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Solar for Tasmania's Future

A submission to the Solar Feed-in Tariff Review

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Summary

Components of a fair feed-in tariff

A fair feed-in tariff should take into account:

- a wholesale price that reflects the total benefit to Tasmania, not just the saving to Aurora
- the fact that locally generated and used energy does not make use of, and should not pay for, the transmission network
- avoided losses from transmitting electricity over long distances
- savings from less demands placed on the distribution network
- the reduced greenhouse gas emissions resulting from solar's role in reducing imports from Victoria
- the health benefits from reducing import of fossil fuel based electricity.

Estimate of a fair feed-in tariff

Taking the above factors into account our estimate of the value of a fair price for energy fed into the distribution network is in the range of 18 to 21.6 c/kWh as per the following table. For more details on the assumptions behind individual components see page 5.

Source of value	Minimum	Maximum
Wholesale value of energy	9.8	11.8
Avoided network losses	0.1	0.1
Avoided transmission costs	2.5	2.5
Reduced distribution costs	1.9	2.8
Reduced CO_2 emissions	2.4	3.1
Health benefits	1.3	1.3
	18	21.6

Equitable access to solar

Access to the benefits of solar PV should be made available to tenants, pensioners and low income households through schemes such as NILS, Darebin Solar Savers, and SunTenants, as well as installing solar on public housing in Tasmania.

Alternative FiT arrangements

In addition to a fair flat rate feed-in tariff, the government should facilitate optional additional arrangements to solar owners where solar can contribute additional value to the electricity network. This includes a time varying FiT and network support payments.

Additional measures to encourage solar

A range of additional measures should be facilitated by the state government to provide incentives for further installation of solar PV in Tasmania including fixing the current metering software problem and speeding up the provision of smart meters.

Context

Current FiT arrangements

Over 32,000 Tasmanian households and businesses have solar PV on their roof. Of these approximately 16,500 (who ordered their solar system before 30 August 2013) receive a fixed rate of 28.3 c/kWh (cents per kilowatt hour) for energy they feed back into the electricity grid. This fixed rate, known as the Legacy feed-in tariff (FiT), will end on 31 December 2018.

Households and business who installed solar PV after 30 August 2013 are paid a FiT rate determined by the Office of the Tasmanian Economic Regulator (OTTER). This rate is adjusted each financial year and is currently set at 8.5 c/kWh for 2018-2019.

The solar industry in Tasmania

TREA represents solar sales companies and solar installers operating in Tasmania. The small scale solar industry is a highly competitive but highly regulated industry. Solar installers have to be licenced electricians. In addition all solar installations have to be individually designed by a Clean Energy Council (CEC) accredited designer and the installation has to be supervised by a CEC accredited installer. Additional qualifications are required to design and/or install off-grid solar and battery systems and to design or install on-grid PV systems with batteries. In Tasmania, *every* solar installation is inspected for standards compliance and electrical safety under a contract issued by Consumer, Building and Occupational Services in the Department of Justice. (Tasmania is the only state with 100% inspection of solar installations.) In addition, nationally, a sample of solar installation are inspected by the Clean Energy Regulator.

Fluctuations in the demand for solar driven by sudden changes in government policy make it more difficult to maintain a local industry that can deliver the required quality standards.

Support for the solar industry will ensure the continuation of these highly skilled jobs located throughout the state.

The move to a decentralised grid

There is widespread agreement that the electricity system is moving to a much greater role for renewable energy and for distributed generation and storage of energy. (See for example {TasNetworks 2018} and {ENA 2017}.) Nationally the ENA/CSIRO Roadmap maps out a future in which by 2050:

- *Networks pay distributed energy resources customers over $2.5 billion per annum for grid support services*
- *Electricity sector achieves zero net emissions*
- *$16 billion in network infrastructure investment is avoided by orchestration of distributed energy resources*
- *Reduction in cumulative total expenditure of $101 billion by 2050*
- *Network charges 30% lower than 2016*
- *$414 annual saving in average household electricity bills (compared with roadmap counterfactual, business as usual, pathway)* {ENA 2017 p.iv}

The TasNetworks Transformation Roadmap suggests that in Tasmania by 2025:

- 40,000 customers will have their own renewable energy source (mainly solar)

- 17,000 people will be driving an electric car
- 5,000 people will have battery storage.

Tasmania is particularly well placed to benefit from this transformation as a result of:

- the ability of our hydro system to provide long term storage to back up variable renewable energy generation (both centralised and distributed)
- the skill base resulting from over a hundred years of renewable energy engineering
- state ownership of the major generation, network and retailing businesses.

To ensure the maximum shared benefit from this transformation it is important that Tasmania has a shared vision of our energy future which translates into integrated policies across government and GBEs. A vibrant solar industry is the basis on which to develop an industry sector leading the way in new technologies of energy management, distributed storage, and the optimal integration of electric vehicles into the electricity network.

Responses to questions in the consultation paper

The Consultation Paper suggests that submissions could address the following:

Q1. What changes could be made to current Feed-in Tariff arrangements (for example, a different Feed-in Tariff rate structure) to provide incentive to install rooftop solar generation and appropriately reward consumers that have already installed rooftop solar generation?

A revised flat feed-in tariff rate should be available to all existing and new solar installations based on the average benefit to the network as summarised on page 2 and described in detail on page 5.

Additional arrangements should be available to solar owners on an opt-in basis in circumstances where solar can contribute additional value to the electricity network. This includes a time varying FiT and network support payments.

Q2. Would those changes be likely to result in any other indirect or unintended impacts (beneficial or otherwise)?

The wider benefits to Tasmania are described on page 8.

Q3. What contribution does rooftop solar generation make to Tasmania's energy security?

Distributed PV contributes to diversity of supply and makes Tasmania's electricity system less dependent on rainfall, or single points of failure such as Basslink. Solar contributes most to our energy supply in summer when our rainfall is lower. As battery prices decrease there will be increasing opportunities for distributed generation and storage to provide secure energy supplies at times of network failure, for both individual consumers and through local microgrids.

Q4. What are the social and environmental benefits and costs of rooftop solar generation? What is the value of these benefits and costs?

The costs of installing rooftop solar are met by owners. Social benefits include increase energy literacy and the flow-on effects from industry development. The health benefits of rooftop solar result from reduced air pollution (mainly in Victoria). The environmental benefits are mainly in reducing greenhouse gas emissions.

Q5. Do the community benefits of incentivising further solar installations outweigh the costs of providing those incentives?

The ENA/CSIRO roadmap suggests that a future based on distributed energy resources could save the average household $414 in electricity bills (compared with a business as usual scenario). This is for all households, not just those who have invested in solar.

Q6. Are there alternative mechanisms (other than changes to Feed-in Tariffs) that could be used to incentivise and reward the installation of rooftop solar generation?

Yes there are additional barriers to effective take up of solar PV in Tasmania which could be addressed by the state government as described on page 11, particularly in relation to metering and network voltage regulation.

Q7. Is there potential for rooftop solar systems, smart metering and battery storage systems to help manage or limit peak demand?

Solar and storage will play a limited role in addressing system (state wide) peak demand. However the main costs and problems are not system peak but constraints from consumption peaks in particular locations. Suggested mechanisms to deal with these problem are described on page 9.

Q8. Are the opportunities to benefit from rooftop solar available equitably across the community?

All consumers will benefit indirectly from greater installation of distributed generation. However active government policy is necessary to ensure that the direct benefit of solar PV is available to tenants and low income households. A number of suitable models already exist which could be supported by the government – see page 8.

Factors in setting a fair FiT

Feed-in tariffs are set at the state level, but all state regulators use a similar basis of considering the impact of various factors in setting a rate. Here we comment on the factors typically considered (although in many cases these are rejected by regulators).

Valuing the components of electricity costs

In order to derive a value for distributed generation based on the various benefits it is necessary to make assumptions about the proportion of residential electricity bills that contributes to various elements of the value chain (wholesale energy, transmission, distribution, retailing and environmental and regulatory costs) and then to translate these to a c/kWh figure based on a typical electricity bill.

Calculations below are based on the methodology described in {Backroad 2017a}, specifically the values calculated in {Backroad 2016} as per the following table:

% of most common retail bill

	SA	Qld	NSW	Vic	ACT	Tas	NEM
Generation	13.8%	12.6%	20.7%	17.6%	25.4%	24.0%	17.7%
Transmission	8.6%	8.5%	5.8%	4.9%	11.0%	15.0%	6.3%
Distribution	42.3%	49.2%	37.9%	37.8%	31.2%	44.0%	40.8%
Retail	24.3%	22.1%	30.5%	33.5%	21.1%	17.0%	29.0%
Environmental	11.1%	7.7%	5.0%	6.2%	11.4%	0.0%	6.2%
	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

c/kWh for most common retail bill

	31.77	27.04	28.39	31.62	20.08	21.29	28.72

Allocation of c/kWh for most common retail bill

	SA	Qld	NSW	Vic	ACT	Tas	NEM
Generation	4.38	3.41	5.87	5.57	5.09	5.11	5.08
Transmission	2.73	2.29	1.66	1.55	2.20	3.19	1.80
Distribution	13.43	13.30	10.77	11.95	6.26	9.37	11.73
Retail	7.71	5.96	8.66	10.59	4.25	3.62	8.32
Environmental	3.52	2.08	1.43	1.96	2.28	0.00	1.79
	31.77	27.04	28.39	31.62	20.08	21.29	28.72

Details of the methodology and the actual calculations are contained in the document *NEM residential supply chain cost components* available from the project website { Backroad 2017b}. Note that these are based on the AEMC's 2015 Residential Electricity Price Trends and prices have risen significantly since then.

Wholesale electricity price

The current OTTER FiT rate is based on the wholesale price of energy set by the Treasurer {Gutwein 2018}. This was set by the government with the explicit objective of minimising regulated retail electricity prices and has been set at 7.968c/kWh for 2018-2019.

An alternative calculation of a Tasmanian wholesale price is that conducted by OTTER in accordance with clause 8.1(a) of the *Standing offer price approval process in accordance with the 2016 Standing Offer Determination (28 April 2016)*. For 2018-2019 this price is 9.806c/kWh.

The value of exported household energy in Tasmania should be the value to the state, not the saving to Aurora from the purchase of energy from Hydro Tasmania at regulated prices.

The two-way operation of Basslink allows Tasmania to export electricity to Victoria when Victorian prices are high and import from Victoria when Victorian prices are low. Tasmania's ability to maximise gains from this process is constrained by the export capacity of Basslink (500 MW) and the availability of water in dams in Tasmania.

We have calculated the value of Basslink imports and exports using data for Basslink flows and Victorian wholesale NEM prices obtained with the NEM Review product from Global Roam. Using data for every 30 minutes in 2017-2018, the average price for exported electricity was 11.8c/kWh and the average cost of imported electricity was 7.4c.

Any additional Tasmanian generation (or energy conservation) reduces the energy we import from Victoria and increases the amount we can export over Basslink at time of highest prices.

On the basis of these various approaches, we argue that the value to Tasmania of additional energy exported to the grid is between 9.8c/kWh and 11.8c/kWh depending on assumptions.

Transmission costs

Aurora passes on to consumers TasNetworks charges for the use of the transmission network irrespective of whether the energy is sourced via the transmission networks or locally from solar PV. Customers pay for a service that is not provided — use of the transmission network for the proportion of their energy that comes from distributed generation. Transmission charges should only apply to the electricity actually carried on the transmission network. These savings should be shared with solar owners. Allocating 80% of these savings to solar owners and 20% to the retailer would provide an incentive to the retailer to encourage distributed generation.

In the calculations above we have used 80% of the 3.19c transmission component of Tasmanian typical electricity costs as described above.

Network losses

In Tasmania about 5% of centrally generated electricity is lost in the transmission and distribution networks[1]. Distributed solar PV avoids almost all these losses because the energy is used in the immediate vicinity. Applied to the 2018-19 Standing Offer determination rate of 9.8c this would equate to 0.5c. We have used a lower figure because we believe that no transmission costs and reduced distribution costs should be charged for solar PV and this would constitute double counting.

Distribution network savings

There are at least two ways in which distributed generation makes less use of the distribution network and reduces its costs. Exported energy from solar PV is typically used close to the point of export and therefore makes significantly less use of the 'poles and wires'. Also a significant proportion of the cost of the distribution network is the transformers which convert higher voltages down to 230V. Solar inverters have this capability built in and export power at 230V.

We have argued for additional mechanisms to reflect the higher value of distributed generation in areas where the distribution network is constrained. In order to determine the general value of distribution network savings we have used a somewhat arbitrary allowance of 20-30% of the 9.37c/kWh distribution component of Tasmanian typical electricity costs as described above.

Reduced CO_2 emissions

Each kWh of solar PV that displaces imported coal fired electricity from Victoria creates a reduction in CO_2 emissions that is worth a minimum of 2.4c to 3.1c using current carbon pricing estimates. Carbon pricing that met the global objective of keeping global warming well below 2°C would translate to a much higher value.

The Victorian single rate FiT for 2018-2019 is 9.9c/kWh {ESC Vic 2018} and this includes an allowance of 2.5c/kWh for the "avoided social cost of carbon". A similar allowance should be applied to the Tasmanian FiT since any increased solar generation in Tasmania reduces imports of mainly coal fired Victorian electricity.

Health benefits

The best available Australian research suggests that each kWh of solar PV that displaces coal fired electricity contributes 1.3c in reduced health costs {ATSE 2009 p.46}. The health impacts of coal fired electricity are felt mainly on the mainland but this should not absolve Tasmania from the moral obligation to reduce these impacts when they arise from generating electricity imported into Tasmania.

[1] For example in the OTTER Final Report for the 2016 Regulated FiT Investigation Marginal loss factor and Distribution lost factor increase the FiT by a combined factor of 5.3%.

This benefit is not currently reflected in any Australian FiTs but recent Victorian legislation makes provision for future FiTs to include a component based on the "avoided human health costs attributable to a reduction in air pollution".

Non-monetary benefits of solar in Tasmania

Solar PV has many additional advantages to Tasmania that cannot be readily translated to a c/kWh value for energy fed into the grid:

Contribution to 100% renewable electricity: household PV contributes to Tasmania becoming the first Australian state to reach 100% renewable electricity (and one of the few in the world).

Private capital investment: Households and businesses invest their own money to make savings on their electricity use, and to contribute to a sustainable energy system. Part of the energy generated is exported to the grid and used by other consumers. This replaces energy which would otherwise require capital investment by Hydro Tasmania or other generators.

Energy security: Distributed PV contributes to diversity of supply and makes Tasmania's electricity system less dependent on rainfall, or single points of failure such as Basslink. Solar contributes most to our energy supply in summer when our rainfall is lower. As battery prices decrease there will be increasing opportunities for distributed generation and storage to provide secure energy supplies at times of network outage, for both individual consumers and through local microgrids.

Direct jobs: The Tasmanian solar industry employs the equivalent of around 400 full time people. These highly skilled jobs are located throughout the state. Many more jobs would be created with a more ambitious goal for solar.

Industry development: Beyond the direct jobs in solar installation, building Tasmania's capacity in emerging technologies such as battery storage, smart grids and demand management will create the jobs of the future as the world moves to a decentralised and decarbonised energy system.

Price stability: Renewable energy technologies have high capital costs, but very low and predictable running costs. This contributes to long term price stability compared with the fossil fuel based alternatives, either coal fired power from Victoria or gas fired power from the Tamar Valley Power Station.

Energy literacy: Installation of solar PV gives homeowner a strong interest and motivation to better understand and manage their energy consumption. This will be an important driver of the uptake of new technologies such as local storage, demand management and integration of electric vehicle charging which ultimately can lead to a more flexible and economical electricity system.

Sharing the benefits of solar equitably

The term 'middle class welfare' is often used glibly in reference to solar incentives. The reality is that solar power tends to have least penetration in very low and very high-income demographics, but a number of other, more significant, factors come into play.

In 2013 Save Solar Tasmania and the Alternative Technology Association conducted an analysis of the relationship between income and solar installations in Tasmania at the LGA level. This showed no significant correlation between income and the uptake of solar PV, if anything the trend line is slightly downwards, ie wealthier areas are slightly less likely to install solar PV. {SST/ATA 2013 p.5}

As solar becomes the most cost effective method of reducing household energy costs, it is important that these opportunities are made available to the most vulnerable consumers.

The state government provides concessions to assist low income customers with the cost of electricity. Support for energy efficiency measures and the installation of solar PV is a way of providing longer term and more sustainable assistance for low income customers.

The state government should support low income customers to be able to invest in solar PV and energy efficiency through increased funding for the NILS scheme (see below).

The state government should facilitate schemes that support access to solar PV for renters and low income households. For example:

- Darebin Solar Savers: This scheme run by Darebin Council in Melbourne has put solar panels on over 500 households. Solar is installed on houses by the council and the cost is repaid via council rates payments. Repayments are less that the savings from solar so there is no upfront cost to owners and ongoing savings. Priority is given to pensioners and low income households.
- SunTenants: is a private organisation that assists landlords and tenants to access and share the benefits of solar.

The current TEELS and NILS schemes[2] provide no-interest loans for various energy efficiency measures and installation of solar PV. The NILS scheme is currently closed to new applications as a result of lack of government funding. A guarantee of continuation of the TEELS scheme and increased funding for the NILS scheme (which specifically assists low income Tasmanians) would assist the take up of solar PV and energy efficiency measures.

Alternative FiT arrangements

The immediate value of energy fed back into the grid from solar PV is strongly dependent on both time and location:

- Wholesale energy prices in the National Electricity Market (NEM) are set every 30 minutes. Energy fed into the grid is of most value when wholesale prices are high.
- Much of the network costs that make up around 40% of the retail cost of electricity result from building a network that can meet peak demand. Energy fed into the grid that reliably reduces peak demand can significantly reduce the need for network investment.
- In some locations the local distribution network is at close to capacity. Locally exported energy can delay or avoid expensive upgrades to wires and transformers.

Time of export FiT

Solar owners in Victoria and regional Queensland have the option of choosing a FiT that varies according to the time of the day and the regulator in NSW has recommended a similar (but more complicated) arrangement[3]. Time varying FiTs have a number of potential advantages:

- they better reflect the way the wholesale value of energy varies over time
- they encourage solar owners to feed energy back into the grid (or use stored energy for their own consumption) when it is most useful in reducing peak demand
- they provide an additional value stream for solar owners considering investing in batteries.

[2] See https://www.auroraenergy.com.au/teels and https://nilstasmania.org.au/
[3] See http://www.ata.org.au/news/time-varying-solar-feed-in-tariffs/

Time varying FiTs are more complicated, and to make the most use of them solar owners need to have batteries and/or energy management systems in their home. For these reasons they should be offered on an opt-in basis and a flat rate FiT should be available as the default.

Network support payments

Locally generated solar electricity stored in batteries can provide additional value at times when the local distribution network is close to capacity. This is the basis of the very successful TasNetworks trial on Bruny Island. Customers with batteries are paid a premium of around $1/kWh to feed energy back into the grid when demand is high via an arrangement known as network support payments.

This arrangement should be available to customers in other locations where the local distribution network is sometimes at close to capacity. This would provide an additional incentive for customers to install solar PV with batteries. With sufficient battery capacity in those locations, expensive network upgrades can be delayed or avoided, reducing network costs for all customers in future.

Aggregation of distributed energy resources

The value of distributed energy resources (solar PV, batteries, electric vehicle charging and energy management systems in houses) is greater if they can be coordinated to deliver reliable services to the electricity network. A recent in-principle announcement by the AEMC to support moves to allow "energy users to participate directly in the wholesale electricity market" will facilitate this participation[4].

The state government should support rule changes which allow organisations to offer these aggregation services without having to work through an energy retailer.

Size of eligible systems

Which systems are eligible for a regulated FiT is set at the state level. Eligible system sizes vary enormously, typically around 10-30 kW but ranging up to 100 kW in Victoria.

In the days of premium FiTs there was a case for limiting the size of eligible systems. Once the FiT is calculated to reflect the benefit of the energy exported there is no logical reason to set a low limit on the size. Some cut-off point between eligibility for a FiT and generators that fall within the NEM rules is necessary. Given that eligibility for STCs for solar projects is capped at 100 kW it would be logical to use the same level for FiT eligibility.

Larger embedded generators can cause problems for network operation in some locations but the logical mechanism for this is at the connection agreement stage with TasNetworks, not by a blanket limit on the size of eligible systems.

If the FiT methodology includes consideration of health and environmental benefits, it would be logical that only renewable energy sources (wind, solar, hydro) should be eligible rather than other embedded generators (eg gas co-generation).

Eligibility should be for any embedded generator connected to the distribution network (rather than the transmission network).

[4] For more explanation see https://reneweconomy.com.au/this-is-huge-rule-changes-to-boost-solar-pv-and-batteries-99826/ and https://www.aemc.gov.au/news-centre/media-releases/supporting-reliable-and-secure-power-system-least-cost-consumers

Additional measures to encourage solar

The Review explicitly aims to identify ways to "incentivise further installation of solar". The FiT rate is only one factor that households and businesses will take into account in deciding whether to install solar.

Additional measures that the state government could take to facilitate the take up of solar include:

Fix the metering anomaly

Most solar owners in Tasmania who are not on the legacy FiT are not receiving the full value of the energy they generate because of a problem with their meter software. Solar has to be connected to either the tariff 31 (light and power) or tariff 41 (heating and hot water) circuit. Most people connect it to the tariff 31 circuit. If they are generating solar and using electricity on the tariff 41 circuit at the same time **solar owners are charged 9.1c for using their own electricity**[5]. A software solution is available to fix this but both Aurora and TasNetworks have declined to implement this.

Smart meter roll-out

The value to a customer of solar PV depends partly on how much of the generated electricity is self-consumed (saving around 25c/kWh) and how much is exported at the FiT rate. This in turn depends on how much electricity consumption occurs while the sun is shining. Most existing electricity meters do not provide this information. However smart meters do. Having a smart meter and analysing the pattern of electricity use can help calculate the value of installing solar, as well as informing other energy and money saving strategies such as changing to a time of use tariff or installing batteries.

As a result of recent national rule changes, Aurora Energy has started the roll-out of communicating smart meters in Tasmania[6]. Due to constraints in the capacity to roll out smart meters, customers who want to voluntarily install smart meters are facing long delays. Action to speed up the roll out of smart meters would assist the take up of solar, as well as facilitating other ways for customers to save on their electricity bills.

Solar on all schools

A state government commitment to install the maximum practical amount of solar PV on all schools has multiple advantages. Schools use most of their energy in the daytime which maximises savings from solar. Reduced electricity bills can free up budget for other educational purposes. If installed as part of an educational program, it can be an effective way of engaging students and increasing their understanding of energy issues.

Network voltage regulation

In some locations high voltage levels in the distribution network result in customers not being allowed to install solar, or being restricted in the amount of energy they are allowed to feed back into the grid[7]. TasNetworks is currently trialling methods to cost effectively control distribution network voltages[8]. These measures should be supported and extended.

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[5] With current meter software, excess generation on tariff 31 is treated as exports and a FiT of 8.5c is paid, the energy then flows back into the tariff 41 circuit without leaving the building and is charged at 17.6c. For more information see http://tasrenew.org.au/metering/

[6] For more information on smart meter rollout see https://www.auroraenergy.com.au/metering

[7] For more details on voltage problems see http://tasrenew.org.au/solar/overvoltage/

[8] see page 46 of the TasNetworks 2018 Annual Planning Report https://www.tasnetworks.com.au/our-network/planning-and-development/planning-our-network/

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