Life after FiTs

Final Report (Summary) for the Total Environment Centre

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Prepared for the Total Environment Centre

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Executive Summary

The Total Environment Centre (TEC) commissioned the Alternative Technology Association (ATA) to provide guidance to existing New South Wales, Victorian and South Australian solar feed-in tariff (FiT) customers as to:

- The financial impact of the closure of the respective 'premium' FiT schemes in each state – i.e:
  - the NSW Solar Bonus Scheme and the Victorian Transitional Feed-in Tariff at the end of 2016; and
  - the South Australian Feed-in Scheme at the end of September 2016; and
- The opportunities for these FiT customers going forward, using a combination of different complementary technologies (e.g. batteries) and/or retail strategies, and the related technical considerations that each option may have (e.g. metering changes).

More than 275,000 solar customers across these three states, will be impacted by the closure of these scheme at or towards the end of 2016. The breakdown by state is as follows:

Table 0.1: No. of Solar Customers for whom Premium FiTs are closing in 2016

State	Current tariff	End date	Feed in tariff rate for 2017	No. affected
NSW	The Solar Bonus Scheme: - a FiT of 20 cents per kWh or 60 c/kWh for all solar generation	Dec 31, 2016 (started 2010)	No mandated FiT for NSW. IPART determines a 'benchmark range' (in 2015-16: 5.5-7.2 c/kWh) but up to retailer to decide the FiT offer.	146,000
Victoria	The Transitional Feed in Tariff: - minimum 25 cents per kWh for excess solar electricity fed into grid	Dec 31, 2016 (started 2011)	~5 cents per kWh	67,160
Victoria	The Standard Feed-In Tariff "one-for-one", based on the retail electricity rate paid	Dec 31, 2016 (started 2012)	~5 cents per kWh	Unknown
South Australia	16c per kWh feed-in tariff	Sept 30, 2016 (started 2011)	The minimum retailer payment is 6.8c/kWh	62,742 at end 2015
TOTAL AFFECTED				**275,902**

The key question for many of these existing FiT customers is – *how do I mitigate the financial impact of the closure of these schemes*?

There are a number of different technology and related considerations for these solar customers to consider before embarking on any purchase decisions or other energy management strategies. This Executive Summary highlights the main findings of this report in a "Decision Tree" type structure, in order to assist these solar customers to work through the various issues that need to be considered to mitigate the economic impact of the scheme closures going forward.

Step 1: Ensure the Correct Metering

With FiTs reducing to relatively low levels, it is imperative that from an economic perspective, those customers are able to use their solar-generated electricity to directly power their household or business appliances.

The Victorian and South Australian schemes were 'net' schemes. Net metering recognises the use of solar electricity on-site to reduce purchases from the grid. As such, solar customers in these jurisdictions will not need to change their metering configuration.

The NSW Solar Bonus Scheme offered a 'gross' FiT. Gross metering separately measures the solar generation from household use – i.e. it does not offset electricity purchases from the grid. Those NSW customers will need to enable net metering at their site in order to maximise the financial benefit of their system.

Overall, the technical solutions for switching from gross to net metering for Solar Bonus Scheme customers are somewhat difficult to navigate at this time. Costs differ greatly and there are differences depending on the local distribution business[1]:

- Customers in the Endeavour distribution area wishing to change to net metering at this point in time will be required to install a new meter. The suggested cost of a new distributor installed meter is around $600. The total cost of allowing a retailer to install the meter is unclear at this time.
- Customers in the Essential Energy area may have the additional possibility of utilising their existing solar meter. This requires a minor wiring adjustment to change the meter from gross to net with an estimated cost of $150. At the time of writing Essential Energy have not clarified if they will accept this solution.
- Customers in the Ausgrid area have the possibility of utilising their existing solar meter after a minor wiring adjustment to change the meter from gross to net (cost estimated to be around $150). At the time of writing Ausgrid have confirmed they will allow this option.
- As a further option for Ausgrid customers, Ausgrid have also suggested they are prepared to use the data from the two existing gross meters to calculate net energy flows. While this is does not require any meter changes, at the time of writing it is unclear if retailers intend to accept this option.

Whether the solution ends up being the replacement of any meter, re-wiring or changes to billing arrangements, if these solutions are being offered through an energy retailer, then the customer must ensure they understand the full implications of agreeing to any particular solution – as this may have implications for that customer's retail tariff or other related considerations.

ATA advise a cautious approach in dealing with both distribution businesses and retailers regarding metering changes. The Solar Bonus Scheme will continue to the end of 2016 and consumers should attempt to maximise the benefits they receive under the existing scheme. At the closure of the Scheme, customers in the Ausgrid and Essential Energy areas should explore zero or low cost options.

[1] To find out which distribution area you are in, go to: https://www.agl.com.au/residential/help-and-support/emergencies-and-outages/electricity-distributor-lookup-tool

Consumers should also carefully evaluate the various retailer tariffs, including those offering a subsidised (net) smart meter.

As of June 2016, ATA understands there are around six retail offers in existence involving free or cheap meters in NSW. The only way for any individual customer at this point in time to calculate if one of those offers is their best approach to enabling net metering, is to:

- calculate an annual bill based on the fixed and kWh rates of that specific retail offer, and using their net consumption (after on site solar use); and then compare this to:

- the distributor charge for re-wiring or the net billing option (e.g. $150) and add this to the calculation of an annual bill for the best retail deal they can find in the market (again using their net consumption).

Given that all retailers will cost recover the meters thru their charges in one way or another (and given the history of NSW solar customers facing somewhat higher retail charges and tariffs that other non-solar customers do not typically face), it is not clear at this point in time which is the better path for any individual customer.

At this point, the last resort should be to request the local distributor to install a net meter. This option will likely incur a high upfront cost and the customer needs to still compare available retail tariffs.

Rather than rushing into the meter upgrade it is suggested customers wait a few weeks or even months after the closure of the Scheme to give time to compare the various options.

Step 2: Use your Solar Electricity

With FiTs being reduced, there is significantly greater value in using your solar electricity on-site – rather than export it to the grid for a low feed-in credit.

Most households, even those with relatively small solar PV systems (e.g. 1.0 – 2.0kW), do not use much of their solar electricity during the day time[2]. Even people who stay at home regularly often run little more than the fridge, a computer or audio-visual equipment, and maybe the washing machine or dishwasher once every few days, during solar generation hours.

The opportunity is to shift more of your appliances to run during the day – and be directly powered by solar. And the biggest two appliances you can shift is your water heating; or your space heating & cooling – to maximise the use of that free solar electricity.

Electric water heating for homes is broadly done in two ways:

- by utilising a traditional electric storage hot water (ESHW) system – which uses single or multiple resistive electric elements in a tank to heat and store water; or

[2] As an example, a 1.5kW PV system in Sydney will generate around 10kWh between 9am and 5pm in summer; and around 5-7kWh in autumn/spring. Most homes consume not much more than 2kWh between breakfast and dinner – meaning even this small system has a relatively export rate to the grid.

- using a heat pump – which involves the compression and expansion of ambient air through a heat exchanger to extract heat, which combined with electricity creates multiple units of heat output for heating water stored in a tank.

Both of these systems use electricity as an input to the system and can be powered directly from solar PV – provided:

- the home or business is configured for net metering;
- the ESHW or heat pump is connected the main electrical circuit (e.g. not a separate, dedicated circuit established for off-peak hot water); and
- the ESHW or heat pump operates during the day (i.e. when the solar system is generating electricity).

ATA modelled the cost and benefits of purchasing and installing a new ESHW system versus a new heat pump hot water system – for a Sydney home with existing solar PV and about to lose their gross FiT (**Section 5.0** of this report).

The analysis suggests that for the majority of existing solar PV customers about to lose their premium FiT, irrespective of PV system size, they would either be better off, or no worse off, over 10 years by choosing to install a heat pump hot water system instead of an ESHW system.

Besides hot water, as the other major (and usually larger) residential load, space heating and cooling is a key opportunity. Where this is electric, these can be programmed to at least partially run during the day time to soak up excess solar energy; whilst at the same time ensuring less electricity is required for temperature control after solar-generation hours.

Pre-heating or pre-cooling takes advantage of excess solar electricity during the daytime by programming the electric heating/cooling appliance to switch on earlier (e.g. 2pm), but at a relatively conservative setting (e.g. 16-18 degrees in winter; or 28-30 degrees in summer).

A key factor in the potential success of a pre-heating / pre-cooling strategy is the thermal performance of the building itself. Any householder attempting to use this strategy should ensure decent levels of ceiling insulation (and potentially wall and floor insulation if undertaking a renovation project) within the building.

And for those solar customers that heat or cool during the day, provided they have net metering and their PV system has sufficient capacity, they will use solar electricity to heat/cool their homes.

Finally, a number of existing solar homes are considering adding more panels to their existing solar system once their premium FiT ends. Provided those solar customers are not looking for the most economic approach to mitigating their loss of FiT income, then this is a great way to add more renewable energy into the grid.

However, if mitigating the economic impact is a key driver, then this will make a difficult situation worse – as not only will the customer lose significant annual revenue through the FiT, they will pay (likely) thousands of additional dollars to add panels to the existing system, and which will likely require the replacement of the existing inverter (as it will likely be matched with the rated capacity of the existing panels).

Ultimately, the majority of the additional generation from the newly expanded system will also be exported to the grid, for very low FiT price.

Step 3: Get Off Gas

With space heating and hot water generally comprising somewhere between 50% and 70% of a home's stationery energy needs, it is difficult to maximise the use of solar PV without using it to power one or both of these major loads.

For some NSW, Victorian and SA solar customers, they will run one or both of these appliances using mains or bottled gas.

For gas-connected solar customers, switching away from gas is imperative to achieving the best economic return possible for their existing (and any upgraded) solar PV system.

This strategy will largely involve considering the kind of electric hot water and space heating solutions canvassed above.
Designed and implemented well, transitioning away from gas will allow most NSW, Victorian and SA customers to reduce their annual stationery energy bills to no more (and potentially less) than $1,000 per year. This is in the context of the majority of NSW, Victorian and South Australian homes currently paying in the order of $2,000-$3,000 per year for stationery energy (i.e. electricity or electricity and gas)[3].

Given the rise of distributed solar energy, most Australian homes now have three clear choices with regards to their stationery energy requirements, those being:

- Electricity from the electricity grid;
- Electricity from their own solar system; and/or
- Gas from the gas grid or bottled (LPG).

From an economic perspective, it makes no sense to rely on all three - ultimately households do not consume such significant amounts of stationery energy as to necessitate three separate input fuel sources.

Going forward, Australian households are facing a clear choice with regards to keeping their energy bills low:

1. either remain dual fuel and rely on both the electricity and gas grids; or
2. become (or remain) all electric – purchasing some electricity from the grid, and some from their own solar PV system.

Increasingly, option 2 is the more economic. And with falling costs of renewable energy and some efficient electric technologies; the increasing efficiency of electric water and space heating technologies; and slow to steadily rising gas prices (due to linkage of the gas price with the international export market), the future trend is clearly in favour of option 2.

[3] http://www.abs.gov.au/ausstats/abs@.nsf/Lookup/4670.0main+features132012

Step 4: Get the Best Retail Deal

ATA conducted an analysis of available retail FiT offers, including their associated consumption tariffs, in NSW, Victoria and SA. This analysis informed the modelling undertaken for the project.

Currently in Victoria, every retailer with 5,000 or more retail customers must offer a mandatory minimum FiT payment to any new solar customer. SA takes the same mandatory minimum approach as Victoria – with regulators in each jurisdiction setting a minimum FiT rate each year.

In NSW, there is no mandatory minimum FiT rate that must be offered by retailers to any new solar customer under the current NSW legislation. Retailers can choose whether or not to offer a FiT at all.

The tables in **Section 6.0** aggregates the results from a review of 52 solar FiT retail offers; and 28 non-solar retail offers; in the NSW, Victorian and SA markets. The ranges and averages/medians of FiT rates, as well as rates for consumption (be those as part of flat or time of use offers) and any pay-on-time discounts, are presented[4].

In considering solar offers versus non-solar offers, ATA did not find material differences in the consumption rates (whether they were as part of flat tariff offers or time of use) for retail offers to solar customers as compared with non-solar customers, across the three jurisdictions.

In addition, a mix of one, two and three year market contracts; as well as 'Ongoing' offers were present in both retail offers to solar customers and non-solar customers.

The only material distinction ATA could find with respect to solar offers versus non-solar offers was the relatively lower pay-on-time discounts that were offered to solar customers – particularly in NSW and SA. Non-solar customers in those markets were offered discounts that were on average 7% higher than for solar customers.

It should be noted that ATA's retail tariff analysis represents only a subset of available offers in each of the three markets; and offers may differ more widely across the full range of available offers.

Irrespective of how solar and non-solar offers play out across these markets, our advice to existing and new solar customers is the same – shop around to get the best overall deal taking into account FiT rate[5], consumption rates and supply charge, discounts and other relevant offer elements.

Step 5: What about Batteries?

ATA conducted modelling to understand the value of installing new lithium-based storage to homes with existing solar PV systems in Sydney, Adelaide and Melbourne.

The modelling considers investment (i.e. battery and inverter purchase and install), at the start of 2017 and in 2020; and takes account of reducing component capital (and operating) costs over time.

[4] It should be noted that this analysis can only be considered accurate at the time of writing. Retail offers in the NEM change on a 6-12 month basis (depending on jurisdiction and offer type). These tariffs are unlikely to be completely accurate at the time of the premium FiTs ending toward the end of 2016.

[5] Bearing in mind that the retail offer with the highest FiT rate may not necessarily be the best retail offer overall for any individual solar customer.

ATA modelled four different system configurations, in order to find the most economic cases:

- 1.5kW solar PV + 3.0kWh storage;
- 4.0kWh solar PV + 3.0kWh storage;
- 1.5kW solar PV + 7.0kWh storage; and
- 4.0kW solar PV + 7.0kWh storage.

The modelling results (**Section 4.3**) demonstrate that retro-fitting energy storage to solar is not cost effective for existing solar PV customers prior to 2020 – with some scenarios remaining unfavourable after 2020 (particularly those associated with the larger battery).

The results can be broadly interpreted as suggesting that:

- systems with smaller batteries, that have more chance of being fully utilised over the course of the year, are likely to be economic in these three (and likely other) jurisdictions by 2020;

- systems with larger batteries, that have less chance of being fully utilised over the course of a year, may remain uneconomic in these three jurisdictions in 2020 and potentially beyond. A key influencing factor will be the future declining cost of storage technology;

- That Adelaide offers better economics than Sydney or Melbourne – largely due to:
  - higher electricity retail tariffs (approx. 30% higher than Sydney/Melbourne); and
  - higher solar insolation levels in Adelaide on an annual basis.

Step 6: Am I Battery Ready?

There are multiple ways that batteries can be added to an existing solar PV system – involving different component configurations which ultimately influence different overall system capabilities.

The majority of NSW, Victorian and SA solar customers will have somewhat older inverters, with the technology likely being installed between the beginning of 2010 and the end of 2013. In terms of functionality, these inverters will not have the full capabilities of many of the inverters available in the Australian market in 2016 – and many of the inverters required for hybrid solar-battery systems.

Given the poor economics of storage in 2016, it is advisable to wait with regards to battery investment and instead, ensure Steps 1-4 above are fully implemented, by:

- ensuring the correct metering;
- maximising your existing solar electricity by shifting major appliances to the day time;
- implementing a plan to get off gas; and
- getting the best possible feed-in tariff offer;

Steps 2 & 3 will likely take one to three years to implement, by which time batteries will have reduced in cost; and your existing inverter may be coming close to needing replacement anyway (a necessary step for existing solar customers moving to a solar-battery system).

Following these steps, and with battery prices low enough around 2020, it should be eminently achievable for most solar homes to be consuming the majority of their own solar electricity whilst at the same time reducing their annual stationery energy bills to below $500 per annum (a reduction of around 75%-83% on what most Australian households currently pay per year).