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Securing Tasmania's energy future

How Tasmania can become energy self-reliant and an exporter of renewable energy

Discussion paper – The Australia Institute Tasmania

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Summary

Tasmania's link to the National Electricity Market (NEM) is subjecting the state to increasing uncertainty when it comes to electricity prices including large and sudden price shifts. The state should take back control and become a self-reliant exporter of clean energy.

Tasmania should become less reliant on the NEM by reducing or eliminating the need to import electricity through the Basslink Interconnector, by increasing its generating capacity and instead become a net exporter into the NEM.

If Tasmania uses its natural advantage in renewable energy this will lower prices, increase security and hasten Australia's transition away from fossil fuels. Tasmania is perfectly placed to lead this transition because it has large hydroelectric 'baseload' power which pairs perfectly with intermittent solar and wind.

This paper proposes that Tasmania sets itself the goal of becoming self-sufficient in electricity generation. Tasmania can then simply use the interconnector to sell surplus generation of clean energy back to the mainland states. To do this Tasmania needs to construct additional generation assets including wind and solar.

Tasmania can become self-sufficient and also drive down prices for Tasmanian homes and businesses through these measures:

- Divert $100 million of forgone revenue and expenditure from the Government to fast track investment in extra generation
- Increase Tasmania's wind generation to around 12 per cent of current capacity
- Install solar PV and hot water on all appropriate public housing, reducing total electricity demand in the state by about 0.6% and improving social equity
- Install solar PV and hot water on all appropriate private housing, reducing total electricity demand by about 15%. This would free up 1,573 GW h of electricity and gas for sale elsewhere and lower bills.

Introduction

Tasmania is facing increasing uncertainty because of a lack of investment and policy certainty in the National Electricity Market (NEM). According to the national regulator, the Australian Energy Market Commission, the retirement of coal-fired power stations on the mainland will drive up Tasmanian electricity prices by 35%.[1]

At the same time Tasmania has substantial hydroelectric generation capacity and excellent wind and solar resources. Prime Minister Malcolm Turnbull has said that he wants to see Tasmania become a 'battery for Australia'.[2]

The Tasmanian government has correctly identified rising electricity prices as a significant political problem, but failed to provide a long-term solution. With a state election expected early next year, the recent state budget set aside more than $100 million to subsidise electricity prices for the next year.[3] $70 million of this is forgone revenue to government from the publically-owned Hydro Tasmania, flowing from the decision to cap electricity price increases at 2% for 12 months.

Rather than spending more than $100 million to reduce electricity bills in the short-term, this paper proposes to invest in building new, distributed solar and wind generation which will make Tasmania self-reliant and reduce bills over the long-term.

Tasmania has unique energy riches. Our large hydroelectric scheme provides a 'baseload' backup for a significant investment in wind and solar resources. Hydro, solar and wind are an excellent and efficient combination for clean and secure energy.

On Wednesday 7 June 2017 the Tasmanian state government announced a new 144 MW wind farm at Wild Cattle Hill in the Central Highlands, to be built by Goldwind.[4] This is a great and long-overdue development, which could help Tasmania implement the strategy of energy independence.

In a carbon constrained world that is transitioning to renewables, Tasmanian consumers and businesses should be enjoying significantly lower power prices and higher than average energy security. However, a failure to modernise the grid and a lack of investment in extra generation has seen the state lose its competitive

[1] AEMC (2016) *Residential Electricity Price Trends*, pp.vii, 21-22

[2] Morton (2017) *Malcolm Turnbull says hydro plan could make Tasmania a 'battery for Australia'*.

[3] Gutwein (2017) *2017-18 Budget speech*

[4] Richards (2017) *Central Highlands Wind Farm Plan to Boost Clean Energy Production*

advantage. Tasmania's connection to rest of the NEM through Basslink compounds the state's policy shortcomings.

Tasmania's reliance on the NEM means that its supply and pricing is tied to ageing coal fired power stations, a lack of investment due to policy uncertainty and trading rules more favourable to inflexible coal power. It is not taking advantage of its responsive hydroelectricity assets and cost effective generation technologies like wind and solar. In short, it is hard to see what Tasmanian consumers and businesses gain from maintaining their reliance on electricity from the NEM.

This paper proposes a long-term energy strategy for the state, where Tasmania is again self-reliant through integrated hydro, wind and solar generation. This would reduce price uncertainty, improve reliability and put downward pressure on the bills of electricity consumers.

Why Tasmania should become self-sufficient again

The National Electricity Market (NEM) has seen security decline and large increases in electricity prices in recent years. Initial increases in the mid-2000s were primarily caused by increases in electricity distribution caused by massive investment in the electricity grid. Electricity prices initially fell after the abolition of the carbon price, but retail prices have since grown and are now above what they were when the carbon price was in place.

These electricity price rises are being driven in large part by a lack of investment around Australia in new generation. This has been caused by policy uncertainty at the national level. Political fighting over climate and energy policy means that investors are wary of building even premium quality generation assets, such as windfarms in Tasmania. As the aging generation assets reach the end of their lives, new generation to replace them is not being built. At the same time the decision by the gas industry to build export facilities on the east coast of Australia has pushed up the gas price making gas generation far less competitive.

The Renewable Energy Target (RET) along with other state and territory based renewable energy targets have been the most effective policy instrument for introducing new electricity generation but more needs to be done.

Falling renewable energy and battery costs[5] mean that coal powered generation is likely to be uncompetitive long before the asset reaches the end of its life. Additionally, future action on climate change is likely to mean that coal powered generation will be phased out. Both these combine to create considerable uncertainty and this is reducing investment in new generation.

It is important to note that even in the absence of action on climate change; investment in a new coal powered generation is unlikely. The falling cost of renewable generation and storage means that the likelihood that a new coal power station would be profitable over a period long enough to justify the capital costs is small.

Gas generation has become increasingly expensive in recent times as the price of gas has risen. This is due to the gas industry's decision to build export facilities on the east

[5] Cass (2016) *Securing renewables*

coast of Australia. This has connected the east coast market to the world market. Previously the east coast gas price was significantly lower than the world price.

Tasmania held back by the NEM

The aging fossil fuel generation stock on the mainland and the lack of coherent national policy is putting considerable upward pressure on electricity prices. These issues should have minimal impact on Tasmanian power prices since Tasmania has no aging fossil fuel generators and has substantial renewable generation capacity. But Tasmania has become reliant on the NEM and lacks a plan to provide energy security and affordability.

The Tasmanian government plans to spend more than $100 million to subsidise electricity prices over one year, with a price rise cap of 2%.

Whilst this provides welcome relief for Tasmanian consumers and businesses, it is a short-term band aid not a long-term plan. It is ultimately an inefficient method for reducing prices, because it does nothing to fix the causes of the problem. One year after the end of the subsidy period, Tasmania's consumers will be subject to the full increase in electricity prices for the subsidised year as well as the next year. The only thing that would prevent this is if the subsidy is extended to additional years, but this will add additional costs to the budget and will again do nothing to fix the underlying issues.

Tasmanian energy generation history

The solution to Tasmania's electricity problem is for the state to change its relationship with the NEM, to again become self-reliant in electricity generation and only use the Basslink interconnector to sell surplus electricity to the NEM.

This idea is not as radical as it might first seem. Tasmania only joined the NEM in 2005 and its connection to the NEM didn't become fully operational until 2006. Before this it was self-reliant in the generation of electricity.

Rather than buying and selling electricity through the interconnector and being reliant on the national market, Tasmania could again make itself self-sufficient in electricity generation. It could then use the interconnector to sell surplus generation back to the NEM, for a profit.

The advantage of such a change would be that Tasmania would no longer be subject to the electricity price determined by the NEM. The problems of aging fossil fuel generators and there approaching withdrawal and the lack of investment certainty would no longer apply to Tasmania.

According to a report by the Australian Energy Market Commission in 2016, the retirement of Northern and Hazelwood coal-fired power stations will result in wholesale electricity costs increasing between 2015/16 and 2018/19:

- $55/megawatt hour (MWh) to $75/MWh in Victoria, an increase of 35 per cent
- $76/MWh to $104/MWh in South Australia, an increase of 37 per cent
- $59/MWh to $79/MWh in Tasmania, an increase of 35 per cent.[6]

At the moment the NEM has separate electricity pools for each state that effectively act as separate but connected electricity markets. This means that electricity prices are different in different states. But because the state pools are connected through the NEM each of the state pools are influenced by what is happening in other parts of the NEM.

Under this papers proposal Tasmania would not need to disconnect from the NEM. Instead if it was self-reliant in electricity generation then the Tasmanian state electricity pool would not be influenced by what was happening more widely in the NEM. This would also allow Tasmania to export surplus electricity back into the NEM. It

[6] AEMC (2016) *Residential Electricity Price Trends*, pp.vii, 21-22

would also allow Tasmania to import electricity from the NEM in the case of a catastrophic event.

Before 2006, Tasmania was self-sufficient in electricity generation. Since that time there have been years when Tasmania has generated more electricity than it has demanded and other years when it has generated less electricity than it demanded. Table 1 shows the last seven years of electricity generation and consumption for Tasmania.

Table 1 – Tasmanian electricity surpluses and deficits 2008 - 2015

Year	Electricity Generation (GWh)	Electricity Consumption (GWh)	Surplus/Deficit (GWh)
2008-09	8,597.2	11,798	-3,200
2009-10	10,014.8	12,035	-2,021
2010-11	11,577.4	12,599	-1,021
2011-12	10,617.8	11,764	-1,147
2012-13	13,121.6	11,930	1,192
2013-14	13,999.5	11,858	2,141
2014-15	9,630.9	11,923	-2,292

Source: Office of Chief Economist (2017) *Australian Energy Statistics*, Table L & O

From this it is clear that Tasmania will need to increase generation to again become self-sufficient. The mismatch in electricity generation and consumption has been caused in part by the decision of Hydro Tasmania to run down its water levels when the carbon price was in place and the fact that since then Tasmania has gone through drought conditions. This has led to low dam water levels. Over time these dam levels are likely to increase and as they do, Hydro Tasmania will be in a position to generate more electricity.

Tasmania's generation potential

To strengthen Tasmania's self-reliance in electricity generation, new generation assets should be constructed. Tasmania has some of the best wind resources in Australia. According to AEMO there are three wind projects under development in Tasmania.[7] They have a combined generation capacity of 329 MW. This represents about 12 per cent of Tasmania's current generation capacity.

The Tasmanian government should make these wind projects a priority. With such excellent wind resources the Tasmanian government should also seek out other wind projects to further expand its generating capacity.

Tasmania is in a unique position to take advantage of integrating its excellent wind resources with its large hydro generation. In order to stabilise and minimise Tasmanian electricity prices it does not make sense for generators to over produce in order to sell to the NEM. It would be better for Tasmanian electricity consumers if during windy periods Hydro generation was reduced. At less windy times Hydro generation could be increased.

Hydro and wind generation complement each other very well and this gives Tasmania a natural advantage since it has both types of generation. This integration can be used to smooth out electricity generation. This will help stabilise electricity prices and bring certainty to the Tasmanian electricity market.

One way to integrate these two types of generation would be for the government to construct new wind farms through the already state owned Hydro Tasmania. With the government about to spend $100 million a year trying to reduce electricity prices with subsidies, this money could be better used building a productive asset that would generate an income stream into the future.

[7] AEMO (2017) *Regional generation information pages: Tasmania*

Saving with solar households

The domestic rooftops of Tasmania are a rich potential source of solar energy from both photovoltaic (PV) and hot water systems. Already about 12% of Tasmanian households have solar PV, with an average capacity of 3 or 4 kW, which represents about 1.3% of Tasmanian electricity demand.[8]

Most remaining households have roofs suitable for solar installations. A government-owned enterprise could use these rooftops to install PV and hot water systems, covering its costs in about a decade while providing discounted energy to the tenants and a leasing fee to the landlord.

Such a scheme would reduce electricity consumption and make a considerable amount of electricity available for use in local industry, and would help keep domestic prices down. If installed on all viable public housing, it would reduce total electricity demand in the state by about 0.6%. If installed on all viable private housing as well, it would reduce total electricity demand by about 15%. This would free up 1,573 GW h of electricity and gas for sale elsewhere.

Because Tasmania's hydro-electric generation functions as a giant battery, Tasmania is particularly well suited to intermittent renewables like solar. The main barriers to a scheme like this are regulatory and institutional, rather than technological or financial.

[8] Clean Energy Regulator (2017) *Postcode data for small-scale installations*; Clean Energy Regulator(2016) *Energy in Tasmania Report 2015–2016*

Solar PV

Table 2: Solar PV generation potential

	Solar households	Public households without solar	Private households without solar
Total properties	29,117	8,000	190,000
Eligible properties	-	6,720	159,600
Capacity (kW)	104,760	33,600	798,000
Annual generation (MWh)	133,831	42,924	1,019,445
Increase on current PV capacity	-	32%	762%
Solar generation potential as share of Tasmania's demand	1.28%	0.41%	9.72%
Total properties	29,117	8,000	190,000

Sources: Calculated by The Australia Institute from our model (in appendix)

Table 3: Solar PV cost and compensation

	Public housing	Private housing without solar
Total cost of installation ($m)	$42.9	$997.5
Total earnings per year ($m, annual)	$7.0	$167.1
Cost of paying discount/leasing fee ($m, annual)	$1.7	$39.9
Revenue to Hydro Tasmania ($m, annual)	$5.4	$127.2
Years to cover installation cost	7.8	7.8

Sources: Calculated by The Australia Institute from our model (in appendix)

Solar hot water

Table 4: Solar hot water generation potential

	Public housing	Private housing
Total properties	8,000	190,000
Eligible properties	6,720	159,600
Annual electricity demand reduction (MW h)	20,160	478,800
Share of Tasmania's total demand	0.19%	4.57%

Sources: Calculated by The Australia Institute from our model (in appendix)

Table 5: Solar hot water cost and compensation

	Public housing	Private housing
Total cost of installation ($ m)	$33.6	$798
Total earnings per year	$3.8	$89.6
Cost of discount/leasing fee	$1.1	$26.9
Revenue to Hydro Tasmania	$2.6	$62.7
Years to cover installation cost	12.7	12.7

Sources: Calculated by The Australia Institute from our model (in appendix)

Public housing

We suggest starting with public housing, for several reasons:

- A single landlord, Housing Tasmania, owns 8,000 properties, making the negotiation and contracting process straightforward and quick
- Tasmania's solar installation rate is well down on what it was a few years ago. The process could ramp up on public installations, then be in a better position to tackle the much larger number of private installations.
- Public housing tenants are worthy recipients of discounted electricity, and a leasing fee for Housing Tasmania would allow it to invest in more public housing.
- Exact knowledge of the properties involved makes the installation process faster and more efficient.

Installing PV on every eligible public housing property would increase Tasmania's total solar generation by about 32%.

For every eligible public housing property, there are more than 23 eligible private properties. If the scheme is a success in public housing, private housing represents an enormous additional resource that could increase Tasmania's total solar generation by about 759%.

Legal and practical challenges

Implementing this solar leasing model may require changes to Tasmania's regulatory and institutional landscape. Hydro Tasmania is not currently permitted to act as a retailer. If the plan was implemented by a new retailer entrant, consideration would have to be given as to whether they would sell all electricity to the property, or just the solar generated by that property's rooftop.

Rapid uptake of commercial solar

As prices to buy from the main grid continue to rise, many commercial operators are going off grid and producing their own solar energy, backed up by battery storage. According to a survey undertaken by energy management company Energy Action, 23 per cent of businesses generate some portion of their electricity supply using solar PV, up from just 14 per cent just two years ago. Another 37 per cent said they had "implemented solar PV measures in their business," up from 23 per cent in 2014.

Tasmania's first and largest commercial scheme producing 1 MW of energy has been installed in Launceston, providing tenants of the industrial complex with electricity at 10–15% less than what they can purchase off the grid. Even more attractive for customers, prices are also locked in, insulating them from price shocks and allowing for better investment decisions.

The greater the savings to commercial users the more attractive it becomes for them to go off the grid. Nest energy has previously stated that is has a number of other projects in the pipeline that could produce between 3–5 MW of power.

This is great news for commercial customers but presents a problem for other Tasmanians. A decrease in customers on TasNetworks will result in escalating prices for customers who are forced to remain on the grid.

Electricity consumption

Tasmania also has a unique electricity consumption pattern. Industrial consumers make up a significant proportion of the Tasmanian market for electricity. Industry uses about half all electricity consumed, with residential and commercial users consuming about a quarter each.[9] Even among industrial users there are four very large users that make up about 93 per cent of industrial electricity use.[10] These consumers are Rio Tinto Alcan, Norske Skog, Nystar and TEMCO.

Putting downward pressure on electricity prices as well as reducing their volatility would benefit electricity consumers including these large industrial users. Lower prices are clearly a cost advantage to a large user of electricity, but also of benefit is stability in prices. This allows businesses to plan with more certainty into the future.

These large users will also gain an advantage from marketing their products as being produced with renewable energy. The products produced from large electricity users are usually seen as environmentally less desirable because most electricity is produced from fossil fuels. If Tasmania was self-sufficient in electricity generation and if the state could further expand its renewable generation so that it was 100% renewable, then this could give these businesses a competitive advantage. Such an advantage might attract other businesses to set up in Tasmania.

[9] Electricity Supply Industry Expert Panel (2011) *Tasmania's Energy Sector – an Overview*

[10] Grudnoff (2014) *The RET's effect on Tasmania - Does the RET cost Tasmanian industrial users $20 million per year?*

Conclusions

Our proposal shows that Tasmania could become energy independent again. It has only been connected to the NEM since 2006 and it is time to review this arrangement and invest in self-reliance for the long-term. Tasmania can then use the Basslink Interconnector to export surplus clean energy to the mainland for a profit.

Tasmania has prodigious natural energy resources and has already invested in a valuable hydroelectric scheme. This hydro scheme can be the 'baseload' backup for a significant expansion of our solar and wind generation.

The NEM is facing difficulties, with a lack of investment, rising prices and significant uncertainty in the future.

This paper shows how Tasmania can invest in solar and wind, to lower bills for energy consumers. Installing solar PV and hot water systems on almost all public housing would lower prices for tenants and increase social equity in Tasmania. By investing in solar PV and hot water for private households, we can lower bills and improve Tasmania's energy self-reliance.

This proposal will also see greater commercial solar and the timely development of Tasmania's premium wind resources.

If Tasmania plays to its strengths it can become a clean energy superpower and take control of energy costs for households and businesses.

References

AEMC (2016) *Residential Electricity Price Trends*, final report, 14 December, Sydney, available at <http://www.aemc.gov.au/getattachment/be91ba47-45df-48ee-9dde-e67d68d2e4d4/2016-Electricity-Price-Trends-Report.aspx>

AEMO (2017) *Regional generation information pages: Tasmania*, 5 June, available at <https://www.aemo.com.au/Electricity/National-Electricity-Market-NEM/Planning-and-forecasting/Generation-information>

Aurora Energy (2016) *Standard electricity rates and charges*, accessed 7 June, available at <https://www.auroraenergy.com.au/your-home/electricity/rates-and-charges/standard-electricity-rates-and-charges>

Australian PV Institute (2017) *PV Performance by Climate Region*, accessed 7 June, available at <http://pv-map.apvi.org.au/performance#4/-28.77/134.91>

Brass N (2013) *If every house had solar …* , *The Australian,* 11 April, available at <http://www.theaustralian.com.au/business/business-spectator/if-every-house-had-solar/news-story/8238f402ed4291fcd6c1258867118a5a?nk=8a7fc6be7496328cfd4a6ad487f08c45-1496023532>

Cass D (2016) *Securing renewables: how batteries solve the problem of clean electricity*, The Australia Institute, Canberra, April, available at < http://www.tai.org.au/sites/defualt/files/P234%20renewables%20and%20battery%20storage%20FINAL.pdf>

Choice (2017) *Solar hot water system buying guide*, 3 March, available at <https://www.choice.com.au/home-improvement/energy-saving/solar/buying-guides/solar-hot-water-systems>

Clean Energy Regulator(2016) *Energy in Tasmania Report 2015–2016*, December, available at <http://www.energyregulator.tas.gov.au/domino/otter.nsf/LookupFiles/2015-16%20Energy%20in%20Tasmania%20Report%20-%20final%20web%20pdf.PDF/$file/2015-16%20Energy%20in%20Tasmania%20Report%20-%20final%20web%20pdf.PDF>

Clean Energy Regulator (2017) *Postcode data for small-scale installations*, 24 May, available at <http://www.cleanenergyregulator.gov.au/RET/Forms-and-resources/Postcode-data-for-small-scale-installations>

Electricity Supply Industry Expert Panel (2011) *Tasmania's Energy Sector – an Overview*, Government of Tasmania, April, Hobart, available at <http://www.dpac.tas.gov.au/__data/assets/pdf_file/0017/141803/Tasmania_s_Energy_Sector_-_an_Overview.PDF>

Gilding J (2017) *A fair price for rooftop solar? Try 10-18c/kWh*, SolarCitizens, available at <http://www.solarcitizens.org.au/a_fair_price_for_rooftop_solar_part_1>

Grudnoff M (2014) *The RET's effect on Tasmania - Does the RET cost Tasmanian industrial users $20 million per year?*, The Australia Institute, November, available at <http://www.tai.org.au/sites/defualt/files/The%20RETs%20effect%20on%20Tasmania.pdf>

Gutwein P (2017) *2017-18 Budget speech*, Government of Tasmania, 25 May, Hobart, available at <http://www.treasury.tas.gov.au/Documents/2017-18-Budget-Speech.pdf>

Morton A (2017) *Malcolm Turnbull says hydro plan could make Tasmania a 'battery for Australia'*, SMH, available at <http://www.smh.com.au/business/energy/malcolm-turnbull-says-hydro-plan-could-make-tasmania-a-battery-for-australia-20170420-gvouvy.html>

Office of Chief Economist (2016) *Australian Energy Statistics*, Department of Industry, September, available at <https://industry.gov.au/Office-of-the-Chief-Economist/Publications/Pages/Australian-energy-statistics.aspx>

Richards B (2017) *Central Highlands Wind Farm Plan to Boost Clean Energy Production*, The Mercury, June 6, available at <http://www.themercury.com.au/news/tasmania/central-highlands-wind-farm-plan-to-boost-clean-energy-production/news-story/a649ce35175d4e1c91f5888aa3f7406c>

Solar Choice (2017a) *Current solar power system prices: Residential and Commercial*, accessed 7 June, available at <https://www.solarchoice.net.au/blog/solar-power-system-prices>

Solar Choice (2017b) *How your hot water system affects your solar PV setup*, 15 March, available at <https://www.solarchoice.net.au/blog/solar-hot-water-and-solar-pv>

Solar Choice (2017c) *Residential Solar PV Price Index – May 2017*, accessed 7 June, available at <https://www.solarchoice.net.au/blog/solar-pv-system-prices-may-2017>

Solahart (2017) *Solar Water Heating*, accessed 7 June, available at <https://www.solahart.com.au/products/solar-water-heating/>

Tasmanian Climate Change Office (2017) *Solar energy information for Tasmanian homes (fact sheet)*, Department of Premier and Cabinet, available at <http://www.dpac.tas.gov.au/__data/assets/pdf_file/0005/267557/Fact_Sheet_-_TCCO_-_2015_solar_information.pdf>

Appendix – Model and assumptions

Eligible houses would have solar PV and solar hot water systems installed, with the size of the system determined by the available rooftop.

Tenants could buy energy generated by their systems at 20% less than the overall retail tariff. The landlord (Housing Tasmania in the case of public housing) would receive 10% of the tariff as a leasing fee for every kW h purchased by the tenants. Owner-occupiers would simply pay 30% less than the overall retail tariff.

Assumptions are conservative

Our modelling assumes:

- The average domestic rooftop can hold a 5 kW of solar panels and a solar hot water system with an electric booster.[11]
- The solar hot water system would be a 330 litre, two-panel system that displaces 3,000 kW h of electricity per annum. A system like this would cost $4,200 upfront.[12]
- Retail and wholesale tariffs remain at $0.261 and $0.067 per kW h respectively, and solar hot water tariffs remain at $0.157.[13]
- 84% of rooftops are eligible for solar.[14]
- Solar PV costs about $1.25 per watt of capacity.[15]
- Tasmania receives 3.5 sun-hours every day.[16]
- Houses will consume the electricity generated by 2.5 kW of solar PV, regardless of how much larger their own installation is (they will consume electricity from other sources as well).[17]

[11] Brass N (2013) *If every house had solar …*

[12] Choice (2017) *Solar hot water system buying guide*; Solar Choice (2017b) *How your hot water system affects your solar PV setup*; Solahart (2017) *Solar Water Heating*

[13] Aurora Energy (2016) *Standard electricity rates and charges*

[14] Brass N (2013) *If every house had solar …*

[15] Solar Choice (2017a) *Current solar power system prices: Residential and Commercial*; Solar Choice (2017c) *Residential Solar PV Price Index – May 2017*

[16] Tasmanian Climate Change Office (2017) *Solar energy information for Tasmanian homes (fact sheet)* p1; see also: Australian PV Institute (2017) *PV Performance by Climate Region*

[17] On the assumption that a household would consume 70% of the production of a 3.5 kW system. See also: Tasmanian Climate Change Office (2017) *Solar energy information for Tasmanian homes (fact sheet)*, p 1

- Our modelling does not take into account discount rates or inflation.

Likely optimistic assumptions

Our assumptions are conservative. A number of factors could make the pay-off time for the scheme even shorter:

- Solar Citizens analysis has found that the total value of solar electricity to society is around 14.5 cents/kW h when health, network and environmental effects are taken into account as well.[18] This is double the wholesale tariff used in our assumption.
- Tasmanian electricity tariffs may continue to rise.
- Our cost per installation is based on the current cost of a one-off solar installation in Hobart. The large size of the scheme and its nature as a government enterprise allows for positive economies of scale and for certain costs to be avoided. This has only been accounted for by using the lower range of costs, but might be more valuable than that.
- Solar PV may continue to fall dramatically in price per watt, which would make later installations under this scheme much cheaper than earlier ones.
- Current Australian rooftops are large by world standards, and by historical Australian standards. They may have the capacity for more than 5 kW of solar PV.

For example, if the Solar Citizens feed-in tariff of 14.5 cents/kW h is used along with a price per watt of $1.00, the pay-off time for solar PV falls to under five years.

[18] Gilding (2017) *A fair price for rooftop solar? Try 10-18c/kWh*