AUSTRALIAN ENERGY COUNCIL

SOLAR REPORT

QUARTER 2, 2022

Australian Energy Council

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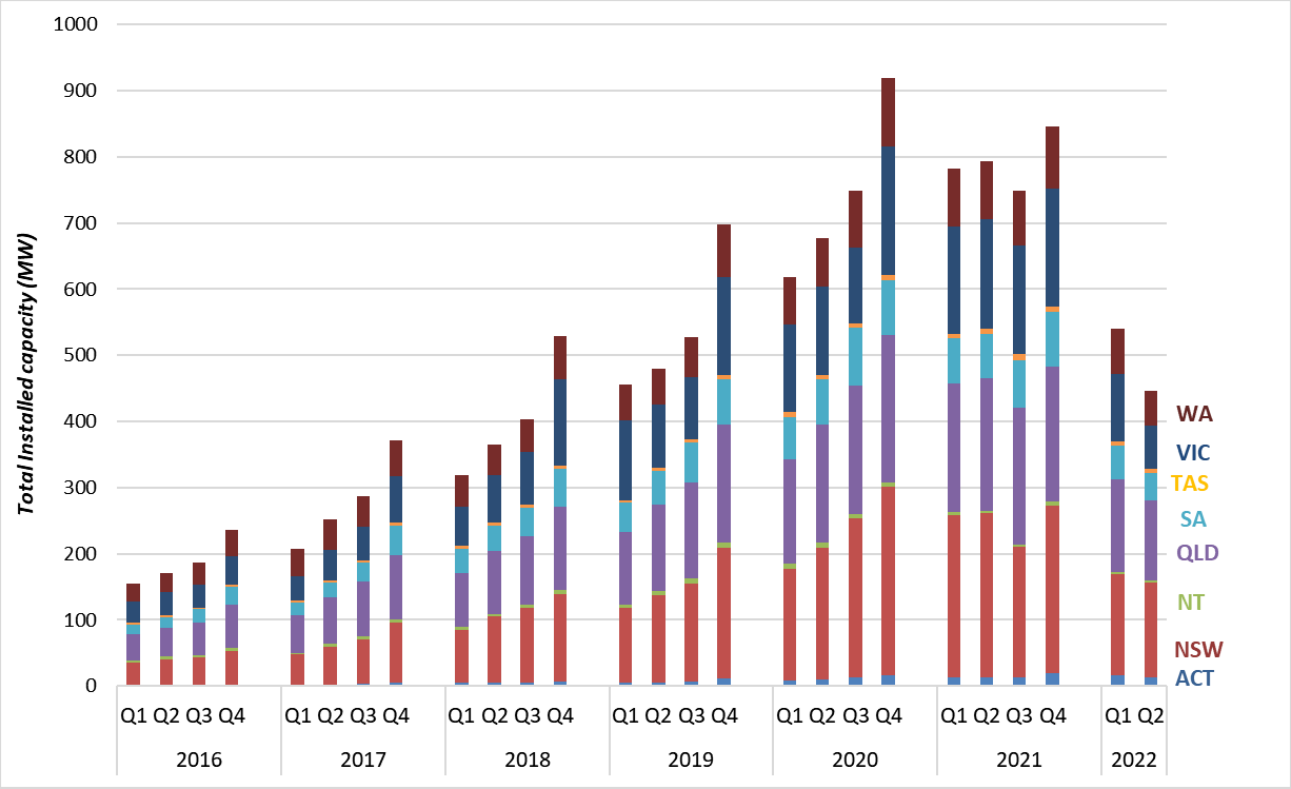
SECTION I: STATE OF SOLAR IN AUSTRALIA

Solar PV installations dropped to their lowest level in three years in the second quarter, according to data from the Clean Energy Regulator (CER). The CER's figures show that more than 52,950 rooftop solar systems were installed in the second quarter of 2022 increasing capacity by 446 megawatts (MW). The number of installations compares to 109,000 in the same quarter last year and 86,000 in 2020.

However due to the 12-month lag in reporting[i], it is anticipated the number of new monthly installations will actually exceed 80,000 for the April to June 2022 quarter.

Figure 1: Quarterly rooftop PV installations by states (unadjusted data)



Source: Clean Energy Regulator data, Australian Energy Council analysis, data as of 25 June 2022
Note: The most recent three months in figure 3 underestimates the data because of a time lag in collation of the data.[ii] Source: Clean Energy Regulator data, Australian Energy Council analysis, data as of 25 June 2022

A drop in installations this year was forecast[iii], however this is the first confirmation of the actual impact of factors such as higher system costs stemming from higher panel and transport costs that emerged last year. There were also supply chain issues, the impacts of COVID-19 as well as the reduction in the small-scale technology certificates (STCs) for the 2022 deeming period. The STCs are created when the solar system is installed (under 100kW). The number of certificates depends on system size as well as its location.

The number of STCs a system is deemed to have created is reduced each year through to 2030 as can be seen below. In Victoria, for example, the number of certificates created for a 6.6kW system in south-east Melbourne is 70 this year, compared to 78 last year for the same system.

Years system installed	Deeming Period in Years
2021	10
2022	9
2023	8
2024	7
2025	6
2026	5
2027	4
2028	3
2029	2
2030	1

We have previously looked at factors behind higher panel costs here, but a key reason was the increased cost of polysilicon, which is used to make solar cells.

In 2022 households are typically paying $1000 more for the same system than their neighbour paid the year before, so the out-of-pocket expense increase is likely to have an impact on consumer decisions. Household hesitancy will also be potentially fuelled by emerging cost of living pressures and economic uncertainty.

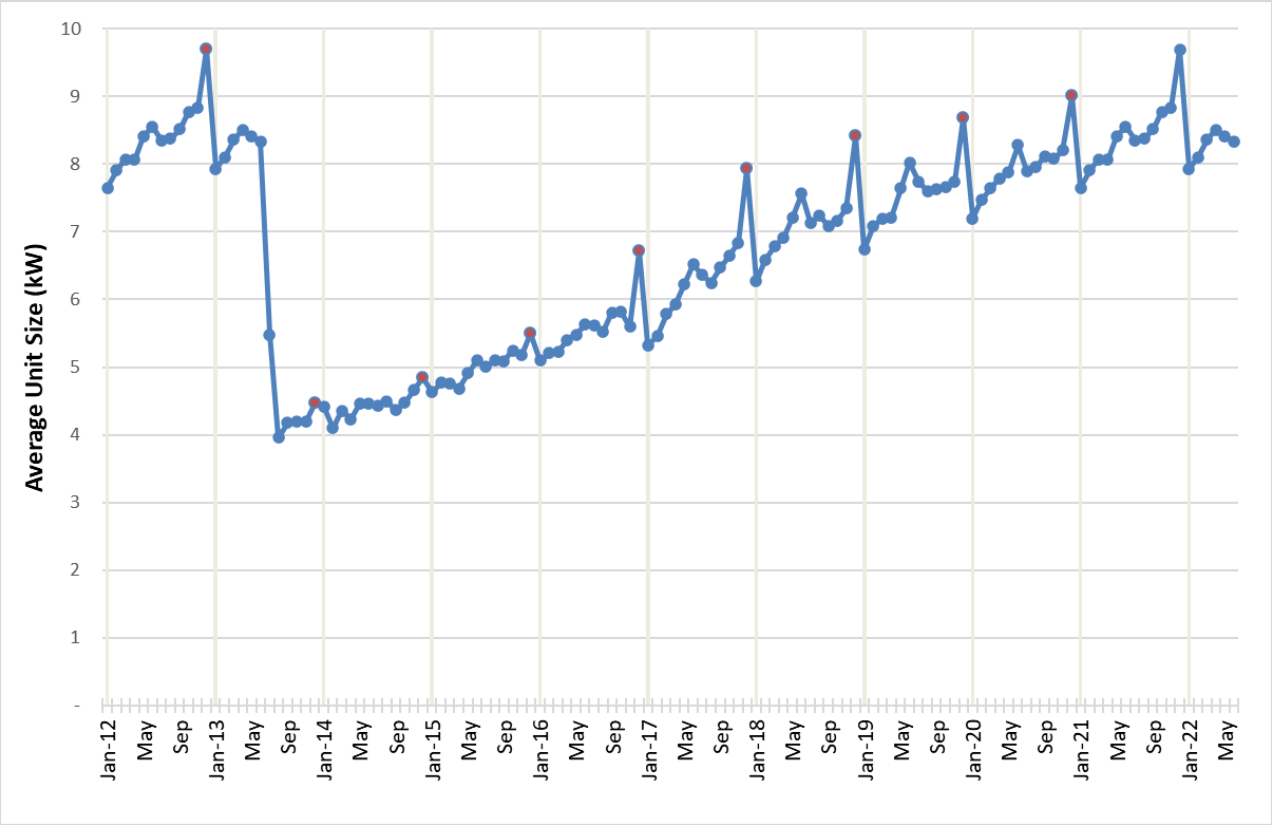
In addition, the first quarter saw heavy rainfall and subsequent flooding events in Queensland and New South Wales over an extended period, which reduced the number of days available for installation.

Figure 1 on page 4 shows the total capacity of solar PV installations by quarter. The National Electricity Market (NEM) states accounted for 88 per cent of total installed capacity in the second quarter of 2022, while Western Australia accounted for the remaining 12 per cent of total installed capacity.

New South Wales continued to lead the states with more than 16,445 new installations and 143MW of total installed solar capacity added in the second quarter of 2022 despite the challenges created by severe weather conditions for part of the period.

Figure 2 below shows the average installed solar system size for residential and small businesses; the average size steadily increased from 2.65kW in January 2012 to a peak of 9.54kW in December 2021. Historically, December has been the peak month for each calendar year in terms of a rise in average size of an installed system, followed by a seasonal fall in January.

Figure 2: Monthly average system size (kilowatts) since 2012



Source: Clean Energy Regulator data, Australian Energy Council analysis, data as of 25 June 2022

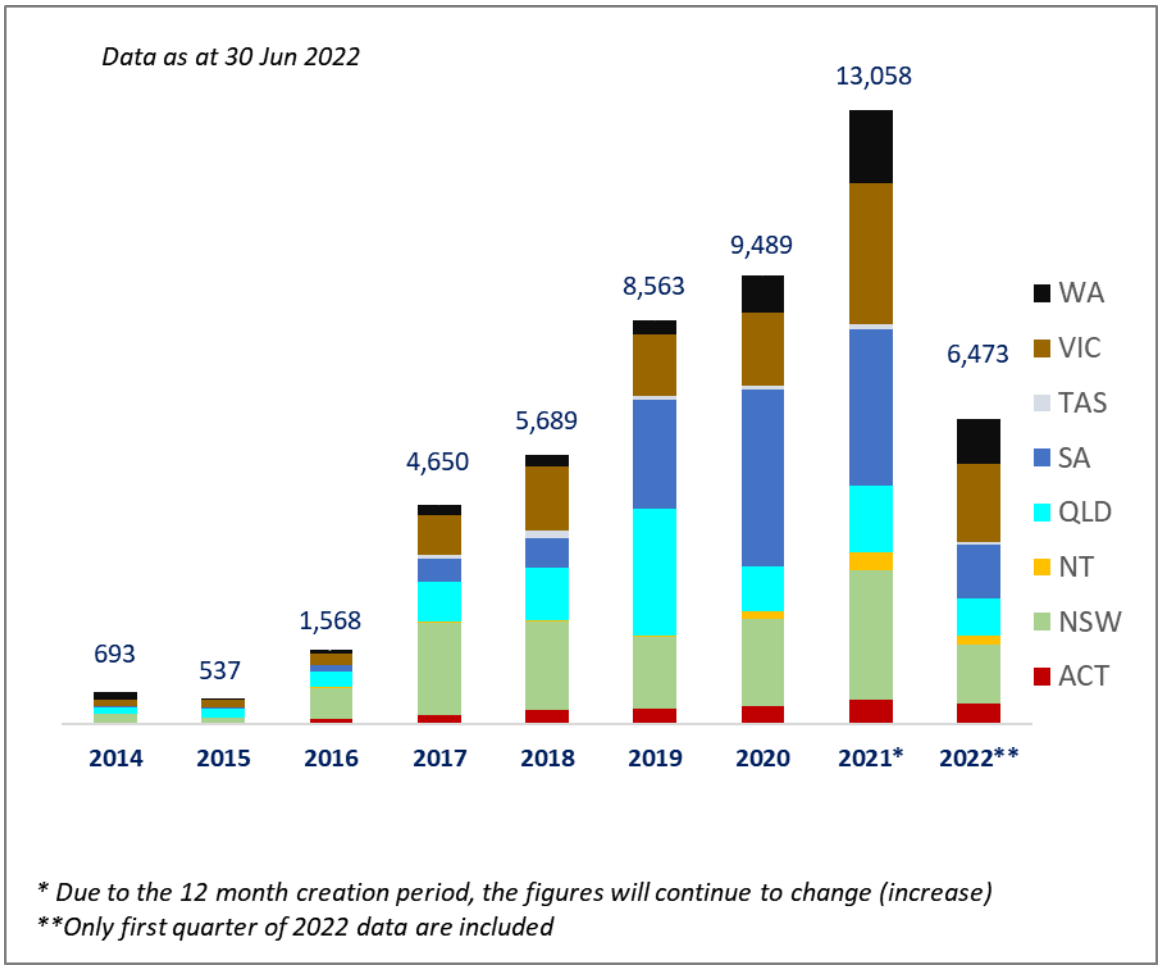
Battery installations with rooftop solar

Australia's rising share of rooftop solar continues to support the adoption of storage technologies.

When comparing the uptake of battery installations with rooftop solar by state (figure 3), South Australia and New South Wales lead, accounting for around 25 and 23 per cent of total installations respectively.

Even with a steady rate of rooftop installations, Queensland continues to see a slow uptake of solar with batteries, accounting for only 12 per cent of the total solar-with-battery installations. The Queensland Government's incentive scheme for solar-with-battery installations was exhausted in 2019, highlighting the influence of state-based schemes in the adoption of storage technology.

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 25 June 2022

Since the last Solar Report, there has been no update on state government schemes or rebates for battery-with-solar installations.

Schemes and rebates remain as:

- New South Wales: The Empowering Homes solar battery loan offer is a state government initiative designed to help eligible homeowners cut their power bills by transitioning to clean, renewable energy. There are two interest-free loans available:
    - up to $14,000 towards a solar PV and battery system (repayable over a range of terms up to 8 years)
    - up to $9000 towards retrofitting a battery system to an existing solar PV system (repayable over a range of terms up to 10 years) [iii]
- Victoria: The Solar battery rebate offers up to $3,500 for a solar-battery system. Victoria also offers the Solar Victoria Virtual Power Plant (VPP) pilot program, which subsidises the purchase of a solar battery only for homes with existing solar panels at a higher fixed value of $4,174[iv]. Eligibility criteria can be found by visiting https://www.solar.vic.gov.au/virtual-power-plant-pilot.

SECTION II: AUSTRALIAN TOP SOLAR INSTALLATION POSTCODES

Australia's rooftop solar PV industry continued to be impacted by COVID-19 restrictions in 2021-22. Though tapering, restrictions and lockdowns again led to reduced installation rates across all states compared with the previous financial year. Around 300,000 of installations were added to the grid in 2021-22, declining from 396,600 in FY 2021. Installed capacity also decreased from 3,242MW to above 2,580 MW in the past financial year.

Table 1 shows the installations by state for each of the past two financial years. New South Wales has led the way with highest number of rooftop installations. More than 84,800 solar rooftop PV installations with 746 MW of capacity were added to household rooftops in the 2021-22 financial year. This accounts for 28.2 per cent and 28.9 per cent of Australia's total installation numbers and installed capacity, respectively.

Queensland, Victoria and Western Australia are in second, third and fourth places respectively, with a combined total installations of 176,300 (58.6% of total installations nationally) and installed capacity of 1,478 MW, (57.3% of total installed capacity nationally) throughout Australia in FY 2022.

Table 1: Total rooftop solar PV installations in the last two financial year (rank: from highest to lowest)

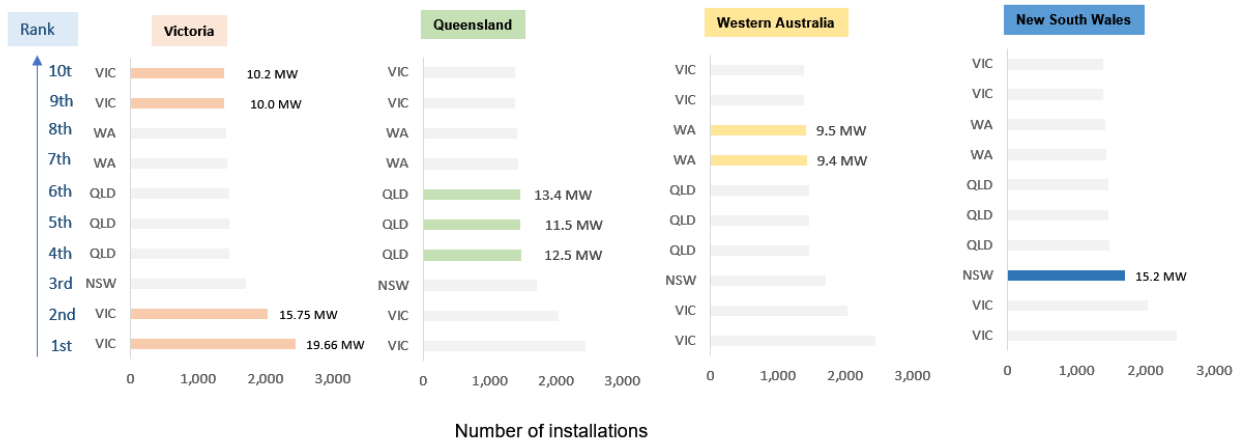
Number of rooftop solar PV installations	FY2021	FY2022*
NSW	122,011	84,801
QLD	93,947	74,186
VIC	81,245	61,155
WA	51,785	40,971
SA	35,429	27,512
ACT	6,295	6,919
TAS	3,691	3,602
NT	2,210	1,652

***** 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.

Source: Clean Energy Regulator data, Australian Energy Council analysis, data as of 25 June 2022

Unsurprisingly, the top 10 postcodes for solar PV uptake come from these top four states (NSW, QLD, VIC, WA)(figure 5). Victoria and Western Australia are the only two states have postcodes remain in the top 10 greatest growth in installation numbers of rooftop solar list in the last financial years.

Figure 5: Number of installations and installed capacity by the top 10 suburbs in the past financial year.



Source: Clean Energy Regulator data, Australian Energy Council analysis, data as of 25 June 2022

Victoria took four of the 10 spots on the list in FY2022, while Queensland claimed three spots. Victoria postcodes 3029 (Hoppers Crossing, Tarneit and Truganina) and 3064 (Donnybrook) held the top two ranks for the past two years.

Queensland postcode 4300, 4670 and 4209 are the suburbs that made it to the top 10 list. Totalling 4,400 systems installed and 37.4 MW connected to the grid.

Western Australia took over Queensland's positions in 7th and 8th place. The state has two postcodes into the top 10 list with installation numbers and installed capacity are fairly closed to 2,854 units and 18.8 MW.

New South Wales only had one postcode remain in the top 10 list with 15.2 MW installed in postcode 2765.

The Australian Capital Territory, Northern Territory and Tasmania have lower population densities than other states, and consequently have lower volumes of rooftop solar uptake.

Australia has seen installations rise year on year as the cost of renewables falls. Sustained low technology costs, increased work from home arrangements and a shift in household spending to home improvements during the pandemic played a key role in the increase of rooftop solar PV systems under the SRES. With the new census 2022 data rolling out next year, more detailed

information on solar penetration per suburb will be available, and we look forward to analysing that data.

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 Oct 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 1: Central estimate: 5.37 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	$0.11	$0.10	$0.09	$0.09	$0.09	$0.09	$0.33	$0.15
Brisbane	$0.12	$0.11	$0.10	$0.09	$0.10	$0.10	$0.22	$0.15
Canberra	$0.11	$0.10	$0.09	$0.09	$0.09	$0.09	$0.22	$0.11
Darwin	$0.15	$0.14	$0.13	$0.13	$0.12	$0.11	$0.26	$0.24
Hobart	$0.16	$0.15	$0.13	$0.13	$0.12	$0.13	$0.27	$0.09
Melbourne	$0.13	$0.12	$0.11	$0.11	$0.11	$0.11	$0.23	$0.15
Sydney	$0.12	$0.11	$0.10	$0.10	$0.10	$0.09	$0.27	$0.15
Perth	$0.09	$0.09	$0.08	$0.08	$0.08	$0.09	$0.29	$0.07

Source: Australian Energy Council analysis, June 2022

Table 2: 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	$0.10	$0.09	$0.08	$0.09	$0.09	$0.33	$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	$0.08	$0.08	$0.22	$0.11
Darwin	$0.13	$0.13	$0.12	$0.12	$0.11	$0.11	$0.26	$0.24
Hobart	$0.15	$0.13	$0.12	$0.12	$0.11	$0.12	$0.27	$0.09
Melbourne	$0.12	$0.11	$0.11	$0.10	$0.10	$0.10	$0.23	$0.15
Sydney	$0.11	$0.10	$0.09	$0.09	$0.09	$0.09	$0.27	$0.15
Perth	$0.09	$0.08	$0.08	$0.07	$0.08	$0.08	$0.29	$0.07

Source: Australian Energy Council analysis, June 2022

Table 3: High cost of capital sensitivity: 10.0 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	$0.14	$0.13	$0.11	$0.11	$0.11	$0.11	$0.33	$0.15
Brisbane	$0.15	$0.13	$0.12	$0.11	$0.12	$0.11	$0.22	$0.15
Canberra	$0.13	$0.12	$0.11	$0.11	$0.10	$0.10	$0.22	$0.11
Darwin	$0.18	$0.18	$0.16	$0.16	$0.15	$0.14	$0.26	$0.24
Hobart	$0.20	$0.18	$0.16	$0.16	$0.15	$0.15	$0.27	$0.09
Melbourne	$0.16	$0.15	$0.14	$0.13	$0.13	$0.13	$0.23	$0.15
Sydney	$0.14	$0.13	$0.12	$0.11	$0.11	$0.11	$0.27	$0.15
Perth	$0.11	$0.10	$0.10	$0.09	$0.10	$0.10	$0.29	$0.07

Source: Australian Energy Council analysis, June 2022

Small and large business - Levelised cost of electricity

Tables 4 and 5 show the estimated cost of electricity production for commercial-sized solar systems. As businesses look to reduce overhead costs, 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 can 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[iv].

Table 4: Central estimate: 4.95 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	$0.10
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	$0.11	$0.11	$0.11	$0.10
Perth	$0.11	$0.10	$0.11	$0.10	$0.09

Source: Australian Energy Council analysis, April 2022

Table 5: Central estimate: 4.76 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

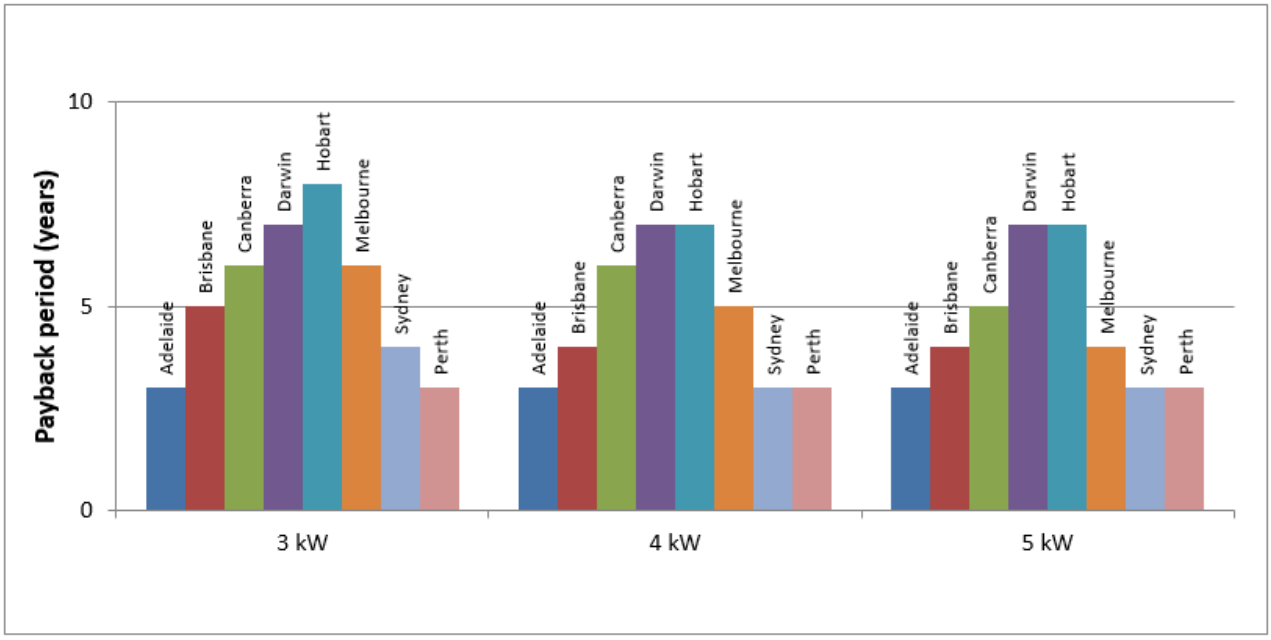
Source: Australian Energy Council analysis, June 2022

SECTION IV: PAYBACK PERIOD, DETAILED MODEL

The payback period is defined as the year when the cumulative savings become 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 7 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 7: Payback period for solar PV (3.2 per cent discount rate)

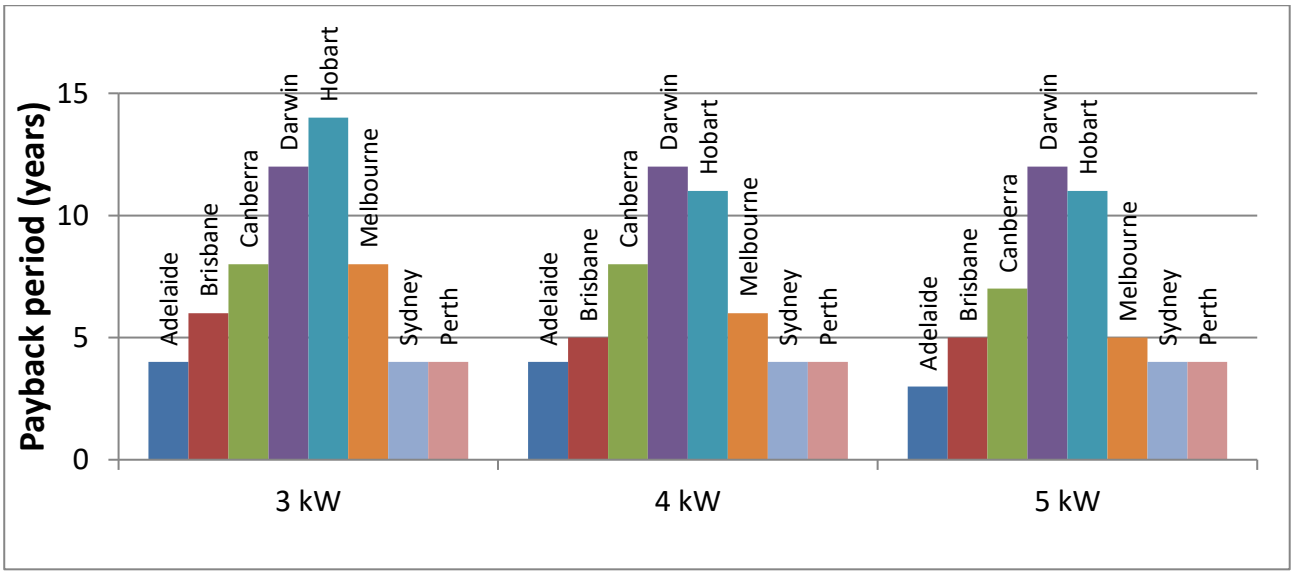


Source: Australian Energy Council analysis, June 2022

Compared to the previous quarter, the price of solar system sizes has not change in Darwin and Hobart. The two states have the highest cost of installations, resulting in the highest payback period of more than 7 years with a 3kW, 4kW and 5kW system. In NSW, the system price has increased $400 for a 3kW PV system, $280 for a 5kW system compares to a quarter ago. Other states have experienced relatively stable system prices. Melbourne sees a strong encouragement to install a 5kW system rather than a 3kW or 4kW unit size. Government incentives via rebate have incentivised the installation of a 5kw system over smaller systems, reducing the relevant payback period by up to two years if a 5kw system is purchased instead of a 3kw system.

Figure 8 shows the expected payback period for systems with a 5.2 per cent discount rate (10-year average home loan rate). Government incentives via rebate have incentivised the installation of a 5kw system over smaller systems, reducing the relevant payback period by up to two years if a 5kw system is purchased instead of a 3kw system. Adelaide, Brisbane, Sydney and Perth show no change in payback periods with a higher interest rate.

Figure 8: Payback period for solar PV (5.2 per cent discount rate)



Source: Australian Energy Council analysis, June 2022

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 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 one. 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

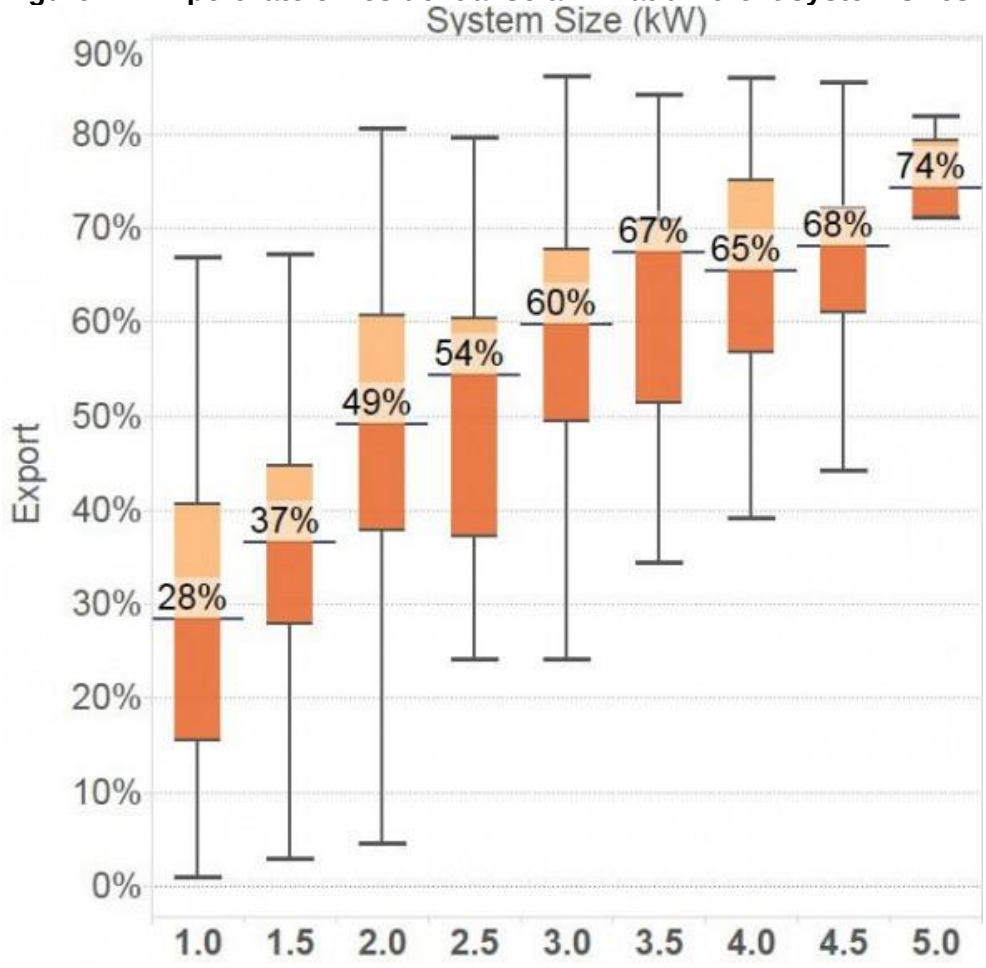
The onsite consumption is multiplied by the retailer's usage charges. CPI has been applied to the usage charge to allow for growth in retail prices. The excess energy is exported to the grid and the

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[v]. 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 data collation. 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] Solar PV system owners have up to 12 months to report their data to the Clean Energy Regulator.
[iii] Growth in rooftop solar slows due to lockdowns and supply chain issues | Energy | The Guardian
[iv] BCA, "Impact of Green Energy Policies on Electricity Prices", June 2014
[v] Sunwiz, Solar Pays Its Way on Networks. Last accessed 17 June 2015.