SOLAR REPORT
QUARTER 3, 2020

Australian Energy Council

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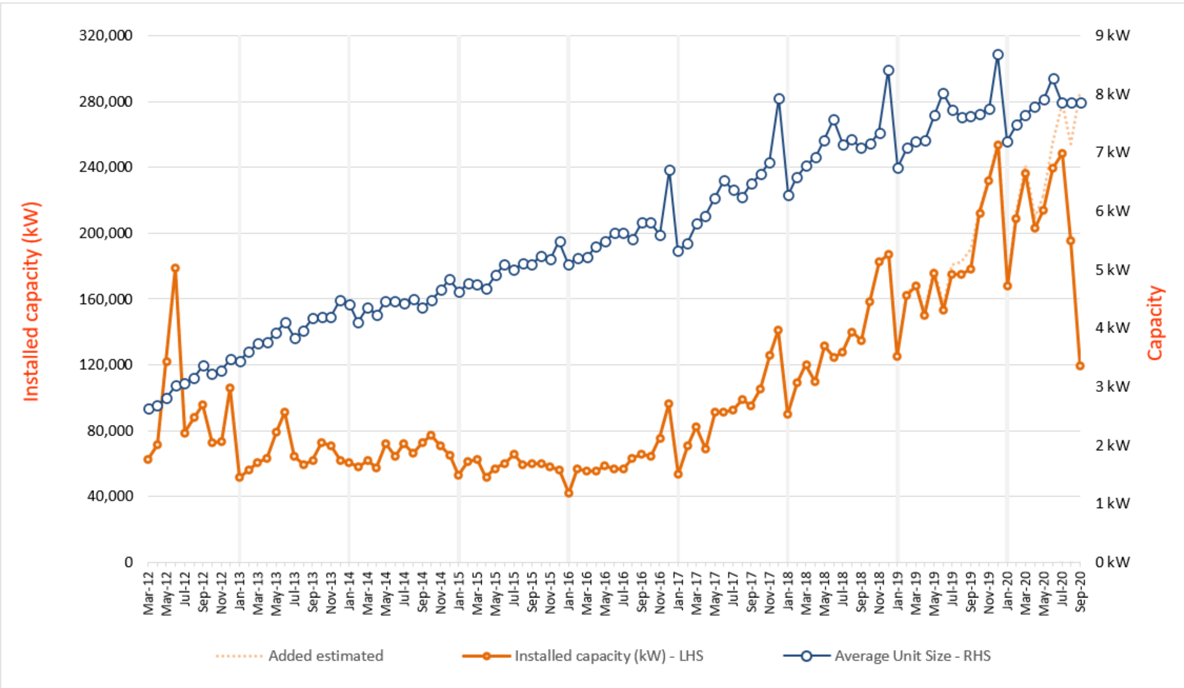
SECTION I: STATE OF SOLAR PV IN AUSTRALIA

Latest data from the Clean Energy Regulator[1] (CER) shows that total installed rooftop solar capacity reached 12.2 gigawatts (GW) nationwide, with more than 2.56 million solar energy systems installed at the end of the third quarter of 2020.

There were 72,000 new installations added in the last three months, compared to 82,000 new installations in the second quarter of 2020. Installations were impacted by COVID restrictions. Victoria's stage 4 restrictions during August and September, for example, saw the state's rooftop solar PV installation activity reduce by 37 per cent compared to the previous quarter. Other jurisdictions saw a slowdown in newly installed rooftop PV, in particular Tasmania saw a decrease of 23 per cent in new installations, while there was around a 7 per cent drop in New South Wales, Queensland and South Australia.

Figure 1 below shows the historical trends in monthly installed capacity and installations of rooftop PV since 2012. This year had a strong start with an upsurge in new rooftop installations with March almost reaching the December 2019 record (the highest recorded monthly installations and installed capacity to date). Due to a 12-month lag in reporting[i], we are anticipating that estimated monthly new installations of solar PV will exceed the record of 30,000 new installations set in December 2019 in June 2020.

Figure 1: Monthly installed solar PV capacity and average system size March 2012 – August 2020

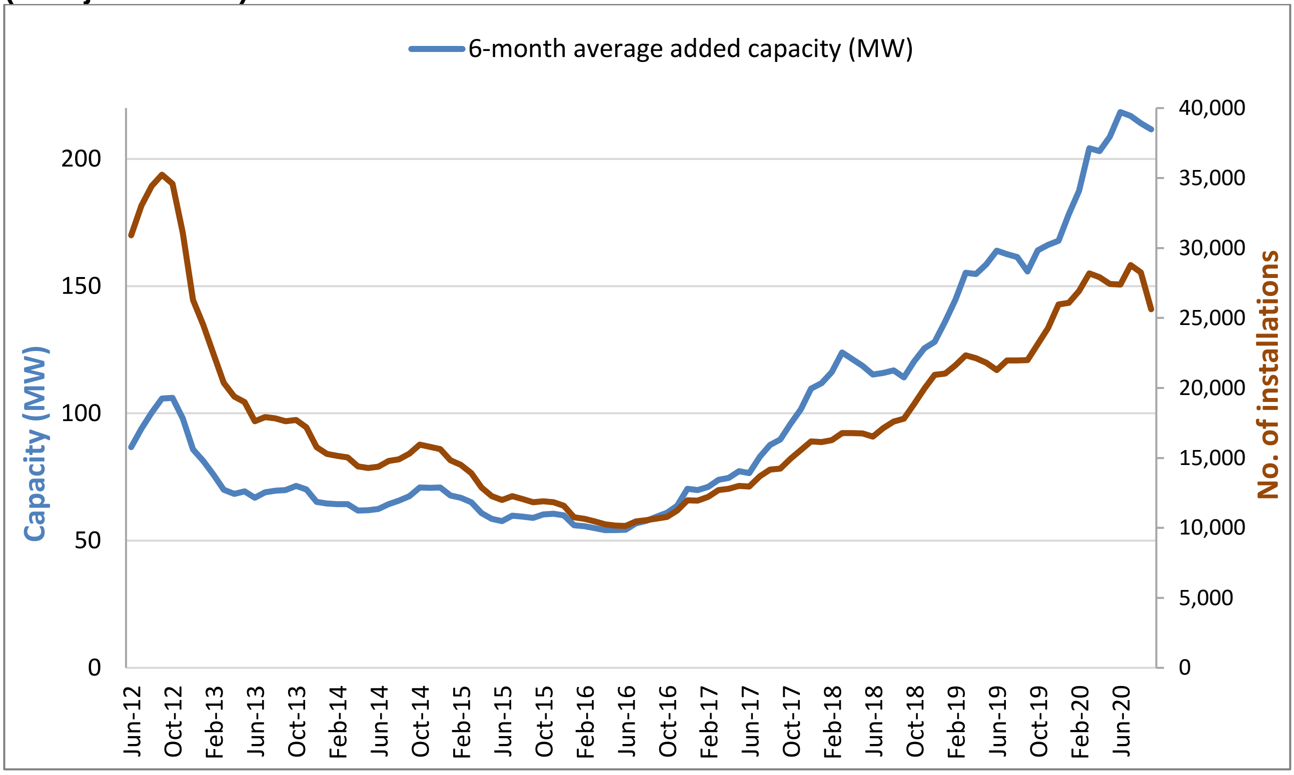


Source: Clean Energy Regulator data, Australian Energy Council analysis, data as of 30 September 2020

[1] CER, Small-Scale Renewable Energy Scheme data

Figure 2 again highlights the continued strong growth in Australian rooftop solar installations. The rolling average for installed capacity (blue line) continues to move upward with an average rate of 251 MW as of September 2020.

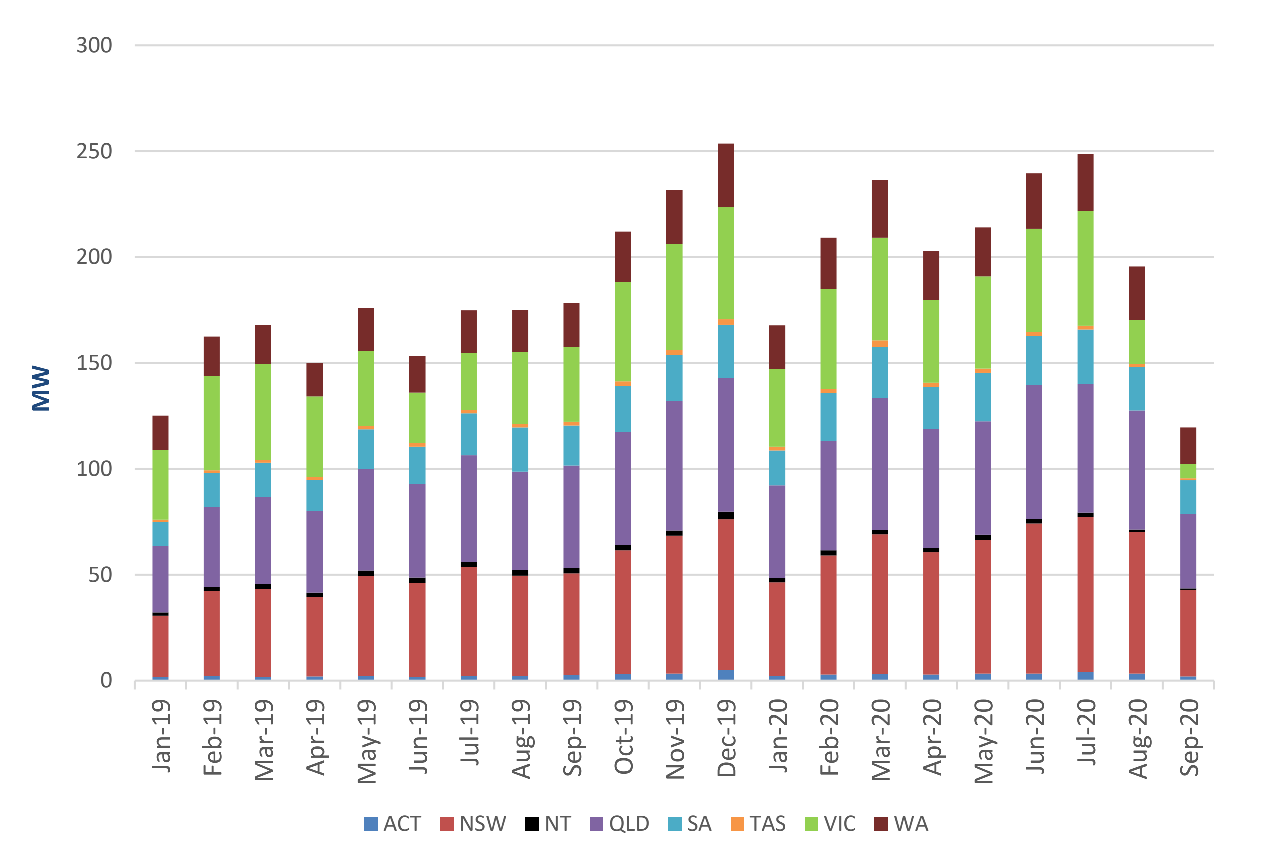
Figure 2: Rolling 6-month installed capacity and number of installations average (unadjusted data)



Source: Clean Energy Regulator data, Australian Energy Council analysis, data as of 30 September 2020

March 2020 recorded one of the highest uptakes of new rooftop PV installations with a surge in new installed capacity across all states (Figure 3).

Figure 3: Monthly rooftop PV installed capacity by states (unadjusted data)



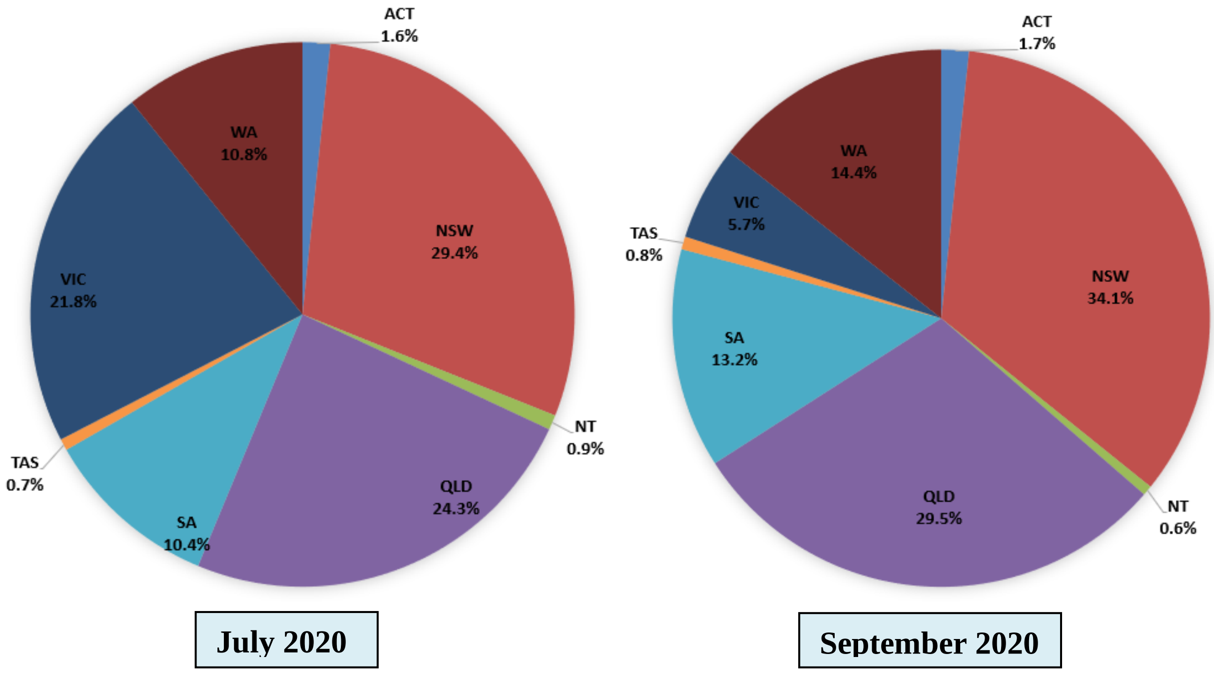
Note: The most recent three months in figure 3 underestimates the data because of a time lag in collation of the data.[2] Source: Clean Energy Regulator data, Australian Energy Council analysis, data as of 30 September 2020

In the first three quarters of 2020, the National Electricity Market (NEM) states accounted for 87 per cent of total monthly rooftop installations in Australia. Figure 3 above shows that Victoria was among the top three states along with New South Wales and Queensland adding new installed capacity until August 2020.

The impact of Victoria's stage 4 restrictions since August 2020, is evident in Figure 4. The unadjusted data shows monthly installed capacity in Victoria drops to a low of 7MW as of September 2020, a decrease from 54MW in July 2020.

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

Figure 4: Proportion of solar PV capacity by jurisdiction in July and September 2020

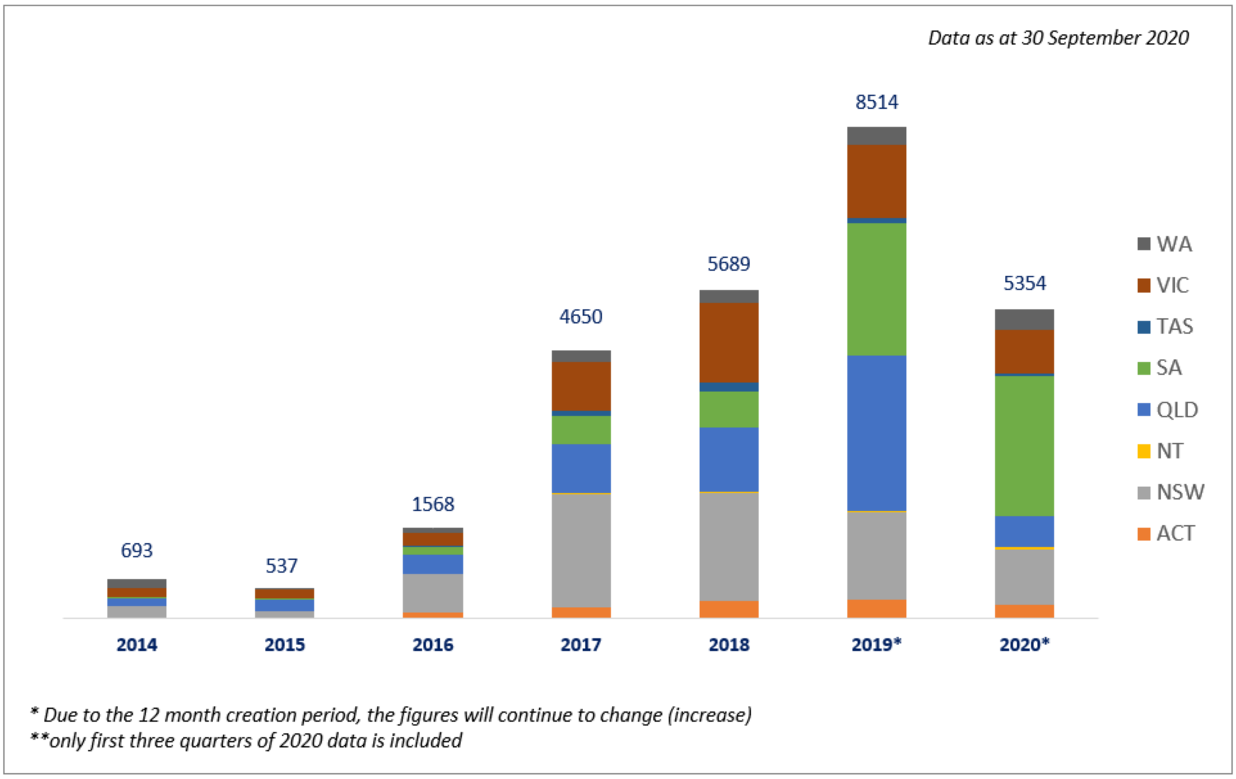


Source: Clean Energy Regulator data, Australian Energy Council analysis, data as of 30 September 2020

Battery installations with rooftop solar

When comparing the uptake of battery installations with rooftop solar by state (figure 5), South Australia remains the leading state, accounting for 44.6 per cent of total installations, with Adelaide's total battery installations with rooftop solar almost equivalent to the total of installations across four states – New South Wales (18.2 per cent), Victoria (15.0 per cent), Queensland (10.1 per cent) and Western Australia (6.8 per cent).

Figure 5: Number of solar with concurrent battery installations per state since 2014



Source: Clean Energy Regulator data, Australian Energy Council analysis, data as of 30 September 2020

From the last Solar Report, there have been no updates on state government schemes or rebates on battery storage installation with solar systems (except for WA, which is outlined in the following section). Schemes and rebates remain as:

- New South Wales: The Empowering Homes Program which will support installation for up to 300,000 households across the state with zero interest loans to purchase solar and battery systems[ii]. At the end of February 2020, this program was extended to allow residents in the Hunter region.
- Victoria: The Solar Homes Program has expanded to 250 postcodes (an addition of 143 postcodes) with offers up to 1000 rebates of up to $4,838 for a solar-battery system in 2019-20[iii]. The new postcodes now include regional Victoria.
- South Australia: The state's Home Battery Scheme has decreased its grant of up to $6,000 to $4,000 for a home solar battery, starting 15 April 2020[iv]. This subsidy cap is expected to reduce over time due to increasing competition in the market along with the continued cost reductions of home battery systems.
- Queensland: The Queensland Government's scheme, introduced in November 2018, allows residents to apply for interest-free loans of up to $10,000 and grants of $3000 to purchase batteries or combined solar-battery systemsv. Approved applicants have six months to install an eligible system.

SECTION II: WHOLE OF SYSTEM PLANNING

The Western Australian Government recently released its first Whole of System Plan (WOSP). Developed by the state's Energy Transformation Taskforce, the blueprint provides a 20-year forecast on the future of the South West Interconnected System (SWIS) and how WA's major power system may evolve over that time.

The WOSP tests a range of different outcomes – or scenarios - with analysis of key sensitivities. The scenarios were chosen to show what may occur in terms of demand, based on different assumptions relating to economic growth and technology uptake. Below we look at how solar may evolve to 2040 based on the plan's four scenarios (figure 6).

Figure 6: WOSP four scenarios

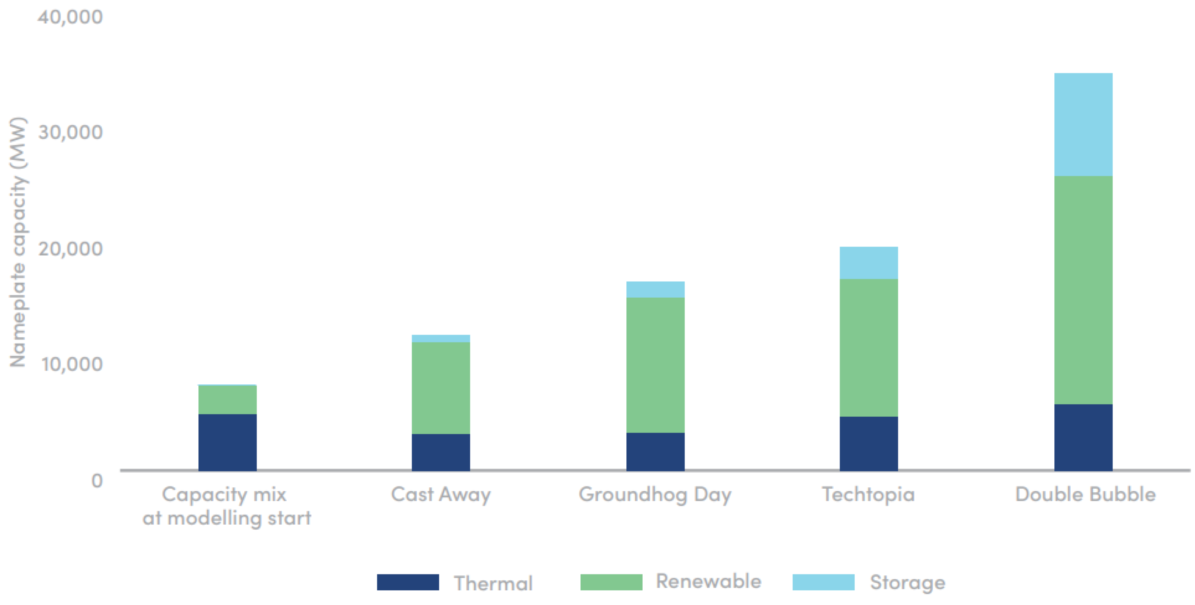
Source: WOSP

Figure 7: 2020 SWIS generation capacity mix

Source: WOSP

Shown in figure 7, the state's 2020 capacity mix shows a strong prevalence of rooftop PV, which accounts for 18 per cent, while large-scale solar capacity is significantly smaller, accounting for roughly 3 per cent of the total capacity in the SWIS.

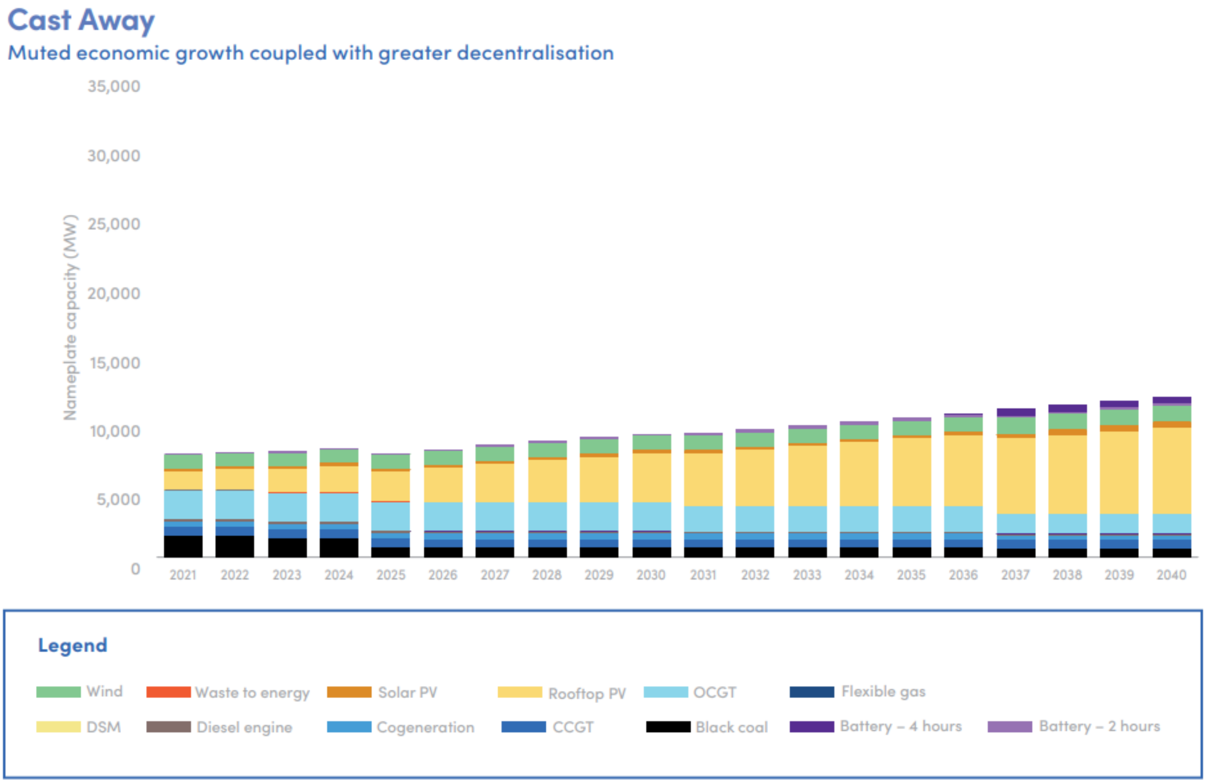
Figure 8: Changing SWIS capacity mix 2020 to 2040 for each scenario



Source: WOSP

Figure 8 shows the changing generation mix under all modelled scenarios, with all four scenarios showing a strong trend towards renewables. Across all modelling scenarios, primary assumption is based on operational demand. Demand growth is expected to be strongest in Double Bubble, with annual consumption forecast to reach 3,500 GWh and 35,000 MW of capacity required. Rooftop PV uptake is another key assumption. It is assumed to continue to increase and continue to displace traditional forms of generation such as coal.

Figure 9: SWIS capacity mix, Cast Away scenario

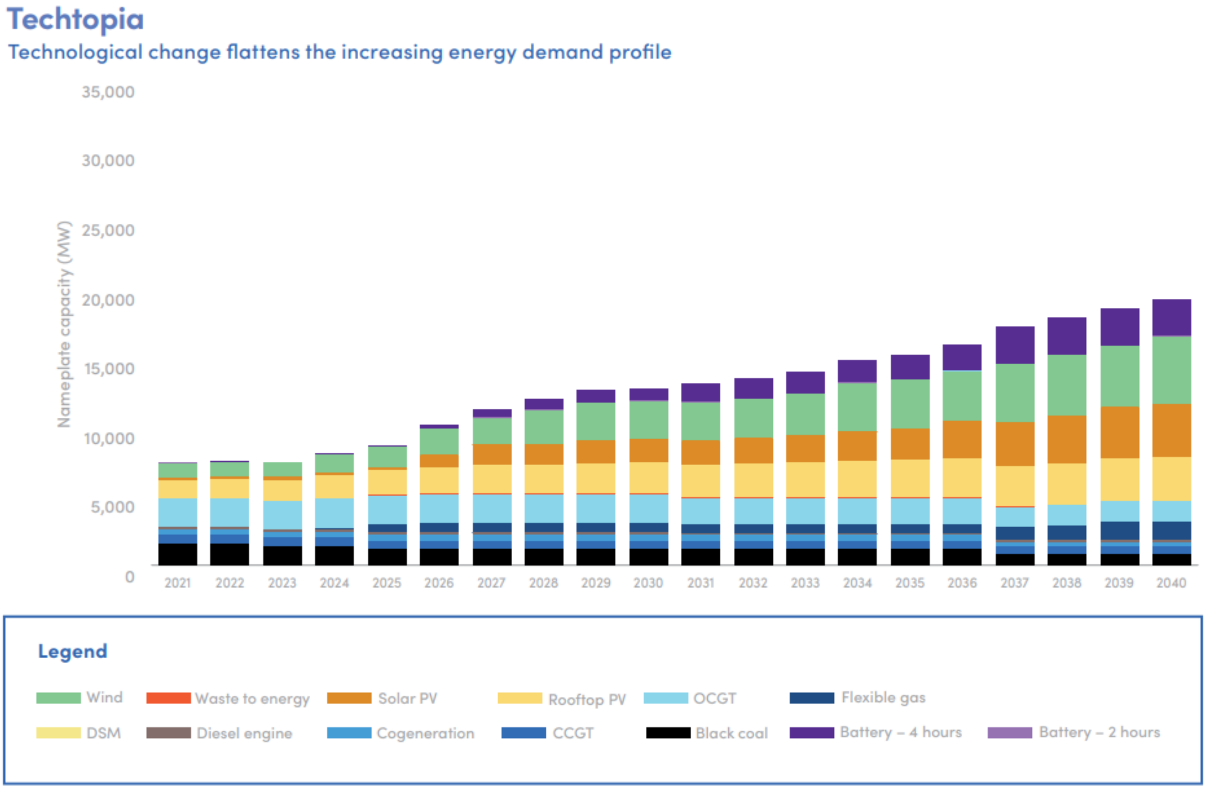


Source: WOSP

Under the Cast Away scenario, the grid is expected to experience greater decentralisation. Operational demand is set as the lowest of all four scenarios. Rooftop PV (in yellow) will dominate the electricity mix, overtaking gas capacity beyond 2026.

Battery storage (in purple) plays a minor role in the mix and no new large-scale solar plants are required until after 2030. 500MW of coal-fired generation is replaced with renewable energy by 2025 and no new gas-fired generation is needed as there is sufficient gas and cogeneration capacity (3,000MW) in the SWIS to act as the firming generation to mitigate the increased intermittency caused by renewables.

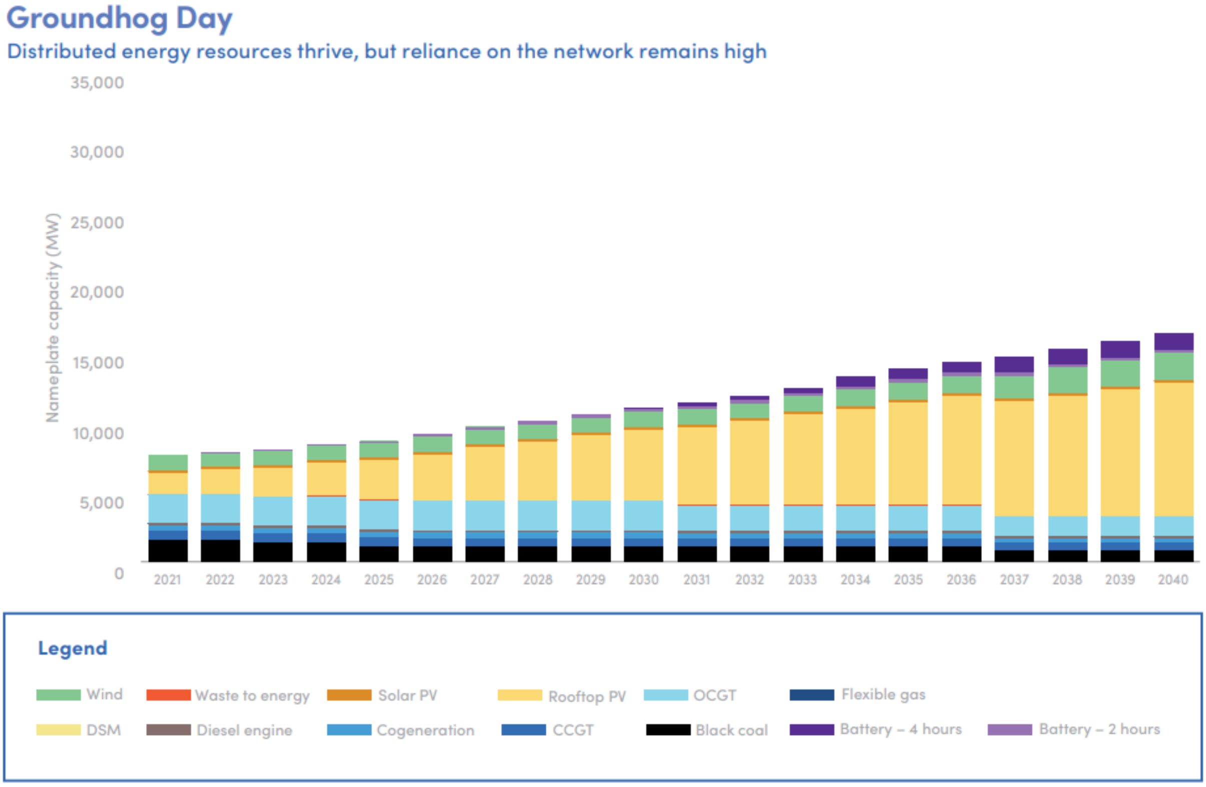
Figure 10: SWIS capacity mix, Techtopia scenario



Source: WOSP

The Techtopia scenario shows that energy demand will continue increasing, while rooftop PV uptake is lower than all other scenarios. In responding to the increasing demand, slow uptake of rooftop PV provides an opportunity for large-scale renewable energy to enter. There is a need for an extra 667MW of gas capacity and 3,196MW of large-scale solar and wind generation. Battery storage plays a key role and will continue to increase along with newly installed large-scale solar and wind beyond 2025.

Figure 11: SWIS capacity mix, Groundhog Day scenario

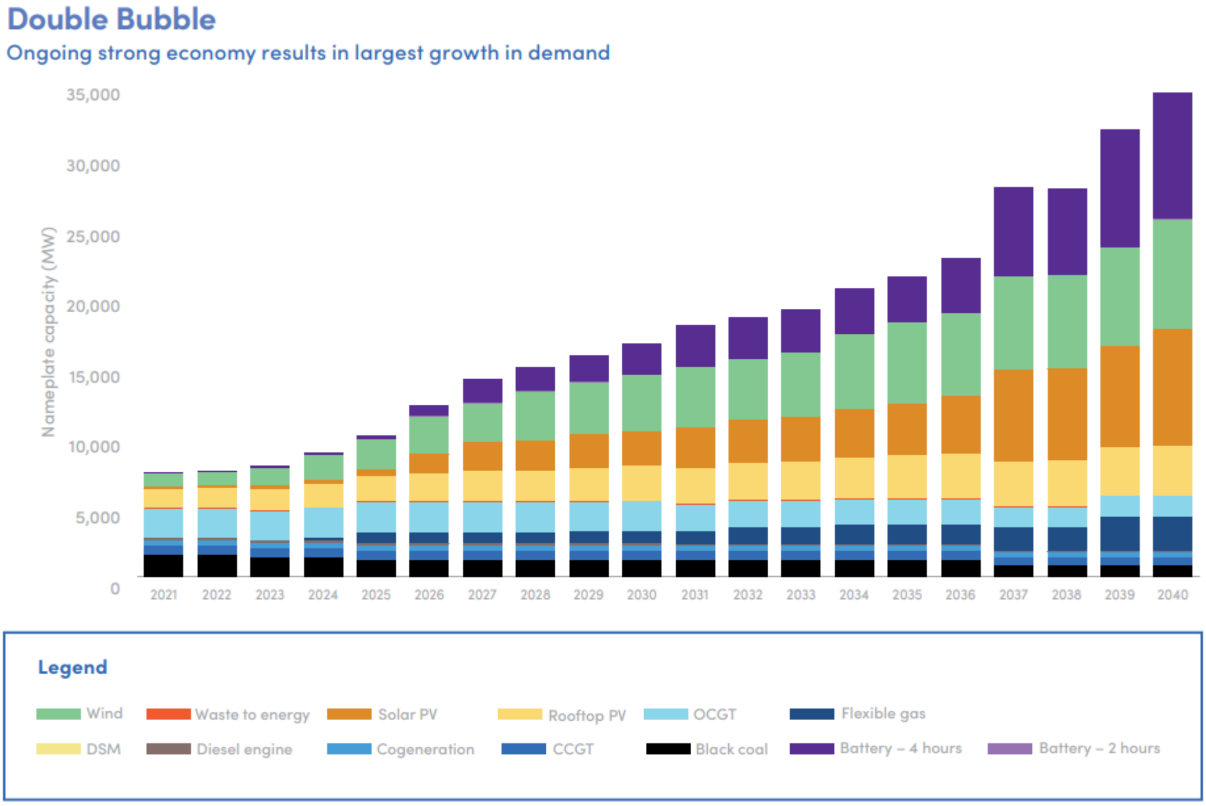


Source: WOSP

Under the Groundhog Day scenario, demand is assumed higher than the previous Cast Away and Techtopia scenarios.

This scenario shows a boom for distributed energy resources, in particular it has the highest uptake of rooftop PV, reaching nearly 70 per cent of the state's capacity. 80MW of large-scale wind farm is required before 2030; and 132MW of coal-fired generation is forced to close for cheaper capacity by 2025.

Figure 12: SWIS capacity mix, Double Bubble scenario



Source: WOSP

Double Bubble hypothesises strong economic growth resulting in the biggest growth in electricity demand, reaching 35,000MW. Such a rapid increase in demand requires a mix of new capacity.

An addition of 5,264MW of new large renewable generation and 867MW of gas-fired capacity is required immediately, and there will be no exit of coal-fired generation. Batteries play a prominent part of the capacity mix in supporting the grid and would overtake rooftop PV capacity beyond 2030 under this scenario.

A push to encourage battery storage?

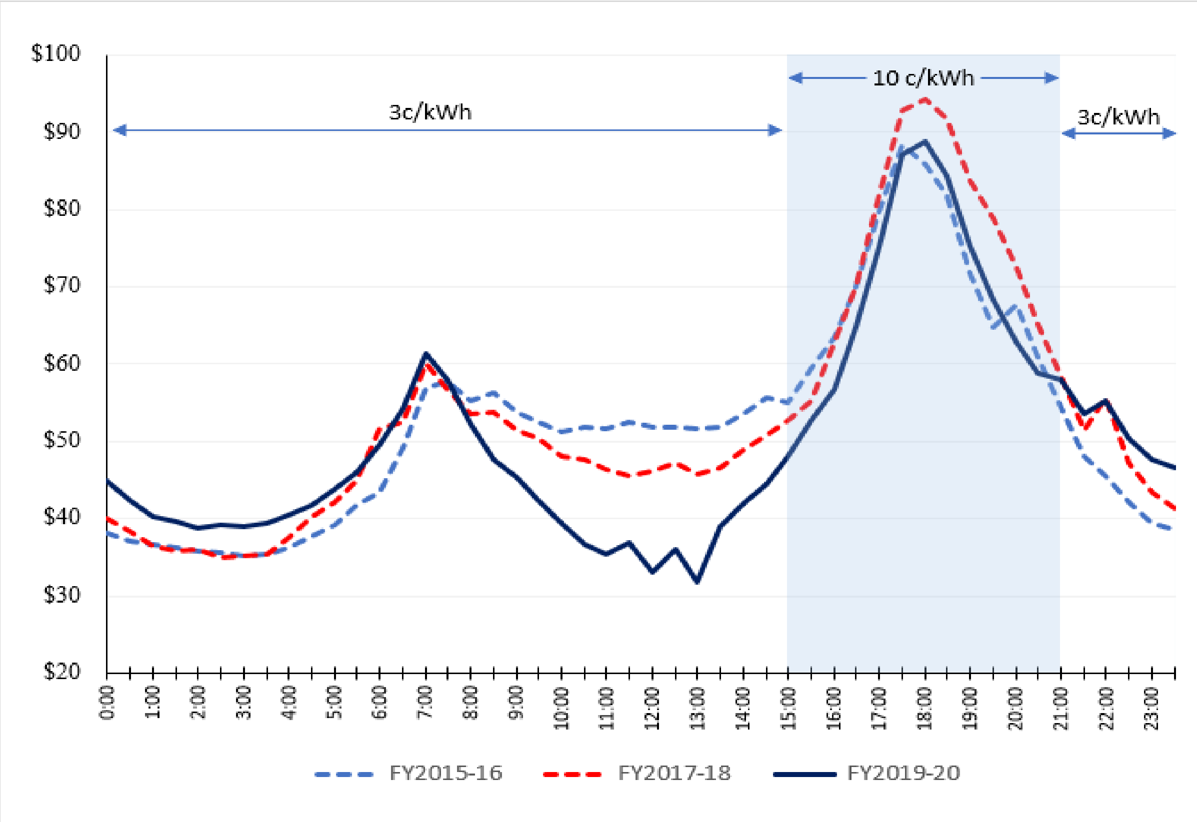
The WOSP highlights the economic pressure on coal-fired generation with rooftop PV and battery storage taking centre stage under each scenario. The plan, however, does not outline a timeframe to replace coal plants with cheaper renewable or adding more firm generation such as gas plants. This creates uncertainty for new investments entering the existing grid.

Yet across all modelling, it is evident that rooftop solar PV becomes a dominant player in the SWIS network. There are now more than 300,000 households with rooftop solar on the SWIS, which is up from almost zero 10 years ago. All that solar is leading to low wholesale electricity prices in the middle of the day, shown in figure 13 below.

The financial year 2019-20 saw a record low in average electricity prices at noon, hitting almost $30/MWh. This underpins the latest new feed-in tariff (FiT) rates announced for WA on the 31 August 2020[vi].

The Distributed Energy Buyback Scheme applies to new or upgraded solar installations in Perth and the south-west region from 6 of November 2020. The rates for electricity exported between 3pm to 9pm are 10 cents per kilowatt-hour (c/kWh); while electricity exported at all other times earns 3 c/kWh. The current solar FiT rate offers at 7.135 c/kWh. The new scheme allows solar households to reduce their usage during peak afternoon period to maximise the higher rebate.

Figure 13: Average wholesale electricity prices ($/MWh) by time with solar feed-in tariff rebate rates



Source: Australian Energy Council analysis

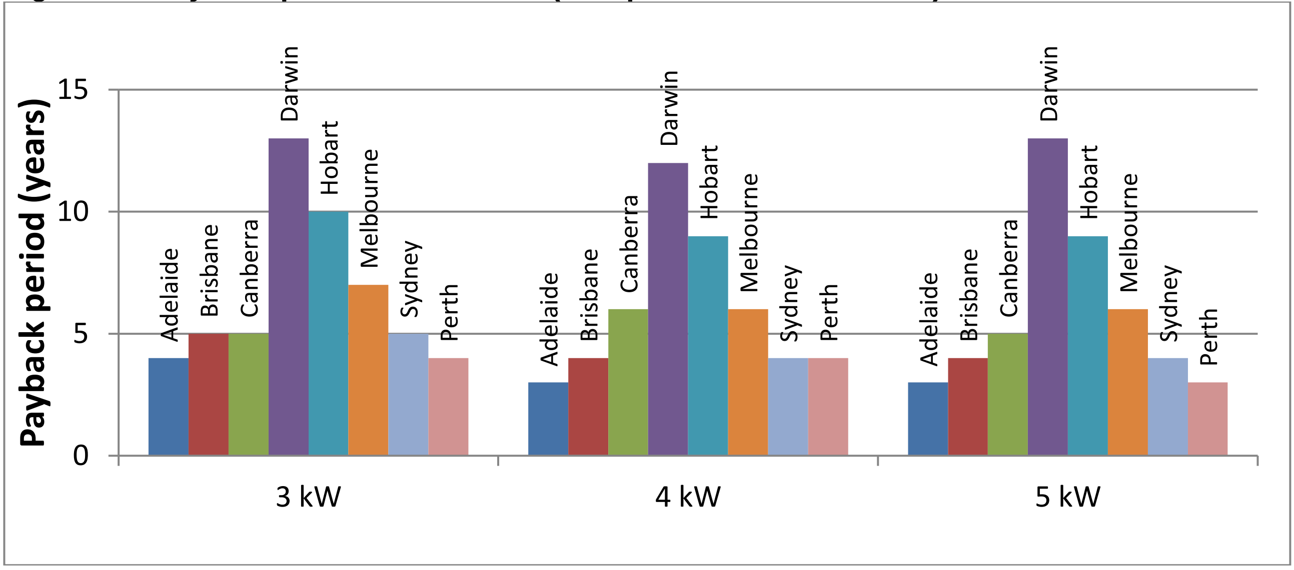
While a shift in the incentive program from a flat to a varying time-of use rate may seem a big reduction, it is worth noting that the SWIS currently has more electricity generation than required during the day. Therefore, one rooftop solar driver - exporting to the grid - has reduced. This new subsidy program will provide a financial incentive for customers to consider new technologies such as batteries.

SECTION III: PAYBACK PERIOD, DETAILED MODEL

The payback period is defined as the year when the cumulative savings are greater than the cumulative costs of a solar PV system. Savings represent the avoided cost of consumption and any revenue received from FiTs. The cumulative cost incurred represents the initial investment and the time value of money. A detailed methodology is contained in Appendix 2.

Figure 14 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 14: Payback period for solar PV (3.45 per cent discount rate)



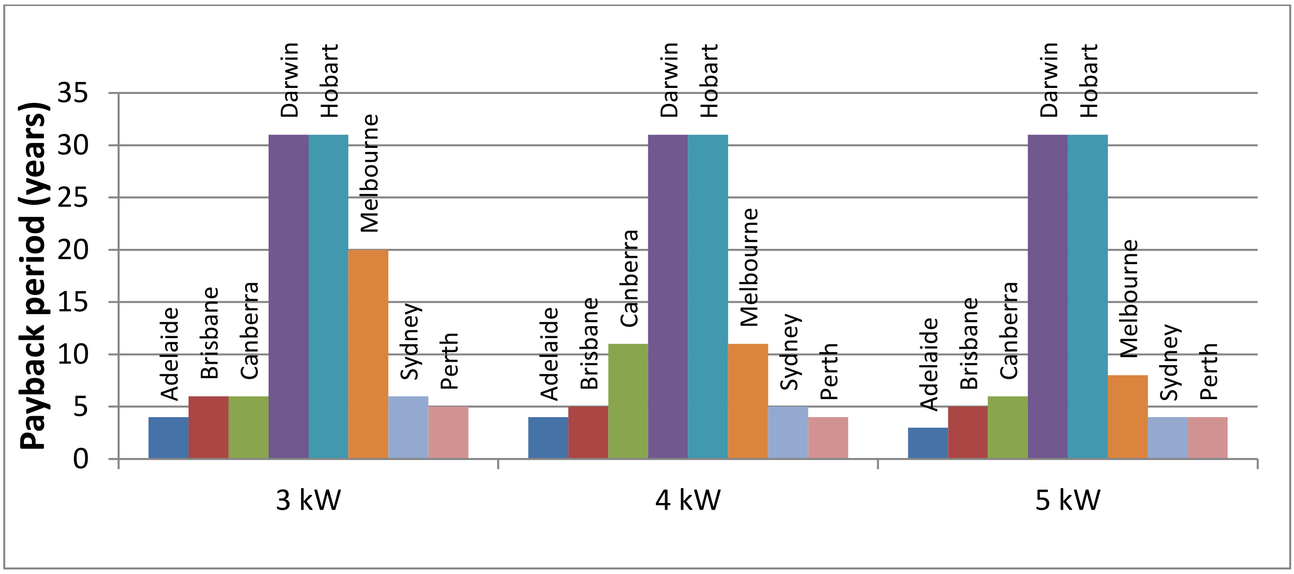
Source: Australian Energy Council analysis, October 2020

As of July 2020, while the interest rate is lower compared to the previous quarter, the negative CPI level of 0.3 per cent gives an increased real interest rate of 3.76 per cent (instead of 3.45 per cent).

Comparing to the previous quarter, a drop of $1,400 in a 3kW and 5kW PV system lowers Northern Territory's payback period by eight and four years. Northern Territory, however, cost of installation is still the highest in Australia, hence, has the highest payback period of 13 years with a 3kW, 4kW and 5kW system. Additionally, a reduction of its FiT from 23.6 c/kWh to 8.3 c/KWh contributes to a higher payback period.

Similarly, Figure 15 shows the expected payback period for systems with a 5.75 per cent discount rate (10-year average home loan rate) with a real rate of 6.07 per cent. Melbourne and Canberra see a strong encouragement to install a 5kW system rather than a 3kW or 4kW unit size. This can reduce the payback time by five to nine years. Darwin and Hobart are highly sensitive to a higher interest rate due to the high cost of rooftop solar PV units. Both cities have a payback period of 31 years for a 3kW, 4kW and 5kW system. Other capitals see the payback period increased by only 1 or 2 years with a higher interest rate.

Figure 15: Payback period for solar PV (5.75 per cent discount rate)



Source: Australian Energy Council analysis, October 2020

SECTION IV: METHODOLOGY APPENDIX

1. Solar installations methodology

Analysis from the CER's monthly data allows us to estimate the amount of solar PV installed in Australia. Since November 2015, the CER has consistently released data dated as at the first of each month. The new consistent release date allows us to provide a more accurate estimate of the capacity of recent installations. Due to the lag in reporting of new installations, however, the CER data takes up to 12 months to be finalised.

2. Payback period methodology

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

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

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

Calculation

Payback period occurs when $\sum$ savings > $\sum$ cost

Where:

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

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

t = years

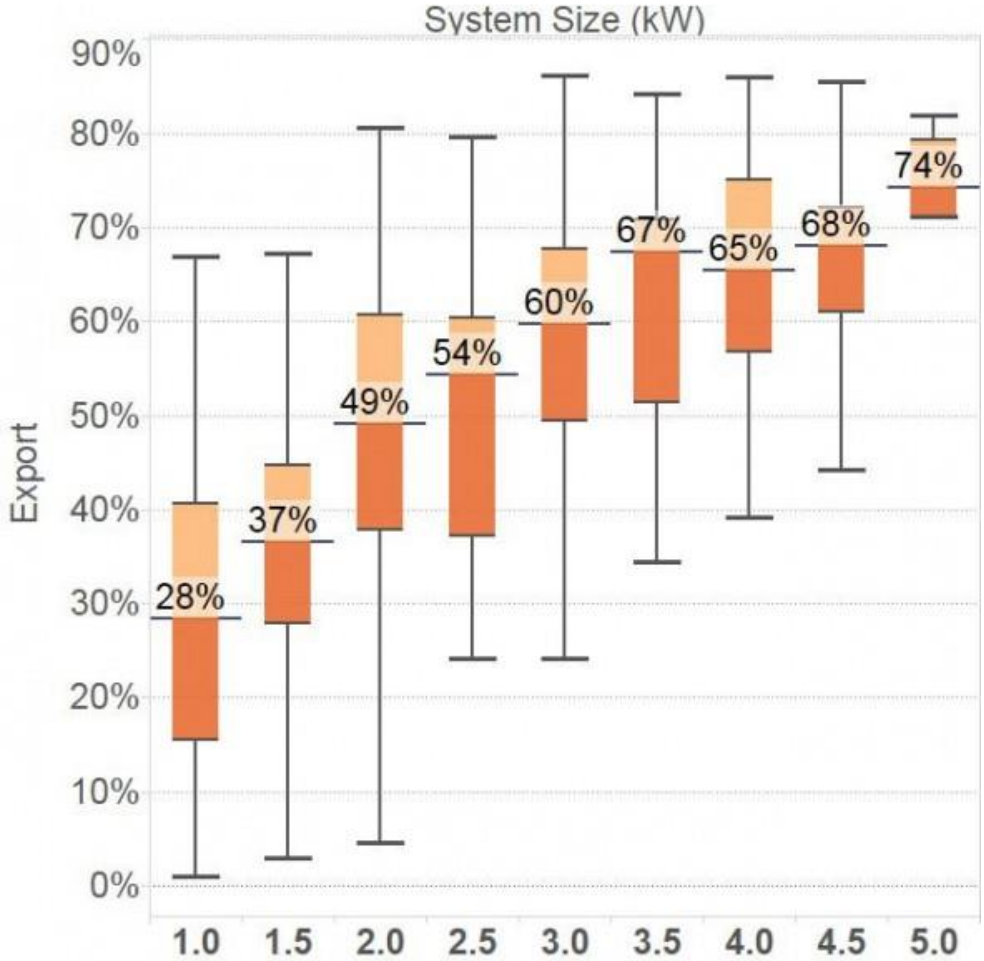
Avoided cost and FiT

The onsite consumption is multiplied by the retailer's usage charges. CPI has been applied to the usage charge to allow for growth in retail prices. The excess energy is exported to the grid and the customer is expected to receive the mandatory FiT or a realistic market offer where mandatory tariffs are not applicable.

Export rate

The percentage of onsite consumption and electricity which is exported to the grid is calculated using the median value from Sunwiz's analysis[vii]. See Figure 11 below.

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



Source: Sunwiz analysis, 2015

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[i] The most recent three months underestimates the data because of a time lag in collation of the data. The data represents all systems that have had certificates created against them. There is a 12-month period to create the certificates, so numbers of installations are expected to continue to rise.

[ii] https://energy.nsw.gov.au/renewables/clean-energy-initiatives/empowering-homes

[iii] https://www.solar.vic.gov.au/solar-battery-rebate

[iv] https://www.sa.gov.au/topics/energy-and-environment/energy-efficient-home-design/solar-photovoltaic-systems

[v] https://www.qld.gov.au/community/cost-of-living-support/concessions/energy-concessions/solar-battery-rebate/about-the-program

[vi] https://www.energy.gov.au/rebates/electricity-feed-tariff-0

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