave the solar PV generating (not recommended - may void house insurance).
- Improve orientation of existing PV panels e.g. north facing frame mounting or pole mounting with or without tracking.

It is easy to detect the spike in exports; however, a Distributor can’t tell from meter readings alone whether a fair reduction in energy use (as per the above) has occurred versus unfair exploitation of the SBS.

It would be reasonable for the Distributor to ask for an explanation (small spike in exports) or conduct an on-site audit (large spike in exports). If it’s determined that the increase in exports is okay there needs to be a way for the Distributor to adjust their compliance processes so that there will not be continuing “false positives” going forward for that SBS consumer.

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Proposal – Cap on SBS Exports

If the only issue is a potential blow out in the State's SBS liability then a proposed solution is to place a cap on exports for SBS consumers. The cap should be based on exports in each billing period averaged over the number of years that the consumer has participated in the SBS up to the commencement date of the Bill. The SBS consumer would be paid the premium FiT for exports up to the cap and the retail FiT for exports over the cap.

The Distributors have all the meter readings needed to calculate a cap for each SBS consumer for the four billing periods within a year. Such a cap eliminates the need for Distributors to have compliance processes as the financial incentive to unfairly exploit the SBS is mostly eliminated. The onus would be on retailers to change their billing systems.

By basing the Bill on a cap on SBS exports it is unlikely that the legislation will need to change every time the market throws up another energy innovation, during the remaining 10 year life of the SBS.

Below is a real-world example. The numbers highlighted in blue represent the cap on exports for a given billing period and the consequent SBS payment.

Period 2010 - 2014						
Actual Readings						
Dec - Mar	**Exports**	**Self-use**	**Gross**	**Imports**	**Reco SBS Cap Amt**	
Seasonal Average	1762.4	443.0	2205.4	421.4	$775.46	
Mar - Jun						
Seasonal Average	1179.8	374.6	1554.4	544.6	$519.11	
Jun - Sep						
Seasonal Average	1261.8	406.8	1668.6	612.8	$555.19	
Sep - Dec						
Seasonal Average	1885.2	419.2	2304.4	414.0	$829.49	
Notes						
Two person household, efficient appliances, no air con, no pool pump, gas stove.						
5 kW system; Not aligned to peak sun; Up to 1 hour of shading AM or PM depending on season.						
Assumes solar HWS booster continues using off peak tariff.						

In the interests of fairness, further consultation should occur with groups that represent the interests of solar owners regarding the method for determining the proposed cap on SBS exports. Such consultation was not possible given the tight timeframe for submissions to the Committee.

Solar Bonus Scheme – Voluntary Buyback

An alternative is to offer a genuine buyback based on a battery rebate to SBS consumers. While acknowledging this has been ruled out by the Government, I have included an attachment that describes a Solar Bonus Scheme – Voluntary Buyback Proposal.

This proposal was discussed with my local MP Dr Lynham and representative(s) from the Department of Energy during 2016 and 2017. It arose from the Queensland Electricity Pricing Inquiry. Since then:

- *the Hornsdale Power Reserve has come online and demonstrated benefits throughout the summer of 2017-18 – millisecond reaction to numerous fossil fuel generator trips, as well as placing downward pressure on wholesale prices during peak energy use (refer page 15-16 below).*
- *The South Australian Government (if re-elected) has unveiled plans to build a 250MW "virtual power plant", linking household rooftop solar and battery storage, in what it says will be the world's biggest. The project aims to connect at least 50,000 households, beginning with low-income Housing Trust (social housing) properties, which will be each fitted with 5kW of rooftop solar and one 13.5kWh Tesla Powerwall 2 battery system (refer pages 16-19 below).*
- *The Queensland Government has removed the cost of the Solar Bonus Scheme from consumer's electricity bills. It will be funded from the State budget until at least 2019-20.*
- *Energy storage prices have fallen further since the cost models used in this document were prepared.*

The above suggests that the community is now better informed and may be more receptive to using an energy storage rebate as a trade-off for leaving the Solar Bonus Scheme, than was apparent in 2016.

Circumstances prevent me from comprehensively updating this proposal. While the dates and amounts may need to be changed, the concepts underpinning this proposal remain the same.

Solar Bonus Scheme (SBS) - Voluntary Buyback Proposal

The Queensland Government has already ruled out unilaterally terminating the SBS in 2020, as recommended by the Electricity Pricing Inquiry draft report. However, it remains economically responsible for the Queensland Government to seek to reduce electricity prices via negotiation with SBS households. Hence, there is an opportunity for a conversation in good faith about the below principles that could underpin an SBS buyback, and to put a genuine proposal on the table.

1. The reduction in network charges resulting from the SBS buyback must be returned to all householders and businesses. The Queensland Government has shown that it has the power to direct the distribution monopolies when it instructed them NOT to appeal a recent decision of the National Energy Regulator.
2. The buyback must be voluntary.
3. It may be more electorally palatable to buyback the SBS in a way that drives down both short and long term electricity costs for all households and businesses. An investment in energy storage would lower evening peak loads, thereby re-invigorating the uptake of solar and the purchase of energy efficient appliances through lower network charges. The aim is to increase the acceptance of the buyback by both SBS households and the wider community.
4. The buyback should be open for a reasonable time to allow SBS households to raise a co-contribution.

Below is a buyback proposal that meets the principles.

- Voluntary departure from the SBS would be encouraged by providing an energy storage rebate claimable by the supplier of the energy storage system. The SBS household would fund the balance (Principles 2, 3).
- A short consultation process should be undertaken with SBS households to fine tune the energy storage rebate and gauge acceptance, together with some marketing to the wider community.
- SBS households would be given six months to participate in the buyback (Principle 4) from the date a buyback offer is made. All households and business would be provided with assistance to form buying groups to obtain volume pricing on energy storage. Assistance would be in the form of an information pack publicised via electricity bills.
- As a condition of the rebate, stored energy will be able to be exported via the network[1] to the wholesale market[2], thereby increasing competition during network peaks.
- The Queensland Government would direct the distribution monopolies to reduce charges for all households and businesses based on the uptake of the buyback. Distribution monopolies must provide independent verification of proportionate reductions in charges to Parliament.

[1] Grid connected energy storage enables more solar PV to be connected to the network. It also enables future energy trading via virtual net metering.

[2] For example, marketing material from Reposit Power indicates grid credits of the order of $1.00 per kWh during network peaks.

- The ceiling on the maximum capacity of solar PV systems for small customers (i.e. electricity customers that use less than 100MW per annum) would be lifted. This was designed to contain the cost of the SBS, which will no longer be necessary after the buyback. Purchasing additional panels would be unrestricted but increasing the size of an inverter would require prior approval from the relevant distributor.

It is fundamental that the Solar Pricing Inquiry results in a fair FiT for solar exports.

The SBS buyback supports the government's election commitments by:

- Lowering electricity prices for all households now and into the future (through deferred / avoided investment in grid capacity upgrades and increased competition in the wholesale market during network peaks).
- Reinvigorating the uptake of solar to achieve 1 million rooftops or 3000 MW of rooftop solar by 2020 (through lower network charges).
- Making a down payment on a Queensland Renewable Target(QRET).

What's in it for SBS Households?

The impact of swapping from $0.44 per kWh for net exports to $0.05 per kWh for net exports is a considerable financial hit that would be partly mitigated as follows:

- An energy storage rebate (with SBS householder contribution) would increase self-use of solar generation.
- As a condition of the rebate, stored energy will be able to be exported via the network to the wholesale market[2].
- Lifting the ceiling on system capacity which would enable increased generation (at the SBS householder's expense).
- Reduction in network charges (to the extent of the uptake of the buyback – up to $89 per annum).

What's in it for solar households and businesses not in the SBS?

Solar households and businesses not in the SBS would receive the following benefits:

- Should such households and businesses wish to acquire energy storage, the business case will be assisted by having all of the mechanisms in place to export stored energy via the network to the wholesale market[2].
- Lifting the ceiling on system capacity which would enable increased generation (at the owner's expense).
- Reduction in network charges (to the extent of the uptake of the buyback - up to $89 per annum).

What's in it for the rest of the community, including businesses?

The rest of the community, including businesses, would receive the following benefits:

- Lifting the ceiling on system capacity which would enable new solar households and businesses to purchase systems at a lower cost per watt.
- Should such households and businesses wish to acquire energy storage, the business case will be assisted by having all of the mechanisms in place to export stored energy via the network to the wholesale market[2].
- Reduction in network charges (to the extent of the uptake of the buyback - up to $89 per annum).

What's in it for the Distributors (Ergon, Energex, Powerlink)?

The distributors would achieve the following benefits:

- The rollout of energy storage will reduce the evening peak through increased self-use of solar generation.
- SBS households will shift loads to the day time to maximise self-use of solar generation, also reducing the evening peak.
- A condition of the rebate is that stored power will be able to be exported and therefore also reduce network peaks.
- Network capacity upgrades would be avoided or deferred due to the above reductions in peak loads.

What's in it for the Queensland Government?

By tackling a sensitive and expensive issue through negotiation, rather than confrontation, the Queensland Government will have succeeded in:

- Reducing network charges (to the extent of the uptake of the buyback – up to $89 per annum) for ALL households and businesses[3].

[3] Interstate premium feed-in tariffs are being wound up making Queensland electricity prices significantly more expensive.

- Putting downward pressure on wholesale electricity prices as stored energy from (up to 265,000) SBS households would now enter the wholesale market increasing competition during network peaks. The mechanisms would be in place for a further 200,000 solar households and businesses to join as they see fit.
- Re-invigorating the Queensland Government's target for 1 million rooftops or 3 GW of solar PV by 2020. Those who have already installed solar understand the benefits and are likely to invest in system upgrades once the ceiling on system capacity is lifted.
- Stimulating the demand for energy storage resulting in increasing levels of mass production and supply chain improvements that would lower energy storage prices for Queenslanders in the long run.

On the downside, Queensland Treasury may see a decrease in GST takings if electricity prices fall, assuming the fall is passed on throughout the economy.

The Queensland Government may wish to direct the rebate towards the purchase of Australian made energy storage systems as an industry development and employment initiative.

How would the SBS buyback be funded?

The SBS buyback should be funded from:

- The distributor's capital allocation as there would be a material drop in evening peak loads that would avoid or defer investment in grid capacity upgrades to beyond 2020 (the next investment cycle).
- Proceeds of the sale of gold-plated network components.
- A contribution from the Queensland Government.

In the below financial model the storage rebate is calculated at 60% of the estimated cost of 14.5 kWh battery (e.g. $10,000 for Powerwall 2 as announced by Tesla for Q1 2017 delivery) as at the start of the SBS buyback (1 July 2017). Based on this assumption the storage rebate would be $6,000, with the balance ($4,000) to be paid by the SBS householder.

SBS cost per consumer			$89			
Annual SBS payment			$340,000,000			
Average SBS cost per consumer per annun			$1,223			
SBS attrition rate per annum			5.80%	Starting at 1300 per month in 2014-15.		
SBS buyback acceptance rate			75.00%			
Energy storage rebate			**$6,000**	Confirm closer to the start of the SBS buyback.		
Year	**SBS Rooftops**	**SBS Departures (assume all depart at year end)**	**SBS Departure Saving (average)**	**Network Charge Reduction to Pass On**	**Storage Rebate Cost**	**SBS Cost with buyback**
2012-13	278,000	6,500				$340,000,000
2013-14	271,500	6,500	$7,947,170	$2.08		$332,052,830
2014-15	265,000	15,370	$7,947,170	$2.08		$324,105,660
2015-16	249,630	14,479	$18,792,000	$4.92		$305,313,660
2016-17	235,151	13,639	$17,702,064	$4.63		$287,611,596
2017-18	221,513	166,135	$16,675,344	$4.37	**$996,807,039**	$270,936,252
2018-19	55,378	3,212	$203,122,944	$53.17		$67,813,308
2019-20	52,166	3,026	$3,927,044	$1.03		$63,886,265
2020-21	49,141	2,850	$3,699,275	$0.97		$60,186,990
2021-22	46,290	2,685	$3,484,717	$0.91		$56,702,273
2022-23	43,606	2,529	$3,282,604	$0.86		$53,419,669
2023-24	41,076	2,382	$3,092,213	$0.81		$50,327,457
2024-25	38,694	2,244	$2,912,864	$0.76		$47,414,592
2025-26	36,450	2,114	$2,743,918	$0.72		$44,670,674
2026-27	34,336	1,991	$2,584,771	$0.68		$42,085,904
2027-28	32,344	32,344	$2,434,854	$0.64		$39,651,049
2028-29			$39,545,389	$10.35		$105,660
						$2,386,283,840

As indicated above an SBS buyback estimated to cost $0.99 billion would reduce the total cost of the SBS from an estimated $4.4 billion (QPC figure) to less than $2.4 billion assuming 166,135 households exit the SBS early.

The below shows the cost of the buyback, the resulting lifetime SBS cost, and the reduction in the lifetime cost for a range of buyback acceptance rates.

Acceptance Rate	Buyback cost	SBS cost with buyback	Lifetime cost reduction
10	$132,907,605	$3,751,547,940	$648,452,060
50	$664,538,026	$2,911,385,417	$1,488,614,583
75	$996,807,039	$2,386,283,840	$2,013,716,160
85	$1,129,714,644	$2,176,243,210	$2,223,756,790

It is important to note that based on energy storage prices in April 2016, the SBS buyback was estimated to cost $1.49 billion and would reduce the total cost of the SBS from an estimated $4.4 billion (QPC figure) to less than $2.4 billion assuming 166,135 households exit the SBS early.

Tesla's recent pricing announcement (for Powerwall 2 effective in Q1 2017) reduces the estimated cost of the SBS buyback by $0.5 billion all else being equal. It also brings to the table an energy storage capacity of 14.5 kWh, which is 45% larger than was thought possible in April 2016, and which magnifies the benefits for distributors and consumers.

The above modelling suggests that the SBS buyback can be funded over time from the revenue stream (i.e. distributor charges) that cover the cost of the Solar Bonus Scheme itself.

How is the value of the energy storage rebate determined?

Energy storage pricing should be analysed much close to the start of the SBS buyback to determine the amount of the rebate and the contribution to be provided by the SBS household. Energy storage prices should fall by the start of the SBS buyback (1 July 2017) as many new suppliers enter the Australian market.

There must be consultation with SBS households to gauge the uptake of an SBS buyback based on different energy storage rebate scenarios.

When should the SBS buyback start?

The below must be addressed before commencing the SBS buyback.

- Energy storage safety standards and wiring rules.
- Training and accreditation of energy storage installers.
- Determine the policy and pricing for distributors to use a consumer's energy storage for "demand response".
- Design and test buyback processes to ensure payments to energy storage suppliers are timely.
- Allocate funding.

It is estimated that the SBS buyback may be ready to start as early as 1 July 2017.

How should the SBS buyback be prioritised?

Assuming the matters listed under When should the SBS buyback start? above are in place, SBS households could be made an offer in tranches based on their annual SBS payment amount. For example:

- Tranche 1 – annual SBS payment of $2,000 and above. This is a small group to fine-tune buyback processes.
- Tranche 2 – annual SBS annual payment of less than $2,000.

Alternatively the tranches could be designed to at first benefit disadvantaged SBS households (e.g. pensioners etc).

Once an offer is made an SBS household should be given six months to raise any contribution.

The above approach enables a carefully managed buyback process where **safety is paramount** and the early focus is on the largest benefits.

What happens at the end of the SBS buyback?

The SBS buyback should be completed within a year (allowing six months for each tranche).

At the end of the SBS buyback, network charges for all consumers will be reduced by an amount proportional to the uptake of the buyback. For example, if the uptake of the buyback is 100%, network charges for each electricity consumer should be reduced by $89 (as identified by the Queensland Competition Authority).

The ceiling on the maximum capacity of solar PV systems for small customers (i.e. less than 100MW per annum) would be lifted. Purchasing additional panels would be unrestricted but increasing the size of an inverter would require prior approval from the relevant distributor.

What if an SBS household cannot install energy storage for some reason (e.g. safety)?

SBS households that are willing to exit the SBS but cannot install energy storage for some reason e.g. site and/or safety constraints, would continue in the SBS.

What can go wrong?

Risk	Likelihood	Impact	Risk Rating	Mitigation
Low uptake of buyback offers.	Medium	Low	Medium	Consultation with SBS households prior to the start of the buyback to gauge the uptake based on different energy storage rebate scenarios. A low uptake would still make a significant reduction in the lifetime cost of the SBS.
Unexpectedly high uptake of buyback offers.	Low	Medium	Medium	Ensure that contingency funding is available. This would be too good an outcome to be allowed to fail through lack of funding.
Community backlash.	Medium	High	High	There is already community angst to the SBS so marketing community benefits is key. ➢ An investment in energy storage is being used as an incentive to reduce the lifetime cost of the SBS. ➢ No payment is made direct to SBS households ➢ SBS households will make a co-contribution. ➢ Verifiable reduction in network charges (to the extent of the uptake of the buyback - up to $89 per annum). ➢ Network capacity upgrades avoided or deferred due to the reductions in peak loads resulting from storage investment. ➢ Industry development and employment.
Energy storage related safety incident occurs. This risk relates to the implementation of energy storage in households generally, not just the SBS buyback.	Low	High	High	It is vital that safety standards and training and accreditation of energy storage installers are in place as soon as possible.

This article was published on 12 April 2016 via One Step Off the Grid newsletter. The article is also referenced from RenewEconomy.

The text highlighted in yellow within the article represents the key benefit of installing storage which, unfortunately, is not modelled in the article. Without the ability to export from the battery at peak times the buyback would be unlikely to achieve a worthwhile level of acceptance.

Why Queensland should trade premium solar tariffs for battery storage

By **James Martin** on April 12, 2016

Shuttershock

Solar Choice recently wrote about the potential for a battery storage incentive program under the Renewable Energy Target. Here, we take an equally speculative approach in looking at an incentive program for battery storage in Queensland based on (voluntary) Solar Bonus Scheme feed-in tariff buyouts. If you have thoughts or feedback about what is discussed here, we'd love to hear it – either in the comments or via email (James@solarchoice.net.au)

Queensland's Solar Bonus Scheme is now closed to new applicants, but there are still tens of thousands of residential solar system owners who benefit from the generous 44c/kWh rate that the program pays out to recipients. Provided they don't move house or upgrade their solar system size, these homes will continue continue to receive this incentive until 2028.

This is great for those who are enrolled in the Solar Bonus Scheme, but not everyone is a fan. Some noteworthy opponents include the Queensland Productivity Commission (QPC), who have suggested that the program be brought to an early close to cut the costs associated with it. Although this idea has been dismissed (the same outcome as similar proposals in NSW and WA), Queensland's regional network company Ergon was at one point contemplating a voluntary buyout program, where Solar Bonus Scheme recipients receive an up-front sum equal to a portion of their total feed-in tariff benefit out to 2028.

But what if the Queensland government were to take slightly different approach, where FiT liabilities were paid out in the form of a battery storage system incentive? Basically, a home benefitting from the Solar Bonus Scheme would be offered a lump sum to put towards a battery storage system; the amount of this sum would be based on their total feed-in tariff liability out to 2028. Forfeiting their FiT would allow those homes who want batteries to get them – at a heavily discounted rate or at virtually no out-of-pocket cost to them. In addition to creating a pathway to home energy independence, they would also potentially be able to avoid tax liability for a windfall payout should they receive cash instead.

Calculating the value of a hypothetical FiT buyout

While the whole idea of such a buyout is still purely speculation, we though that it would be interesting to explore what parameters might be put on this kind of scheme and what the outputs would be. Tweaking these parameters, we can estimate the maximum and minimum amounts that an up-front payment / battery incentive could be.

The main questions regarding payout would revolve around the following variables:

- Solar system size
- Ratio of solar export vs solar self-consumption
- The date of the buyout (i.e. how many years of FiT payments remain?)
- Assumed percentage of the buyout (the government would probably offer a discounted payout of 50-75% total FiT liability)
- Location (and associated solar resource)
- How panel degradation is accounted for

Based on these factors (plus a few others), we've put together the below calculator tool to allow anyone to estimate what their FiT payout might be if such a program were implemented. As should be obvious, the tool is not prescriptive or even relevant to any real-life program – we've only put it together to stimulate conversation on the topic.

<need to go to the article to access the embedded spreadsheet>

As you can see, the outputs vary dramatically depending on how the parameters are set, with a potential incentive value ranging from as little as about $8,500 to as much as over $42,000 for a 5kW system. A 'middle of the road' result would be about $12,000-$15,000 for someone who accepted a buyout sometime next year.

How much battery capacity would a FiT payout buy?

How much battery capacity would that that buy? That also depends. Of the many options available in Australia, lithium-ion and lead-type batteries are the two most popular battery chemistries for home energy storage on the market at the moment (although we certainly shouldn't discount others like Aquion and RedFlow). The former are a great option for grid-connected systems while the latter are the tried-and-trusted solution for off-grid systems (although they may also be used for on-grid or partial off-grid systems).

The table below provides a quick glance at how battery system installation costs would stack up at a range of price points – from 'very optimistic' on the low end to 'realistic but possibly still a bit pricey' on the high end.

Battery type	Price point(per kWh capacity)	5kWh	7kWh	10kWh	20kWh
Lithium-ion	@$700	$3,500	$4,900	$7,000	$14,000
	@$1,000	$5,000	$7,000	$10,000	$20,000
	@$1,200	$6,000	$8,400	$12,000	$24,000
	@$1,500	$7,500	$10,500	$15,000	$30,000
	@2,000	$10,000	$14,000	$20,000	$40,000
Lead-type	@$300	$1,500	$2,100	$3,000	$6,000
	@$500	$2,500	$3,500	$5,000	$10,000
	@$700	$3,500	$4,900	$7,000	$14,000
	@$800	$4,000	$5,600	$8,000	$16,000

For a lithium-ion battery bank fully installed, a retail price of $1,000 per kWh of fully installed capacity (e.g. $7,000 for a 7kWh battery storage system) is fairly optimistic at the time of writing. At around this price, a moderately optimistic FiT buyout for a 5kW solar system (~$15,000) would allow a home to purchase about 13-15kWh battery storage system.

A battery bank of this size – while not being enough to allow a home to go off-grid – is still nothing to sneeze at. For many homes, it would be enough for them to become energy self-sufficient for most days of the year (that is, purchasing no energy from the grid). If the home in question had particularly low daily electricity demand in the first place and decided they wanted to get fully or partially off the grid, they might opt for a lead-based battery solution instead (pending some very serious consultations with a number of solar installers, of course).\

Would cashing your FiT in be worth it?

Even in the best case scenario outlined above, the savings achieved by installing a battery bank may not match up with the value of the FiT over 10-12 years. Conversely, a larger system purchased with a larger buyout may deliver inferior returns to a smaller one. We've done some indicative analysis in the table below.

(Importantly, figures in the table do not factor in revenues gained from energy trading on the NEM using approaches like Reposit Power's GridCredits. Reposit's technology promises to sweeten the economic case for installing batteries further by allowing homes to benefit from premium peak-time feed-in rates.)

Buyout scenario: North-facing 5kW solar system in Brisbane, 25kWh consumption per day, 6c/kWh FiT rate, 25c/kWh electricity price, 'double peak' usage pattern					
FiT value @50% export & 90% panel efficiency	Buyout terms	Buyout amount (battery subsidy amount)	Approx battery system size purchasable (@$1,000/kWh)	Rough battery system payback (w/ tariff arbitrage*)	Net Present Value (NPV) @ 6% discount rate
$19,500	100% value	$19,500	20kWh	13.7	-$2,800
	75% value	$14,625	15kWh	11.7	$1,400
	50% value	$9,750	10kWh	7	$5,200
*Charging batteries with grid at cheap rates, discharging during expensive peak times. Assumed rates: 10c/kWh off-peak, 42c/kWh peak, 18c/kWh shoulder					

The (somewhat unsurprising) general conclusion we can draw is that any FiT buyout / battery storage incentive would probably be of most interest to early adopters, technology enthusiasts and those who despise dealing with electricity retailers. It might also hold a lot of appeal to those who know they're going to sell their home – the FiT benefit evaporates when a house changes hands, but a battery storage system will continue to deliver benefits, therefore presumably increasing a home's value.

Another important point to make is that homes should probably be allowed to put money towards expanding their solar arrays as well as installing batteries. In the 'highly optimistic' buyout scenarios, where system owners are given full credit or nearly full credit for their FiT upfront, the maximum size

of the battery bank that the home could purchase would probably be much too large for their needs – especially if they're charging the batteries only with solar (no grid charging). Instead of earmarking the payout money only for batteries, the government might opt to make the program flexible enough to allow for additional solar panels as well. This would allow homes to select a system whose balance of battery and solar capacity is tailored to meet their needs.

With these thoughts in mind, those who are interested in exploring the possibilities are encouraged to do the maths either using Solar Choice's battery sizing & payback estimator tool, or with the NSW Farmers / AgInnovators calculator (which was created for NSW but which is nevertheless useful as an indicative guide.)

We should also not that the absence of this kind of an incentive shouldn't deter those who are interested in batteries from investigating them! If you're a home-owner considering a battery storage system, just make sure you do your homework: get opinions & quotes from multiple installers to make sure you're well informed before making a decision.

Source: Solar Choice. Reproduced with permission.

Sydney home becomes 'mini power station' with solar + Powerwall + GridCredits

By Sophie Vorrath on 10 February 2016

One Step Off The Grid

Australia's first household to add a Tesla Powerwall battery can this week begin buying and selling energy on the electricity market, after the addition of a world-leading software program by Canberra company, Reposit Power.

At the end of last month, the Pfitzner family in Kellyville Ridge, north-west of Sydney, became the first of what will soon be many Australian households to install one of Tesla's much-hyped 7kWh batteries, to store energy generated by the house's 5kW solar system.

Homeowner Nick Pfitzner with the newly installed Powerwall battery and Natural Solar's Oliver Coleman

On Tuesday afternoon, the same household became the first in Australia to integrate Reposit Power's GridCredit technology with the Powerwall, to act as the "brains" of the solar plus battery storage system.

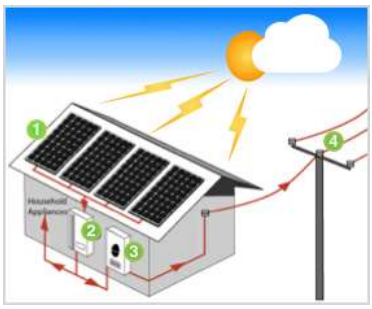
"What we do is put some smart brains on that (technology) and allow it to interact with wholesale markets," says Reposit's Luke Osborne.

"We want customers to be able to choose the best storage device and have a great user experience from us by trading in energy markets, buying low and selling high and supplying themselves in between."

The "set and forget" technology – which was tested last year in a series of ARENA-backed trials based in Canberra and the surrounding region, – uses data from inputs including advanced weather forecasting and electricity market pricing to decide whether to store solar generated energy in the battery during the day or sell it back to the grid at a profit.

For example, when energy prices drop overnight and the system predicts low solar generation the following day GridCredits takes electricity from the grid to charge the batteries.

As Reposit Power CTO and co-founder Lachlan Blackhall puts it, the technology effectively turns your solar and storage into "a mini power station" that works just for you.



"You capture excess solar when there is excess, and use it when it's most efficient for you – when energy prices would otherwise be high," Blackhall told One Step Off The Grid in an interview on Tuesday.

"It also allows you to trade your energy onto the grid, via GridCredits – to sell it back to the retailer or the network or into the wholesale market."

Blackhall says the company is now in the process of rolling out their software to hundreds of customers, and by the start of Q2, they expect that number to grow.

And while Reposit's software is compatible with other battery technologies, the company's early pairing with the much hyped Tesla battery – announced last May – is a feather in the young company's cap and a great way to get on the radar.

"We are passionate about working with partners that share our vision of empowering consumers to take control of their energy future," Blackhall told One Step. "Tesla is one such company.

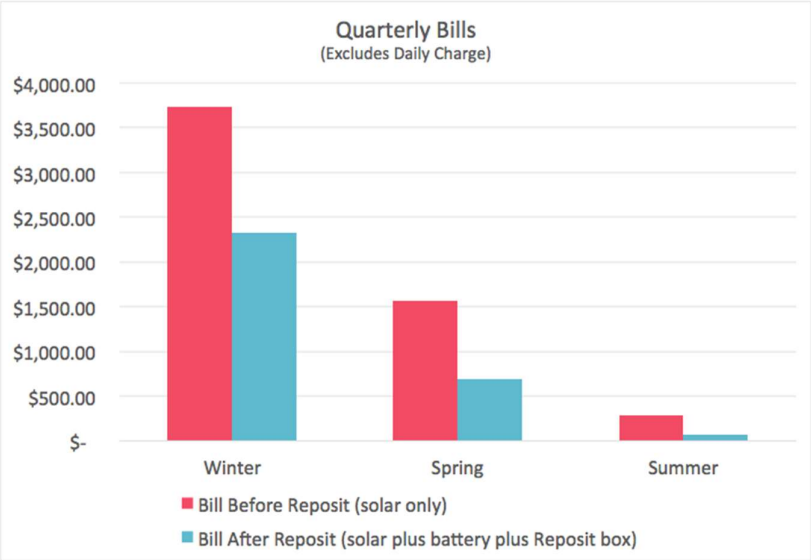
"We are delighted to starting seeing the impact that Tesla batteries powered by Reposit technology will have for consumers, and the electricity grid as a whole, over the years ahead," he said.

But battery compatibility is not the only prerequisite for households wishing to use the GridCredits technology – it also requires the cooperation of the household's retailer or network operator.

And of course, not all of Australia's energy industry incumbents will be thrilled with the prospect of consumers becoming active market players.

Currently, Blackhall says there is a small selection of retailers playing ball, including Diamond Energy – so far the only retailer to publicly announce it is working with Reposit (more will be announced later in the year).

According to the retailer's website, the Diamond Energy GridCredit100 "is like a feed-in tariff. We will initiate the purchase of your battery dispatched electricity at a whopping 100 cents/kWh* during any 'Grid Credit Event' (when the market requires your electricity)."



The chart above shows what happened to the quarterly electricity bills of Reposit Power's first GridCredits customer, a couple living near Bungendore, NSW. The couple, despite having a "sizeable" free-standing solar system installed, were suffering from huge electricity bills due to an inefficient heating system. Reposit's was commissioned to install a battery – in this case, a Magellan RES1 – with its GridCredits software. Source: Reposit Power

"I think whenever there's game chaining technology afoot, there's always incumbents who feel a little bit threatened by that," Blackhall said.

"But there is also a growing understanding of the importance of consumers who've spent the money on storage – that they deserve to be rewarded for that; and that their investment creates opportunities for networks.

"A lot of retail companies realise that there are opportunities here and are actively trying to take advantage of that," he added.

Chris Williams, managing director of authorised Tesla reseller Natural Solar, agrees.

Williams told One Step Off The Grid in an interview on Tuesday that as many as 90 per cent of his new solar customers were also looking at batteries.

Of those who chose to go ahead and add battery storage with their solar, 90 per cent, he said, were opting for a Tesla. As many as a quarter of those customers were also inquiring about Reposit's GridCredits.

The momentum among consumers to invest in this level of energy independence, he said, was driven by a combination of a desire to save money, to be green, and to get rid of the utility bill and "stick it to the man."

"I think even people that want to save money get a great feeling when they're helping the environment, and people who want to help the environment also like saving money," he said.

"At the end of the day," he added, "(solar and storage with energy management software like Reposit's) creates market efficiency. And everyone is for market efficiency.

"If (the networks) are going to bury their heads in the sand, then they will miss out."

This article was originally published on RE sister site, One Step Off The Grid. Click here to sign up for the weekly newsletter

Tesla big battery results suggest local storage better than "monster" projects

By Giles Parkinson on 23 February 2018

Print

New analysis of the performance of the Tesla big battery in South Australia suggests that distributed local battery and pumped hydro projects could offer better value to the grid than a single "monster" project like Snowy 2.0.

The analysis, from energy analyst Hugh Saddler, in his quarterly update of the National Electricity Market for The Australia Institute, will make a useful contribution to the debate over the future of storage in Australia.

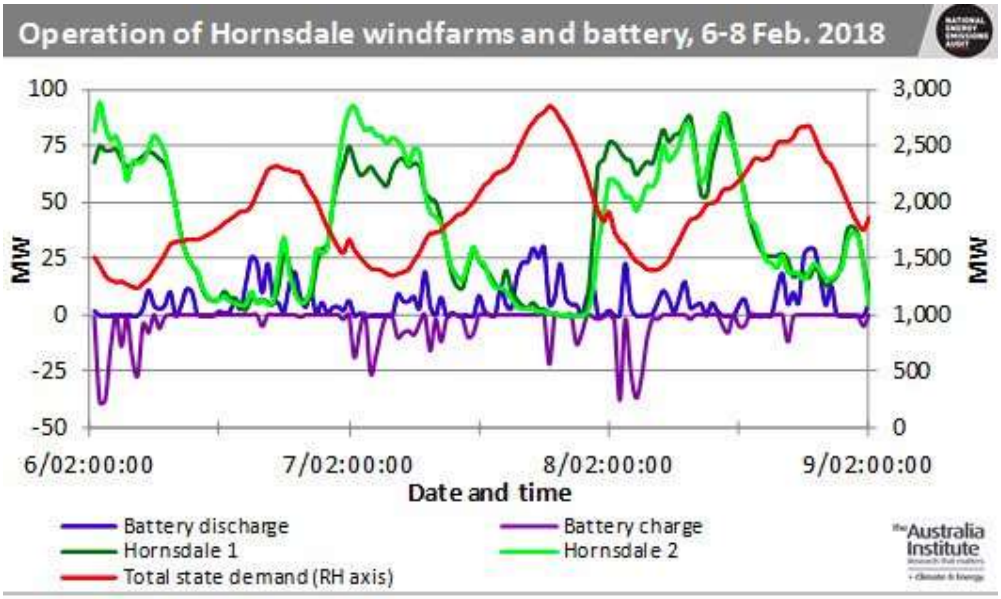
The Tesla big battery, known as the Hornsdale Power Reserve, has impressed all observers since it was switched on in early December, with the notable exception of the federal government which wants instead to build the massive Snowy 2.0 pumped hydro project at a cost of $8 billion or more.

Saddler's analysis confirms earlier reports – see our story Tesla big battery moves from show-boating to money-making – that its speed and flexibility allows it to intervene in high-priced events and "take the straw off the camel's back."

Already, the battery's has eliminated significant price gouging in the small FCAS market, as we reported here. Premier Jay Weatherill confirmed this week that the Tela battery had "smashed" the gas cartel's hold over the FCAS market, which provides network security.

Its influence on the bigger wholesale electricity market is less marked, because with only 30MW of capacity dedicated to arbitrage, it is still just clipping the peaks of a local grid that can consume up to 3,000MW or more at times of peak demand.

Still, Saddler says, its impact is clear.



"The graph shows a consistent pattern of charging up overnight, when prices are very low (well below $100 per MWh on all three days) and discharging in the late afternoon, when prices are very high ($8,000 per MWh between 4.00 and 4.30 pm local time on 7 February, which is 3.30 to 4.00 pm NEM time, as shown in Figure 11, somewhat lower on the other two days)."

Saddler notes that battery storage sceptics (yes, there is such a thing) often point out that 30MW is hardly more than 1 per cent of the peak demand of 2.9GW on 7 February.

"This is true, but not particularly relevant," Saddler says.

"The Hornsdale battery is the first of its kind. Planning for a number of others in South Australia, Victoria and elsewhere is well underway.

"Since the capacity requirement for frequency control services is limited, it is almost certain that a number of subsequent battery projects will devote a larger proportion of their capacity to energy arbitrage."

And, Saddler says, Hornsdale is clearly making the case for distributed storage.

"The experience of operating Hornsdale Power Reserve already demonstrates that multiple smaller energy storage facilities, which will certainly include both batteries and small pumped hydro projects, located close to wind and solar generators, are almost certainly better suited to matching variable supply with varying demand than a single monster project located a thousand kilometres or more away." he says.

This is a clear reference to Snowy 2.0, which he also notes will only be able to deliver its service via multiple transmission lines "which often reach saturation capacity when demand for electricity reaches peak."

Snowy Hydro has tried to turn the case for its big pumped hydro project into a battle between its project and battery storage. But its costings of battery storage have been contentious, see The case against Tesla and battery storage just hit peak stupid and so has its estimates of the value chain.

Note: Saddler also defended the AEMO and its Integrated System Plan Consultation, which has been used by critics to call for the closure of the key market institution.

"AEMO is required to think long term, and therefore to consider a wide range of possible futures, in order to do its job of managing the evolving electricity system," Saddler notes.

You can see live updates of Neoen's Hornsdale Power Reserve, as the Tesla big battery is know, on its home page here.

Tesla to build 250MW "virtual power plant" in South Australia

By Giles Parkinson on 4 February 2018

Print

Both of mine are way bigger than yours.

The South Australia Labor government has unveiled plans to build a 250MW "virtual power plant", linking household rooftop solar and battery storage, in what it says will be the world's biggest.

The project aims to connect at least 50,000 households, beginning with low-income Housing Trust (social housing) properties, which will be each fitted with 5kW of rooftop solar and one 13.5kWh Tesla Powerwall 2 battery system.

The involvement with Tesla further strengthens the links between the US solar, storage and Electric vehicle company, but this project will be significantly bigger than the s0-called Tesla big battery next to the Hornsdale wind farm.

The $800 million project (see more details here) will ultimately bring together 250MW of capacity and 650MWh of storage, allowing the combined resource to be pooled to help provide grid stability and extra capacity when supply is short.

The project easily dwarfs the 5MW AGL virtual power plant being put together by AGL – the scene at its launch of a clash between state premier Jay Weatherill and federal energy minister Josh Frydenberg, and the 250-home Reposit Power-led project in the ACT.

"My government has already delivered the world's biggest battery, and now we will deliver the world's largest Virtual Power Plant," Weatherill said in a statement issued on Sunday.

"We will use people's homes as a way to generate energy for the South Australian grid, with participating households benefitting with significant savings in their energy bills.

"Our energy plan means that we are leading the world in renewable energy and now we are making it easier for more homes to become self-sufficient."

The project will begin with a trial 1100 Housing Trust properties, which will have the solar and storage installed at no cost, funded by the state government's Renewable Technologies Fund, where the Tesla proposal emerged.

Around 100 homes have already or are being installed and Tesla has the contract to install all 50,000 homes, but insists it will not cause delays to deliveries to other customers (as occurred when the Tesla big battery was being built. Its own technology will be used to "aggregate" the systems.

An initial $2 million will be provided as a grant and a further $30 million as a loan. The government is seeking investors in the program.

The first install at the home of Des Jenkins occurred less than 24 hours after deal signed with Tesla. Also pictured, premier Jay Weatherill, energy minister Tom Koutsantonis, and Social Housing minister Zoe Bettison

The second state will see installations at a further 24,000 Housing Trust properties, and then a similar deal offered to all South Australian households over the next four years. Private households will need to pay for the installation but should see a significant (30 per cent) saving on their power bill.

The government will seek an electricity retailer to deliver the program, and appears determined to bring in a new player to increase competition in the state market, which has suffered from its dominance by two or three major players. Tesla will be responsible for the installation.

"When the South Australian Government invited submissions for innovation in renewables and storage, Tesla's proposal to create a virtual power plant with 250 megawatts of solar energy and 650 megawatt hours of battery storage was successful," Tesla said in a statement.

"A virtual power plant utilises Tesla Powerwall batteries to store energy collectively from thousands of homes with solar panels. At key moments, the virtual power plant could provide as much capacity as a large gas turbine or coal power plant."

Tesla said it will install Powerwall and solar panels on up to 50,000 homes in South Australia by June 2022, starting with 600 homes in 2018.

"Residents will enjoy lower bills and backup storage from their Tesla Powerwall battery, and the broader community will benefit from a more reliable grid that can better cope with peak demand."

The announcement confirms South Australia's status as not just a global leader in renewable energy, but also in storage.

The 100MW/129MWh Tesla big battery is already operating, and starting to change the way the industry thinks about the grid, the the 150MW, 800MWh Aurora project, using solar tower and molten salt storage is also due to begin construction this year.

On top of this, a battery storage facility will be delivered in May at the Wattle Point wind farm, a smaller battery is to be built at the new Lincoln Gap wind farm, and Sanjeev Gupta has plans for both battery storage and pumped hydro to help power the Whyalla steelworks.

At least two other pumped hydro projects, including Cultana, are also in planning stages.

The announcement also comes ahead of the state election, where Labor is in a three-way battle for power with the Coalition and Nick Xenophon's SA Best party.

The Coalition last October proposed a $100 million household battery fund, which would provide means-tested grants averaging $2,500 to 40,000 homes to help them buy batteries.

"All South Australians will also benefit from the increased generation in the South Australian energy mix, with lower energy prices and increased energy stability," the government said in its statement.

Social Housing Minister Zoe Bettison said people in social housing can often struggle meeting their everyday needs and this initiative will take some pressure off their household budget.

"I am very pleased that this Government is able to back South Australia's housing trust tenants through providing cheaper power through this exciting program."

The government said on its website that the virtual power plant could add up to a new 250MW/650MWh, dispatchable power plant "that can meet around 20 per cent of the state's total average daily energy requirements," adding competition to the market and putting downward pressure on everyone's energy bills.

"In addition, the virtual power plant will provide security services through the distribution network (like the Tesla Powerpack 'Big battery'), helping keep the power on during events or disturbances in the network," it said.

It noted that if the batteries were charged when a blackout occurred, the households would not lose power, but be able to operate their lights and appliances from the battery.

The key objectives of the virtual power plant are to:

- Provide significant cost savings to consumers participating in the program
- Demonstrate the ability of a virtual power plant to deliver savings to households and improve the resilience of the grid

- Introduce competition into the South Australian energy market, placing downward pressure on energy prices
- Establish a new, dispatchable renewable energy power plant, providing energy when it is most required

John Grimes, the CEO of the Smart Energy Council, hailed the initiative, saying virtual power plants allow families to take control of their power bills, whilst providing greater security for the energy network.

"This is smart energy and smart leadership from the South Australian Government," he said in a statement.

"South Australia is a world leader on solar, storage and action on climate change, with world-leading renewable energy and emission reduction targets.

"South Australia has the world's biggest battery and now it will have the world's biggest virtual power plant."