SOLAR REPORT

QUARTER 4, 2023

Australian Energy Council

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SECTION I: STATE OF SOLAR IN AUSTRALIA

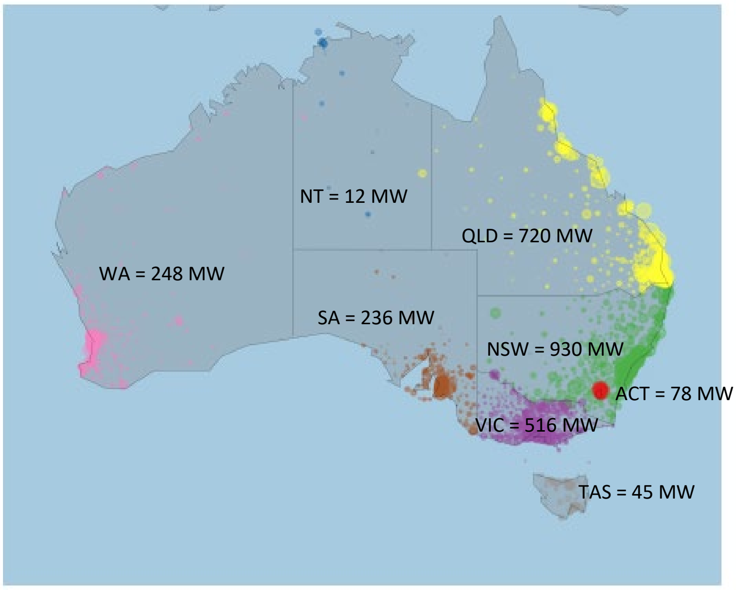
Rooftop solar installations continued their strong growth nationally during 2023. By the end of the year, a total of 2,785 MW of new rooftop solar had been installed, taking Australia's cumulative total to 22,072 MW as at the end of December 2023.

Figure 1 below shows the new installed capacity by state during 2023 with New South Wales leading the way with 930 MW installed. Queensland installed a further 720 MW, Victoria 516 MW, 248 MW in Western Australia, 236 MW in South Australia, 45 MW in Tasmania, 78 MW in the Australian Capital Territory, and just 12 MW in the Northern Territory.

In the last quarter of 2023, 663 MW of capacity was added to the solar fleet. While this appears to be a significant reduction (204 MW) compared to the same quarter in the previous year, there is a lag in Clean Energy Regulator accreditation of all systems. The data presented here is updated as of mid-January 2024 and we estimate that the final fourth quarter total will settle near 860 MW once all installations are recorded and reported in future publications of the CER over the next 12 months. The forecast of 860 MW is similar to the totals reported for Q4 in both 2021 and 2022.

Once the full year data update is finalised, we estimate it will show 2,990 MW of capacity was installed in 2023 in Australia. This forecast would mean a 7.18 per cent increase in annual installed capacity compared to the 2022 final number – an improved outcome compared to the 12.60 per cent reduction in installations between 2021 and 2022.

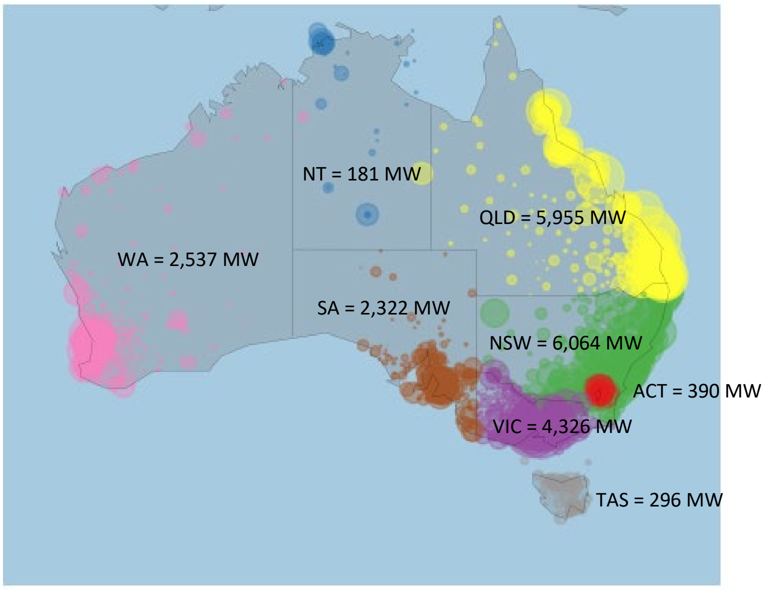
Figure 1. Total rooftop solar installations in 2023.



Source: AEC, 2024 with data from CER, 2024

Solar had been installed by 3,691,626 households and businesses as of the end of 2023. With more than a million (1,003,543) Small Generation Units (SGUs), Queensland is the leader in rooftop solar, followed by NSW with 947,357 SGUs, and Victoria with 724,554 SGUs. These three states account for around 72 per cent of the national figure. At the other end of the scale, the Northern Territory has accumulated only 22,744 SGUs to the end of 2023, or 0.62 per cent of Australia's rooftop solar fleet. However, it is worth noting that the NT is installing the largest-sized units among all states and territories (see Table 1) with an average size of 11.45kW.

Figure 2. Cumulative rooftop solar installation to end December 2023



Source: AEC, 2024 with data from CER, 2024

The average solar system size has increased consistently in Australia every year. Last year was another record year for the average solar system size in every state. Australians installed an average system size of 9.13 kW in 2023, with several jurisdictions (NSW, Queenlsnad, SA, the ACT, and the NT) installing even bigger units. These figures represent aggregated businesses and household systems. Companies tend to install larger capacity solar systems to meet their higher daily consumption needs and they also have greater rooftop space available, so they can install much larger systems in many cases. Regardless, the size of household installations has also increased over time, encouraged, along with businesses, by the lower prices of solar systems.

Table 1. Annual average size of solar system per state (kW/SGU)

Year	Australia	NT	SA	ACT	QLD	NSW	VIC	TAS	WA
2012	3.02	4.47	3.30	3.26	3.21	2.68	3.13	3.18	2.33
2013	3.95	4.93	4.85	4.49	3.78	3.93	3.94	4.11	3.22
2014	4.44	5.97	5.44	3.98	4.31	4.63	4.28	4.51	4.05
2015	4.99	7.22	5.52	5.37	4.88	5.28	4.78	4.72	4.63
2016	5.64	7.28	6.16	6.89	5.79	5.66	5.40	4.76	5.29
2017	6.40	7.88	7.13	6.33	6.60	6.07	6.55	6.08	5.94
2018	7.19	8.51	7.98	6.91	7.40	7.16	7.17	7.15	6.35
2019	7.62	8.18	8.24	7.92	7.99	7.60	7.45	7.09	6.73
2020	8.00	8.57	8.35	8.34	8.51	8.08	7.71	7.97	6.95
2021	8.46	9.64	8.89	8.99	8.99	8.63	8.13	8.09	7.24
2022	8.84	10.84	8.84	9.43	9.24	9.15	8.66	8.38	7.41
2023	9.13	11.45	9.17	9.91	9.52	9.53	8.75	8.52	7.54

Source: AEC, 2024 with data from CER, 2024

Battery installations with rooftop solar

In 2023, New South Wales led the installation of batteries with solar systems, with a state record of 5,334 SGUs with batteries. With fewer than 30 installations less, Victorians positioned themselves second nationally with 5,307 SGUs, and in third place, South Australia installed 4,529 SGUs. Compared to the previous year, Victoria and South Australia decreased installations slightly, while New South Wales's grew by 36.31 per cent in 2023.

The Northern Territory has installed the highest share of SGUs with batteries despite the low number of total solar installations. Territorians coupled a battery with their solar systems in 42.23 per cent of the installations in 2023. This was followed by South Australia, where 17.60 per cent of its newly installed solar systems also had battery storage. All other states and territories had between 5-9 per cent of their solar systems installed with batteries.

Overall, Australia installed 8.44 per cent more batteries with solar systems in 2023 than in 2022, and we expect this number to continue increasing with newer registrations before the CER. Cumulatively, NSW has installed more batteries than any other state or territory with 20,184 solar systems installed with battery storage, accounting for 22.39 per cent of the national total, followed by SA with 19,883 (22.05 per cent) and Victoria with 19,539 (21.67 per cent). Battery installations are largely consistent with total solar system installation trends with two of the top three states who lead in rooftop solar also leaders in aggregating solar with battery systems.

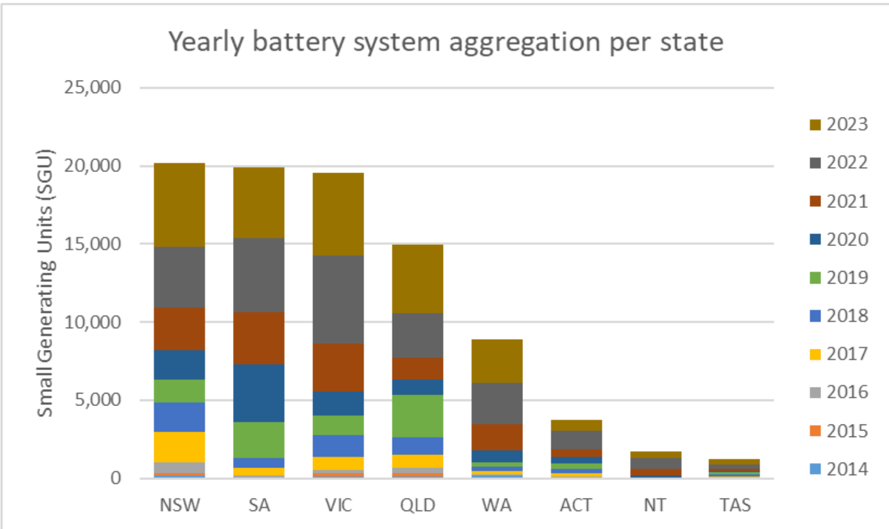
Although there are more installations in NSW, a possibly higher benefit from batteries may exist in SA which has shown high price volatility – the state has been more vulnerable than other regions to short-lived high magnitude price spikes, according to the Australian Energy Regulator[1]. The region experienced more frequent and severe high price events than other regions, but also had the most

[1] State of the Energy Market 2023, Australian Energy Regulator

instances of negative prices in the National Electricity Market in 2022-23, which could incentivise consideration of a battery-with-solar system.

The upfront costs of battery storage are considered to be an impediment to its uptake given the potentially long payback periods. As with rooftop solar, the uptake of batteries is likely to be encouraged by cost reductions in the technology. At the same time, government support programs, as well as arrangements like the orchestration of customer distributed energy resources (DER), such as solar and batteries, by electricity retailers, and potentially third-party aggregators, are likely to assist in encouraging further uptake of battery storage in the long term.

Figure 3. Cumulative battery installations in Australia per state



Source: AEC analysis of CER 2024 data

Government policies

A new PV rebate has been added to government policies in Victoria since the last report, while Queensland has just announced a Battery Booster rebate.

Table 2: Current government policies

State/ Territory	Policy Incentive (Solar & Battery)	Energy target
Australian Capital Territory	• Sustainable Household Scheme[2] provides zero-interest loans to help with the costs of energy-efficient upgrades, including solar panels and batteries.	• To deliver a 70 per cent cut in emissions by 2035 compared to 2005 levels • Net zero by 2050
New South Wales	• Rebate Swap for Solar: The program gives low-income homeowners the option to get a free 3kW solar system. • No specific policy for new solar or battery installations.	• 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 (reduced from $6,000) from 1 July 2023 [i]	• 50 per cent by 2030
Queensland	• Battery Booster rebate. A rebate up to $3,000 is available for households with a combined income of less than $180,000 to install an approved battery. A rebate up to $4,000 is available for households where the highest income earner earned $66,667 or less. • Applies to dwellings with minimum solar system capacity of 5kW.	• 50 per cent by 2030
South Australia	• No specific policy	• 100 per cent by 2030
Tasmania	• No specific policy	
Victoria	• 4,500 interest-free loans of up to $8,800 are available in 2023-24. • The solar homes program provides rebates of up to $1,400 towards the installation of solar panel systems.	• 65 per cent by 2030 • 95 per cent by 2035[3]
Western Australia	• No specific policy	

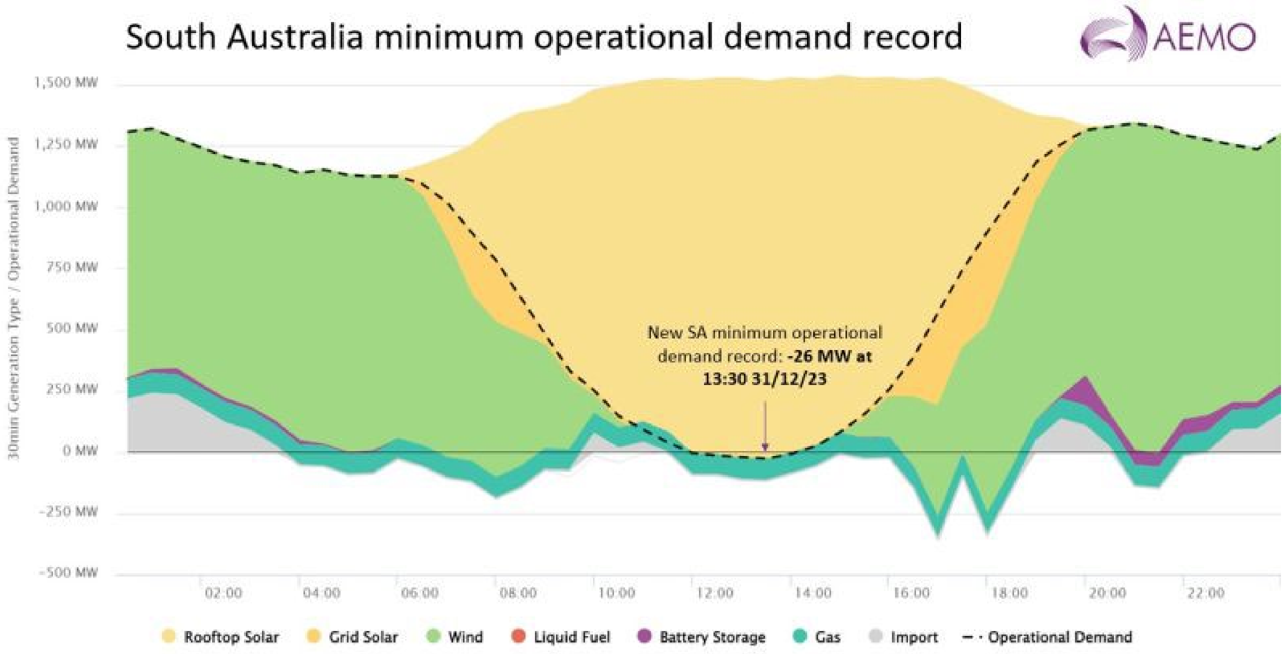
[2] Sustainable Household Scheme

[3] Victorian renewable energy and storage targets, page last updated 24 November, 2023

SECTION II: SOLAR GENERATION, SPOT PRICE, AND MINIMUM OPERATIONAL DEMAND

Lower operational demand records in several states continue to drop, as reported by Australian Energy Market Operator (AEMO). South Australia reported negative demand (-27 MW[4]) on 31 December 2023 and often deals with very low operational demand due to its high solar penetration.

Figure 4. Operational demand in South Australia – 31st of December 2023.



Source: AEMO, 2024.

Table 3. Monthly minimum demand per state. Years 2019, 2021, and 2023

	2019				2021				2023			
	NSW	QLD	SA	VIC	NSW	QLD	SA	VIC	NSW	QLD	SA	VIC
January	6,459	5,397	677	3,589	5,553	5,105	403	2,863	4,906	4,687	235	2,694
February	6,206	5,473	760	3,593	5,728	5,417	386	3,194	5,168	4,901	107	2,668
March	5,817	5,162	847	3,669	5,619	4,611	382	3,106	5,808	4,951	174	2,544
April	5,744	5,142	734	3,463	5,405	4,581	516	3,379	4,806	3,797	150	2,624
May	5,822	4,948	814	3,629	5,823	3,517	590	3,458	5,574	4,097	418	3,198
June	6,220	4,978	811	3,912	6,701	4,406	708	3,914	6,180	4,375	605	3,613
July	6,555	4,420	856	4,057	6,596	4,125	785	3,693	5,656	4,190	534	3,127
August	6,542	4,514	732	3,841	5,659	4,195	426	2,952	5,245	3,644	361	2,860
September	5,712	4,391	559	3,550	5,230	4,158	230	2,568	4,080	3,832	- 16	2,022
October	5,829	4,624	471	3,576	4,912	3,878	160	2,355	4,232	3,633	37	1,942
November	5,824	4,875	442	3,400	5,435	4,148	57	2,306	4,532	4,120	43	1,953
December	5,620	5,182	565	3,321	5,351	4,905	169	2,366	4,613	4,846	- 27	1,559
Yearly average	6,029	4,925	689	3,633	5,668	4,420	401	3,013	5,067	4,256	218	2,567

Source: AEC analysis of NEOExpress data, 2024.

[4] NEOExpress data

This reduction in operational demand is driven by the increasing number of rooftop solar installations that minimise or more than meet the demand of households and businesses in the middle of the day. The result in the NEM is that much less grid supply is required to meet demand, resulting in much lower (or at times negative) wholesale spot prices.

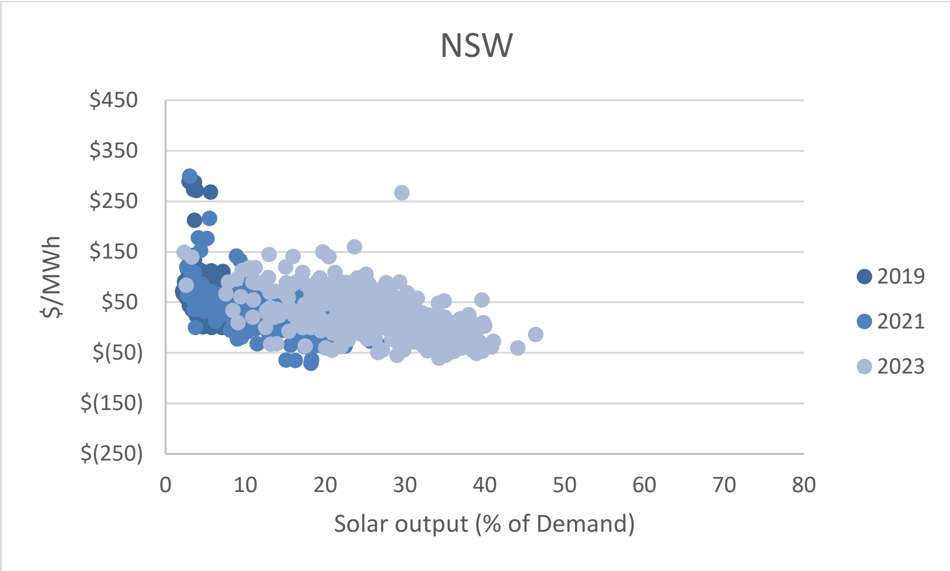
Utility-scale solar is also having a dampening effect on spot prices. Below we depict the growing frequency of negative pricing events and the occurrence of high utility-scale solar outputs correlated to spot prices at that time. We present the daily maximum solar semi-scheduled production as a share of the regional generation (operational demand + exports), and graph it against the spot price recorded at the time of maximum solar generation. We compare the calendar years 2019, 2021, and 2023, which shows a clear trend.

Note that we have used utility-scale solar as a share of generation as solar generators and others compete to supply and balance the operational demand and exports, while household solar PV does not participate directly in the price setting or auction process.

The overall trend

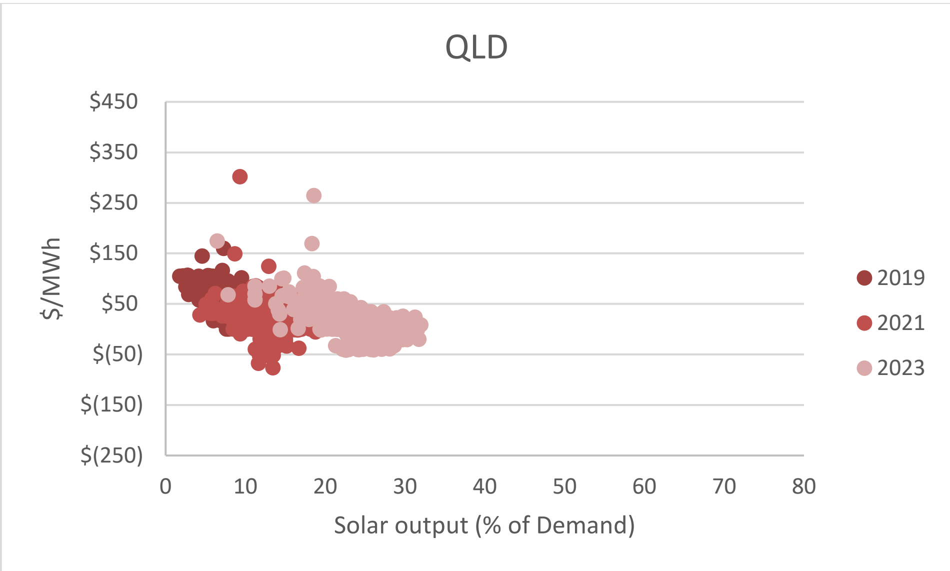
In NSW, Queensland, and SA solar output (both small- and utility-scale) captures a higher proportion of the generation in the middle of the day, comparing 2023 data to 2019 and 2021. On some days in 2023, solar reached almost 80 per cent of the supply in SA, up to 50 per cent of the grid supply in NSW, and more than 30 per cent in Qld. In contrast, in 2019, these shares of solar output maxed at 34.2 per cent, 9 per cent, 14.5 per cent, respectively.

Figure 5. Price at daily maximum solar output in NSW, years 2019, 2021, and 2023



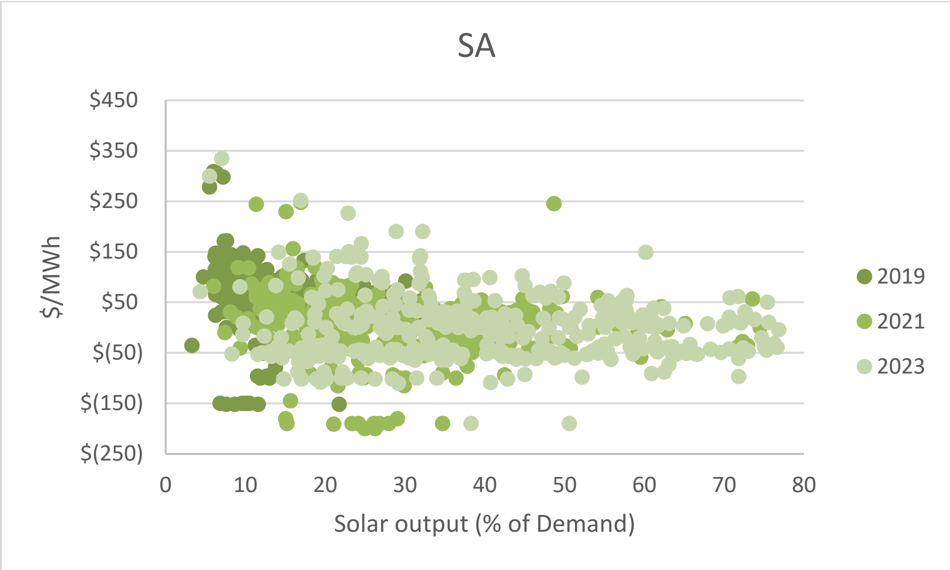
Source: AEC analysis based on NEOExpress data, 2024..

Figure 6. Price at daily maximum solar output in QLD, years 2019, 2021, and 2023



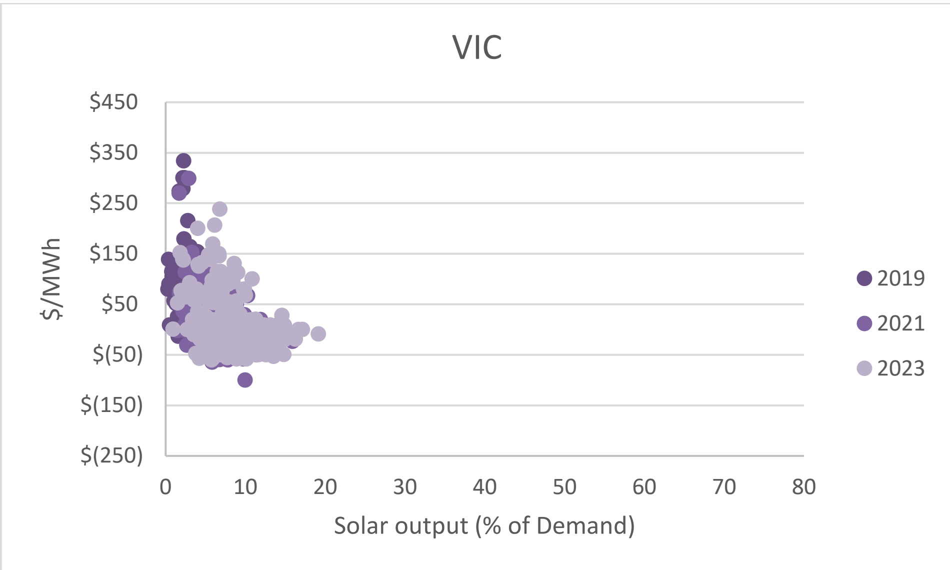
Source: AEC analysis based on NEOExpress data, 2024.

Figure 7. Price at daily maximum solar output in SA, years 2019, 2021, and 2023



Source: AEC analysis based on NEOExpress data, 2024..

Figure 8. Price at daily maximum solar output in VIC, years 2019, 2021, and 2023



Source: AEC, 2024 with data from NEOExpress, 2024.

Note: these graphs show the highest output of utility-scale solar, which is a key driver in lower spot prices. Other renewables such as wind could also be a factor in these lower spot prices.

Negative prices due to solar output

In all regions, we see a correlation between solar output and lower spot prices. This is the result of a cascade of rational actions in the wholesale electricity market. Firstly, solar (and wind) generators generally bid the lowest in the auction process of the electricity market and are dispatched ‘first’ due to their close-to-zero marginal costs. Finally, we see in these snapshots a declining operational demand to be met by more conventional generation where utility-scale solar and other renewables can supply. Periods of negative prices means some generators may actually pay to produce. Coal plants for example, may stay on because they cannot easily, or quickly, ramp up or ramp down and turning off and on cannot can be expensive and it can also be harmful to the future operation of the plant. Generators bidding negative prices may also be able to earn revenue from ancillary services, renewable energy certificates or from hedging contracts and offtake arrangements.

Evolution of negative prices

South Australia has the highest share of solar output in its generation mix compared to other states, as demonstrated in the graphs above. South Australia also has the lowest demand records at the time of maximum solar output, as shown in Table 3. They are followed by New South Wales, Queensland, and Victoria, on average solar output as a percentage of demand.

In Table 2, we see the number of negative price events due to the influence of solar generation. Based on the data for the graphs above, we have assessed the days where negative prices occurred resulting from solar availability. New South Wales and Queensland are the states with the least influence from solar in negative price events. However, they both saw almost 25 per cent of days in the year with negative price events during 2023. This figure has steadily grown from minimal or no events in 2019 in those states. South Australia and Victoria have more than 50 per cent of days in 2023 with negative prices due to solar generation.

Table 4. Count of negative pricing events at daily maximum solar generation, breakdown by month. Years 2019, 2021, and 2023

	2019				2021				2023			
	NSW	QLD	SA	VIC	NSW	QLD	SA	VIC	NSW	QLD	SA	VIC
January	0	0	0	0	0	0	11	15	4	1	19	26
February	0	0	1	0	0	0	10	11	0	1	17	18
March	0	0	0	0	0	4	6	5	1	6	20	19
April	0	0	3	0	5	5	6	10	5	7	13	17
May	0	1	2	0	0	3	3	9	1	5	5	3
June	0	0	0	1	0	3	3	3	1	2	11	8
July	0	1	0	1	2	4	3	8	9	8	12	14
August	0	0	7	1	8	7	17	18	7	14	17	14
September	0	0	7	0	13	16	21	22	18	16	19	21
October	0	1	2	0	10	4	25	27	18	17	20	20
November	0	0	1	1	4	1	14	13	11	9	23	17
December	0	0	1	6	3	0	16	19	11	3	20	18
Year total	0	3	24	10	45	47	135	160	86	89	196	195

Source: AEC analysis of NEOExpress data, 2024.

We can expect to continue to see a growing number of negative pricing events in upcoming years as more large-scale solar projects are commissioned and more rooftop solar is installed.

SECTION III: LEVELISED COST OF ELECTRICITY

The Levelised Cost of Electricity (LCOE) is the cost of energy per kilowatt hour (kWh) produced for a type of electricity generator. The LCOE helps to compare costs between different electricity sources like coal, wind, solar, etc. When the cost is equal to or below the price consumers pay directly to suppliers for electricity, this is called grid parity.

Table 5 shows the LCOE for rooftop solar in Australia's major cities, indicative retail prices and current Feed-in tariff (FiT) rates. A detailed methodology on how the LCOE was computed can be found in the Appendix.

The retail comparison rates are representative variable rates and do not include supply charges. That is, the rate is an energy-only price. 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 2023. Perth prices are regulated and obtained from Synergy. Hobart prices were obtained from Aurora Energy's Tariff 31, while Darwin prices were obtained from Jacana Energy's regulated residential usage charges. Tables 5, 6 and 7 show the LCOE across major cities at different discount rates.

Table 5. Central estimate: 4.99 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	$0.09	$0.08	$0.08	$0.08	$0.08	$0.42	$0.09
Brisbane	$0.10	$0.09	$0.09	$0.08	$0.08	$0.08	$0.31	$0.08
Canberra	$0.11	$0.09	$0.09	$0.08	$0.08	$0.08	$0.26	$0.10
Darwin	$0.11	$0.12	$0.11	$0.11	$0.11	$0.10	$0.28	$0.11
Hobart	$0.14	$0.13	$0.12	$0.12	$0.11	$0.12	$0.30	$0.11
Melbourne	$0.12	$0.11	$0.10	$0.10	$0.10	$0.09	$0.31	$0.07
Sydney	$0.11	$0.10	$0.09	$0.08	$0.09	$0.08	$0.35	$0.08
Perth	$0.09	$0.08	$0.08	$0.08	$0.08	$0.08	$0.31	$0.06

Source: AEC, January 2024

Table 6. Low cost of capital sensitivity: 6.54 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	$0.09	$0.09	$0.09	$0.09	$0.42	$0.09
Brisbane	$0.11	$0.10	$0.09	$0.09	$0.09	$0.09	$0.31	$0.08
Canberra	$0.12	$0.10	$0.09	$0.09	$0.09	$0.08	$0.26	$0.10
Darwin	$0.12	$0.13	$0.12	$0.12	$0.12	$0.11	$0.28	$0.11
Hobart	$0.15	$0.13	$0.13	$0.12	$0.12	$0.12	$0.30	$0.11
Melbourne	$0.13	$0.12	$0.11	$0.10	$0.10	$0.10	$0.31	$0.07
Sydney	$0.12	$0.10	$0.10	$0.09	$0.09	$0.09	$0.35	$0.08
Perth	$0.09	$0.08	$0.08	$0.08	$0.08	$0.09	$0.31	$0.06

Source: AEC, January 2024

Table 7. High cost of capital sensitivity: 19.99 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	$0.15	$0.14	$0.14	$0.14	$0.42	$0.09
Brisbane	$0.19	$0.17	$0.15	$0.14	$0.14	$0.14	$0.31	$0.08
Canberra	$0.21	$0.17	$0.15	$0.14	$0.14	$0.14	$0.26	$0.10
Darwin	$0.22	$0.23	$0.21	$0.21	$0.21	$0.19	$0.28	$0.11
Hobart	$0.27	$0.24	$0.22	$0.21	$0.21	$0.21	$0.30	$0.11
Melbourne	$0.23	$0.19	$0.18	$0.17	$0.17	$0.16	$0.31	$0.07
Sydney	$0.20	$0.17	$0.16	$0.14	$0.15	$0.14	$0.35	$0.08
Perth	$0.16	$0.14	$0.13	$0.13	$0.13	$0.14	$0.31	$0.06

Source: AEC, January 2024

Small and large businesses - Levelised cost of electricity

Tables 8 and 9 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 from residential retail tariffs. Depending on the size of the customer and the amount of energy used, businesses can negotiate lower prices. If a business were to consume all electricity onsite, the electricity prices in Tables 8 and 9 would represent the cost per kWh energy consumption 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 8. Central estimate: 5.35 per cent discount rate, ten-year average small business interest rate

All figures in c/KWh	System Size				
	10kW	30kW	50kW	70kW	100kW
Adelaide	9.09 c/kWh	8.83 c/kWh	9.26 c/kWh	9.11 c/kWh	8.45 c/kWh
Brisbane	8.90 c/kWh	8.57 c/kWh	8.89 c/kWh	8.83 c/kWh	8.44 c/kWh
Canberra	8.43 c/kWh	8.79 c/kWh	8.70 c/kWh	8.49 c/kWh	8.30 c/kWh
Hobart	11.77 c/kWh	10.04 c/kWh	10.18 c/kWh	10.13 c/kWh	9.31 c/kWh
Melbourne	10.14 c/kWh	9.71 c/kWh	10.02 c/kWh	9.73 c/kWh	9.39 c/kWh
Sydney	9.72 c/kWh	8.91 c/kWh	9.39 c/kWh	9.09 c/kWh	8.70 c/kWh
Perth	8.98 c/kWh	8.36 c/kWh	9.11 c/kWh	8.40 c/kWh	8.03 c/kWh

Source: AEC, January 2024

Table 9. Central estimate: 2.77 per cent discount rate, ten-year average large business interest rate

All figures in c/KWh	System Size				
	10kW	30kW	50kW	70kW	100kW
Adelaide	8.21 c/kWh	8.00 c/kWh	8.36 c/kWh	8.23 c/kWh	7.69 c/kWh
Brisbane	8.05 c/kWh	7.79 c/kWh	8.05 c/kWh	8.00 c/kWh	7.69 c/kWh
Canberra	7.66 c/kWh	7.95 c/kWh	7.87 c/kWh	7.70 c/kWh	7.55 c/kWh
Hobart	10.56 c/kWh	9.15 c/kWh	9.26 c/kWh	9.22 c/kWh	8.55 c/kWh
Melbourne	9.20 c/kWh	8.85 c/kWh	9.10 c/kWh	8.86 c/kWh	8.59 c/kWh
Sydney	8.79 c/kWh	8.12 c/kWh	8.52 c/kWh	8.27 c/kWh	7.95 c/kWh
Perth	8.09 c/kWh	7.58 c/kWh	8.19 c/kWh	7.61 c/kWh	7.31 c/kWh

Source: AEC, January 2024

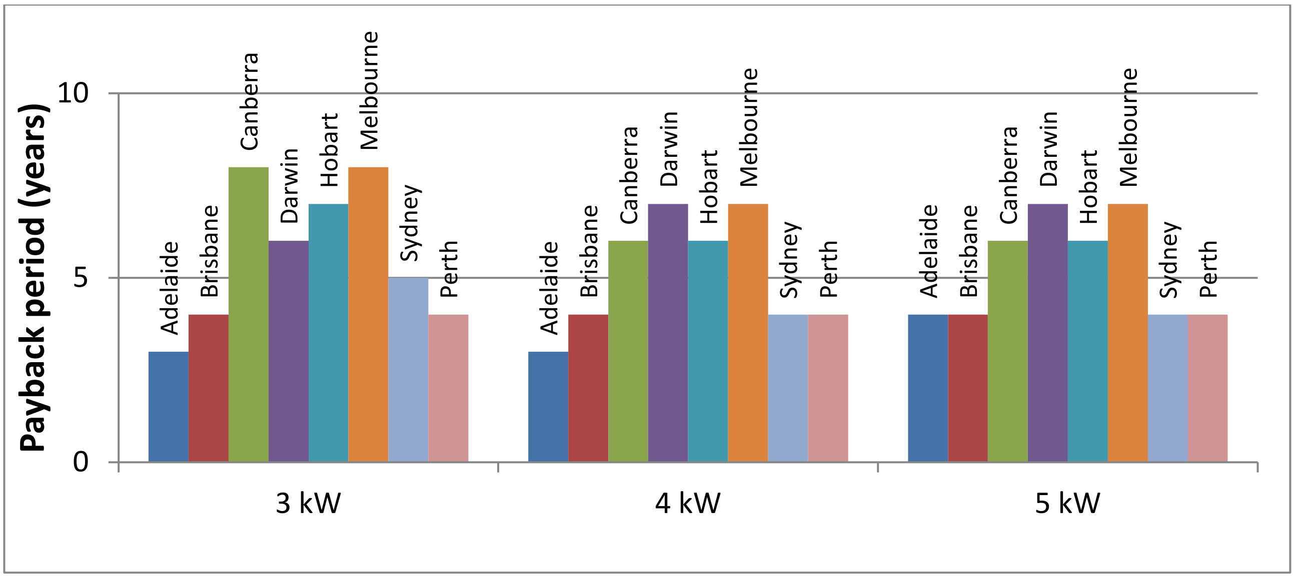
SECTION IV: PAYBACK PERIOD, DETAILED MODEL

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.

Although installing solar panels typically involves an initial investment, customers who have them, benefit from future 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. Nevertheless, it's essential to note that solar feed-in tariff rates have declined in all regions nationwide. When selecting an energy plan, customers with solar panels should assess their choices based on their historical electricity consumption and the amount of solar energy they export. It's important to remember that 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.

Figure 9 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. The low payback periods across many cities highlight the reason behind the continuous support of customers to install solar PV. However, the persistent high interest rates in Australia, along with minimal price differences in the cost of the systems, do not significantly impact the payback period compared to the previous quarter.

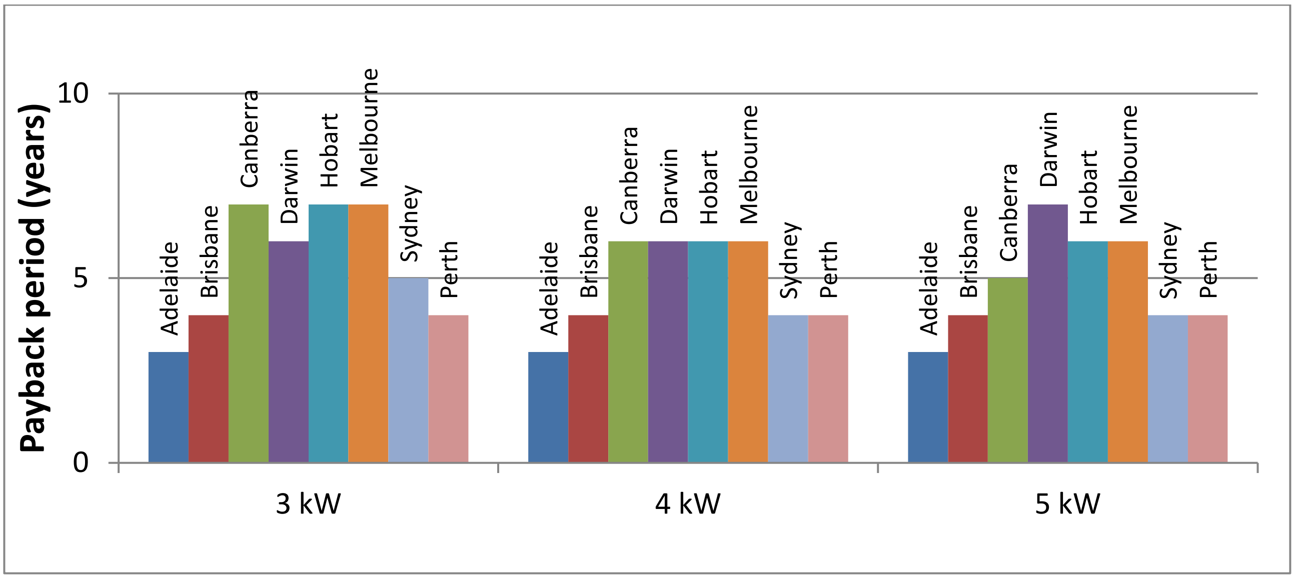
Figure 9. The payback period for solar PV (6.54 per cent discount rate)



Source: AEC, January 2024

Figure 10 shows the expected payback period for systems with a 4.99 per cent discount rate (10-year average home loan rate). Most capital cities' payback period falls between 5 - 7 years inclusive. However, we have Adelaide, with a 3-year payback period, as the best place to produce returns installing solar. Since the costs of electricity are high, solar panels are cheap, and solar irradiation is excellent in this place, the benefits of installing solar are evident. With a similar situation, we have Brisbane in second place with payback periods of 4 years.

Figure 10. The payback period for solar PV (4.99 per cent discount rate)



Source: AEC, January 2024

SECTION V: METHODOLOGY APPENDIX

1. Solar installation 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 of 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 to 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. The key difference to LCOE calculation is that the payback period assumes no annual maintenance cost.

Calculation

The payback period occurs when ∑ savings > ∑ cost

Where:

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

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

t = years

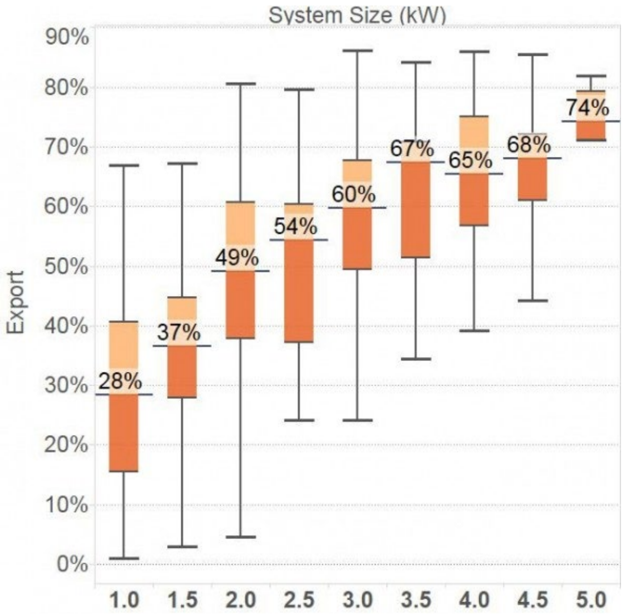
Avoided cost and FiT

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[iii]. See Figure 11 below.

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



Source: Sunwiz's analysis, 2015

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[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.