AUSTRALIAN ENERGY COUNCIL

SOLAR REPORT

QUARTER 3, 2021

Australian Energy Council

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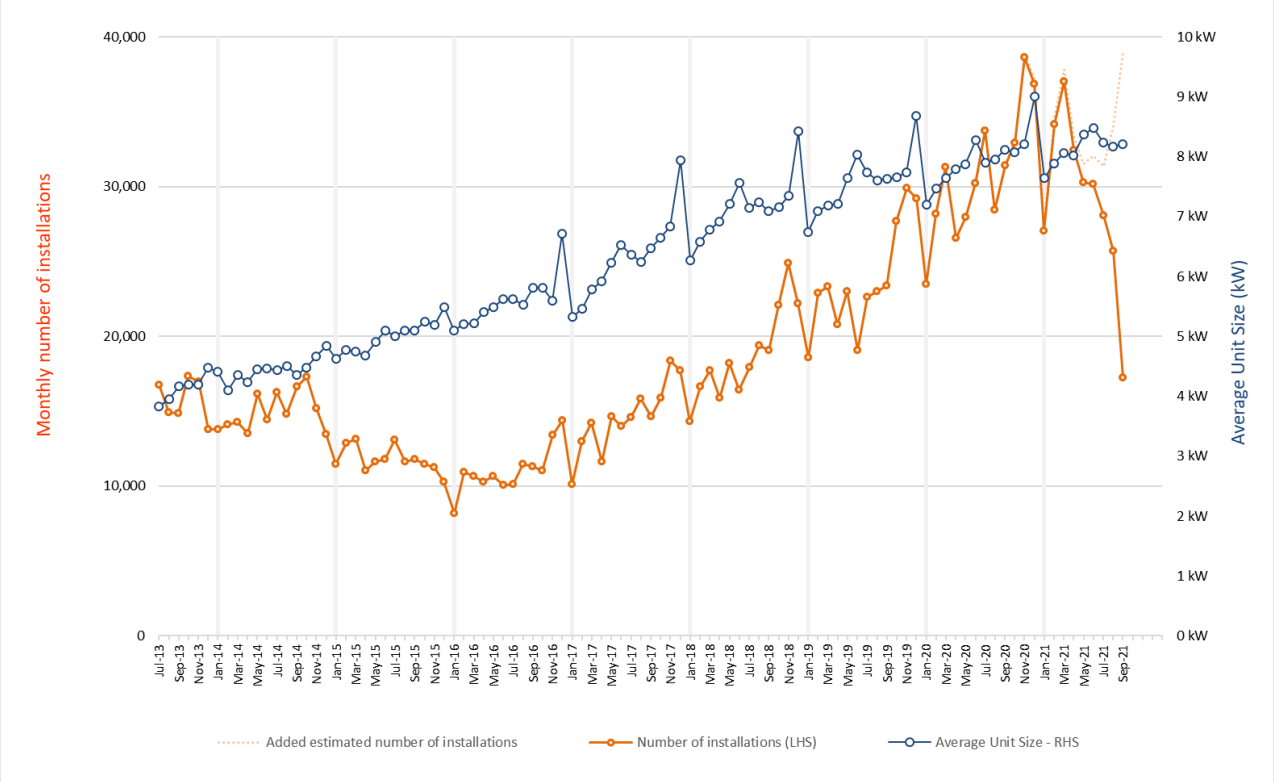
SECTION I: STATE OF SOLAR IN AUSTRALIA

As of 30 September 2021, the total installed capacity of rooftop solar PV in Australia is close to exceeding 15.4 GW, representing more than 2.96 million installations (according to latest data from the Clean Energy Regulator (CER) – 4 November 2021).

It is expected that rooftop solar will contribute 7 per cent of the energy going into the national electricity grid and will help to reduce Australia's emissions by over 17.7 million tonnes in 2021.

Figure 1 shows the number of monthly installations with the average monthly system size installed across Australia. It is estimated there were 71,000 new installations in the third quarter, but due to the 12-month lag in reporting[i], it is anticipated that the final number of new installations for the quarter will increase to around 104,000 small-scale solar PV systems, with a total capacity of 871 MW. This is an 11.4 per cent increase in installations, and a 16.5 per cent rise in total capacity compared to the same period last year.

Figure 1: Monthly installations and average system size July 2013 – September 2021

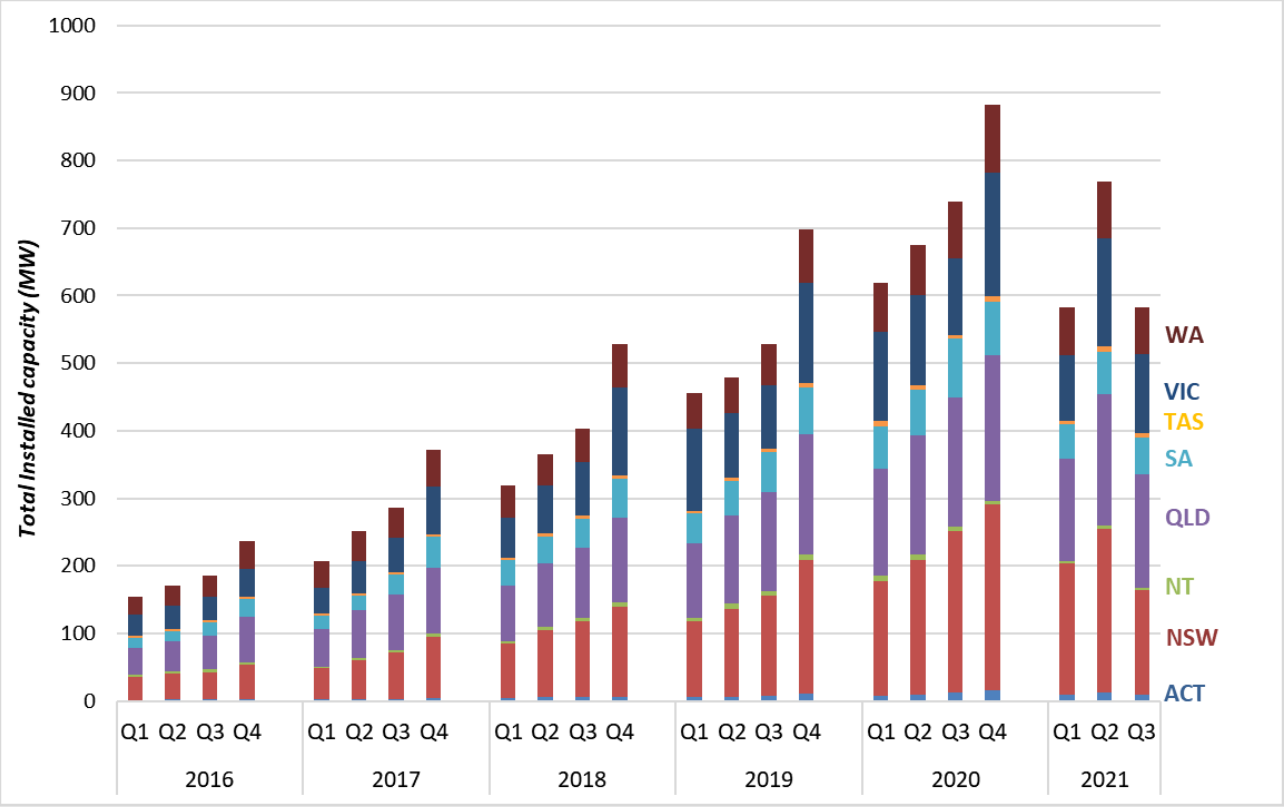


Source: Australian Energy Council analysis, Nov 2021

COVID-19 restrictions in some jurisdictions did have some impact on installations during the quarter and we take a closer look in Section II of this report.

Figure 2 shows the total installed solar rooftop PV capacity by quarter. National Electricity Market (NEM) regions accounted for 88 per cent of total capacity in the third quarter of 2021, while New South Wales and Queensland accounted for 55 per cent of the nation's total quarterly installed capacity.

Figure 2: Quarterly rooftop PV installed capacity by states (unadjusted data)



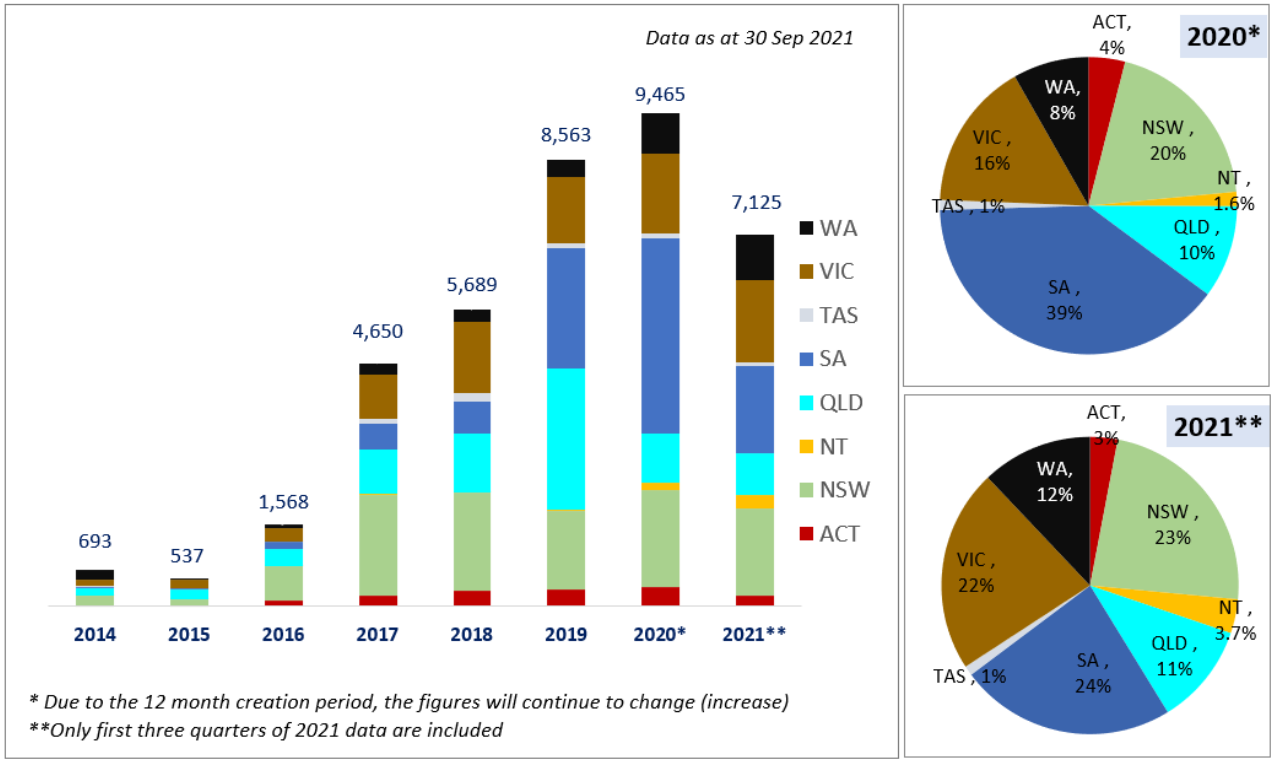
Source: Clean Energy Regulator data, Australian Energy Council analysis, data as of 4 Nov 2021
Note: The most recent three months in figure 3 underestimates the data because of a time lag in collation of the data.[1]

Battery installations with rooftop solar

[1] Solar PV system owners have up to 12 months to report their data to the Clean Energy Regulator.,

Since the previous Solar Report there have been no updates on State Government schemes or rebates regarding battery storage installation with solar systems.

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



Source: Clean Energy Regulator data, Australian Energy Council analysis, data as of 4 Nov 2021

Schemes and rebates remain as:

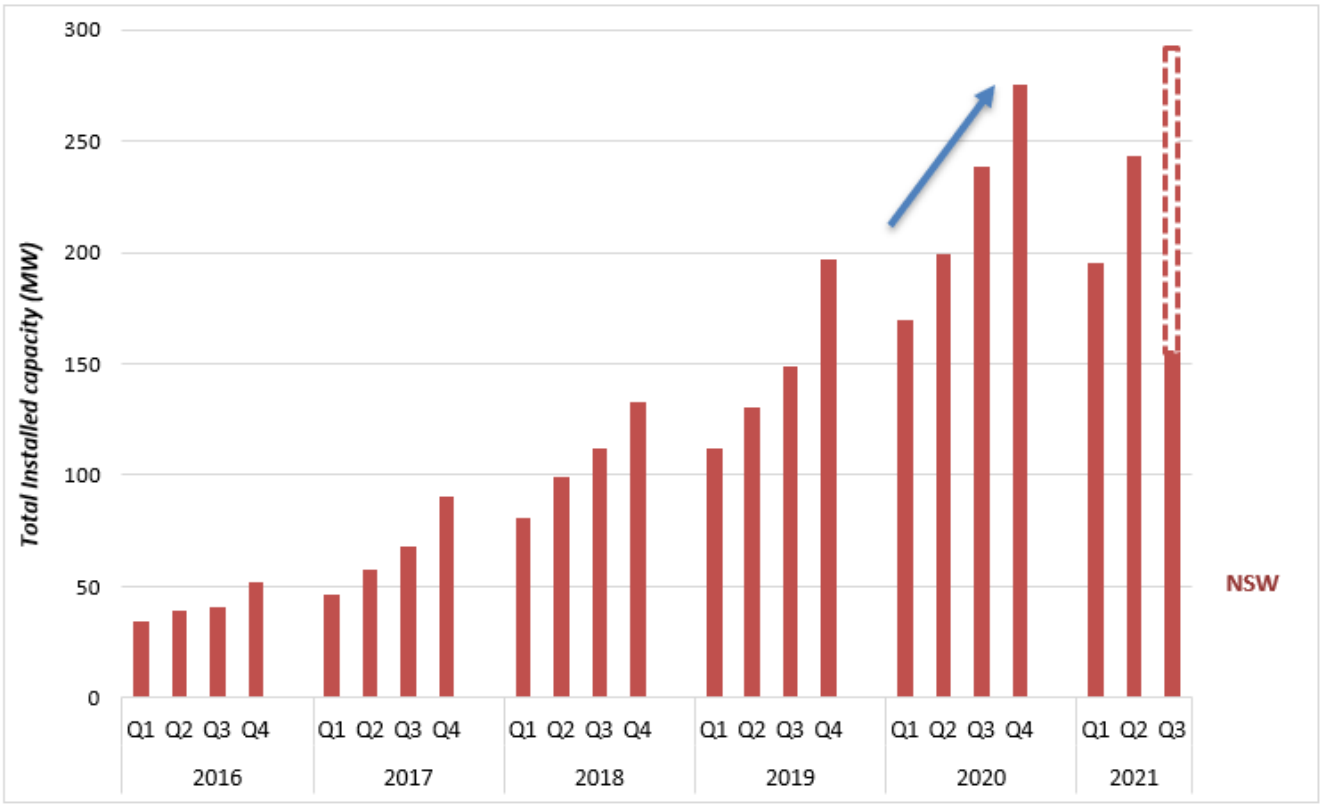
- New South Wales: The Empowering Homes Program which will support installation for up to 300,000 households across the state with zero interest loans to purchase solar and battery systems[ii]. At the end of February 2020, this program was extended to allow residents in the Hunter region.
- Victoria: The Solar Homes Program offers a rebate of up to $3,500 for a solar-battery system in 2020-21 and a rebate of up to $1,400 for residential properties installing solar PV[iii].
- South Australia: The state's Home Battery Scheme has decreased its grant of up to $3,000 for a home solar battery, starting 15 September 2020 [iv]. This subsidy cap is expected to reduce over time due to increasing competition in the market along with the continued cost reductions of home battery systems.

SECTION II: IMPACTS OF COVID-19 ON SOLAR INSTALLATIONS

It has been a complicated year for most industries and markets due to the impacts of the COVID-19 pandemic, and Australia's rooftop solar PV industry also felt the effects during the third quarter of 2021. Across all states, installed capacity dropped by around 20 per cent, when compared to the previous corresponding quarter of 2020.

Data for the third quarter of 2021 highlights the impacts of COVID-19 lockdowns especially in New South Wales, where there was some loss of momentum for solar PV installations. The number of installations in this quarter were lower than the same quarter last year (see table 1). The CER's estimations show New South Wales did not achieve its expected growth trend during the third quarter; with the state adding 100MW – 150MW of capacity rather than almost 300MW that had been estimated. The dotted bar in figure 4 highlights the CER's original estimate based on the previous quarter, as well as the same corresponding quarter last year.

Figure 4: Quarterly rooftop PV installed capacity in NSW (unadjusted data)



Source: Clean Energy Regulator data, Australian Energy Council analysis, data as of 4 Nov 2021

Table 1 shows that Queensland led the way with highest number of installations, with more than 19,129 with a capacity of 168MW added to household rooftops during the third quarter. This accounts

for 27 per cent and 29 per cent of Australia's total installation numbers and installed capacity, respectively.

Table 1: Total rooftop solar PV installations in the 3rd quarter in 2020 and 2021 (rank: from highest to lowest)

Number of rooftop solar PV installations	Q3 2021*	Q3 2020	% Quarter on quarter
QLD	19,129	23,481	81%
NSW	18,704	29,613	63%
VIC	14,833	14,291	104%
WA	9,878	12,568	79%
SA	6,293	10,576	60%
ACT	1,027	1,610	64%
TAS	848	775	109%
NT	317	736	43%

Source: Clean Energy Regulator data, Australian Energy Council analysis, data as of 4 Nov 2021
Note: A 12-month creation period for STCs applies under the Renewable Energy (Electricity) Act 2000, so the figures will continue to rise throughout this year.

While there was a 20 per cent drop recorded during the third quarter of 2021, when looking at the national yearly data, COVID-19 lockdowns in New South Wales, Victoria and the ACT show little impact on the nation's overall rooftop solar installations - with a total of 2.3 gigawatts installed as at the end of September.

With jurisdictions transitioning out of lockdowns, the CER also expects installations to again gather pace; the regulator anticipates a new annual capacity record of around 3.2 gigawatts for the full year (the current 3-gigawatt record was set in 2020) with over 400,000 solar systems expected to be installed.

Solar uptake by postcode

The falling costs of renewables, increased working from home arrangements, and a shift in household spending to home improvements during the COVID-19 pandemic have played a key role in the increase of rooftop solar PV systems under the small renewable energy scheme (SRES).

It is not surprising the top installation states (Queensland, Victoria, Western Australia) also rank in the top Australian postcodes for the highest number of rooftop PV installations during the third quarter of 2021 (figure 5).

Figure 5: Number of installations and installed capacity by the top 10 suburbs, Q3 2021

Source: Clean Energy Regulator data, Australian Energy Council analysis, data as of 4 Nov 2021

Four **Victorian postcodes** ranked in the top 10 during the third quarter. The Victorian postcodes 3029 (Hopper Crossing, Tarneit, Truganina) and 3064 (Donnybrook) have held the top two ranks for the past two years.

Queensland postcodes 4300, 4121, 4209 and 4740 made to the top 10 list, with nearly 1,658 systems installed and 13.8MW connected to the grid in those areas.

Western Australia took over positions 8 and 9, with the areas installing 752 units with a capacity of around 5MW.

With the Census 2021 data due to be released next year, further analysis on the solar penetration levels of dwellings by postcodes will continue to be of interest.

SECTION III: LEVELISED COST OF ENERGY

The Levelised Cost of Energy (LCOE) is the cost of energy per kilowatt hour (kWh) produced. When this is equal to or below the cost consumers pay directly to suppliers for electricity, this is called grid parity. Table 1 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 2021. 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. Tables 1, 2 and 3 show the LCOE across major cities at different discount rates.

Table 2: Central estimate: 5.28 per cent discount rate (ten-year average mortgage rate)

All figures in $/KWh	System Size						Retail prices	FIT
	3 kW	4 kW	5 kW	6 kW	7 kW	10 kW		
Adelaide	$0.10	$0.10	$0.09	$0.09	$0.09	$0.09	$0.31	$0.15
Brisbane	$0.11	$0.10	$0.09	$0.09	$0.09	$0.09	$0.22	$0.15
Canberra	$0.10	$0.09	$0.09	$0.08	$0.09	$0.08	$0.23	$0.11
Darwin	$0.14	$0.13	$0.12	$0.12	$0.11	$0.11	$0.26	$0.24
Hobart	$0.15	$0.14	$0.13	$0.12	$0.12	$0.12	$0.27	$0.09
Melbourne	$0.13	$0.11	$0.11	$0.10	$0.10	$0.10	$0.22	$0.10
Sydney	$0.12	$0.10	$0.10	$0.10	$0.09	$0.09	$0.21	$0.15
Perth	$0.09	$0.08	$0.08	$0.08	$0.08	$0.09	$0.29	$0.07

Source: Australian Energy Council analysis, Nov 2021

Table 3: Low cost of capital sensitivity: 3.45 per cent discount rate (low current standard variable rate)

All figures in $/KWh	System Size						Retail prices	FIT
	3 kW	4 kW	5 kW	6 kW	7 kW	10 kW		
Adelaide	$0.10	$0.09	$0.08	$0.08	$0.08	$0.08	$0.31	$0.15
Brisbane	$0.10	$0.09	$0.09	$0.08	$0.09	$0.08	$0.22	$0.15
Canberra	$0.09	$0.09	$0.08	$0.08	$0.08	$0.08	$0.23	$0.11
Darwin	$0.13	$0.12	$0.11	$0.11	$0.10	$0.10	$0.26	$0.24
Hobart	$0.14	$0.13	$0.12	$0.11	$0.11	$0.11	$0.27	$0.09
Melbourne	$0.12	$0.11	$0.10	$0.09	$0.09	$0.09	$0.22	$0.10
Sydney	$0.11	$0.10	$0.09	$0.09	$0.09	$0.08	$0.21	$0.15
Perth	$0.08	$0.08	$0.07	$0.07	$0.08	$0.08	$0.29	$0.07

Source: Australian Energy Council analysis, Nov 2021

Table 4: High cost of capital sensitivity: 9.88 per cent discount rate (indicative personal loan rate)

All figures in $/KWh	System Size						Retail prices	FIT
	3 kW	4 kW	5 kW	6 kW	7 kW	10 kW		
Adelaide	$0.13	$0.12	$0.11	$0.10	$0.10	$0.10	$0.31	$0.15
Brisbane	$0.14	$0.12	$0.11	$0.10	$0.11	$0.11	$0.22	$0.15
Canberra	$0.12	$0.11	$0.10	$0.10	$0.10	$0.09	$0.23	$0.11
Darwin	$0.17	$0.16	$0.15	$0.14	$0.14	$0.13	$0.26	$0.24
Hobart	$0.19	$0.17	$0.16	$0.15	$0.14	$0.14	$0.27	$0.09
Melbourne	$0.16	$0.14	$0.13	$0.12	$0.12	$0.12	$0.22	$0.10
Sydney	$0.14	$0.13	$0.11	$0.11	$0.11	$0.11	$0.21	$0.15
Perth	$0.11	$0.10	$0.09	$0.09	$0.10	$0.10	$0.29	$0.07

Source: Australian Energy Council analysis, Nov 2021

Small and Large business - Levelised Cost of Electricity

Tables 5 and 6 show the estimated cost of electricity production for commercial-sized solar systems. As businesses look to reduce overhead costs, the installation of larger-scale solar systems continues 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 4 and 5 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. The average electricity bill for industrial businesses in 2014-15 was 10.72 c/kWh[v].

Table 5: Central estimate: 4.85 per cent discount rate, ten-year average small business interest rate

All figures in $/KWh	System Size				
	10kW	30kW	50kW	70kW	100kW
Adelaide	$0.11	$0.10	$0.10	$0.10	$0.10
Brisbane	$0.11	$0.10	$0.10	$0.10	$0.09
Canberra	$0.10	$0.10	$0.10	$0.10	$0.10
Hobart	$0.14	$0.13	$0.13	$0.12	$0.11
Melbourne	$0.13	$0.12	$0.12	$0.12	$0.11
Sydney	$0.12	$0.10	$0.11	$0.11	$0.10
Perth	$0.11	$0.10	$0.11	$0.10	$0.09

Source: Australian Energy Council analysis, Nov 2021

Table 6: Central estimate: 4.77 per cent discount rate, ten-year average large business interest rate

All figures in $/KWh	System Size				
	10kW	30kW	50kW	70kW	100kW
Adelaide	$0.10	$0.10	$0.10	$0.10	$0.10
Brisbane	$0.11	$0.10	$0.10	$0.10	$0.09
Canberra	$0.10	$0.10	$0.10	$0.10	$0.10
Hobart	$0.14	$0.12	$0.13	$0.12	$0.11
Melbourne	$0.13	$0.12	$0.12	$0.11	$0.11
Sydney	$0.12	$0.10	$0.11	$0.11	$0.10
Perth	$0.11	$0.10	$0.11	$0.10	$0.09

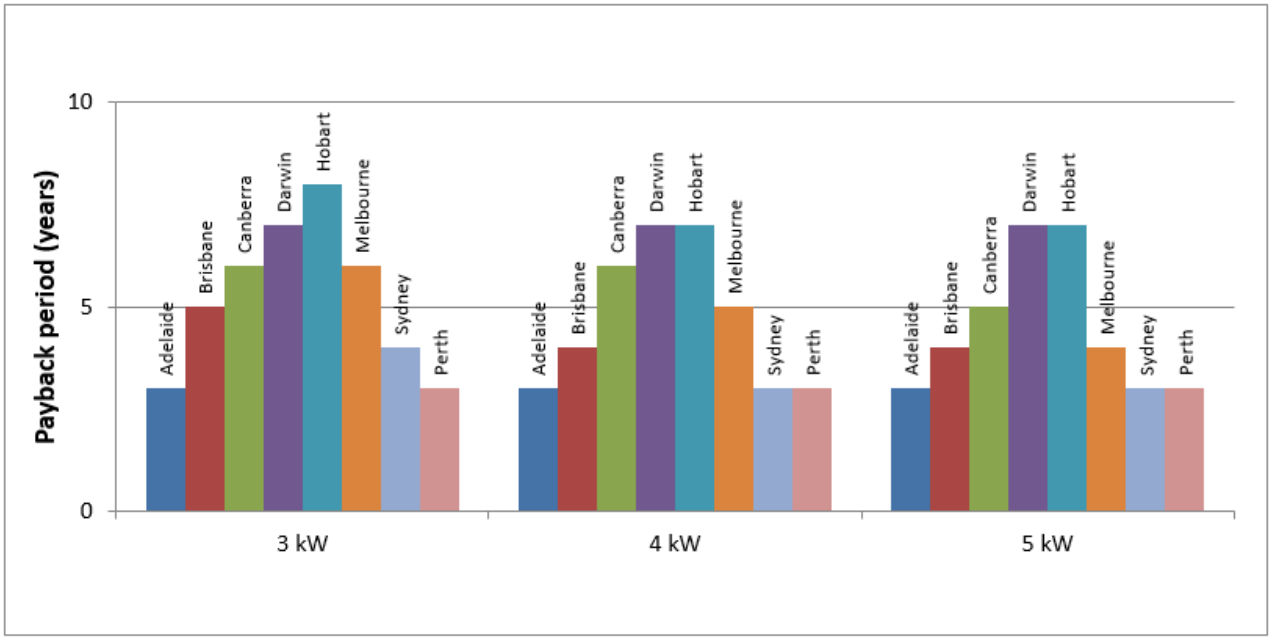
Source: Australian Energy Council analysis, Nov 2021

SECTION IV: PAYBACK PERIOD, DETAILED MODEL

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 5 highlights the payback period for different system sizes across Australia. Note that electricity prices are subject to change with consumer price index (CPI) levels and therefore 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. The low payback periods across many cities further highlights the greater encouragement for customers to install solar PV.

Figure 5: Payback period for solar PV (3.45 per cent discount rate)

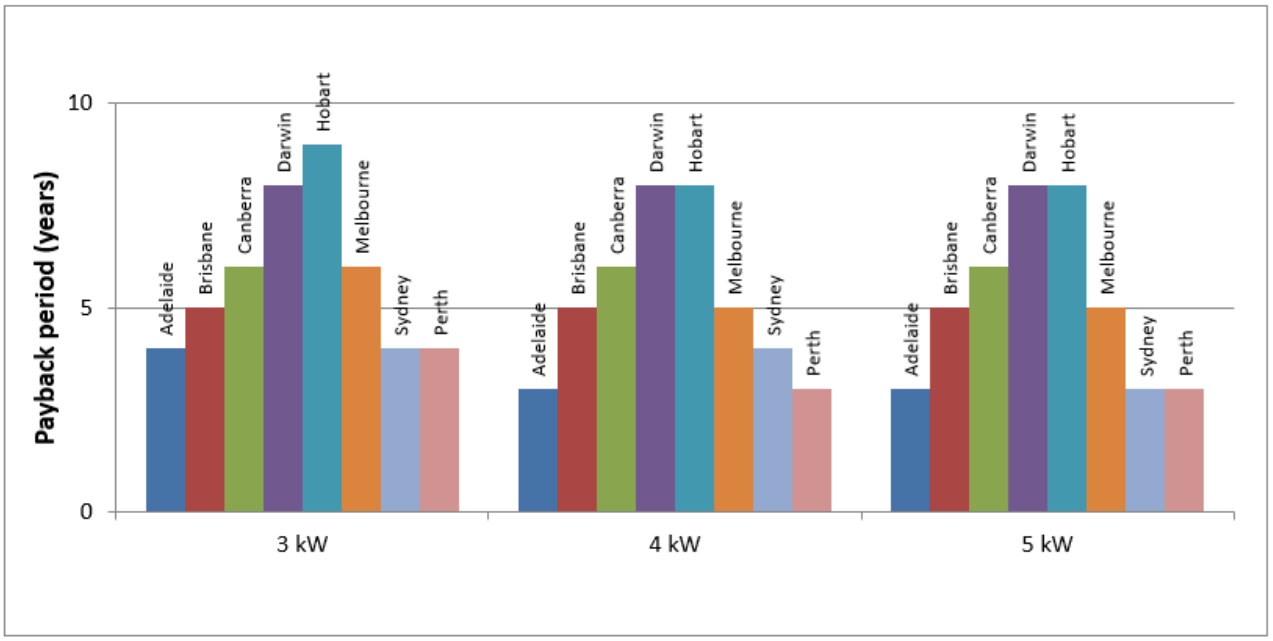


Source: Australian Energy Council analysis, Nov 2021

Comparing to the previous quarter, the price of solar system sizes has no changes in Darwin and Hobart. The two states have the highest cost of installations, resulting in the highest payback period of more than 10 years with a 3kW, 4kW and 5kW system. Meanwhile, in NSW, the system price has increased $370 for a 3kW PV system, $210 for a 4kW system, $170 for a 5kW system compares to a quarter ago. Other states see relatively stable system prices. Melbourne sees a strong encouragement to install a 5kW system rather than a 3kW or 4kW unit size. This can reduce the payback time by two years for a 5kW system compares to a 3kW system.

Similarly, figure 6 shows the expected payback period for systems with a 5.28 per cent discount rate (10-year average home loan rate). Adelaide, Brisbane, Sydney and Perth see no changes in payback periods with a higher interest rate.

Figure 6: Payback period for solar PV (5.28 per cent discount rate)



Source: Australian Energy Council analysis, Nov 2021

SECTION V: METHODOLOGY APPENDIX

1. Solar installations methodology

Analysis from the CER's monthly 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 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. 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 $\sum$ savings > $\sum$ cost

Where:

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

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

t = years

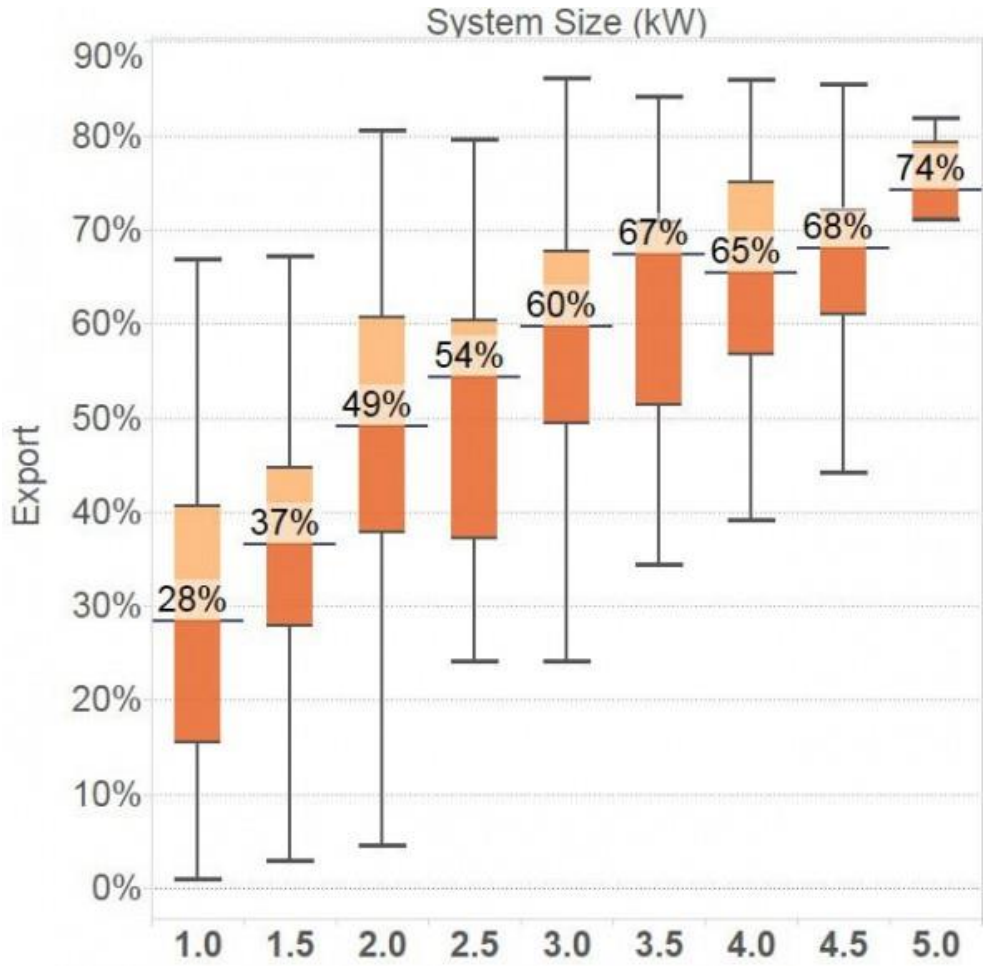
Avoided cost and FiT

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[vi]. See Figure 11 below.

Figure 11: Export rate of residential solar PV at different system sizes



Source: Sunwiz analysis, 2015

[i] The most recent three months underestimates the data because of a time lag in collation of the data. The data represents all systems that have had certificates created against them. There is a 12-month period to create the certificates, so numbers of installations are expected to continue to rise.
[ii] https://energy.nsw.gov.au/renewables/clean-energy-initiatives/empowering-homes
[iii] https://www.premier.vic.gov.au/helping-victorians-pay-their-power-bills
[iv] https://www.sa.gov.au/topics/energy-and-environment/energy-efficient-home-design/solar-photovoltaic-systems
[v] BCA, "Impact of Green Energy Policies on Electricity Prices", June 2014
[vi] Sunwiz, Solar Pays Its Way on Networks. Last accessed 17 June 2015.