CLIMATE TASMANIA

Independence, knowledge and commitment to climate action

Submission to Legislative Council Energy Price Inquiry.

1. Solar PV in Tasmania.

1.1 Introduction: the forgotten renewable power station

The primary thesis of this submission is that solar PV, and primarily behind the meter rooftop PV, is an important source of renewable electricity in Tasmania which seems to get little to no policy airtime when Tasmania's renewable energy policies are discussed. We argue that the potential of rooftop PV should be front and centre when Tasmania's renewable electricity policies are developed.

Encouragement of additional installation of solar PV is one of the most effective ways of reducing energy costs for consumers. With the correct regulatory frameworks, solar PV can reduce the costs of energy for all consumers, and not just those who install solar.

Some comments on terminology: the Terms of Reference for this inquiry refer to "energy" throughout, and we assume that this means "electricity" and that the other types of energy used in Tasmania - liquid and gaseous fuels, coal, firewood, etc - are not within the scope of the inquiry. We use "rooftop PV" as a shorthand for all behind the meter solar photovoltaic installations, regardless of whether or not the panels are actually on a roof, although the great majority are. The phrase "behind the meter" has its usual meaning, which is that the energy from the rooftop PV installation is fed into a local electricity load on the local side of the electricity meter so that energy provided by the rooftop PV is not charged for on the customer's electricity bill.

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1.2 Current deployment of solar PV in Tasmania

Figure 1 is from the Australian PV Institute (APVI)[1].

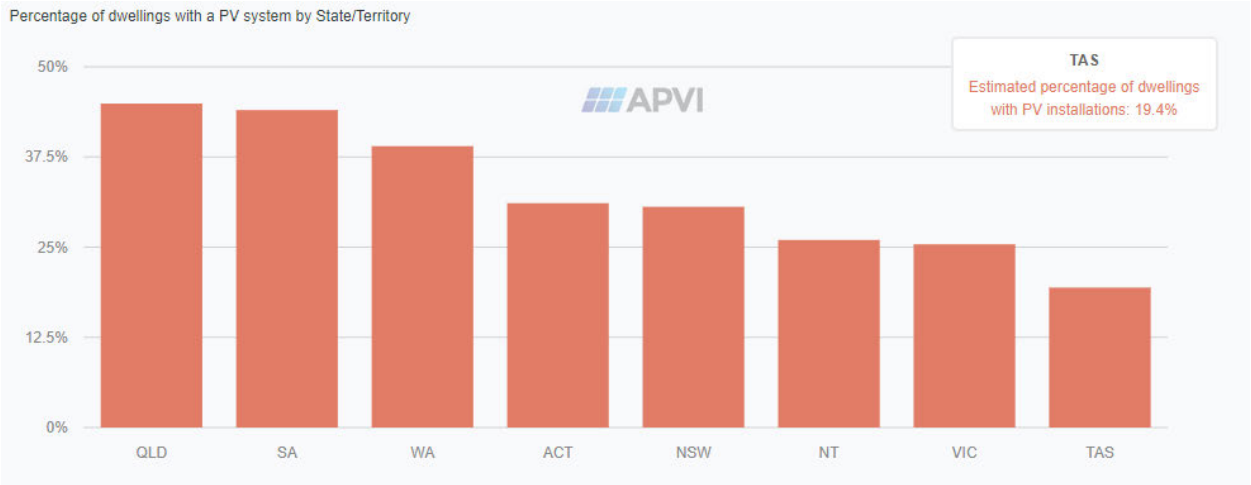

Figure 1 Rooftop PV penetration on dwellings by Australian State.

The APVI classifies all systems above 10 kW capacity as being commercial, and are therefore not included in the dwellings data. It is clear that Tasmania is coming last in the exploitation of the cheap, local electricity provided by rooftop PV. The APVI gives the capacity breakdown by system size in Tasmania:

Systems under 10 kW	209 MW
Systems between 10 and 100 kW	61 MW
Systems over 100 kW	6 MW
Total	276 MW

Placing rooftop PV capacity in a partial list of Tasmania's other renewable power stations by capacity in descending order demonstrates that even with the lowest penetration in Australia, Tasmania's rooftop PV provides a significant addition to the capacity of our electricity system.

Gordon Hydro Power Station	450 MW
Poatina Hydro Power Station	363 MW
Rooftop PV	***276 MW***
Reece Hydro Power Station	244 MW
Musselroe Wind Farm	168 MW
John Butters Hydro Power Station	145 MW
Cattle Hill Wind Farm	144 MW
(etc.)	

[1] https://pv-map.apvi.org.au/historical accessed 14 September 2023. The source and timeliness of the data compiled by the APVI are discussed on the referenced page.

1.3 Yields from rooftop solar PV in Tasmania

One of the possible reasons for the under-appreciation of the potential of rooftop PV to make a contribution to Tasmania's electricity system might be a view that Tasmania's colder climate and shorter winter days restricts the generation potential of PV too much. The Australian Government's Renewable Energy Target (RET) scheme provides for the generation of renewable energy certificates from solar PV and other renewable energy systems. A system of climate zones is used to calculate the amount of renewable energy expected to be produced by a PV system based on its location. Figure 2 shows the PV climate zones adopted by the Clean Energy Regulator from 1 January 2020. Tasmania is in Zone 4, along with southern Victoria (including much of Melbourne) and southern Western Australia. Therefore, the amount of electricity expected to be generated by PV systems in Tasmania is not expected to vary greatly from the amounts in southern Victoria and southern Western Australia. Specific local siting issues such as shading from hills, trees and buildings can impact on PV production everywhere.

In summary, the Australian Government's PV support policy assumes that yields from rooftop Pv in Tasmania do not materially differ from yields in southern Victoria and southern Western Australia.

Germany helped reduce the cost of PV through its support policies in the early days of the PV industry. All of Germany lies further away from the equator than does Tasmania, yet this is where the rooftop PV industry developed.

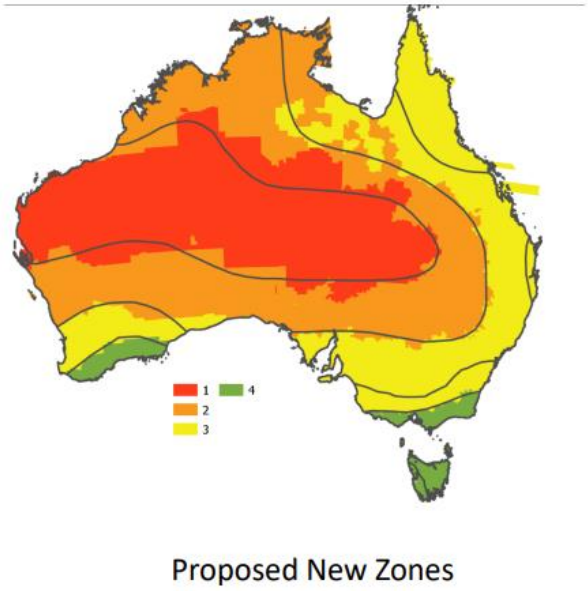

Figure 2: Climate zones for renewable energy certificate production from PV system to take effect from 1 January 2020[2]

2 https://www.cleanenergyregulator.gov.au/DocumentAssets/Documents/Maps%20of%20postcode%20zone%20changes%202019.pdf accessed on 19 September 2023.

1.4 Cost of electricity from rooftop solar PV in Tasmania

A metric called the Levelized Cost of Electricity (LCOE) is used to compare the cost of electricity from various sources. The Australian Energy Council's Solar Report for Quarter 1, 2023 has some state by state calculations of the LCOE for solar electricity. Their central estimate for the LCOE for domestic sized rooftop PV systems in Hobart ranged from $0.10/kWh to $0.12/kWh depending on system size[3]. They compared this estimate with the then Aurora Energy Tariff 31 cost of $0.28/kWh, now $0.2995/kWh.

Clearly, if low cost electricity is the objective, then rooftop PV is able to deliver exactly that.

1.5 Household batteries as well as PV?

While it is true that Tasmania's flexible hydro generation allows ready integration of variable renewable energy at the state-wide level, there is still a case for batteries at the household, business and community level.

Distributed battery energy storage can:

- Reduce costs for consumers on time of use or demand based tariffs
- Reduce the load on the local distribution network and in some case delay or avoid expensive network upgrades.
- Facilitate sharing of solar PV at the local level (especially if combined with revised network tariffs)

2. Tasmania's Electricity System and solar PV

2.1 Power versus energy

The words "energy" and "power" have more precise meanings in physics and engineering than they do in general usage. Both words are used with their more precise meanings throughout this submission.

Energy is the fundamental commodity purchased from electricity retailers. Electrical energy is usually measured in kilowatt-hours, written as kWh. Larger amounts are megawatt-hours MWh, where 1MWh = 1,000kWh and gigawatt-hours GWh, where 1GWh = 1,000MWh = 1,000,000kWh. As a comparison, most electric car batteries hold between 50kWh and 100kWh of energy, and a typical Tasmanian 2 person household uses about 25kWh per day.

Power is the rate at which energy is supplied. Power is measured in Watts (W), kilowatts (kW, 1kW = 1,000W), megawatts (MW, 1MW = 1,000kW = 1,000,000W) and gigawatts (GW, 1GW = 1,000 MW).

[3] Table 2, page 13 of Solar Report, Quarter 1 2023 Australian Energy Council, April 2023.

In Tasmania's hydro system, the energy available at any time depends on how much water is in storage. Assuming water is available when needed, the power available depends on which power stations are running, up to the maximum power available when all the hydro stations are running. The actual numbers for Tasmania are instructive. According to Hydro Tasmania, the total capacity of our hydro system is 2.5GW, which is the power available if every power station is running at its maximum. According to the Office of the Tasmanian Economic Regulator, the energy capacity of the hydro system (when all storages are full) is 14,427GWh. This storage would last 5,828 hours at full power, which is 243 days, or 67% of a year. Thus the fundamental constraint on the Tasmanian hydro system is energy - water in storage, not power.

2.2 Benefits of having more rooftop solar PV in Tasmania.

In summary, the benefits are:

1. It's cheap
2. Consumers pay for it and maintain it.
3. It's local - connected to the distribution system, not the transmission system
4. It saves water as well as money
5. There are no on-going greenhouse gas emissions from it.
6. It is quick to install, with no connection contracts to be negotiated.

1. It's cheap.

As discussed in section 1.4, the cost of electricity from rooftop PV in Tasmania is substantially less than the cost of electricity on the standard domestic retail flat rate (e.g. Aurora's Tariff 31). One of the barriers to making this cheap electricity more available to people is that current incentives only relate to owner-occupiers. Because rooftop PV is a fixed installation, people who rent cannot take a system they have paid for when they leave a rental, and because electricity costs are borne by tenants, landlords have no incentive to install rooftop PV on the properties they rent out.

2. Consumers pay for it and maintain it.

Because rooftop PV is behind the meter, the people who pay for it are primarily the people who are able to use the electricity their system generates. The Australian Government incentive scheme (part of the RET) does pass the cost of the incentives to all electricity users, but in the absence of any other incentives, the owners of the systems pay for the systems and are responsible for the very small amounts of maintenance required to keep systems operational for two decades or more.

3. It's local - connected to the distribution system, not the transmission system.

The electricity network (the grid) has two modes of transporting energy:

- The transmission network carries bulk energy at high voltage from power station to substation, or from one substation to another. The tall towers and swooping cables of the transmission system can be controversial because of their visual impact, and yet large scale sources of electricity such as hydro power stations, wind farms, and solar farms

cannot supply their energy to the grid without a substantial grid connection, most often to the transmission system.

- The distribution network carries energy at lower voltages and includes the familiar poles and wires that run along most streets in Tasmania.

Therefore, no new transmission or distribution connections are required for rooftop PV: new systems are installed on buildings with existing grid connections, which are used to carry any excess energy back into the wider grid. This aspect of rooftop PV alone makes it a very attractive proposition as a way of increasing Tasmania's renewable electricity capacity.

4. It saves water as well as money.

Buildings with rooftop PV are seen by the grid as electricity consumers whose load has decreased, even if there is no excess energy to export back into the grid. Such systems save money – because the electricity from the PV system is cheaper than electricity from the grid – and save water, as they reduce the demand on the hydro system. Systems which routinely export excess energy back into the grid save even more water.

5. There are no on-going greenhouse gas emissions.

The "fuel" for PV systems – sunlight – is free and has no greenhouse gas emissions.

6. It is quick to be installed with no connection contracts to be negotiated.

Australia has been a pioneer in the efficient installation of rooftop PV. In the US, rooftop PV systems cost 2 to 3 times the cost in Australia, and it can take 6 months for approvals to connect to be obtained. If Tasmania ever experiences another energy crisis in which dwindling water storages are a source of concern, the water saving electricity capacity that can be installed the fastest is rooftop PV.

2.3 System difficulties from having more rooftop solar PV in Tasmania?

2.3.1 Lessons from South Australia

The high penetration of rooftop PV in South Australia (see Figure 1) has occurred in a grid with relatively few large industrial loads, such as aluminium smelters. This has resulted in a grid in which, under the right conditions, most or even all of the power comes from rooftop PV systems[4]. This expected development has brought some grid management challenges, one that the Australian Energy Market Operator (AEMO) has responded to with updated requirements for the inverters used in rooftop PV systems[5]. The South-West Interconnected System (SWIS) in Western Australia faces similar challenges in the near future. Grid operators in both states are confident that improved technology in new (and upgraded) PV systems will allow them to manage these issues.

[4] https://reneweconomy.com.au/solar-reaches-new-peak-of-126-7-pct-of-south-australia-demand-nsw-coal-at-record-low/

[5] https://reneweconomy.com.au/solar-switch-off-a-must-for-all-states-says-aemo-to-control-seven-erarings-of-rooftop-pv/

2.3.2 An issue for Tasmania?

The flexibility of Tasmania's hydro system means that additional variable renewable energy can be incorporated readily without the need for storage that is necessary in other states where existing generation is either less flexible (coal fired) or expensive (gas fired).

Investigations by the TasNetworks Future Distribution System Vision demonstrated that, while there are challenges in specific locations, overall the Tasmanian distribution system is able to readily accommodate substantially increased installation of distributed solar PV. Tasmania can look to the rest of Australia, particularly South Australia and Western Australia, for guidance on how to manage the continued rollout of rooftop PV here in such a way that such problems are avoided.

2.4 Benefits of rooftop solar PV compared with solar and wind farms.

It is notable that since the 200% Tasmanian Renewable Energy Target was legislated (Nov 2020) nearly three years ago, no new central solar or wind farms have been commissioned. However in the same time over 97 MW of rooftop solar has been installed in Tasmania.

While we accept that it is desirable that new large-scale renewable generation be built in Tasmania, this disparity illustrates the ease with which rooftop solar can be funded and installed compared with large scale projects.

3. Policy issues and proposals.

3.1 Existing rooftop solar PV incentives

The only existing state level incentives for the installation of solar PV are the Tas Energy Saver Loan Scheme (TESLS), the Business Energy Efficiency Scheme and the No Interest Loan Scheme. These are all no-interest loan schemes. These are desirable, but other states illustrate that far more active approaches to facilitating the up-take of solar PV are possible.

3.2 Solar Victoria as a case study

The Victorian Government has had its own program of cash subsidies and no interest loans to promote the adoption of rooftop PV and home batteries in the state. A government body called Solar Victoria was formed to manage the government's various incentive schemes[6]. The early days of the program administered by Solar Victoria saw a huge demand for the incentives on offer, and the program has been modified over time as experience developed. Solar Victoria has used the leverage given it by its incentives to ensure a very high standard of quality control and height safety on new rooftop PV installations, and has also been active in the issue of inverter

[6] https://www.solar.vic.gov.au/

technical standards to ensure that systems installed with the aid of their incentives meet the expected needs as the installed base of rooftop PV grows in Victoria.

3.3 Policy proposals

Political leadership

The state government spends a lot of time and effort on promoting the benefits of large scale renewable electricity developments (Project Marinus, new wind farms, hydrogen developments) but is essentially silent on the benefits of distributed solar PV. More active promotion of the benefits of solar PV, and dispelling some of the myths about it, would contribute to increased take-up.

Leadership from government procurement

The state government should set targets for solar PV on all suitable government owned buildings, starting with schools and social housing.

The state government should partner with local government and community organisations to support bulk purchase schemes at the local level.

Addressing equity issues

Additional funding should be provided to the NILS scheme to facilitate purchase of solar PV (and other energy efficiency measures) by low income households.

Loans under the Tas Energy Saver Loan Scheme should be extended to 7 years for low income households so that the repayments can be matched by the savings on electricity bills.

Additional policy measures are necessary to ensure that the benefits of solar PV are available to renters and others who are not able to install solar PV on their own roofs. Many examples of programs to address this need exist in other states, including community solar gardens and community batteries.

Comprehensive independent advice

The maximum benefit from solar PV at the household level is realised when it is integrated with:

- Insulation and other energy efficiency measures
- Optimum tariff selection
- Load control
- Integration with electric vehicle charging (or provision for future EV use)

The government can play an important role in ensuring that households and businesses are provided with comprehensive independent advice that considers all these issues.

Workforce development

Proactive government policies are necessary to ensure that there is sufficient skilled workforce to cater to an increasing demand for:

- Design and installation of solar PV
- Integration of solar PV with household batteries
- Provision of electric vehicle charging infrastructure.

Updated regulation

Building and planning standards should be modified to ensure that new buildings can have solar PV added efficiently (for example planning to ensure solar access, roof trusses certified to take the load of solar PV).

Network tariffs that support local sharing of both behind the meter resources and community batteries will support the continued adoption of rooftop PV. This will also contribute to addressing social equity by facilitating access to shared solar for residences that are not suitable, due for example to shading.

Appendix.

About Climate Tasmania

Climate Tasmania is a group of concerned professionals who have a diverse range of expertise, spanning scientific, legal, economic, health, energy, social and policy aspects of climate change. Our aim is to provide timely, independent and authoritative advice to Tasmanian business, government and community leaders on climate change and appropriate policy responses.

Details of the members of the Climate Tasmania board and expert advisers are available at www.climatetasmania.org/members/