AUSTRALIAN ENERGY COUNCIL

SOLAR REPORT

QUARTER 3, 2024

Australian Energy Council

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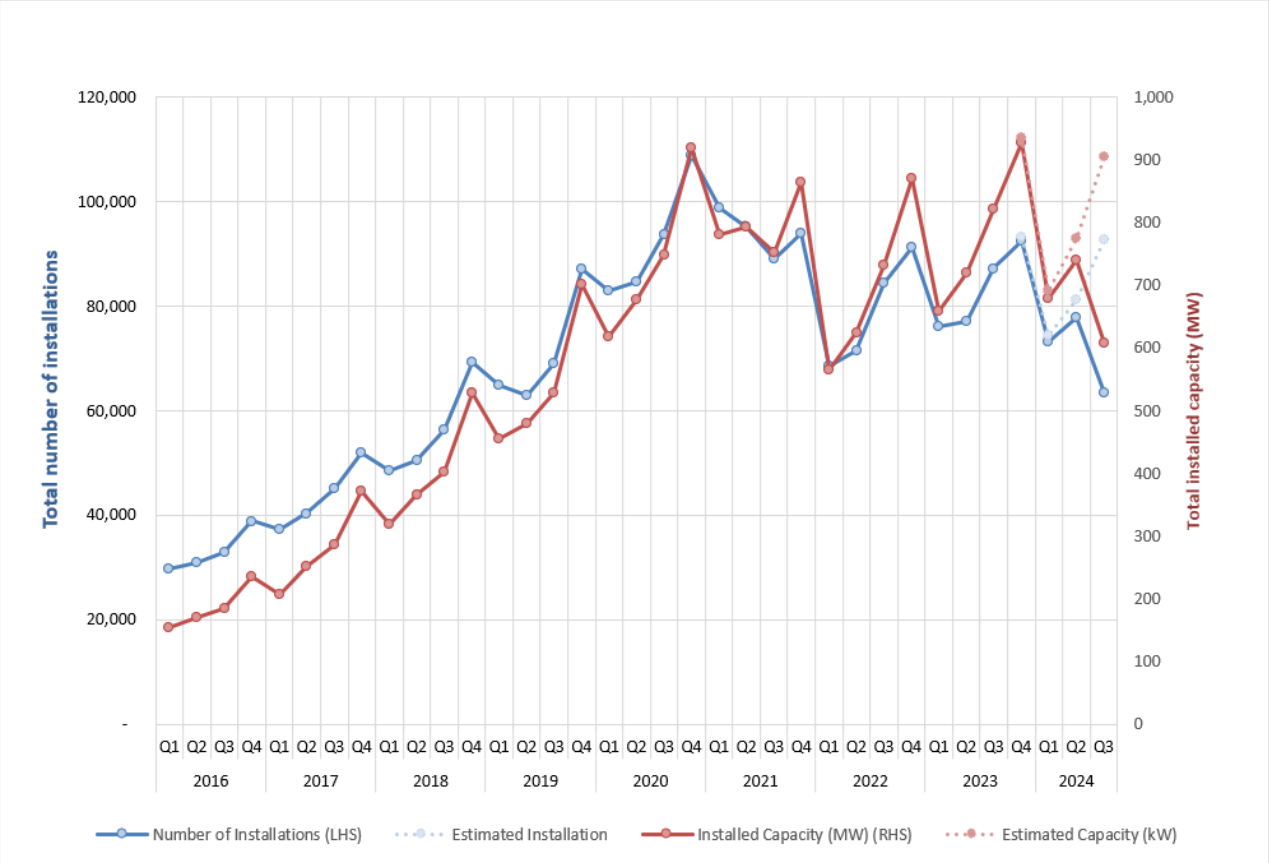
SECTION I: STATE OF SOLAR IN AUSTRALIA

Recent figures from the Clean Energy Regulator (CER) reveal in the first nine months of 2024, rooftop solar installations for homes and businesses added 2.03 GW of capacity from 214,813 photovoltaic systems. The installation number and capacity installed figures may be subject to adjustments as further data is reported (see Figure 1) and based on historical trends, it is projected the final numbers could reach approximately 249,000 installations, contributing 2.37 GW total capacity. In line with previous years (with the exception of Q3 2021) the third quarter is expected to outperform the first two quarters of the year. This trend is largely due to homeowners taking proactive steps in spring to maximize their solar energy access ahead of the summer months.

Figure 1: Quarterly installation number and capacity of rooftop PV in Australia

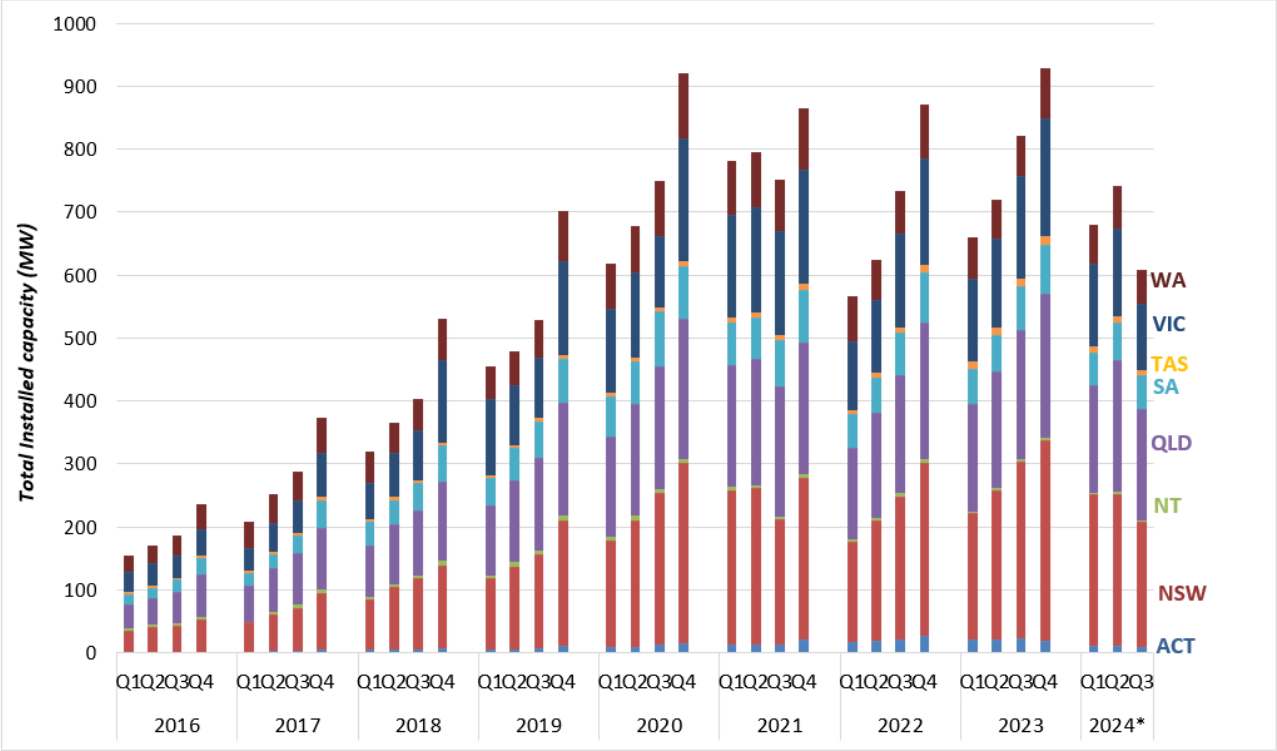


Source: Clean Energy Regulator data, Australian Energy Council analysis, data as of 23 October 2024. Note note that the data reporting has a 12-month lag. The graph includes a projection of final capacity.

Figure 2 shows quarterly installed capacity uptake by states, highlighting the proportion of solar installations across different regions. In the third quarter of 2024, Queensland continued to be the top contributor in terms of capacity installed, followed by New South Wales. Together, these two

states accounted for 61.7 per cent of Australia's total quarterly installed capacity withVictoria's new installation rate appearing to slow as a share of the national total. It was between 19.6 to 20.0 per cent every quarter in 2023, while it only accounts for 19.2, 18.8 and 17.1 per cent of the national total new capacity in the three quarters of 2024.

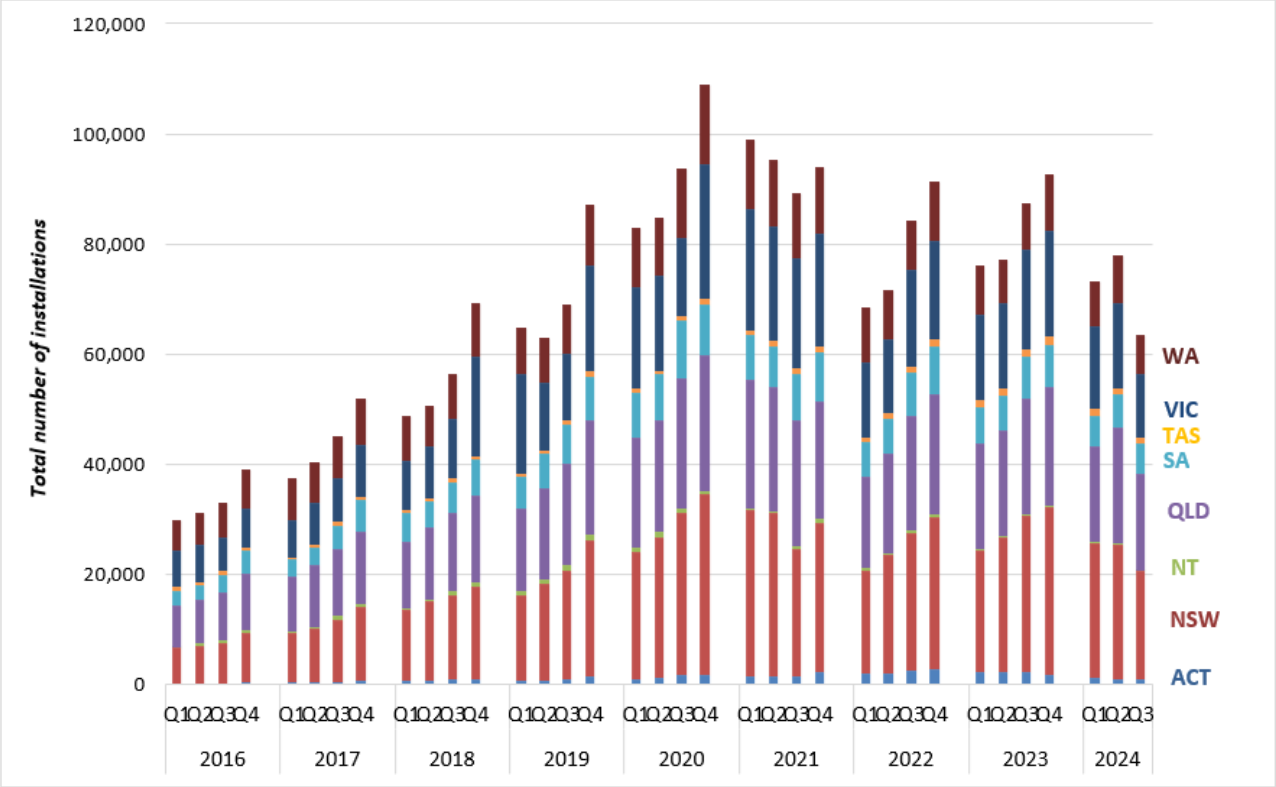
Figure 2: Quarterly installed capacity of rooftop solar PV in Australia since 2016 (unadjusted data)



Source: Clean Energy Regulator data, Australian Energy Council analysis, data as of 23 October 2024

Figure 3 shows quarterly installations that were added to the grid by state. Since the peak in 2020, household solar installations have declined, and the adjusted data for Q3 2024 is expected to be 3 per cent lower than Q3 2023. This drop is likely due to the ongoing cost-of-living pressures affecting consumer spending and investment decisions. Even with a decrease in solar panel prices in 2024, many homeowners are prioritising essential expenses, leading to reduced demand for new installations as can be clearly seen in Figure 3. The combination of economic constraints and rising living costs has made it challenging for potential customers to commit to solar investments.

Figure 3: Quarterly installation numbers of rooftop solar PV in Australia since 2017 (unadjusted data)



Source: Clean Energy Regulator data, Australian Energy Council analysis, data as of 23 October 2024

In the third quarter, New South Wales continued to lead the nation, accounting for 30.8 per cent of new rooftop solar. Queensland and Victoria followed, contributing 27.8 per cent and 18.3 per cent of new installations, respectively. South Australia represented 8.6 per cent of the total, while Western Australia made up 11.1 per cent.

The Victorian government's Premium Feed-In Tariff (PFIT) solar scheme, introduced in 2009 and closed to new applicants at the end of 2011, expired on 1 November 2024, impacting over 84,000 homes currently receiving 60 cents per kilowatt hour for their excess solar energy.

The end of the scheme means these homeowners will receive considerably lower rates, ranging from 3.9 to 11.3 cents per kilowatt hour, with a flat minimum rate of 3.3 cents established by Victoria's Essential Services Commission. It will be interesting to see how the uptake of solar installations in Victoria unfolds in the coming months, particularly in November and December, which have consistently been the busiest periods for rooftop solar adoption in Victoria. Given any additional solar panels installed during the period of the PFIT scheme were not eligible for the premium rate, the ending of the scheme may also encourage some of those PFIT eligible homeowners with older systems to consider upgrades.

At the national level, except for 2021, November is often the busiest month, and has accounted for the highest national total installation numbers of rooftop PV in the past few years. Table 1 highlights

the trends in solar adoption, showcasing the peak months when the most significant number of new systems were installed.

Table 1: National highest month of newly rooftop solar across the years

	2017	2018	2019	2020	2021	2022	2023	2024*
National highest monthly installation numbers in a year	18,357	24,895	30,059	38,769	37,392	33,203	32,043	28113*
Month	Nov	Nov	Nov	Nov	Mar	Nov	Nov	May*
Victoria highest monthly installation numbers in a year	3,299	6,419	6,588	9,662	8,478	6,485	6,619	5,732
Month	Dec	Nov	Nov	Nov	Mar	Dec	Dec	May

**2024 data is not complete because of the lag in CER data finalisation. .*

Battery installations with rooftop solar

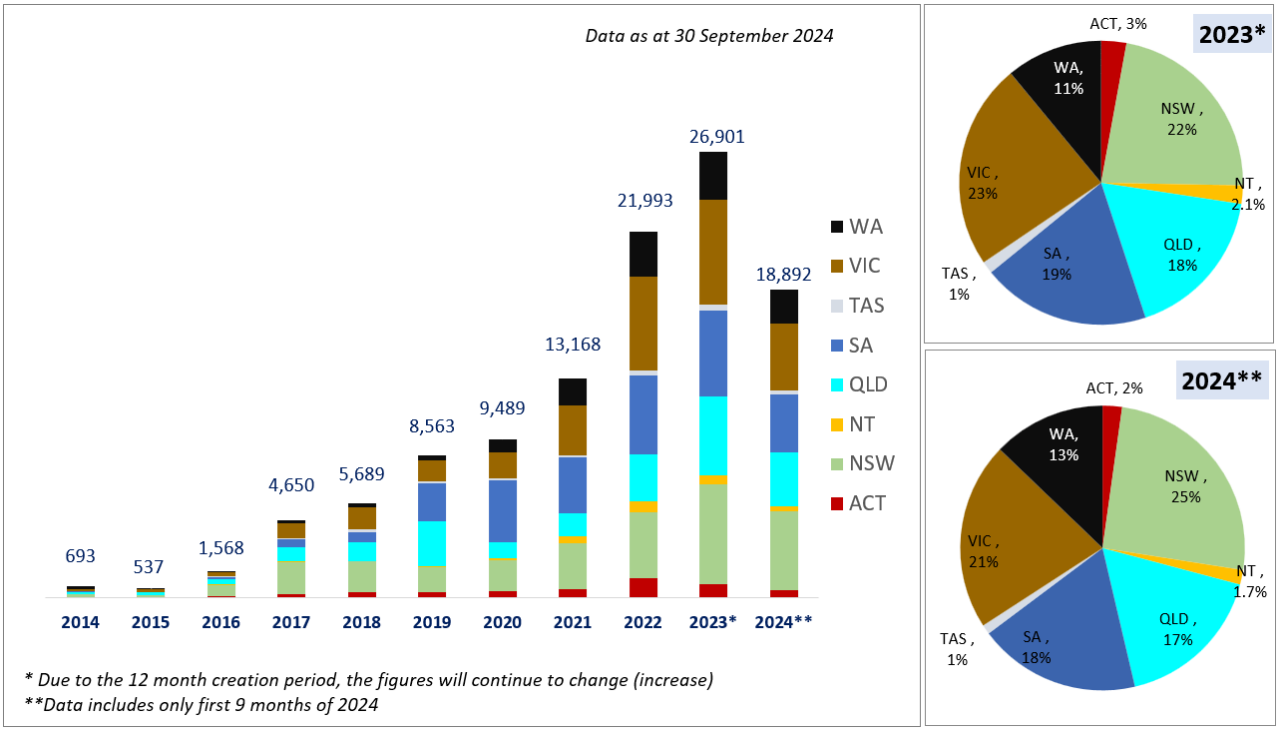
There wasnearly 18,900 new rooftop PV installations paired with batteries registered to the Clean Energy Regulator (CER) by the end of the third quarter of 2024 (see figure 4). While Victoria held the top position in 2022 and 2023, it is on track to be surpassed by New South Wales in 2024. Both states have seen significant growth, with New South Wales adding 4,774 and Victoria adding 4,028 new combined solar and battery installations. Together, these two states account for 46.6 per cent of the national total of battery with rooftop solar installations.

South Australia ranks third, with 3,483 new battery installations paired with distributed PV units, representing 18.4 percent of the national total. Queensland follows closely with 3,250 new installations, accounting for 17.2 percent.

Besides New South Wales, Western Australia is the second state with highest rate of newly installations of rooftop PV with battery. The share of newly installed battery and rooftop PV systems in 2024 is greater than in 2023. In the first nine months of 2024, Western Australia accounted for 12.8 per cent of the national total, up from 11 per cent in 2023.

The Australian Capital Territory, Tasmania, and the Northern Territory collectively recorded 933 installations, which account for 4.9 per cent of the country's total.

Figure 4: Number of solar PV installations with concurrent battery installations, per state since 2014



Source: Clean Energy Regulator data, Australian Energy Council analysis, data as of 23 October 2024

Since the last Solar Report, there has been an additional New South Wales government support scheme available for solar and battery storage installations (see table 2).

It is worth noting that the number of home battery installations may be understated by the CER data which only includes details on the number of solar with battery systems that are installed at the same time. It does not account for batteries that may have been installed separately to the solar panels.

Table 2: Government policies

State/ Territory	Policy Incentive (Solar & Battery)	Energy target
Australian Capital Territory	• No specific policy	• To deliver a 70 per cent cut in emissions by 2035 compared to 2005 levels • Net zero by 2050
New South Wales	• NSW Government Solar Battery Rebate[1] (starting 1 November 2024): Discount range $770 and $1150 for a 6.5 kWh battery; or $1600 and $2400 for a 13.5 kWh battery	• NSW's emissions by 70 per cent by 2035 and achieve net zero by 2050
Northern Territory	• Home and Business Battery Scheme allows residents to buy and install batteries and inverters with a maximum grant of $5,000 (reducing from $6,000) from 1 July 2023[i]	• 50 per cent by 2030
Queensland	• Battery Booster program[2] closed to new conditional approval applications on 8 May 2024.	• 50 per cent by 2030
South Australia	• No specific policy	• 100 per cent by 2030
Tasmania	• No specific policy	
Victoria	• Solar Battery Loans[3]: Interest-free loans of up to $8,800 are available for eligible households.	• 65 per cent by 2030 • 95 per cent by 2035[4]
Western Australia	• No specific policy	

[1] NSW Government Battery Rebate

[2] Battery Booster Rebate

[3] Solar Battery Loans for financial year 2024-25

[4] Victorian renewable energy and storage targets, page last updated 15 February, 2023

SECTION II: AUSTRALIAN TOP SOLAR INSTALLATION POSTCODES

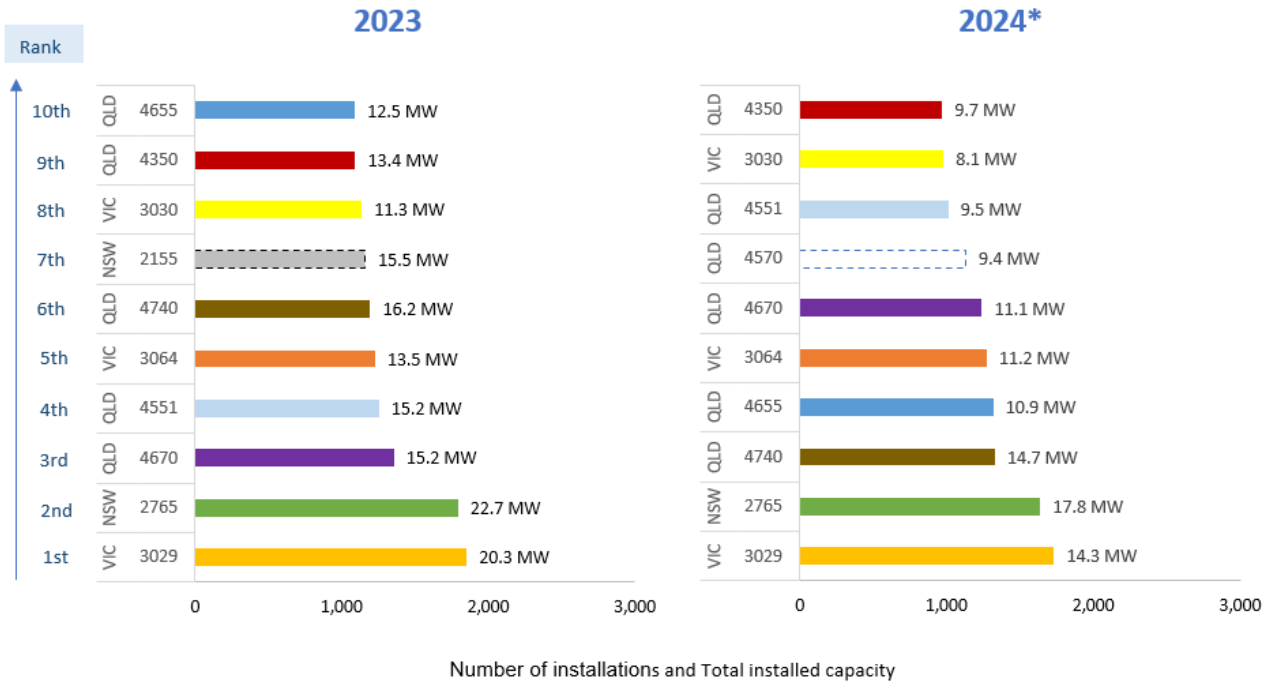
As the world shifts toward sustainable energy solutions, rooftop solar photovoltaic (PV) systems have emerged as a popular choice for homeowners looking to reduce their carbon footprint and save on electricity costs. In many regions, specific postcodes have emerged as leaders in the adoption of this rooftop PV, demonstrating both a commitment to clean energy sources and a more economic approach. In this article, we explore the top 10 postcodes with the highest rooftop PV installations.

In 2024, Queensland dominates the list with six entries, while Victoria contributes three, and New South Wales has one postcode among the top ten. In order from the top, the Victoria suburb of Truganina (3029) has again secured the number one spot in 2024 with 1,731 installations in the first nine month of 2024, followed closely by the New South Wales suburbs of Nelson (2765) with 1,638 installations. The combined installations of these two postcodes in first nine months of 2024 accounted for just 271 fewer installations than the total for all of 2023.

Similarly, postcodes ranked third to fifth include Qld (4740), Qld (4655) and Victoria (3064) with a total of 3,913 installations in the first nine months of 2024. Remarkably, this number already surpasses the total of 3,555 installations for the entirety of 2023. This highlights a rebound of interest in residential rooftop installations in those suburbs.

Additionally, the Queensland suburbs of 4570 on the Sunshine Coast entered the top 10 for the first time in 2024.

Figure 4: Top 10 postcodes with total installation numbers of distributed PV and installed capacity



Source: Clean Energy Regulator data, Australian Energy Council analysis, data as of 23 October 2024

*Data includes only first nine months of 2024

In 2024, the average system sizes for rooftop solar installations noticeably declined compared to 2023 (see table 3), which may be due to the escalating cost of living (as mentioned in our previous solar reports). Homeowners facing tighter budgets as well as lower feed-in tariffs for solar, may be prompted to reconsider their solar investments This shift is evident in postcodes across Australia, where smaller system installations are becoming more common as people seek to balance their desire for renewable energy with financial realities.

For example, in Victoria, Truganina's average system size dropped from 10.97 kW in 2023 to 8.27 kW in 2024. This pattern is similar in other leading regions, such as New South Wales' Nelson (2765), where the average size fell from 12.68 kW to 10.88 kW. Other regions, such as Queensland or Victoria, have reported reductions in average system sizes, with homeowners opting for more affordable setups. The trend reflects a broader economic environment where rising utility costs, housing expenses, and inflation are forcing individuals to assess their system choice.

Table 3: Average system size in 2023 and 2024 of the top 10 suburbs

Rank (2024)	Postcodes	Average system size in 2024	Average system size in 2023
1	VIC (3029)	8.27	10.97
2	NSW (2765)	10.88	12.68
3	QLD (4740)	11.09	13.60
4	QLD (4655)	8.29	11.48
5	VIC (3064)	8.85	11.03
6	QLD (4670)	8.98	11.26
7	QLD (4570)	8.28	8.27
8	QLD (4551)	9.43	12.17
9	VIC (3030)	8.30	9.99
10	QLD (4350)	10.00	12.27

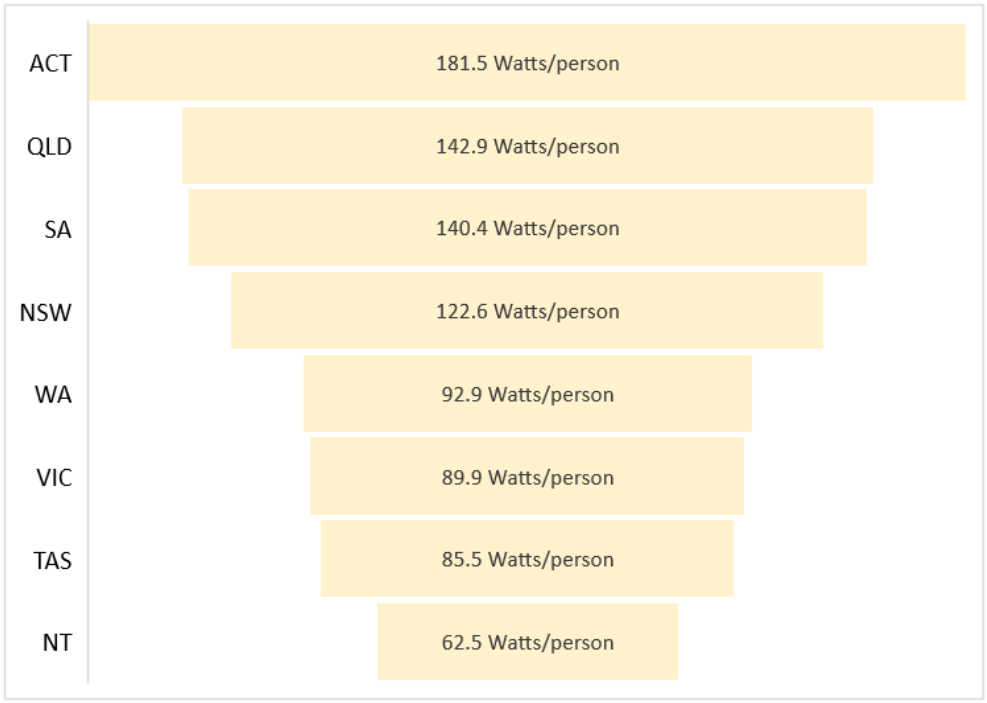
Source: Clean Energy Regulator data, Australian Energy Council analysis, data as of 23 October 2024

Australian cities ranked by rooftop solar capacity per capita

As 2024 has not yet concluded and population data is not yet available, we will only look at 2023 here. In 2023, South Australia, Western Australia, and Tasmania did not feature in the top 10 postcodes for total rooftop solar capacity, but when considering rooftop solar capacity on a per capita basis, these regions performed exceptionally well. Despite New South Wales leading the country in total solar capacity, South Australia, Queensland, and the Australian Capital Territory ranked among the top regions for solar capacity per person in 2023. Australian Capital Territory took the lead with 181.5 watts per person, followed by Queensland at 142.9 watts per person, and the South Australia at 140.4 watts per person. These figures highlight the strong uptake of solar technology in regions with relatively low population densities and favorable conditions for solar energy.

In contrast, areas with more urban density, such as major cities, tend to have lower per capita solar capacity due to limited space for rooftop installations, particularly in high-rise buildings. Urban living conditions can restrict the amount of rooftop space available for solar panels, which contributes to the relatively lower per capita figures in those regions. New South Wales reported 122.6 watts per person, while Victoria had 89.9 watts per person, respectively. Tasmania trailed with 85.5 watts per person, and the Northern Territory had the lowest at 62.5 watts per person.

Figure 5: Rooftop PV capacity per capita by states in 2023



Source: Clean Energy Regulator data, ABS (data as of 13 June 2024), Australian Energy Council analysis, data as of 23 October 2024

While the commitment to solar energy remains strong, economic pressures in the residential solar market continues. Homeowners are increasingly focused on maximising value while minimising upfront costs. As noted above this may result in smaller systems that still contribute to energy savings.

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 2 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 2024. 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 4, 5 and 6 show the LCOE across major cities at different discount rates.

Table 4: Central estimate: 5.06 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	$0.09	$0.09	$0.09	$0.09	$0.09	$0.42	$0.08
Brisbane	$0.11	$0.10	$0.09	$0.09	$0.09	$0.08	$0.31	$0.08
Canberra	$0.12	$0.10	$0.09	$0.09	$0.09	$0.08	$0.26	$0.09
Darwin	$0.12	$0.13	$0.12	$0.12	$0.11	$0.11	$0.28	$0.08
Hobart	$0.15	$0.14	$0.13	$0.12	$0.12	$0.12	$0.30	$0.09
Melbourne	$0.13	$0.11	$0.11	$0.10	$0.10	$0.10	$0.31	$0.05
Sydney	$0.12	$0.11	$0.10	$0.09	$0.10	$0.09	$0.35	$0.07
Perth	$0.10	$0.09	$0.08	$0.08	$0.09	$0.09	$0.31	$0.07

Source: Australian Energy Council analysis, October 2024

Table 5: Low cost of capital sensitivity: 6.88 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	$0.12	$0.10	$0.10	$0.09	$0.09	$0.09	$0.42	$0.08
Brisbane	$0.12	$0.11	$0.10	$0.09	$0.09	$0.09	$0.31	$0.08
Canberra	$0.13	$0.11	$0.10	$0.10	$0.10	$0.09	$0.26	$0.09
Darwin	$0.13	$0.14	$0.13	$0.13	$0.12	$0.12	$0.28	$0.08
Hobart	$0.16	$0.15	$0.14	$0.13	$0.13	$0.13	$0.30	$0.09
Melbourne	$0.14	$0.12	$0.12	$0.11	$0.11	$0.10	$0.31	$0.05
Sydney	$0.13	$0.11	$0.11	$0.10	$0.10	$0.10	$0.35	$0.07
Perth	$0.11	$0.10	$0.09	$0.09	$0.09	$0.09	$0.31	$0.07

Source: Australian Energy Council analysis, October 2024

Table 6: High cost of capital sensitivity: 17.32 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	$0.17	$0.15	$0.14	$0.13	$0.14	$0.13	$0.42	$0.08
Brisbane	$0.18	$0.16	$0.14	$0.13	$0.14	$0.13	$0.31	$0.08
Canberra	$0.19	$0.16	$0.15	$0.14	$0.14	$0.13	$0.26	$0.09
Darwin	$0.21	$0.22	$0.20	$0.20	$0.19	$0.18	$0.28	$0.08
Hobart	$0.25	$0.23	$0.21	$0.19	$0.19	$0.19	$0.30	$0.09
Melbourne	$0.21	$0.18	$0.17	$0.16	$0.16	$0.15	$0.31	$0.05
Sydney	$0.20	$0.17	$0.16	$0.15	$0.15	$0.14	$0.35	$0.07
Perth	$0.16	$0.15	$0.13	$0.13	$0.13	$0.14	$0.31	$0.07

Source: Australian Energy Council analysis, October 2024

Small and large business - Levelised cost of electricity

Tables 7 and 8 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 7 and 8 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[ii].

Table 7: Central estimate: 4.84 per cent discount rate, ten-year average small business interest rate

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

Source: Australian Energy Council analysis, October 2024

Table 8: Central estimate: 6.24 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	$0.11	$0.11	$0.10
Brisbane	$0.10	$0.10	$0.10	$0.10	$0.09
Canberra	$0.10	$0.10	$0.10	$0.10	$0.09
Hobart	$0.14	$0.11	$0.12	$0.12	$0.11
Melbourne	$0.11	$0.11	$0.11	$0.11	$0.11
Sydney	$0.11	$0.10	$0.11	$0.10	$0.10
Perth	$0.09	$0.09	$0.10	$0.10	$0.09

Source: Australian Energy Council analysis, October 2024

SECTION IV: PAYBACK PERIOD, DETAILED MODEL

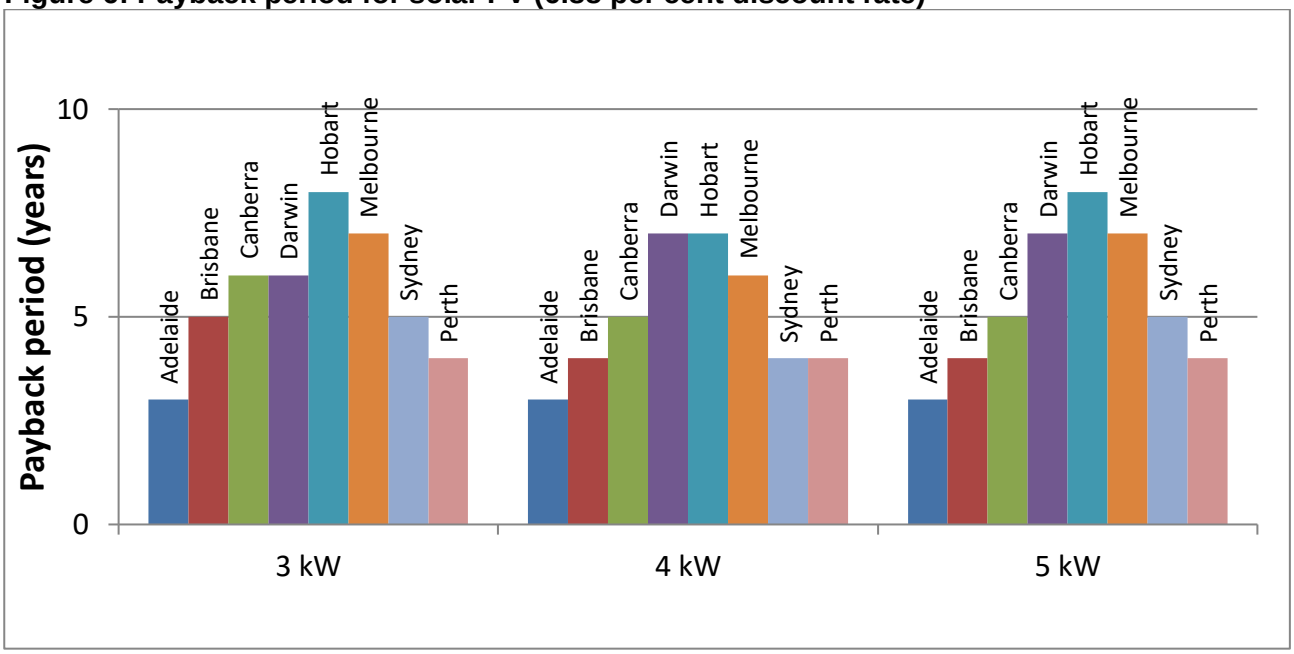
The payback period for rooftop solar photovoltaic (PV) systems in Australia is an important consideration for homeowners, as it determines how long it takes to recoup the initial investment. It is defined as the year when the cumulative savings are greater than the cumulative costs of a solar PV system. 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.

Although the installation of solar panels typically involves an initial investment, customers who have them benefit from reduced electricity bills. This is achieved by lowering their reliance on grid electricity and selling surplus electricity back to the grid in exchange for solar feed-in tariff credits. Recently, as wholesale electricity prices have decreased, many retailers have adjusted their FiT offerings downward, impacting the attractiveness of solar installations. In addition to fixed FiTs, many retailers now offer time-varying tariffs, which provide higher rates during peak demand hours, typically in the late afternoon from around 3 PM or 4 PM. This change is particularly advantageous for homeowners with west-facing solar panels, as these systems generate more electricity during high-demand periods, thereby maximising savings.

Each household's energy consumption patterns play a crucial role in determining the actual savings. Homes with higher electricity usage during peak generation times will benefit more from their solar investments compared to those with lower consumption. Therefore, while rooftop solar can yield significant financial benefits, the specific payback period is influenced by system size, tariff structures, and individual energy usage. An energy plan offering the highest solar feed-in tariff may not always be the most cost-effective choice overall, as it could involve higher supply and usage charges compared to other plans. So, it is essential to select an energy plan subject to householders' historical electricity consumption and the amount of solar energy they export.

Here we only use simple average FiT when estimating payback periods to get a clearer understanding of potential savings for households. Figure 6 and 7 highlights the payback period for different system sizes across Australia. The low payback periods across many cities further highlights the greater encouragement for customers to install solar PV.

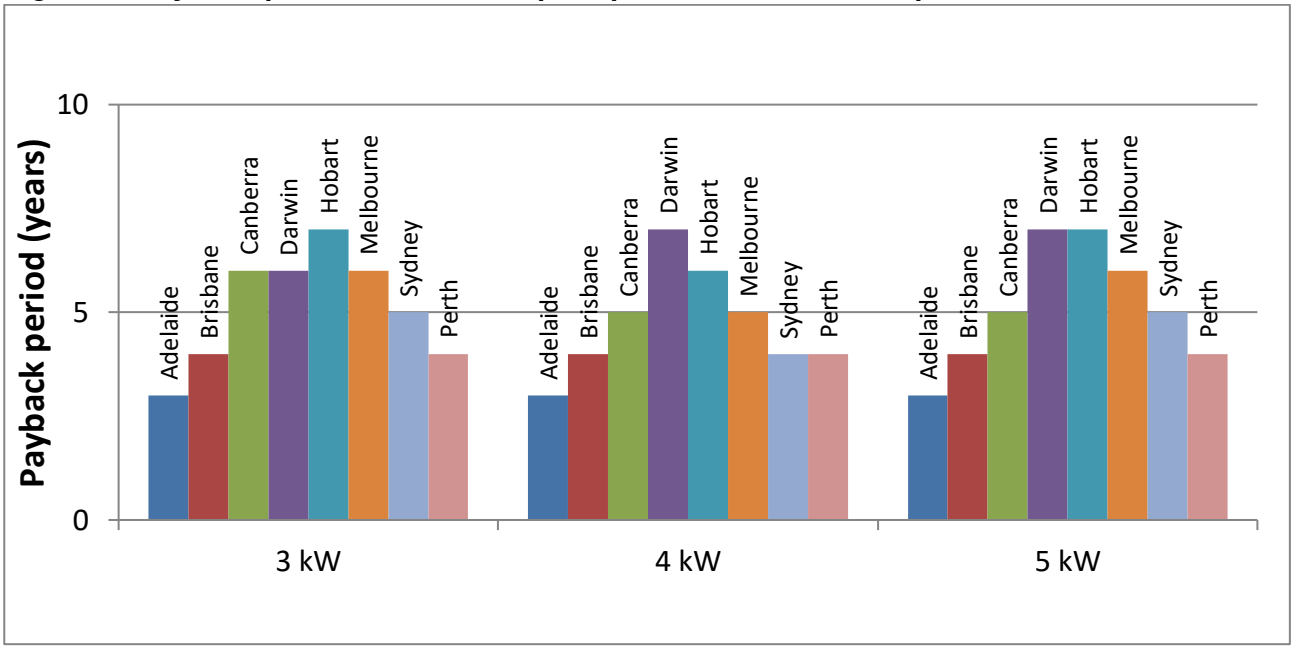
Figure 6: Payback period for solar PV (6.88 per cent discount rate)



Source: Australian Energy Council analysis, October 2024

Figure 7 shows the expected payback period for systems with a 5.06 per cent discount rate (10-year average home loan rate). In Adelaide, homeowners can expect a relatively quick payback period of just 3 years for all system sizes, indicating a strong return on investment. Brisbane follows closely, with a consistent payback of 4 years across all three sizes. Meanwhile, solar investment may take longer to recover in Hobart and Darwin.

Figure 7: Payback period for solar PV (5.06 per cent discount rate)



Source: Australian Energy Council analysis, October 2024

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 $(1 + real\ discount\ rate)^t$

t = years

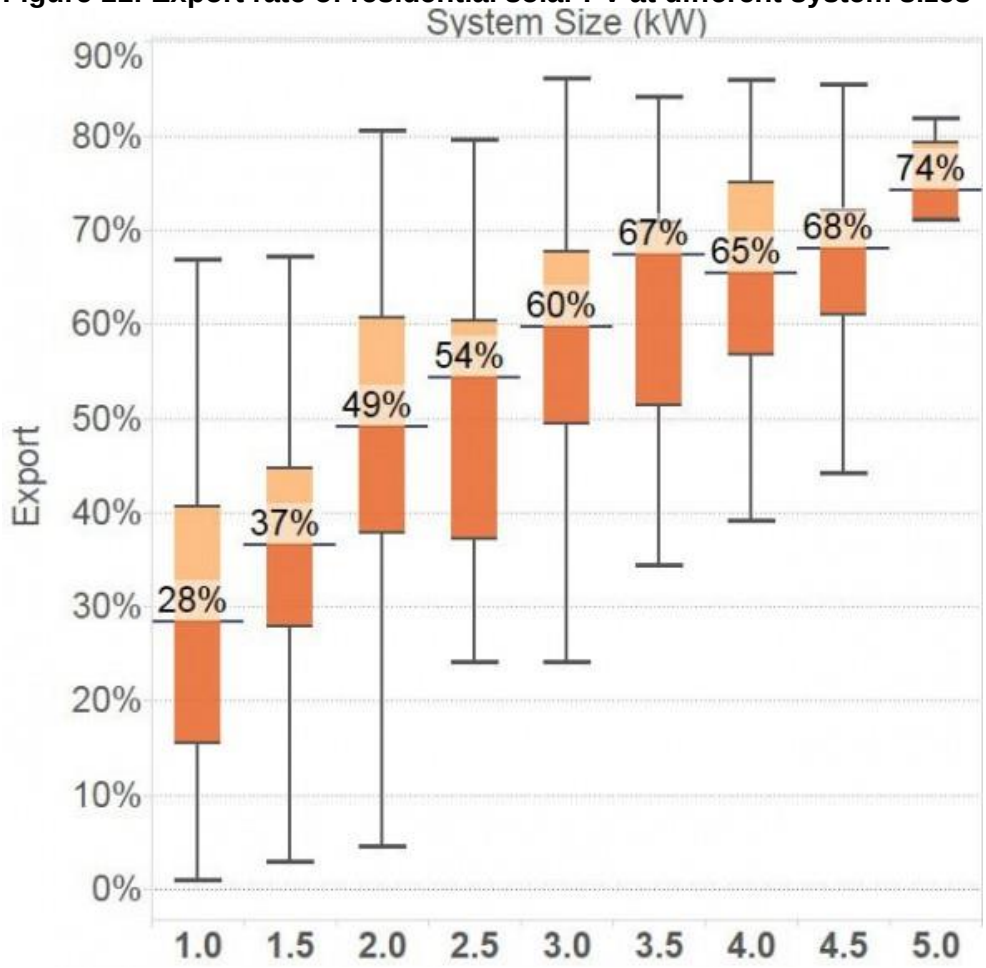
Avoided cost and FiT

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' analysis[iii]. See Figure 11 below.

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



Source: Sunwiz' analysis, 2015

[i] https://nt.gov.au/industry/business-grants-funding/home-and-business-battery-scheme

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

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