

SOLAR REPORT QUARTER 2, 2019

Australian Energy Council



Table of contents

SEC	TION I:	STATE OF SOLAR PV IN AUSTRALIA	.3
SEC	TION II:	BEHIND THE METER PV SYSTEMS IN WESTERN AUSTRALIA	.7
SEC	TION III:	LEVELISED COST OF ENERGY	0
SEC	TION IV:	PAYBACK PERIOD, DETAILED MODEL	13
SEC	TION V:	METHODOLOGY APPENDIX	15
1.	Solar inst	allations methodology	15
2.	Levelised	Cost of Electricity Methodology	15
3.	Payback	period methodology	17

SECTION I: STATE OF SOLAR PV IN AUSTRALIA

As at 30 June 2019 the total installed capacity of rooftop solar PV in Australia is now close to exceeding 9.0 GW, representing more than 2.1 million installations (according to latest data from the Clean Energy Regulator (CER) – 17 July 2019).

The average system size has continued to rise to reach 8kW this year, as technology matures and installation and unit costs decline.





Source: Clean Energy Regulator (adjusted data), Australian Energy Council analysis, data as at 30 June 2019

Shown in figure 1, the installed capacity of residential scale solar PV has steadily increased in a seasonal pattern from the end of 2016, with a dip in January each year followed by progressive upward movement to reach a cumulative installed capacity of around 170 MW as of June 2019.

Since the beginning of 2019 the monthly average unit size is 0.5 kW higher than the previous corresponding month of 2018. This compares to 2018 and 2017, when the monthly average unit size is roughly 1 kW higher than previous corresponding period. This highlights that while 2018 was a particularly strong year for rooftop PV in Australia, households and small businesses are still opting for a bigger-scale system with a steady increase in the number of installations.



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

Similarly in figure 2, since late 2016, the two trend lines continue to widen - showing that bigger PV system units are being installed across the nation. Specifically, the rolling average installed capacity (blue line) has steadily grown, to reach an estimated six-month average of more than 160 MW on rooftops as of June 2019ⁱ.

Many jurisdictions in the national electricity market (NEM) have established, or are developing, programs to incentivise the uptake of energy technology. Many zero-interest and state government solar schemes were rolled-out in the last quarter of 2018. The highlighted green section, shown in figure 3 below, illustrates the surge of solar installations, recording peak installations within each jurisdiction during November 2018. Victoria is currently leading the states in monthly solar installations (overtaking New South Wales and Queensland since October 2018) this is expected to be due to the state's Solar Homes Program.

Source: Clean Energy Regulator data, Australian Energy Council analysis, data as at 30 June 2019



Figure 3: Monthly rooftop PV installations by states

Note: The most recent three months in figure 3 underestimate the data and shall not be include in analysis. Source: Clean Energy Regulator (unadjusted data), data as at 30 June 2019

Battery installations with rooftop solar

Australia's market for home energy storage is increasingly growing. From 2016 to 2018 New South Wales and Victoria were the leading states in solar and battery storage installations. However, 2019 has seen a shift with Queensland now leading the way, followed by New South Wales (figure 4).

This national rise has been helped by different incentives from electricity retailers for households to sell their energy to the grid, as well as various state government schemes for the installation of residential solar with battery storage.

Current state government schemes and rebates for solar panels and solar battery storage include:

- New South Wales: The Empowering Homes Program will support the installation of up to 300,000 households across the state with zero interest loans to purchase solar and battery systemsⁱⁱ.
- Victoria: The Solar Homes Program offers up to 1000 rebates of up to \$4,838 for a solarbattery system in 2019-20ⁱⁱⁱ.
- South Australia: The Home Battery Scheme offers rebates to around 40,000 households with the grant of up to \$6,000 for a home solar battery^{iv}.

Due to the lag period for households to report their installations to the CER, in figure 4, the 2019 half-year data does not provide a full picture of solar-battery installations. Yet Queensland is charging ahead of New South Wales and Victoria in 2019, accounting for 43.2 per cent of total installations at the time of reporting. This rise is due to the Queensland Government's scheme, introduced in November 2018, in which Queenslanders can apply for interest-free loans of up to \$10,000 and grants of \$3000 to purchase batteries or combined solar-battery systems^v. Approved applications will have six months to install an eligible system. As at the end of the 2019 financial year, the state program has now closed and experienced high demand.



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

Source: Clean Energy Regulator data, Australian Energy Council analysis, data as at 30 June 2019

SECTION II: BEHIND THE METER PV SYSTEMS IN WESTERN AUSTRALIA

In its latest report on the Wholesale Electricity Market Electricity Statement of Opportunity (WEM ESOO), the Australian Energy Market Operator (AEMO) said for the first time that electricity demand in the South West Interconnected System (SWIS) is forecast to fall at an annual average rate of 0.4 per cent. In comparison to the 2018 WEM ESOO, electricity demand was estimated to grow 0.9 per cent due to an increase of energy consumption from the state's growing population. The continued strong uptake of solar PV capacity and improvements in energy efficiency are the two key factors supressing peak demand and operational consumption growth.

Western Australia renewable energy generation increased from 14 per cent in 2017 to 16.2 per cent in 2018^{vi}. To date, the state has lagged behind the rest of Australia in the clean energy space due to the absence of a renewable energy target or emissions target^{vii}. Though the state does not have a large amount of large-scale wind and solar, Western Australia does rival South Australia in its uptake of rooftop solar PV by households and small businesses. The paradigm shift in the South-West power system are in line with those observed in other electricity systems including the NEM.

Figure 5 shows rooftop generation and grid demand changes on a hot summer day in Western Australia and South Australia. Comparing both states, the underlying demand has been offset by PV generation, shifting the peak to later in the day. Underlying demand refers to all electricity consumed on site and can be provided by localised generation from behind the meter PV, battery storage, and embedded generators, or by the electricity grid (AEMO's definition).



Figure 5: Demand and behind the meter PV generation on the peak demand day during 2018-19

SWIS peak demand

According to AEMO's ESOO, peak demand in the SWIS was recorded at a record high of 4,004 MW in 2015-16. Over the previous seven years, average of peak demand remained close to 3,700 MW.

The summer of 2018-19 recorded the lowest peak observed in the SWIS since 2006, which sees a significant drop of 10 per cent from 3,616 MW in 2017-18 to 3,256 MW in 2018-19 (figure 6). AEMO states that the unusually low 2018-19 peak demand highlights the impact of behind the meter PV systems and the timing of very hot days with a maximum temperature of over 40°C. Batteries are also said to influence the timing of peak demand, however, there are currently no incentives offered to discharge around peak times in SWIS, so this influence is expected to be relatively small, according to the report.



Figure 6: Comparison of peak demand from 2011-12 to 2018-19 financial year

With more than one in four homes in the south-west grid now having a solar system (figure 6), AEMO estimates rooftop solar will reach around 2,500 MW of installed capacity by 2028-29.

Source: Australian Energy Council's Analysis on AEMO ESOO 2019



Figure 7: Penetration rate of residential rooftop solar across financial years

Source: Australian Energy Council analysis, June 2019

The rapid uptake of behind the meter PV in 2018, which includes both rooftop solar and large-scale systems is transforming the South West's power system. As a result, both peak demand and operational consumption growth remain subdued. While the rate of peak demand growth has evidently decreased, it is still forecast to grow slowly over the outlook period to 2029 due to economic growth and the addition of new coming online of desalination plants and large mines. Operational consumption is forecast to reduce from behind the meter PV by 3,432 gigawatt hours (GWh) by the end of the forecast period (the 2028-29 financial year).

SECTION III: LEVELISED COST OF ENERGY

The Levelised Cost of Energy (LCOE) is the cost of energy per kWh produced. When this is equal to or below the cost consumers pay directly to suppliers for electricity, this is called grid parity. Table 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 2018 for most states, with Victorian offer was last updated in January 2019. 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.

The tables on the next page use the highest offer of the lower range of FiTs among retailers in different states. For example, in Canberra, Energy Locals is one of the four retailers offering FiTs ranging from 10 c/kWh to 16 c/kWh for consumers exporting back to the grid. Energy Locals has the best lowest FiT offer, in other words, other retailers offer lower than 9 c/kWh. This however does not mean it is the best deal of FiT, other retailers in Canberra are offering up to 20 c/kWh for their maximum FiT. This FiT rate is offered depending on household consumption and exporting rates.

All figures			Retail	FIT					
III Ş/ KVVII	1.5 kW	3 kW	4 kW	5 kW	6 kW	7 kW	10 kW	prices	
Adelaide	\$0.15	\$0.11	\$0.10	\$0.10	\$0.09	\$0.10	\$0.10	\$0.48	\$0.16
Brisbane	\$0.17	\$0.12	\$0.11	\$0.11	\$0.10	\$0.11	\$0.10	\$0.31	\$0.16
Canberra	\$0.15	\$0.12	\$0.11	\$0.10	\$0.09	\$0.10	\$0.09	\$0.23	\$0.13
Darwin	\$0.24	\$0.18	\$0.16	\$0.16	\$0.14	\$0.14	\$0.13	\$0.26	\$0.24
Hobart	\$0.19	\$0.15	\$0.15	\$0.13	\$0.14	\$0.14	\$0.16	\$0.26	\$0.09
Melbourne	\$0.20	\$0.14	\$0.13	\$0.12	\$0.11	\$0.12	\$0.12	\$0.28	\$0.15
Sydney	\$0.18	\$0.13	\$0.11	\$0.11	\$0.10	\$0.11	\$0.11	\$0.27	\$0.15
Perth	\$0.14	\$0.10	\$0.09	\$0.08	\$0.08	\$0.09	\$0.10	\$0.28	\$0.07

Table T. Central estimate. 0.15 per cent discount rate (ten-year average mortgage rat	Table 1: Central estimate: 6.13	per cent discount rate (ten	-year average mortgage rate
---	---------------------------------	-----------------------------	-----------------------------

Source: Australian Energy Council analysis, July 2019

		Sy	stem Siz	е	Retail	FIT		
1.5 kW	3 kW	4 kW	5 kW	6 kW	7 kW	10 kW	prices	
\$0.14	\$0.11	\$0.10	\$0.09	\$0.09	\$0.09	\$0.09	\$0.48	\$0.16
\$0.16	\$0.12	\$0.11	\$0.10	\$0.10	\$0.10	\$0.10	\$0.31	\$0.16
\$0.14	\$0.11	\$0.10	\$0.09	\$0.09	\$0.09	\$0.09	\$0.23	\$0.13
\$0.22	\$0.17	\$0.15	\$0.15	\$0.13	\$0.13	\$0.12	\$0.26	\$0.24
\$0.18	\$0.14	\$0.14	\$0.13	\$0.13	\$0.13	\$0.15	\$0.26	\$0.09
\$0.19	\$0.13	\$0.12	\$0.11	\$0.11	\$0.11	\$0.11	\$0.28	\$0.15
\$0.17	\$0.12	\$0.11	\$0.10	\$0.10	\$0.11	\$0.10	\$0.27	\$0.15
\$0.13	\$0.10	\$0.09	\$0.08	\$0.08	\$0.09	\$0.09	\$0.28	\$0.07
	1.5 kW \$0.14 \$0.16 \$0.14 \$0.22 \$0.18 \$0.19 \$0.17 \$0.13	1.5 kW 3 kW \$0.14 \$0.11 \$0.16 \$0.12 \$0.14 \$0.11 \$0.22 \$0.17 \$0.18 \$0.14 \$0.19 \$0.13 \$0.17 \$0.12	Sy 1.5 kW 3 kW 4 kW \$0.14 \$0.11 \$0.10 \$0.16 \$0.12 \$0.11 \$0.16 \$0.12 \$0.11 \$0.16 \$0.12 \$0.11 \$0.16 \$0.12 \$0.11 \$0.18 \$0.17 \$0.15 \$0.18 \$0.14 \$0.14 \$0.19 \$0.13 \$0.12 \$0.17 \$0.12 \$0.11 \$0.19 \$0.13 \$0.12 \$0.13 \$0.10 \$0.09	System Size 1.5 kW 3 kW 4 kW 5 kW \$0.14 \$0.11 \$0.10 \$0.09 \$0.16 \$0.12 \$0.11 \$0.10 \$0.14 \$0.12 \$0.11 \$0.10 \$0.16 \$0.12 \$0.11 \$0.10 \$0.14 \$0.11 \$0.10 \$0.09 \$0.15 \$0.15 \$0.15 \$0.18 \$0.14 \$0.13 \$0.12 \$0.19 \$0.13 \$0.12 \$0.11 \$0.17 \$0.12 \$0.11 \$0.10 \$0.19 \$0.13 \$0.12 \$0.11 \$0.17 \$0.12 \$0.11 \$0.10 \$0.18 \$0.14 \$0.13 \$0.12 \$0.17 \$0.12 \$0.11 \$0.10 \$0.17 \$0.12 \$0.11 \$0.10 \$0.17 \$0.12 \$0.11 \$0.10	System Size 1.5 kW 3 kW 4 kW 5 kW 6 kW \$0.14 \$0.11 \$0.10 \$0.09 \$0.09 \$0.16 \$0.12 \$0.11 \$0.10 \$0.09 \$0.14 \$0.11 \$0.10 \$0.09 \$0.09 \$0.16 \$0.12 \$0.11 \$0.10 \$0.10 \$0.14 \$0.11 \$0.10 \$0.09 \$0.09 \$0.12 \$0.11 \$0.10 \$0.09 \$0.09 \$0.12 \$0.11 \$0.10 \$0.10 \$0.10 \$0.12 \$0.11 \$0.10 \$0.13 \$0.13 \$0.18 \$0.14 \$0.14 \$0.13 \$0.13 \$0.19 \$0.13 \$0.12 \$0.11 \$0.10 \$0.17 \$0.12 \$0.11 \$0.10 \$0.10 \$0.17 \$0.12 \$0.11 \$0.10 \$0.10 \$0.17 \$0.12 \$0.11 \$0.08 \$0.08 \$0.13 \$0.10 \$0.09 \$0.80 <t< th=""><th>System Size 1.5 kW 3 kW 4 kW 5 kW 6 kW 7 kW \$0.14 \$0.11 \$0.10 \$0.09 \$0.09 \$0.09 \$0.16 \$0.12 \$0.11 \$0.10 \$0.10 \$0.10 \$0.14 \$0.11 \$0.10 \$0.09 \$0.09 \$0.09 \$0.16 \$0.12 \$0.11 \$0.10 \$0.10 \$0.10 \$0.14 \$0.11 \$0.10 \$0.09 \$0.09 \$0.09 \$0.22 \$0.17 \$0.15 \$0.13 \$0.13 \$0.18 \$0.14 \$0.14 \$0.13 \$0.13 \$0.13 \$0.18 \$0.14 \$0.14 \$0.13 \$0.13 \$0.13 \$0.19 \$0.13 \$0.12 \$0.11 \$0.11 \$0.11 \$0.19 \$0.13 \$0.12 \$0.11 \$0.10 \$0.11 \$0.17 \$0.12 \$0.11 \$0.10 \$0.11 \$0.11 \$0.13 \$0.09 \$0.08 \$0.08 \$0.09</th><th>System Size 1.5 kW 3 kW 4 kW 5 kW 6 kW 7 kW 10 kW \$0.14 \$0.11 \$0.10 \$0.09 \$0.09 \$0.09 \$0.09 \$0.16 \$0.12 \$0.11 \$0.00 \$0.10 \$0.10 \$0.10 \$0.14 \$0.12 \$0.11 \$0.10 \$0.10 \$0.10 \$0.10 \$0.14 \$0.12 \$0.11 \$0.09 \$0.09 \$0.09 \$0.09 \$0.14 \$0.11 \$0.10 \$0.09 \$0.09 \$0.09 \$0.09 \$0.14 \$0.11 \$0.10 \$0.09 \$0.09 \$0.09 \$0.09 \$0.22 \$0.17 \$0.15 \$0.13 \$0.13 \$0.12 \$0.18 \$0.14 \$0.13 \$0.13 \$0.13 \$0.15 \$0.18 \$0.14 \$0.14 \$0.13 \$0.13 \$0.13 \$0.19 \$0.13 \$0.12 \$0.11 \$0.11 \$0.11 \$0.17 \$0.12 \$0.11 \$0.10</th><th>System SizeRetail prices1.5 kW3 kW4 kW5 kW6 kW7 kW10 kW\$0.14\$0.11\$0.10\$0.09\$0.09\$0.09\$0.09\$0.09\$0.16\$0.12\$0.11\$0.10\$0.10\$0.10\$0.10\$0.10\$0.14\$0.11\$0.10\$0.09\$0.09\$0.09\$0.09\$0.09\$0.14\$0.11\$0.10\$0.09\$0.09\$0.09\$0.09\$0.09\$0.12\$0.11\$0.15\$0.13\$0.13\$0.13\$0.12\$0.26\$0.18\$0.14\$0.13\$0.13\$0.13\$0.15\$0.26\$0.19\$0.13\$0.12\$0.11\$0.11\$0.11\$0.11\$0.28\$0.17\$0.12\$0.11\$0.10\$0.10\$0.11\$0.10\$0.27\$0.13\$0.14\$0.19\$0.10\$0.10\$0.11\$0.10\$0.28\$0.19\$0.13\$0.12\$0.11\$0.10\$0.11\$0.11\$0.28\$0.17\$0.12\$0.11\$0.10\$0.10\$0.11\$0.10\$0.28\$0.13\$0.14\$0.15\$0.15\$0.15\$0.15\$0.15\$0.16\$0.18\$0.19\$0.10\$0.10\$0.10\$0.10\$0.10\$0.28\$0.14\$0.15\$0.08\$0.08\$0.09\$0.09\$0.28\$0.15\$0.15\$0.15\$0.15\$0.16\$0.16\$0.16\$0.13\$0.16\$0.16\$0.16\$0.16\$0.16</th></t<>	System Size 1.5 kW 3 kW 4 kW 5 kW 6 kW 7 kW \$0.14 \$0.11 \$0.10 \$0.09 \$0.09 \$0.09 \$0.16 \$0.12 \$0.11 \$0.10 \$0.10 \$0.10 \$0.14 \$0.11 \$0.10 \$0.09 \$0.09 \$0.09 \$0.16 \$0.12 \$0.11 \$0.10 \$0.10 \$0.10 \$0.14 \$0.11 \$0.10 \$0.09 \$0.09 \$0.09 \$0.22 \$0.17 \$0.15 \$0.13 \$0.13 \$0.18 \$0.14 \$0.14 \$0.13 \$0.13 \$0.13 \$0.18 \$0.14 \$0.14 \$0.13 \$0.13 \$0.13 \$0.19 \$0.13 \$0.12 \$0.11 \$0.11 \$0.11 \$0.19 \$0.13 \$0.12 \$0.11 \$0.10 \$0.11 \$0.17 \$0.12 \$0.11 \$0.10 \$0.11 \$0.11 \$0.13 \$0.09 \$0.08 \$0.08 \$0.09	System Size 1.5 kW 3 kW 4 kW 5 kW 6 kW 7 kW 10 kW \$0.14 \$0.11 \$0.10 \$0.09 \$0.09 \$0.09 \$0.09 \$0.16 \$0.12 \$0.11 \$0.00 \$0.10 \$0.10 \$0.10 \$0.14 \$0.12 \$0.11 \$0.10 \$0.10 \$0.10 \$0.10 \$0.14 \$0.12 \$0.11 \$0.09 \$0.09 \$0.09 \$0.09 \$0.14 \$0.11 \$0.10 \$0.09 \$0.09 \$0.09 \$0.09 \$0.14 \$0.11 \$0.10 \$0.09 \$0.09 \$0.09 \$0.09 \$0.22 \$0.17 \$0.15 \$0.13 \$0.13 \$0.12 \$0.18 \$0.14 \$0.13 \$0.13 \$0.13 \$0.15 \$0.18 \$0.14 \$0.14 \$0.13 \$0.13 \$0.13 \$0.19 \$0.13 \$0.12 \$0.11 \$0.11 \$0.11 \$0.17 \$0.12 \$0.11 \$0.10	System SizeRetail prices1.5 kW3 kW4 kW5 kW6 kW7 kW10 kW\$0.14\$0.11\$0.10\$0.09\$0.09\$0.09\$0.09\$0.09\$0.16\$0.12\$0.11\$0.10\$0.10\$0.10\$0.10\$0.10\$0.14\$0.11\$0.10\$0.09\$0.09\$0.09\$0.09\$0.09\$0.14\$0.11\$0.10\$0.09\$0.09\$0.09\$0.09\$0.09\$0.12\$0.11\$0.15\$0.13\$0.13\$0.13\$0.12\$0.26\$0.18\$0.14\$0.13\$0.13\$0.13\$0.15\$0.26\$0.19\$0.13\$0.12\$0.11\$0.11\$0.11\$0.11\$0.28\$0.17\$0.12\$0.11\$0.10\$0.10\$0.11\$0.10\$0.27\$0.13\$0.14\$0.19\$0.10\$0.10\$0.11\$0.10\$0.28\$0.19\$0.13\$0.12\$0.11\$0.10\$0.11\$0.11\$0.28\$0.17\$0.12\$0.11\$0.10\$0.10\$0.11\$0.10\$0.28\$0.13\$0.14\$0.15\$0.15\$0.15\$0.15\$0.15\$0.16\$0.18\$0.19\$0.10\$0.10\$0.10\$0.10\$0.10\$0.28\$0.14\$0.15\$0.08\$0.08\$0.09\$0.09\$0.28\$0.15\$0.15\$0.15\$0.15\$0.16\$0.16\$0.16\$0.13\$0.16\$0.16\$0.16\$0.16\$0.16

Table 2: Low cost of capital sensitivity: 4.72 per cent discount rate (low current standard variable rate)

Source: Australian Energy Council analysis, July 2019

Table 3: High cost of capital sensitivity: 13.32 per cent discount rate (indicative personal loan rate)

All figures		Retail	FIT						
III Ş/ KVVII	1.5 kW	3 kW	4 kW	5 kW	6 kW	7 kW	10 kW	prices	
Adelaide	\$0.21	\$0.15	\$0.14	\$0.13	\$0.12	\$0.13	\$0.13	\$0.48	\$0.16
Brisbane	\$0.24	\$0.17	\$0.15	\$0.14	\$0.13	\$0.14	\$0.14	\$0.31	\$0.16
Canberra	\$0.21	\$0.15	\$0.15	\$0.13	\$0.12	\$0.13	\$0.12	\$0.23	\$0.13
Darwin	\$0.34	\$0.26	\$0.23	\$0.22	\$0.20	\$0.19	\$0.17	\$0.26	\$0.24
Hobart	\$0.27	\$0.21	\$0.20	\$0.18	\$0.19	\$0.19	\$0.21	\$0.26	\$0.09
Melbourne	\$0.28	\$0.19	\$0.17	\$0.15	\$0.15	\$0.16	\$0.15	\$0.28	\$0.15
Sydney	\$0.26	\$0.17	\$0.15	\$0.14	\$0.14	\$0.15	\$0.14	\$0.27	\$0.15
Perth	\$0.19	\$0.13	\$0.12	\$0.11	\$0.10	\$0.12	\$0.12	\$0.28	\$0.07

Source: Australian Energy Council analysis, July 2019

Small and large business - Levelised Cost of Electricity

Tables 4 and 5 show the estimated cost of electricity production for commercial-size solar systems. As businesses look to reduce overhead costs, installation of large-scale solar panels continue to increase.

Business tariffs differ to residential retail tariffs. Depending on the size of the customer and the amount of energy used, businesses have the ability to negotiate lower prices. If a business was to consume all electricity onsite, the electricity prices in Tables 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. For comparison, the average electricity bill for industrial businesses in 2014-15 was 10.72 c/kWh^{viii.}

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

Table 4:	Central	estimate:	6.85	per	cent	discount	rate,	ten-year	average	small	business
interest ra	ate										

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

Source: Australian Energy Council analysis, July 2019

Table 5: Central estimate: 4.79 per cent discount rate, ten-year average large business interest rate

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

Source: Australian Energy Council analysis, July 2019

SECTION IV: PAYBACK PERIOD, DETAILED MODEL

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

Figure 8 highlights the payback period for different system sizes across Australia. Note that electricity prices are increased at consumer price index (CPI) levels (currently 1.3 per cent, last updated June 2019 according to the Reserve Bank of Australia) and any changes to CPI will affect the payback period. Many retailers offer higher solar FiTs, which help to offset the impact of higher prices in some states and deliver savings to customers with solar panels, for example, in Darwin, where the offered FiT is 23.7 c/kWh.





Source: Australian Energy Council analysis, July 2019

Figure 8 shows a bigger system unit will cost more initially with the range of FiTs offered from retailers, though the cost will be recovered faster than a 1.5 kW system, hence lowering the payback periods through the credits from the energy export back to the grid. For a 3 kW or bigger system, Darwin is no longer the state has the longest payback period though the system cost is at least 50

per cent more expensive than Hobart's system price. This is due to the FiT currently offering 23.5 cents by one major Northern Territory retailer.

Figure 9 shows that the expected payback period for systems with a 6.13 per cent discount rate (10year average home loan rate). Similarly, the trends in both figures 8 and 9 show that the bigger the system, the lower the number of years a customer will have to pay back the costs of installation.





Source: Australian Energy Council analysis, July 2019

SECTION V: METHODOLOGY APPENDIX

1. Solar installations methodology

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

2. Levelised Cost of Electricity Methodology

Introduction

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

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

Initial investment

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

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

Annual costs

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

Discount rate

The discount rate represents the risk nature of the consumer. For this exercise, three different discount rates have been used and will be updated each quarter. The central estimate is based on the 10-year average home loan, as presented by the Reserve Bank of Australia (6.13 per cent).

The low discount rate sensitivity is based on the minimum variable home loan mortgage rate offered by the Big Four banks (currently 4.72 per cent).

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

Small business and large business discount rates are based on the 10-year average of the variable weighted average rate on credit outstanding. The large business discount rate is 4.79 per cent and the small business discount rate is 6.85 per cent.

The discount rate also takes into account the Consumer Price Index (CPI); this has been given a constant value of 1.3 per cent (according to Australian Bureau of Statistics, March 2019).

Efficiency

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

System degradation rate

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

Formula

Retail comparison rates

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

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

3. Payback period methodology

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

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

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

Calculation

Payback period occurs when \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's analysis^{xii} (see figure 10)





Source: Sunwiz analysis, 2015

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

ⁱⁱ <u>https://energy.nsw.gov.au/renewables/clean-energy-initiatives/empowering-homes</u>

ⁱⁱⁱ <u>https://www.solar.vic.gov.au/solar-battery-rebate</u>

^{iv} <u>https://www.sa.gov.au/topics/energy-and-environment/energy-efficient-home-design/solar-photovoltaic-systems</u>

<u>https://www.qld.gov.au/community/cost-of-living-support/concessions/energy-concessions/solar-battery-rebate/about-the-program</u>

^{vi} 2019 Annual Report, Clean Energy Council

^{vii} 2019 Annual Report, Clean Energy Council

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

^{ix} Clean Energy Regulator, How to have STCs assigned to you as a Registered Agent,

http://ret.cleanenergyregulator.gov.au/For-Industry/Agents/Having-STCs-assigned-to-you/stcs-assigned-to-you * Estimate based on RenewEconomy, 26 August 2013, <u>http://reneweconomy.com.au/2013/hidden-cost-of-rooftop-solar-who-should-pay-for-maintenance-99200</u>

^{xi} Clean Energy Council, <u>https://www.solaraccreditation.com.au/consumers/purchasing-your-solar-pv-system/how-solar-pv-works.html</u>

^{xii} Sunwiz, <u>Solar Pays Its Way on Networks</u>. Last accessed 17 June 2015.