AUSTRALIAN ENERGY COUNCIL

SOLAR REPORT

QUARTER 3, 2018

Australian Energy Council

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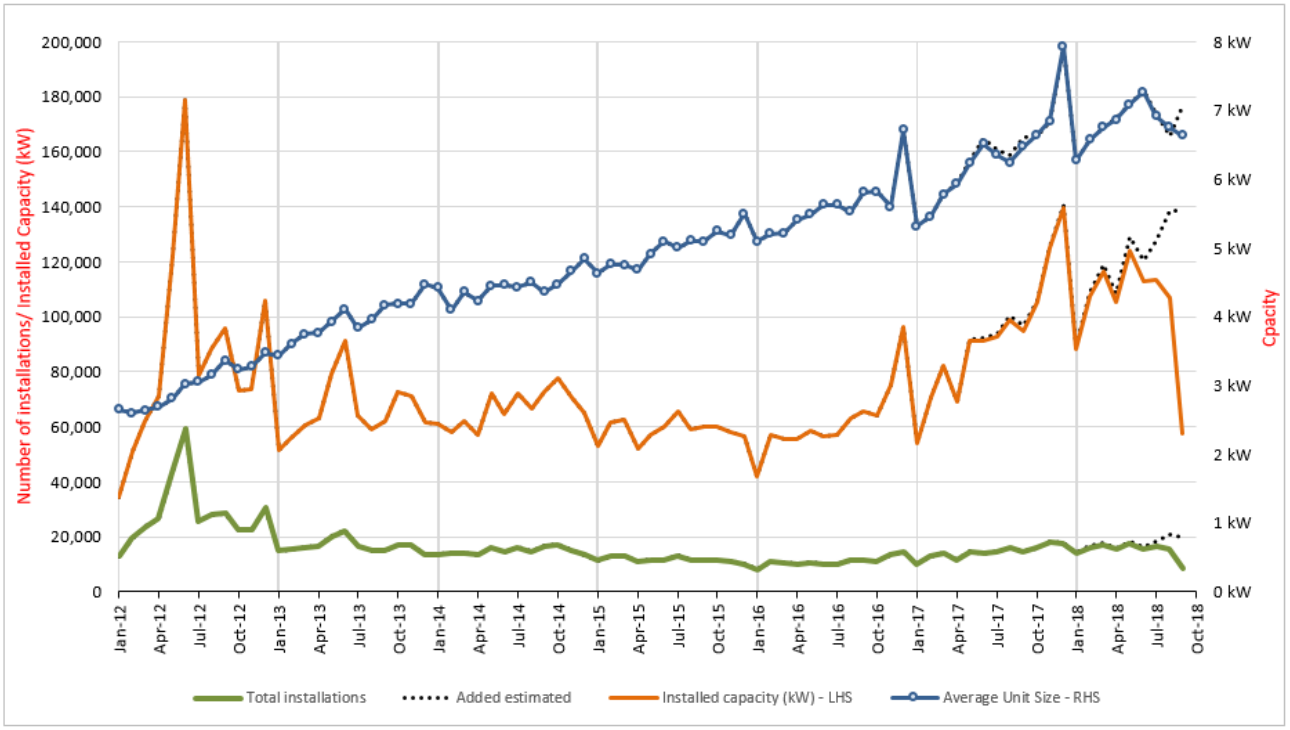
SECTION I: STATE OF SOLAR PV IN AUSTRALIA

Updated data from the Clean Energy Regulator (CER, 11 October 2018) shows that as at 30 September 2018, Australia had 1.95 million solar PV installations. The CER estimates that 1,600 MW of small-scale solar PV will be installed by the end of 2018, a 44 per cent rise on the previous record for installed capacity set in 2017.

Figure 1 shows the number of monthly installations and installed capacity, with the average monthly system size installed across Australia. Roughly, 136,970 small-scale solar PV systems with a total capacity of 932 MW have been installed as at the end of September 2018. This is equivalent to a 27.9 per cent increase in the number of installations and a 46.8 per cent increase in total capacity compared to the same period last year.

Figure 1: Monthly installations, installed solar PV capacity and average system size January 2012 – September 2018



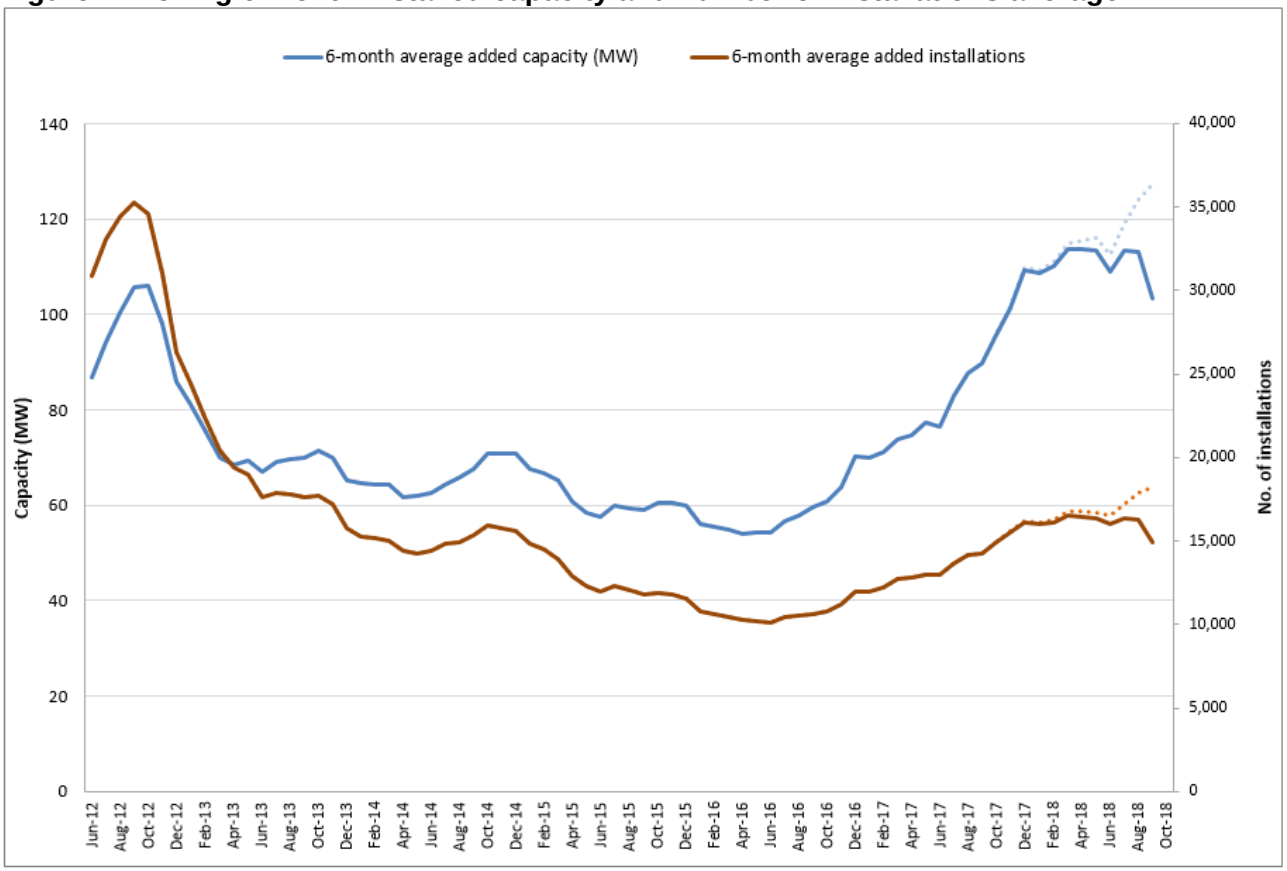
Source: Clean Energy Regulator (adjusted data), Australian Energy Council analysis, data as at 30 September 2018

The average added installed capacity of systems dipped from 7.27 kW in June 2018 to around 6.7 kW in August 2018. This trend has previously occurred during the colder winter period; 2017 also experienced a similar dip, dropping from 6.52 kW in June 2017 to 6.25 kW in August 2017.

As shown in figure 2, since late 2016 the average added capacity has increased faster than the number of average installations, this is likely to be due to households opting for bigger solar systems with the continued price decline of solar panels. The two trend lines in figure 2 will continue to widen

as these bigger units are installed, specifically, the rolling average installed capacity (blue line) has been steadily growing and the estimated six-month average of 127 MW put on rooftops to September 2018[i], surpassed the old peak of 105.8 MW (in 2012), again illustrating the continued strong growth in Australian rooftop solar installations.

Figure 2: Rolling 6-month installed capacity and number of installations average



Source: Clean Energy Regulator data, Australian Energy Council analysis, data as at 30 September 2018

The Australian Energy Market Operator (AEMO) states that the record number of installed small-scale PV capacity during 2018 mirrors an increase in generation.

Small-scale Renewable Energy Scheme cost forecast 2018-19

Clean energy financial advisory, Demand Manager, recently released its Small-scale Renewable Energy Scheme (SRES) 2019 Forecast[ii], according to the forecast the cost of the SRES in 2018 is expected to reach $1.08 billion. It is expected to rise a further 51 per cent in 2019 to $1.64 billion - a cost that is passed on to all electricity consumers as a levy included in their energy bill per kWh of energy consumption.

The report estimates that for a residential house using 130kWh of electricity a week, the cost of the SRES in 2019 will total around $71. While an equivalent house with solar providing 50 per cent of its energy consumption will pay around $35 to the scheme.

Demand Manager notes that the SRES is effectively an uncapped scheme, so program costs mirror the increase in national solar installations. And it goes on to equate that businesses are also contributing to household costs - assuming that the total cost of the SRES is passed onto customers – pushing the total cost per Australian household to around $190 during 2019.

SRES forms one part of the Federal Government's Renewable Energy Target (RET) scheme alongside the Large-Scale Renewable Energy Scheme (more here) and rewards homes and businesses that install eligible small-scale power generators such as solar panels and small-scale wind or hydro systems.

The RET creates a floating-price market where certificates are currency: Under the RET, liable entities (large purchasers of electricity such as energy retailers and large energy users) must purchase a percentage of their electricity from renewable sources each year, which is administered by the CER.

SRES achieves this by legislating demand for Small-scale Technology Certificates (STCs). The number of certificates to be purchased each year is set by the Small Technology Percentage, which creates demand for STCs. The 2018 percentage was set at 17.08 per cent – this means around 29.3 million of STCs are required to be surrendered by retailers nationally.

The CER adjusts retailers' SRES liability each year with the objective of achieving a fairly stable price of about $40 per certificate. STCs can be purchased through the Clean Energy Regulator's Clearing House at $40, or in the secondary market at a lower price. Liable entities that fail to surrender all their STCs for any quarter of an assessment year will receive a shortfall charge.

Assuming that there are no changes to the SRES, Demand Manager anticipates the pace of solar installations will continue in 2019, with the estimated surrender target to be around 44.3 million certificates. It estimates that the primary drivers of solar next year will be:

- The cost of solar continuing to fall, relative to the SRES rebate
- The increasing adoption of solar on commercial buildings
- The Victorian Government's Solar Homes Program.

Battery installations with rooftop solar

Table 1 shows the continued growth of home battery installations with rooftop solar PV. There was an addition of 1,570 new installations in the third quarter of 2018, with all jurisdictions experiencing positive growth.

Table 1: Number of solar with concurrent battery installation in Q1, Q2 – 2018 versus Q1, Q2, Q3 - 2018

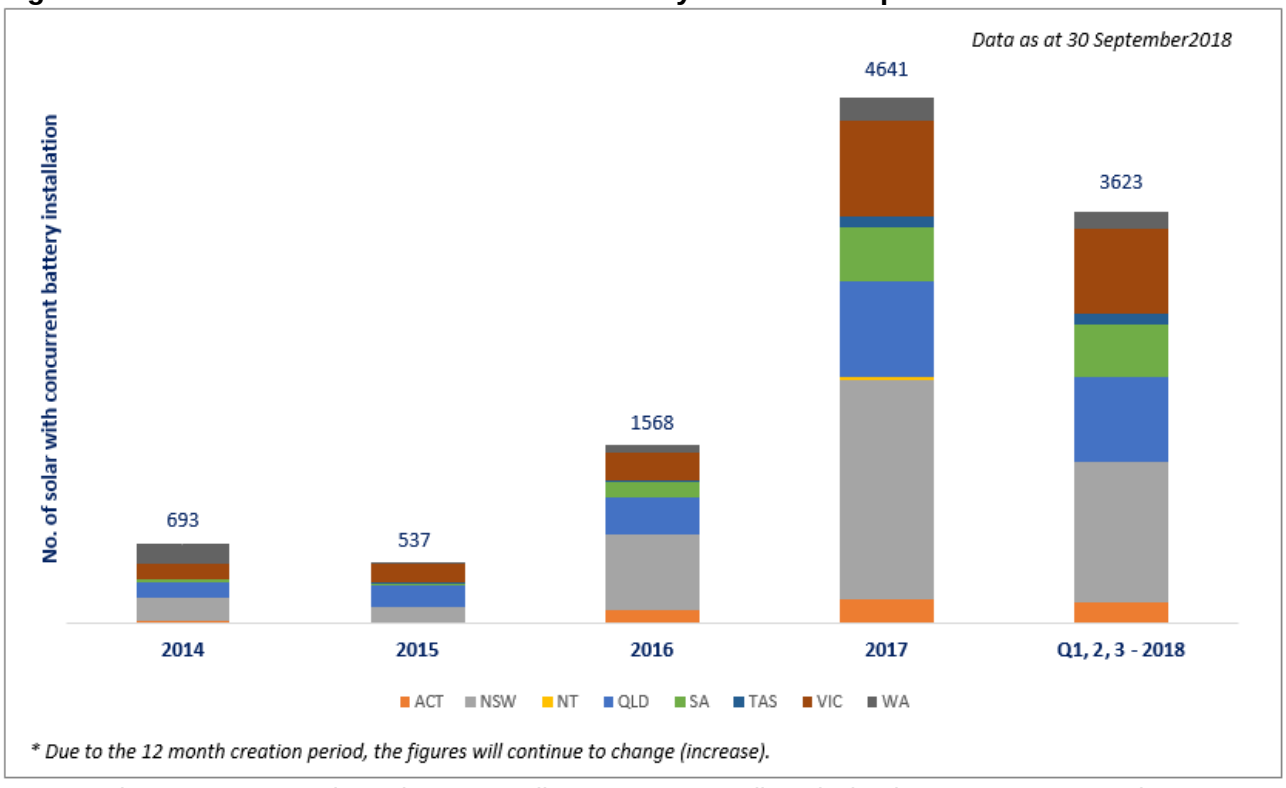
Data as of (year 2018 only)	ACT	NSW	NT	QLD	SA	TAS	VIC	WA	Total
30-Jun-18	120	697	1	423	247	63	415	87	2,053
30-Sep-18	181	1,234	3	746	465	101	750	143	3,623

Source: Clean Energy Regulator data, Australian Energy Council analysis, data as at 30 September 2018

New South Wales continues to lead the way with its market share increasing to 37.8 per cent of total battery storage installations in Australia, compared to 34 per cent in the last quarter. Queensland and Victoria are second and third respectively, with a combined total of 4,377 installations (39.6 per cent of total installations).

Figure 3 shows that the number of solar with battery installations peaked in 2017 (4641), however 2018 is currently tracking not too far behind with 3,623 installations to date.

Figure 3: Number of solar with concurrent battery installations per state since 2014



Source: Clean Energy Regulator data, Australian Energy Council analysis, data as at 30 September 2018

SECTION II: NEW SOLAR HOMES PROGRAM IN VICTORIA

In September the Victorian Minister for Energy Lily D'Ambrosio, announced the state's new Solar Homes Program. Under the program, the Victorian Government will help households to reduce their electricity bills with either solar panels, solar hot water or solar batteries for 720,000 homes the over the next 10 years[iii]. Solar homeowners can apply for a 50 per cent rebate on the cost of a solar PV system installing on or after 19 August 2018.

The claim can be either up to a maximum of $2,225 on the cost of solar PV system or a maximum of $1,000 rebate for the replacement of hot water systems with solar hot water. Since not all homes can install solar panels due to roof issues or shade, solar hot water systems are also included in the program.

This new rebate is said to save Victorian households, on average, from $160 to $400 a year off their electricity bills, and as such, the uptake of solar panels and solar water heaters specifically in Victoria is expected to spike up in the coming months.

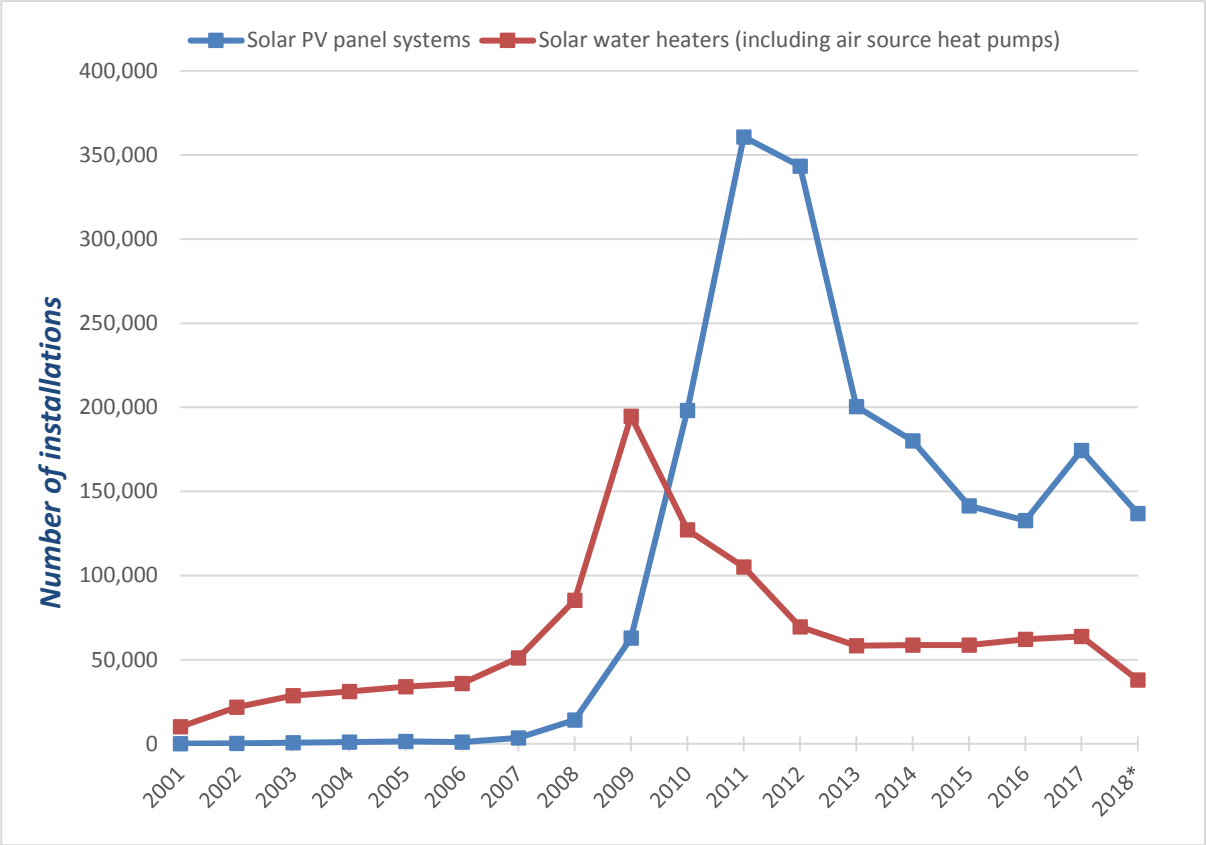
Solar water heater trends

Despite the uptake of solar PV installations across the nation, to date there has not been a corresponding increase in the use of solar water heaters (SWH).

Approximately 64,000 SWH systems were installed across Australia during 2017, taking the number of total installations to almost 1.1 million units. The increase in installations is due to solar feed-in tariffs (FiTs) for exporting electricity generated from rooftop back to the grid during peak demand periods.

Figure 4 shows that since 2010 the number of installations of solar panels has continued to increase sharply, overtaking SWH installations in Australia. There was a noticeable increase in the use of SWH from 2006 to 2009. The year 2009 saw a peak of 194,695 solar water and heat pump system installations - double compared to the previous year's 85,385 recorded installations. This jump was due to Government rebate programs to assist with the initial purchase cost - The Federal Government offered a rebate up to $1,600 per home for the installation of a PV system or $1,000 rebate for SWH system[iv].

Figure 4: Solar PV and solar water heater uptake in Australia since 2001



Source: Clean Energy Regulator data, Australian Energy Council analysis, data as at 30 September 2018

As shown in figure 5 below, in 2009 New South Wales, Queensland and Victoria had the greatest SWH uptake of the rebate, accounting for roughly 76 per cent of the total installations throughout Australia.

In early November 2009, the rebate dropped to $1,200 for the installation of a system, and Queensland and New South Wales experienced a decrease in SWH installations, dropping from over 122,000 in 2009 to just 12,700 SWH installations in 2017.

Since 2012 no state has had a SWH rebate, except Victoria which currently has three rebates on offer[v] (not including the state's latest introduction of the Solar Rebate Program):

1. Metropolitan Melbourne Solar Hot Water System installs
2. Regional Victoria Solar Hot Water System installs
3. Victorian Energy Saver Incentive (VEET)

Victoria continues to register at least 20,000 new installations of SWH each year, which makes it the leading state of total SWH installations. However, the market share of SWH by state is affected in inverse proportion by natural gas infrastructure. For example, Victoria has a high proportion of gas infrastructure, whereas Queensland has a relatively small gas infrastructure coverage. As such, even

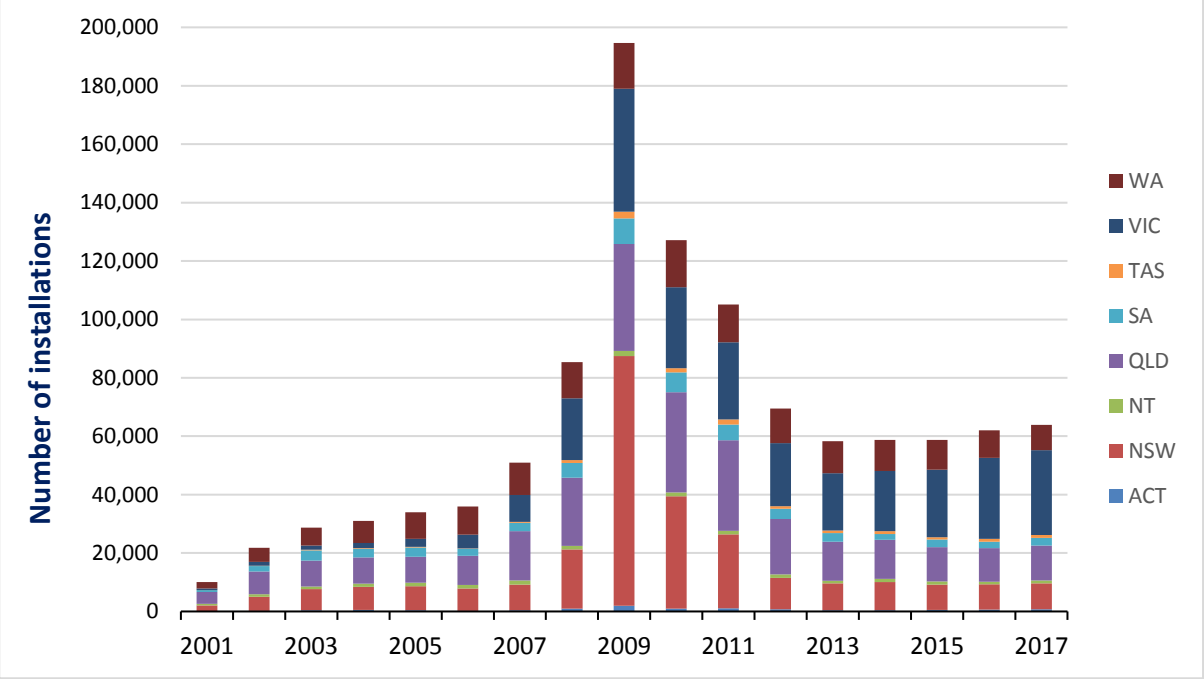
though Victoria has the highest uptake of SWH installation each year, the proportion of households with SWH systems only accounts for roughly 7 per cent, while more than 60 per cent of Queensland householders have solar water systems installed as shown in table 2[vi].

Table 2: Proportion of households with solar hot water systems

		2011	2017
VIC	Number of gas distribution connections	1,834,067	2,045,155
	Total SWH installations	18,413	160,016
	% SWH use in dwellings	**1.00%**	**7.82%**
QLD	Number of gas distribution connections	170,669	198,678
	Total SWH installations	51,149	132,211
	% SWH use in dwellings	**29.97%**	**66.55%**

Source: Clean Energy Regulator data, as at 30 September 2018,
Solar Hot Water & Heat Pump Study, Clean Energy Council, January 2011, page 18
Australian Energy Council analysis of Electricity Gas Australia 2011 and 2017

Figure 5: Solar water heater uptake across jurisdictions since 2001

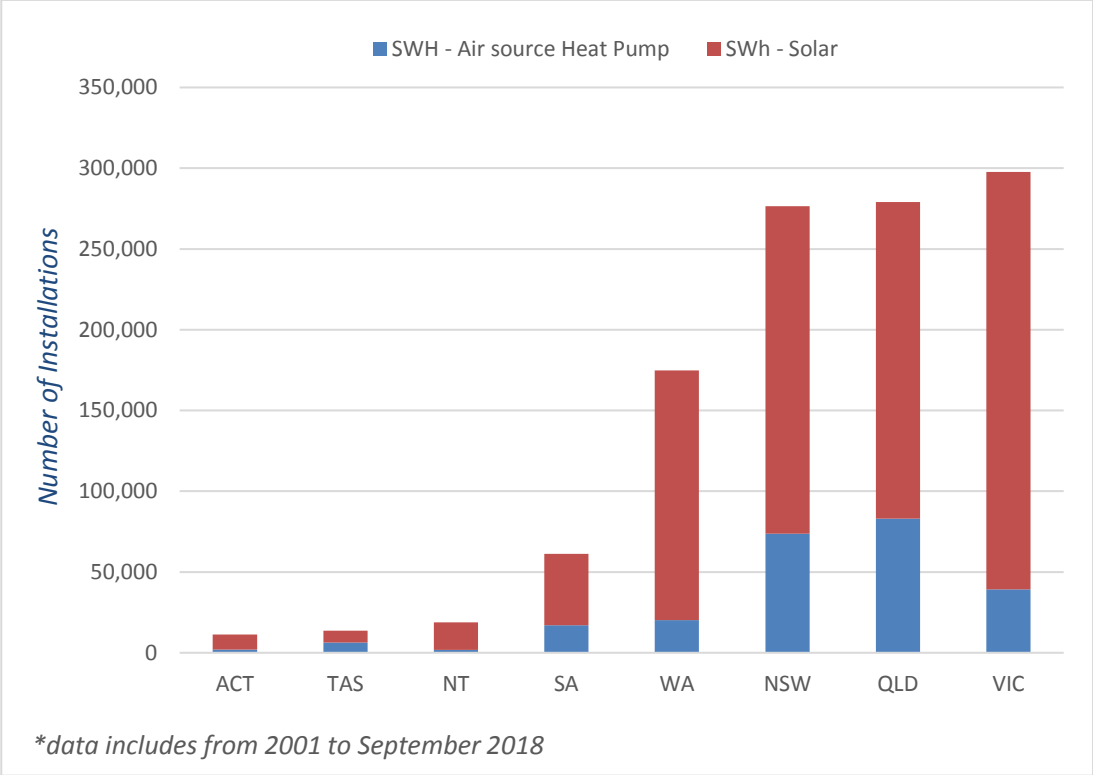


Source: Clean Energy Regulator data, Australian Energy Council analysis, data as at 30 September 2018

SWH can refer to either a stand-alone solar hot water system that captures heat from the roof; or a heat pump, which heats water, using energy from the ambient air. The stand-alone solar system is ideal if households have an unshaded roof, while a heat pump generally draws energy from surrounding air and does not rely on direct sunlight.

Figure 6 shows that SWH with solar has been more favourable than an air source heat pump across all jurisdictions.

Figure 6: Solar water heater uptake across jurisdictions since 2001



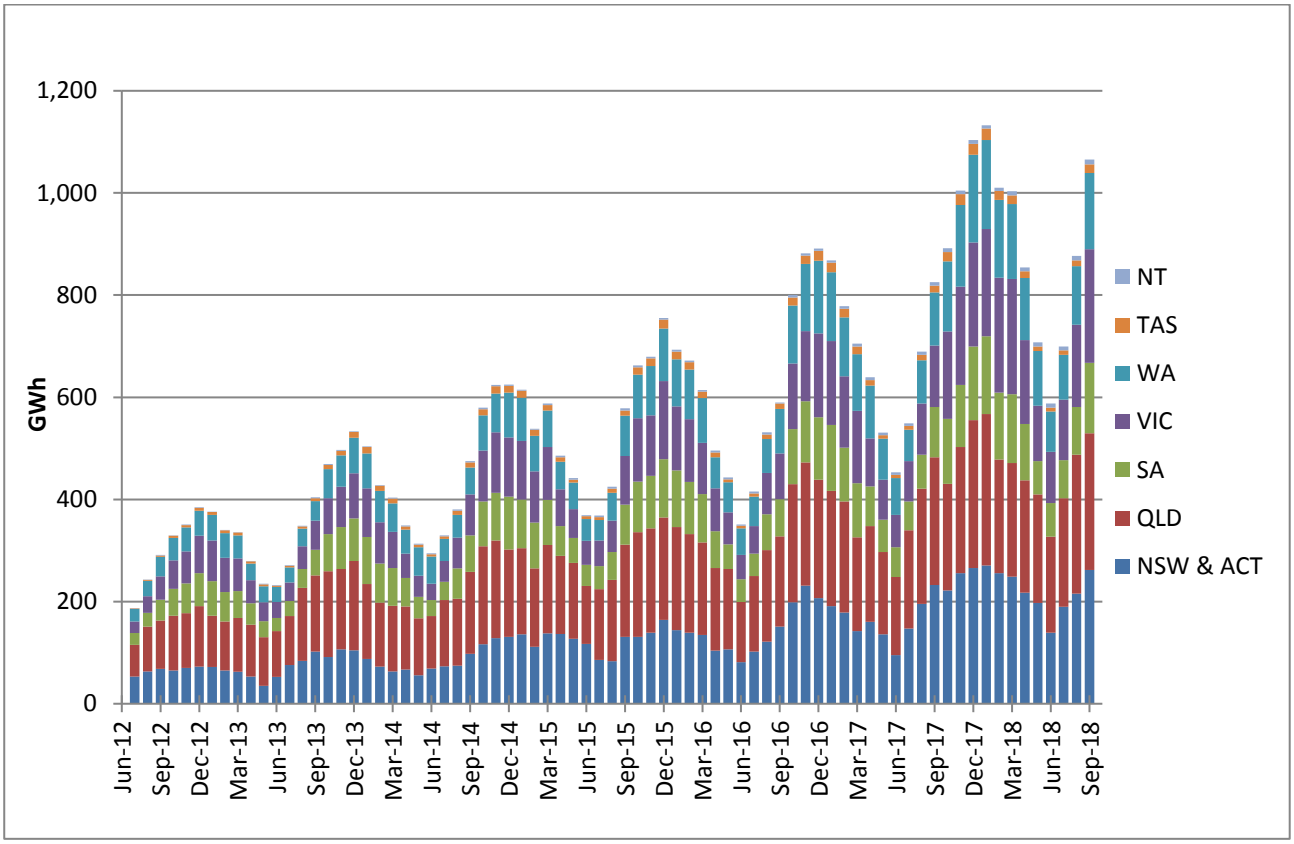
Source: Clean Energy Regulator data, Australian Energy Council analysis, data as at 30 September 2018

It is expected that the rising cost of electricity will continue to attract households to switch to solar hot water, however one study has found that there are a number of barriers to entry for consumer uptake of SWH systems. It states that raising customer awareness of SWH is vital as consumers currently lack knowledge of its benefits and are not aware of its efficient technology. Consumers also often experience issues when considering installing a new system, or maintaining and repairing old SWH systems because maintenance and repair costs can be perceived as high[vii].

SECTION III: ESTIMATED RESIDENTIAL PV GENERATION

PV output is obtained by multiplying the efficiency factor of systems with the estimated capacity (MW) in each state (as described in Section VI of this report). The efficiency factor is calculated from PVoutput where self-selecting solar systems enter data into a database. Due to self-selection, the estimate may have an upward bias as self-selecting clients are more likely to maintain solar systems and therefore have a higher efficiency factor. Sample sizes for the Northern Territory and Tasmania are very small. The CER data may not accurately capture the rooftop PV generating capacity due to systems that have failed, and are no longer generating, or systems that have been upgraded but have not been notified to the CER. All systems which are reported to the CER are assumed to be residential.

Figure 7: Estimated residential PV generation (GWh)



Source: Australian Energy Council analysis (unadjusted data), data as at 30 September 2018

Figure 7 illustrates the seasonal patterns of the estimated total output of solar systems, nationally. PV generation is generally low during cold periods (May to July), while it unsurprisingly reaches a peak during summer each year. Due to the continued strong uptake of solar installations with larger systems being installed, generation from these units also increases proportionally - this means that September 2018 is likely to be higher than the previous summer 2017/18 peak in January (due to a 12-month reporting lag of installed capacity).

SECTION IV: LEVELISED COST OF ENERGY

The Levelised Cost of Energy (LCOE) is the cost of energy per kWh produced. When this is equal to or below the cost consumers pay directly to suppliers for electricity, this is called grid parity. Table 3 shows the LCOE for solar in Australia's major cities, indicative retail prices and current feed-in tariff (FiT) rates. The detailed methodology can be found in the Appendix.

The retail comparison rates are representative variable rates and do not include supply charges. For all capital cities, excluding Perth and Hobart, retail prices are based on the implied usage charges from St Vincent de Paul's tracking of market offers, which was last updated in July 2017. Perth prices are regulated and obtained from Synergy. Hobart prices were obtained from Aurora Energy's Tariff 31, while Darwin prices are obtained from Jacana Energy's regulated residential usage charges. Both Hobart and Darwin see the drop in FiT offering from 8.9 c/kWh to 8.5 c/kWh in Hobart and from 25.7 c/kWh to 23.6 c/kWh in Darwin. Tables 3, 4 and 5 show the LCOE across major cities at different discount rates.

In Victoria a new minimum rate of 9.9 c/kWh was introduced from 1 July 2018. Many retailers in Victoria are still offering the old rate of 11 c/kWh and many have raised their solar FiT, which allows customers to shop around and choose the best deal. In many states, households will benefit from a steep increase in the solar FiT from around 9 c/kWh to up to 23 c/kWh for their exports fed back to the grid.

The tables on the next page use the highest offer of the lower range of FiTs among retailers in different states. For example, in Canberra, Energy Locals is one of the four retailers offering FiTs ranging from 9 c/kWh to 16 c/kWh for consumers exporting back to the grid. Energy Locals has the best lowest FiT offer, in other words, other retailers offer lower than 9 c/kWh. This however does not mean it is the best deal of FiT, other retailers in Canberra are offering up to 20 c/kWh for their maximum FiT. This FiT rate is offered depending on household consumption and exporting rates.

Table 3: Central estimate: 6.22 per cent discount rate (ten-year average mortgage rate)

All figures in $/KWh	System Size						Retail prices	FIT
	2.0 kW	3.0 kW	4.0 kW	5.0 kW	7.0 kW	10.0 kW		
Adelaide	$0.14	$0.12	$0.11	$0.10	$0.10	$0.12	$0.48	$0.16
Brisbane	$0.15	$0.13	$0.12	$0.11	$0.11	$0.12	$0.31	$0.16
Canberra	$0.13	$0.11	$0.10	$0.09	$0.10	$0.13	$0.23	$0.09
Darwin	$0.24	$0.20	$0.18	-	$0.15	$0.12	$0.26	$0.07
Hobart	$0.19	$0.16	$0.15	$0.14	$0.15	$0.16	$0.26	$0.09
Melbourne	$0.18	$0.14	$0.13	$0.12	$0.13	$0.14	$0.29	$0.12
Sydney	$0.15	$0.13	$0.12	$0.11	$0.11	$0.13	$0.27	$0.24
Perth	$0.12	$0.10	$0.09	$0.09	$0.09	$0.12	$0.28	$0.13

* In Darwin, there is no 5kW pricing as installers prefer to list pricing for 4.5kW systems and as there are additional hurdles for connecting solar systems above that size to the grid.
Source: Australian Energy Council analysis, September 2018

Table 4: Low cost of capital sensitivity: 5.27 per cent discount rate (low current standard variable rate)

All figures in $/KWh	System Size						Retail prices	FIT
	2.0 kW	3.0 kW	4.0 kW	5.0 kW	7.0 kW	10.0 kW		
Adelaide	$0.13	$0.11	$0.10	$0.10	$0.10	$0.11	$0.48	$0.16
Brisbane	$0.14	$0.12	$0.11	$0.10	$0.10	$0.12	$0.31	$0.16
Canberra	$0.13	$0.10	$0.09	$0.09	$0.09	$0.12	$0.23	$0.09
Darwin	$0.23	$0.19	$0.17	-	$0.15	$0.12	$0.26	$0.07
Hobart	$0.18	$0.15	$0.15	$0.14	$0.14	$0.16	$0.26	$0.09
Melbourne	$0.17	$0.14	$0.12	$0.12	$0.13	$0.14	$0.29	$0.12
Sydney	$0.15	$0.12	$0.11	$0.10	$0.11	$0.12	$0.27	$0.24
Perth	$0.11	$0.10	$0.09	$0.08	$0.09	$0.11	$0.28	$0.13

Source: Australian Energy Council analysis, September 2018

Table 5: High cost of capital sensitivity: 13.56 per cent discount rate (indicative personal loan rate)

All figures in $/KWh	System Size						Retail prices	FIT
	2.0 kW	3.0 kW	4.0 kW	5.0 kW	7.0 kW	10.0 kW		
Adelaide	$0.19	$0.16	$0.14	$0.13	$0.13	$0.16	$0.48	$0.16
Brisbane	$0.21	$0.17	$0.16	$0.14	$0.15	$0.16	$0.31	$0.16
Canberra	$0.18	$0.14	$0.13	$0.12	$0.13	$0.17	$0.23	$0.09
Darwin	$0.35	$0.29	$0.25	-	$0.22	$0.17	$0.26	$0.07
Hobart	$0.27	$0.22	$0.21	$0.19	$0.20	$0.23	$0.26	$0.09
Melbourne	$0.25	$0.20	$0.17	$0.16	$0.18	$0.20	$0.29	$0.12
Sydney	$0.21	$0.17	$0.15	$0.14	$0.15	$0.17	$0.27	$0.24
Perth	$0.16	$0.13	$0.12	$0.11	$0.12	$0.16	$0.28	$0.13

Source: Australian Energy Council analysis, June 2018

Small and large business - Levelised Cost of Electricity

Tables 6 and 7 show the estimated cost of electricity production for commercial-sized solar systems. As businesses look to reduce overhead costs, installation of large-scale solar panels continue to increase.

Business tariffs differ to residential retail tariffs. Depending on the size of the customer and the amount of energy used, businesses have the ability to negotiate lower prices. If a business was to consume all electricity onsite, the electricity prices in Tables 6 and 7 would represent the cost per kWh of consumption from the energy generated from the different system sizes listed. For businesses, installation occurs if the benefits of installation outweigh the cost. For comparison, the average electricity bill for industrial businesses in 2014-15 was 10.72 c/kWh[viii].

The CER sets out guidelines for the redemption of small-scale certificates. There are two criteria which can exclude a system from receiving STCs: systems cannot exceed 100 kW in capacity or generate more than 250 MWh per year[ix].

Table 6: Central estimate: 7.00 per cent discount rate, ten-year average small business interest rate

All figures in c/KWh	System Size				
	10kW	30kW	50kW	70kW	100kW
Adelaide	$0.12	$0.11	$0.12	$0.11	$0.11
Brisbane	$0.12	$0.11	$0.12	$0.12	$0.11
Canberra	$0.13	$0.11	$0.11	$0.11	$0.11
Hobart	$0.19	$0.16	$0.16	$0.16	$0.16
Melbourne	$0.15	$0.14	$0.14	$0.14	$0.14
Sydney	$0.13	$0.12	$0.13	$0.13	$0.12
Perth	$0.12	$0.11	$0.11	$0.11	$0.11

Source: Australian Energy Council analysis, September 2018

Table 7: Central estimate: 4.94 per cent discount rate, ten-year average large business interest rate

All figures in c/KWh	System Size				
	10kW	30kW	50kW	70kW	100kW
Adelaide	$0.11	$0.10	$0.11	$0.11	$0.10
Brisbane	$0.11	$0.11	$0.11	$0.11	$0.11
Canberra	$0.12	$0.10	$0.10	$0.10	$0.10
Hobart	$0.17	$0.14	$0.15	$0.15	$0.15
Melbourne	$0.14	$0.13	$0.13	$0.13	$0.13
Sydney	$0.12	$0.11	$0.12	$0.12	$0.11
Perth	$0.11	$0.10	$0.10	$0.10	$0.10

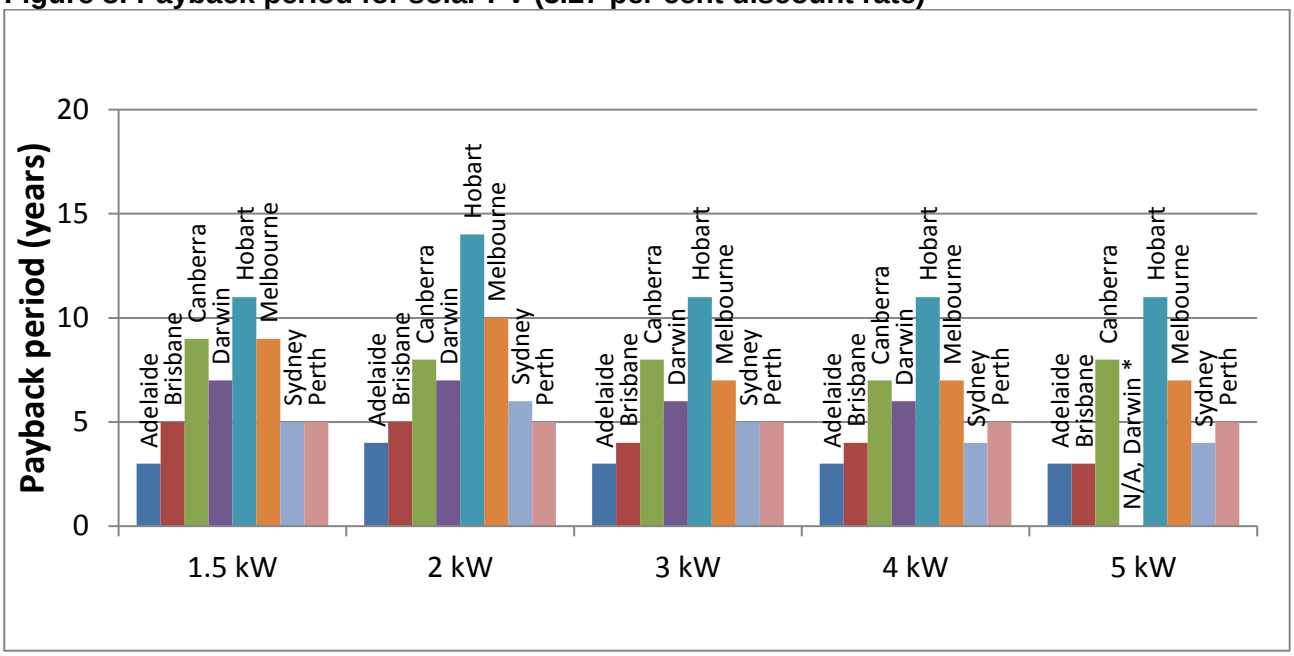
Source: Australian Energy Council analysis, September 2018

SECTION V: PAYBACK PERIOD, DETAILED MODEL

Using a similar methodology to that used to calculate the LCOE of solar PV in Australia (see Section 4), the Australian Energy Council has calculated the payback period for residential solar PV systems. The payback period is defined as the year when the cumulative savings are greater than the cumulative costs of a solar PV system. Savings represent the avoided cost of consumption and any revenue received from FiTs. The cumulative cost incurred represents the initial investment and the time value of money. A detailed methodology is contained in Appendix 2.

Figure 8 highlights the payback period for different system sizes across Australia. Note that electricity prices are increased at consumer price index (CPI) levels (currently 1.9 per cent, last updated September 2018 according to the Reserve Bank of Australia) and any changes to CPI will affect the payback period. Many retailers offer higher solar FiTs, which help to offset the impact of higher prices in some states and deliver savings to customers with solar panels, for example, in Darwin, the offered FiT is 23.6 c/kWh.

Figure 8: Payback period for solar PV (5.27 per cent discount rate)



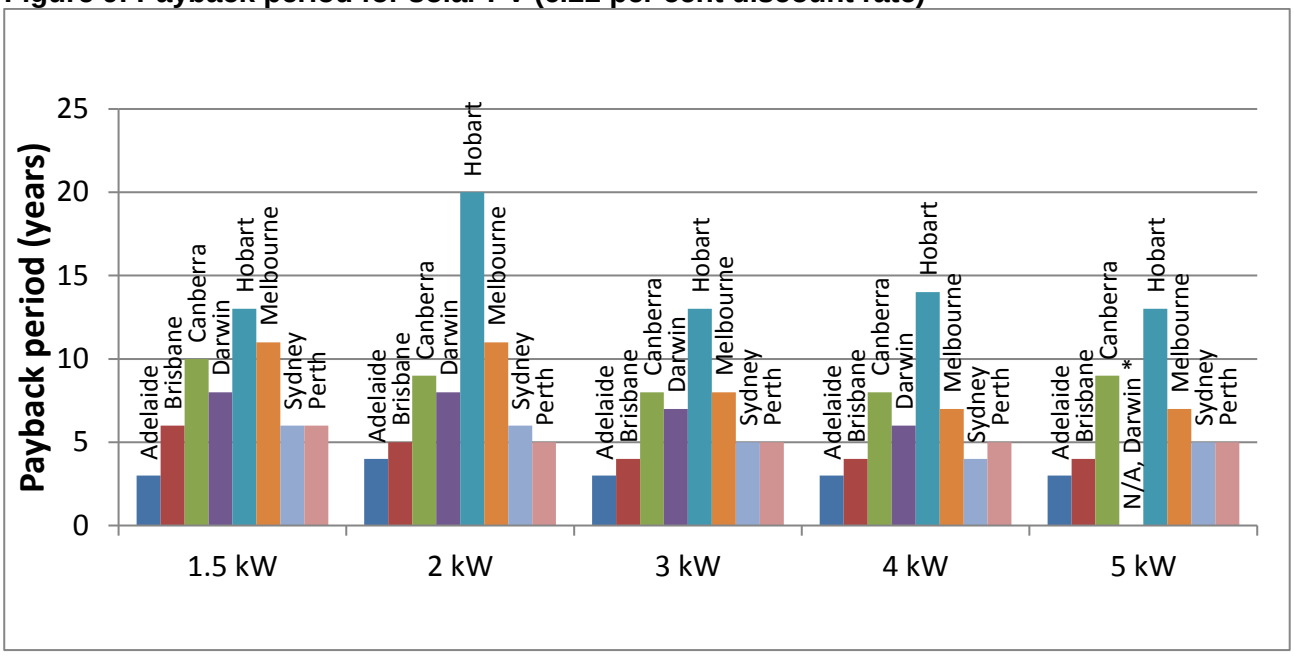
* In Darwin, there is no 5kW pricing as Darwin installers prefer to list pricing for 4.5kW systems instead and as there are additional hurdles for connecting solar systems above that size to the grid.
Source: Australian Energy Council analysis, September 2018

Figure 8 shows that installing a 2 kW system is not ideal with higher payback periods across the states. Even though a bigger system unit will cost more initially, due to the range of FiTs offered from retailers the cost will be recovered faster than a 2 kW system, hence lowering the payback periods

through the credits from the energy export back to the grid. Adelaide is currently experiencing the most consistent lowest payback period of three years for all systems, except the 2 kW system.

Figure 9 shows that the expected payback period for systems with a 6.22 per cent discount rate (10-year average home loan rate).

Figure 9: Payback period for solar PV (6.22 per cent discount rate)



* In Darwin, there is no 5kW pricing as Darwin installers prefer to list pricing for 4.5kW systems instead and as there are additional hurdles for connecting solar systems above that size to the grid.
Source: Australian Energy Council analysis, September 2018

As many residential customers are now considering a larger PV system size, the trends in both figures 8 and 9 show that the bigger the system, the lower the number of years a customer will have to pay back the costs of installation.

SECTION VI: METHODOLOGY APPENDIX

1. Solar installations methodology

Analysis from the Clean Energy Regulator's (CER) monthly released data allows us to estimate the amount of solar PV installed in Australia. Since November 2015, the CER has consistently released data dated as at the first [t] of each month. The new consistent release date allows us to provide a more accurate estimate of the capacity of recent installations. Due to the lag in reporting of new installations, however, the CER data takes up to 12 months to be finalised.

2. Levelised Cost of Electricity Methodology

Introduction

The methodology outlines our approach in calculating the Levelised Cost of Electricity (LCOE) for solar panels installed across capital cities in Australia. Our analysis includes the following:

- Initial investment
- Annual costs
- Discount rate
- Efficiency
- System degradation rate

Initial investment

The initial investment plays a major role in the LCOE calculations. The initial investment represents the cost of buying and installing solar panels all values are inclusive of Federal small-scale technology certificate (STC) discounts.

The initial investments in this report are obtained from the Solar Choice website. Solar Choice takes prices from over 125 installers across Australia and updates pricing data monthly.

Annual costs

We have estimated the annual cost to clean a solar panel at $12.50[x], and the average sized solar panel in our calculations to be 200 W.

Discount rate

The discount rate represents the risk nature of the consumer. For this exercise, three different discount rates have been used and will be updated each quarter. The central estimate is based on the 10-year average home loan, as presented by the Reserve Bank of Australia (6.22 per cent).

The low discount rate sensitivity is based on the minimum variable home loan mortgage rate offered by the Big Four banks (currently 5.27 per cent).

The high discount rate sensitivity is based on personal loans offered by the Big Four banks as the assumption has been made that a personal loan will include all costs including the initial start-up of the loan (13.56 per cent).

Small business and large business discount rates are based on the 10-year average of the variable weighted average rate on credit outstanding. The large business discount rate is 4.94 per cent and the small business discount rate is 7.00 per cent.

The discount rate also takes into account the Consumer Price Index (CPI); this has been given a constant value of 1.9 per cent (according to Australian Bureau of Statistics, September 2018).

Efficiency

The kWh/kWp represents the average daily production of solar panels. The number was obtained from the Clean Energy Council's consumer guide to installing household solar panels[xi]. The efficiency figure represents the average daily output for a 1 kW system.

System degradation rate

The system degradation rate is used to show the reduced output of a system from year to year. Numbers vary from approximately 0.1 per cent to 1 per cent depending on the system. The Australian Energy Council has used 0.5% as a constant degradation rate for all LCOE calculations.

Formula

$$LCOE\ \$/kWh = \frac{Initial\ Investment + \sum_{N=1}^{N} \frac{Annual\ Costs}{(1+Discount\ Rate)^n}}{\sum_{N=1}^{N} \frac{Initial \frac{kWh}{kWp} * (1-System\ Degradation\ Rate)^n}{(1+Discount\ Rate)^n}}$$

Retail comparison rates

St Vincent de Paul tracks market offers on a bi-annual basis. New South Wales, Queensland, South Australia and Victoria implied usage charge of electricity have been obtained from these reports.

A single rate tariff was analysed to calculate the implied usage charge in Victoria, South Australia, New South Wales and the ACT. Tariff 11 in Queensland. Tasmania's usage charge was obtained for Aurora Energy tariff 31 and Synergy the sole retailer in Western Australia was used.

3. Payback period methodology

This methodology outlines our approach in calculating the payback period for solar panels installed across capital cities in Australia. Our analysis includes the following:

- Initial investment
- Discount rate
- Efficiency
- System degradation rate
- Export rate
- Avoided usage cost
- FiT

Initial investment, discount rate, efficiency and system degradation rate are described in appendix 1. Key difference to LCOE calculation is the payback period assumes no annual maintenance cost.

Calculation

Payback period occurs when ∑ savings > ∑ cost

Where:

Savings = (usage cost x $(1+ CPI)^t$ x consumption / 100) + (Export x FiT)

Cost = investment x $(1 + real\ discount\ rate)^t$

t = years

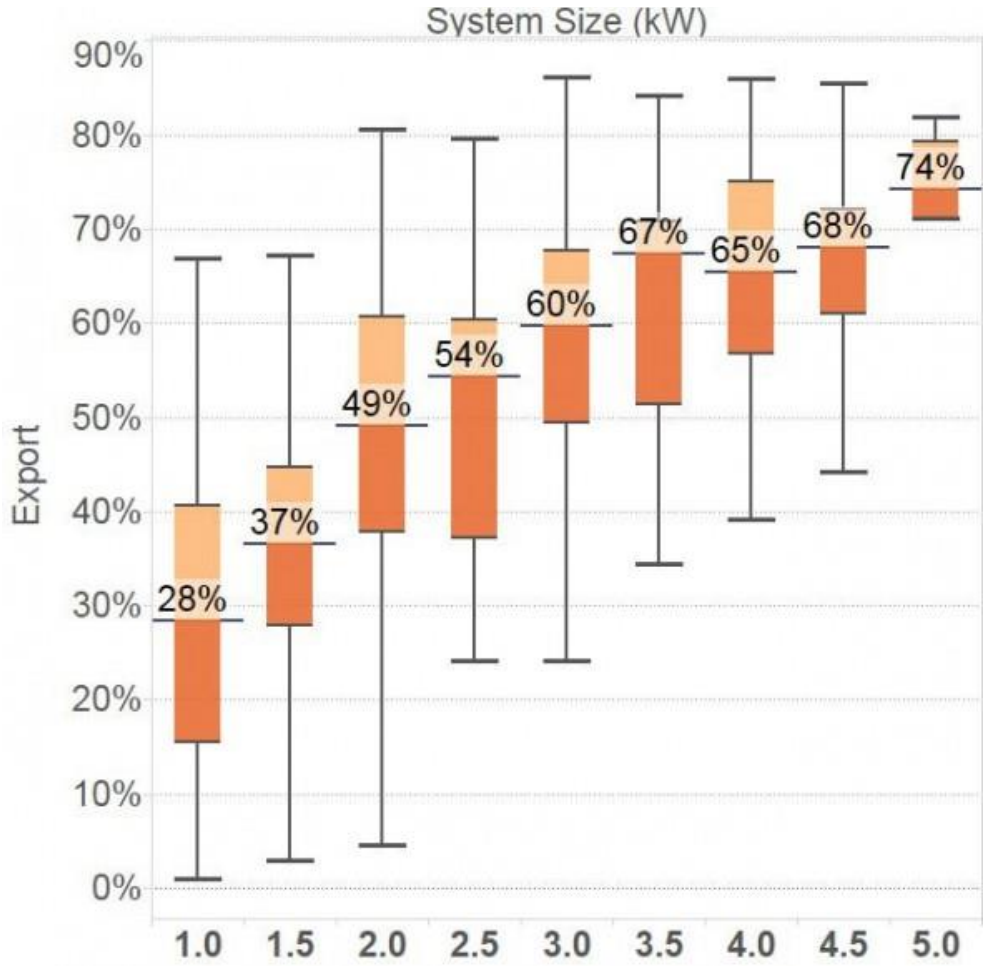
Avoided cost and FiT

The onsite consumption is multiplied by the retailer's usage charges, CPI has been applied to the usage charge to allow for growth in retail prices. The excess energy is exported to the grid and the customer is expected to receive the mandatory FiT or a realistic market offer where mandatory tariffs are not applicable.

Export rate

The percentage of onsite consumption and electricity which is exported to the grid is calculated using the median value from Sunwiz's analysis[xii] (see figure 10)

Figure 10: Export rate of residential solar PV at different system sizes



Source: Sunwiz analysis, 2015

[i] This is based on estimations of capacity, allowing for the lag in reported data

[ii] Demand Manager, Small-Scale Renewable Energy Scheme 2019 Forecast, http://www.demandmanager.com.au/wp-content/uploads/2018/10/Small-Scale-Renewable-Energy-Scheme-2019-Forecast.pdf

[iii] Victorian Government, https://www.premier.vic.gov.au/applications-now-open-for-half-price-solar-panel-rebates/

[iv] ABC, Home insulation rebate slashed, https://www.abc.net.au/news/2009-11-01/home-insulation-rebate-slashed/1124352

[v] Sustainability Victoria, Government Incentives and Rebates, https://www.sustainability.vic.gov.au/You-and-Your-Home/Save-energy/Government-incentives-and-rebates

[vi] Clean Energy Council, Solar Hot Water & Heat Pump Study, January 2011

[vii] ScienceDirect, Solar water heaters uptake in Australia – Issues and barriers, 2018, page 21

[viii] BCA, "Impact of Green Energy Policies on Electricity Prices", June 2014

[ix] Clean Energy Regulator, How to have STCs assigned to you as a Registered Agent, http://ret.cleanenergyregulator.gov.au/For-Industry/Agents/Having-STCs-assigned-to-you/stcs-assigned-to-you

[x] Estimate based on RenewEconomy, 26 August 2013, http://reneweconomy.com.au/2013/hidden-cost-of-rooftop-solar-who-should-pay-for-maintenance-99200

[xi] Clean Energy Council, http://www.solaraccreditation.com.au/dam/cec-solar-accreditation-shared/guides/Guide-to-installing-solar-PV-for-households.pdf

[xii] Sunwiz, Solar Pays Its Way on Networks. Last accessed 17 June 2015.