

Australian Battery Market Report - 2021



Introduction

- SunWiz is Australia's leading market analyst for the solar and storage industry. 2021 marks our twelfth anniversary.
- SunWiz tracks every single Australian PV installation, in order to produce monthly reports on:
 - The rooftop solar market.
 - Progress of every solar farm.
 - The market for STCs and LGCs.
- SunWiz has been producing battery market reports since 2015.
- This report contains the culmination of extensive market research, interviews, surveys, and analysis.
- SunWiz also provides consultancy services.
- Should you have any further questions, please get in touch.
- This report is not to be distributed beyond the boundaries of the purchaser's company, in whole or in part, without the express permission of SunWiz.

Outline

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Key Facts and Figures

- 31269 installations of home energy systems in 2020, a 20% growth upon 2019. The capacity (MWh) of residential storage grew by 27% as average battery size increased.
- Equivalent to 9% of the new PV systems that were installed in 2020 included a battery, down from 12% in 2017 but an improvement on 2019.
- This brings the cumulative tally to just under 110,000 battery systems installed in Australia.
- SA expanded upon its market lead, with Victoria and NSW not far behind.
- 69 MWh of non-residential projects were installed in 2020, plus 341MWh of distributed systems.
- For 2021, SunWiz forecasts a market for 33,000 home energy storage systems totalling 334 MWh, plus 400MWh of grid-scale storage

Trends, Commentary & Insights

Key Trends

- Big Batteries Completed
- Governments Supporting Big Batteries
- Governments Supporting Home Batteries
- Big Batteries Announced
- Co-location with network/existing generation
- Commercial Storage on the up
- Storage influencing the network and market
- Storage Supporting the Grid
- Volatile Revenues
- Batteries on New-build homes
- Community Batteries
- Local Production
- Product Developments
- VPPs

Key Trend – Governments Supporting Storage

- [Redacted]
- [Redacted]
- [Redacted]
- [Redacted]
- [Redacted]
- [Redacted]
- [Redacted]

Key News – Governments Supporting Big Batteries

- The NT government has announced [REDACTED]
- NSW govt to part fund 4 large battery projects: [REDACTED]
- [REDACTED]
- [REDACTED]
- [REDACTED]
- [REDACTED]
- [REDACTED]

Key News – Governments Supporting Home Batteries

- 40% of SA's Home Battery Scheme 5500 applications to date have occurred in the last two-and-a-half months. The combined storage volume is 62MWh, once all these are installed <http://ow.ly/wnC830q9MNI>
- >5,000 SA households have rushed to access battery storage subsidies in the last five weeks, before the subsidy drops. That's as many applications in 5 weeks as there were batteries installed to date <http://ow.ly/mahS50zgl2B>

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

Key Trends – Big Battery Trends



Key News – Big Batteries Completed

[Redacted]

[Redacted]

[Redacted]

[Redacted]

[Redacted]

[Redacted]

Key News – Big Batteries Announced

- [Redacted]
- [Redacted]
- [Redacted]
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Key Trend – Storage, the Network, and Market

[Redacted text]

[Redacted text]

[Redacted text]

[Redacted text]

[Redacted text]

Key News – Co-location with network/existing generation

- AGL is planning two mega batteries: 500MW at its ageing Liddell (coal) power station and 150MW at its Torrens Island (gas) power station <https://t.co/epcboGwDRr>
- Genex secures land adjacent to the Bouldercombe 275kV/132kV substation near Rockhampton to build the Bouldercombe big battery, expected to be sized at 50MW/75MWh and operational early 2022 <https://t.co/bjwGWBwv6f>

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Key News – VPPs

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Key News – Volatile Revenues

- (March) Neoen's Tesla Big Battery (still the world's largest) is creaming it! 56% jump in revenues in Q4-2019, and more expected for Q1-2020. Elon sure has a knack for making money from bold ventures <http://ow.ly/gKMI30qiTLb>

- [REDACTED]
- [REDACTED]
- [REDACTED]
- [REDACTED]
- [REDACTED]
- [REDACTED]
- [REDACTED]
- [REDACTED]
- [REDACTED]

Key News –Storage Supporting the Grid

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Key News – Commercial Storage

- GEM Energy to install 1160kWh of battery storage along with 810kW of solar power at Shalom College in Bundaberg, part of a 6MW+ PV / 3MWh battery partnership with Catholic Education Rockhampton <http://ow.ly/LVWr30qbUFs>

- █ [REDACTED]
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- █ [REDACTED]
- █ [REDACTED]
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- █ [REDACTED]
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Key News – Batteries on New-build homes

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[Redacted text block]

[Redacted text block]

Key Trends – Products

- [Redacted text block]

Key News – Local Production

- Soluna batteries hit Australian market, with plans for local manufacturing <https://onestepoffthegrid.com.au/soluna-batteries-hit-australian-market-with-plans-for-local-manufacturing/>
- Energy Renaissance will build a \$28 million battery manufacturing facility on the NSW central coast, paving the way for the company to become Australia's first lithium-ion battery manufacturer. Will produce 66MWh/year though it hopes to scale up. <https://t.co/RJFwz3lZYt>

Key News – Product Developments

- [Redacted]
- [Redacted]
- Origin Energy to test plug-n-play battery in Australia. Orison battery plugs into wall without electricians or permits, costs US\$2200 for 2.2kWh. Soaks up excess solar for later release. If there's a blackout, only powers devices plugged into it <http://ow.ly/VsU730qUMBf>
- Germany: Sonnen has unveiled a new home and small commercial battery storage range, Sonnerbatterie 10, which includes a “performance” model that can store up to 55kWh, and a three-phase “island” solution that can power a house through a blackout. <http://ow.ly/bNwf30qR47>
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- [Redacted]
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Key Trends – Residential Storage

- Home Energy Storage Systems are still the ‘main game’ for most battery manufacturers, wholesalers, and retailers
- Customer Type: research indicates that consumers are still conscious of battery brand. Interestingly subsidies play a greater role in a customers’ purchase decision over cost.

- [REDACTED]
- [REDACTED]
- [REDACTED]
- [REDACTED]
- [REDACTED]
- [REDACTED]
- [REDACTED]
- [REDACTED]

Government Involvement

Subsidies Available

| Program Name | State | Size of Program | Program Funding | Subsidy Level | Status |
|-------------------------------------|-------|-----------------|-----------------|---------------------------------------------------------------------------------------|-----------------------|
| Next Generation Energy Storage | ACT | 5000 homes | | \$825/kW up to 30kW | Since 2016 |
| Smart Distributed Batteries Project | NSW | 6MW VPP | \$5.4m | POS discount based on sustained output of battery / inverter ~5kW/\$4,950 discount | Open |
| Distributed Energy Buyback Scheme | WA | State | | Peak: 10c/kWh Off-Peak 3c/kWh Up to 50kWh/day/premise | Since 6 November 2020 |
| [REDACTED] | SA | [REDACTED] | \$118m | \$200/kWh (non-concession) \$300/kWh (concession) \$3000 cap | [REDACTED] |
| [REDACTED] | VIC | [REDACTED] | \$40m | [REDACTED] | [REDACTED] |

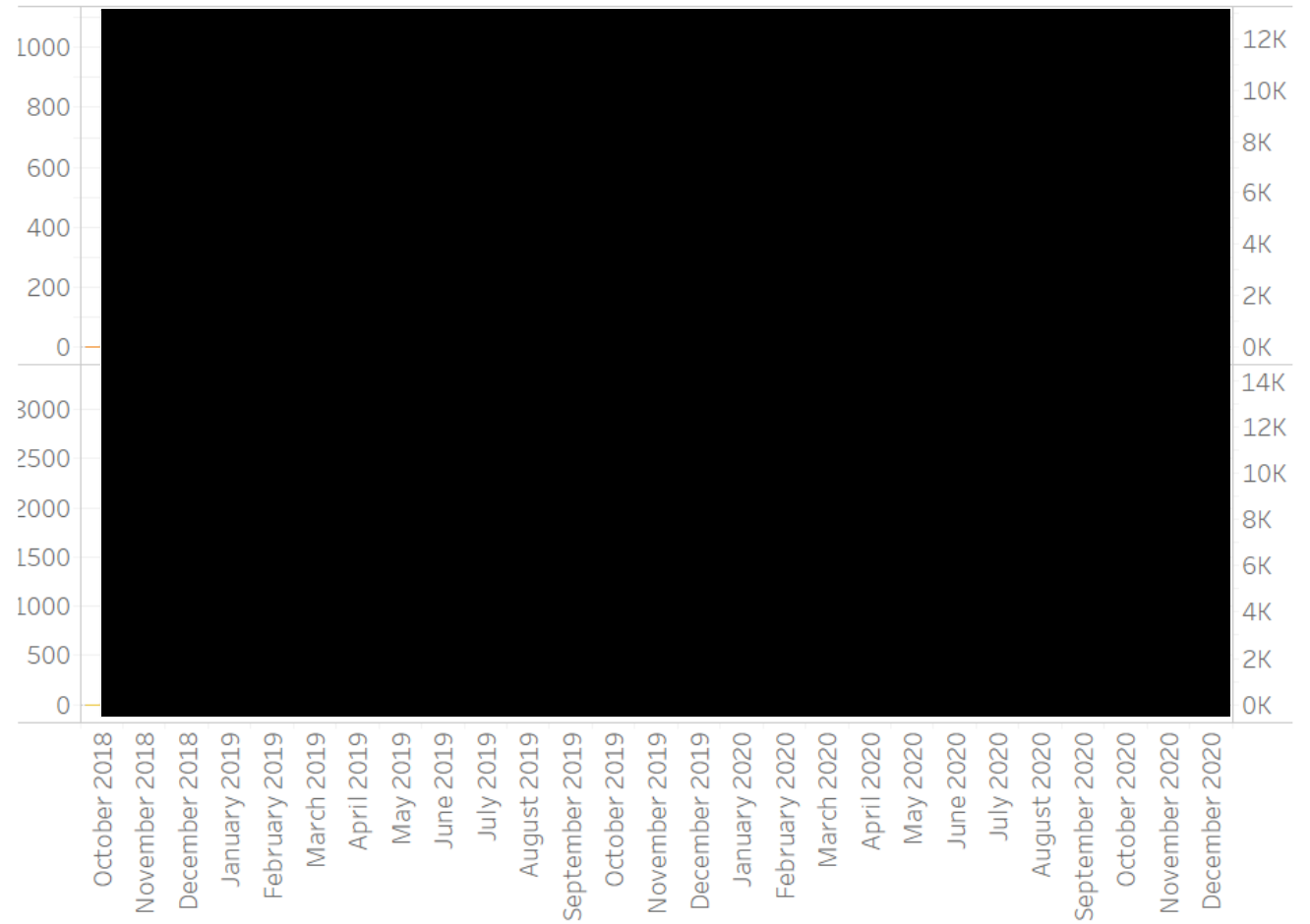
| Program Name | State | Size of Program | Program Funding | Subsidy Level | Status |
|-----------------------------------------------------------------------------------------------------|-------|-----------------|-----------------|---------------|--------------------|
| [REDACTED] | NSW | [REDACTED] | \$20m | [REDACTED] | [REDACTED] |
| [REDACTED] | NSW | [REDACTED] | \$520m | [REDACTED] | [REDACTED] |
| [REDACTED] | QLD | [REDACTED] | [REDACTED] | [REDACTED] | Program [REDACTED] |
| [REDACTED] | NSW | [REDACTED] | [REDACTED] | [REDACTED] | [REDACTED] |
| South Australia's Virtual Power Plant <i>(Refer to subsequent slides for additional details)</i> | SA | [REDACTED] | [REDACTED] | [REDACTED] | [REDACTED] |

Key Program Data – SA Home Battery Scheme

SA Government data shows an initial ramp up of quotes (lower pane) starting in 2020 maxing out at ~3,300 conditionally-approved quotes/month by April 2020 as the subsidy decreased, causing a dramatic drop to ~150/month in May 2020.



Subsidy Activity

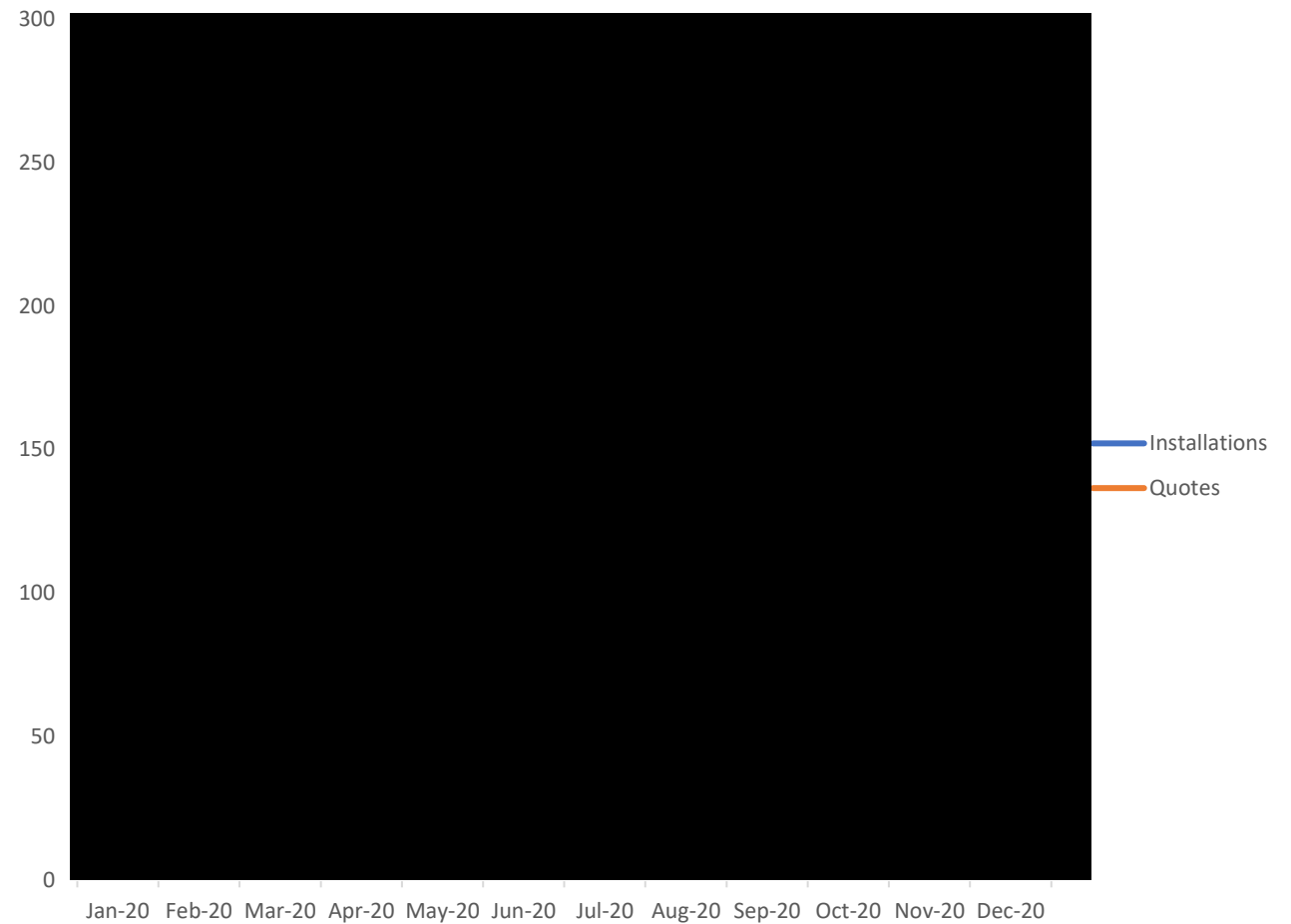


Battery Rebates – Victoria (2020 Battery Rebate Volume)

Over 2020 the most amount of Victorian Solar Rebate battery installations occurred in [REDACTED] whereas [REDACTED] observed the least amount [REDACTED]



VSR Battery Quotes & Installations, 2020



Virtual Power Plants

VPPs

- There are a wide variety of VPPs available in the market, as seen below.
- We believe there's a minimum number of participants required to make a VPP worthwhile. While the SA rebate was high, that provided sufficient volume (Critical Mass) for VPPs to become worthwhile – and prompted an arms race to secure an electricity retailer through whom the benefits could be returned to the customer.
- Further complicating things, VPPs have been designed towards the FCAS market which has collapsed. VPPs offering high FiTs will need to restructure. Those who are locked in to providing too much fixed value to customers may get burned, not to mention those who provided forward-loaded benefits.
- That said, in the long run [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

| Brand & VPP Name | Offered in | | | | | | | | Currently Available |
|-----------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------|----|-------------------------------------|------------------------------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|
| | ACT | NSW | NT | QLD | SA | TAS | VIC | WA | |
| Brand [REDACTED] VPP Name [REDACTED] | | | | | <input checked="" type="checkbox"/> >6kW solar capacity | | | | <input checked="" type="checkbox"/> |
| | Batteries approved for use [REDACTED] VPP Subsidy [REDACTED] Number of places in program [REDACTED] Feed-in/usage tariffs offered [REDACTED] Minimum energy storage capacity reserved for homeowner [REDACTED] Contract term length [REDACTED] Contract cancellation fee [REDACTED] | | | | | | | | |
| Brand [REDACTED] VPP Name [REDACTED] | <input checked="" type="checkbox"/> April 2021 Launch | <input checked="" type="checkbox"/> | | <input checked="" type="checkbox"/> | | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |
| | Batteries approved for use [REDACTED] VPP Subsidy [REDACTED] Number of places in program [REDACTED] Feed-in/usage tariffs offered [REDACTED] Minimum energy storage capacity reserved for homeowner [REDACTED] Contract term length [REDACTED] Contract cancellation fee [REDACTED] | | | | | | | | <input checked="" type="checkbox"/> |
| Brand [REDACTED] VPP Name [REDACTED] | | | | | | | <input checked="" type="checkbox"/> | | <input checked="" type="checkbox"/> |
| | Batteries approved for use [REDACTED] VPP Subsidy [REDACTED] Number of places in program [REDACTED] Feed-in/usage tariffs offered [REDACTED] Minimum energy storage capacity reserved for homeowner [REDACTED] Contract term length [REDACTED] Contract cancellation fee [REDACTED] | | | | | | | | |

| Brand & VPP Name | Offered in | | | | | | | | Currently Available | |
|-----------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------|----|------------------------------------------------------------|---------------------------------------------------|---------------------------------------------------|---------------------------------------------------|---------------------------------------------------|---------------------|-------------------------------------|
| | ACT | NSW | NT | QLD | SA | TAS | VIC | WA | | |
| Brand [REDACTED] VPP Name [REDACTED] | | <input checked="" type="checkbox"/> [REDACTED] [REDACTED] [REDACTED] | | | | | | | | <input checked="" type="checkbox"/> |
| | Batteries approved for use [REDACTED] VPP Subsidy [REDACTED] [REDACTED] Number of places in program [REDACTED] Feed-in/usage tariffs offered [REDACTED] Minimum energy storage capacity reserved for homeowner [REDACTED] Contract term length [REDACTED] Contract cancellation fee [REDACTED] [REDACTED] | | | | | | | | | |
| Brand [REDACTED] VPP Name [REDACTED] | <input checked="" type="checkbox"/> [REDACTED] | <input checked="" type="checkbox"/> [REDACTED] | | <input checked="" type="checkbox"/> >3kW solar capacity | <input checked="" type="checkbox"/> [REDACTED] | <input checked="" type="checkbox"/> [REDACTED] | <input checked="" type="checkbox"/> [REDACTED] | <input checked="" type="checkbox"/> [REDACTED] | | <input checked="" type="checkbox"/> |
| | Batteries approved for use [REDACTED] VPP Subsidy [REDACTED] Number of places in program [REDACTED] Feed-in/usage tariffs offered [REDACTED] [REDACTED] Minimum energy storage capacity reserved for homeowner [REDACTED] Contract term length [REDACTED] Contract cancellation fee [REDACTED] [REDACTED] | | | | | | | | | |

Prices & Financials

2020 Pricing Trends (SolarChoice)

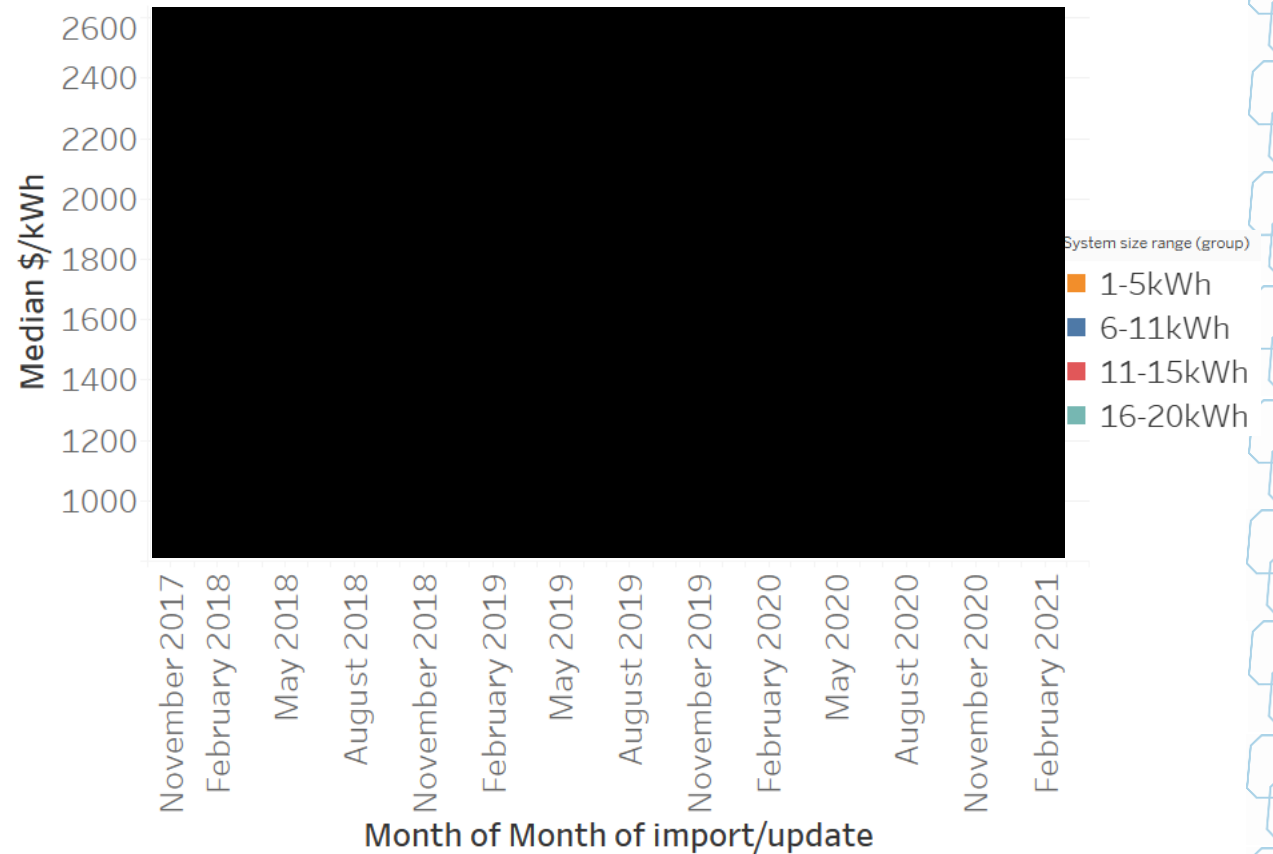
SolarChoice provides SunWiz with access to its anonymised database of PV + storage retailers pricing. This rich dataset reveals trends that include:

Prices for the smallest batteries [redacted] over 2020.

Prices for the 6-11kWh range and large batteries [redacted] over 2020.

Prices for the 11-15kWh range group of batteries [redacted] over 2020.

[redacted]



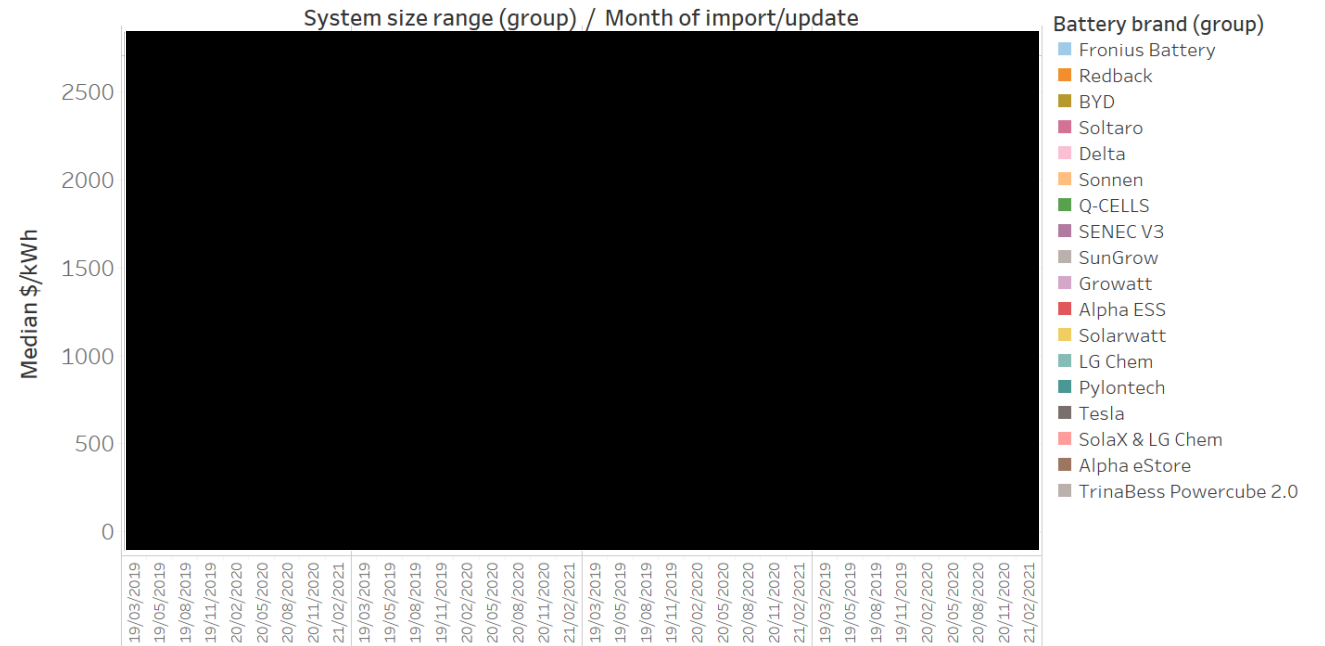
2020 Pricing Trends (SolarChoice)

Looking at what batteries are contributing to the price trends, we can see

Price rises happening in early 2020 for Sonnen and LG Chem

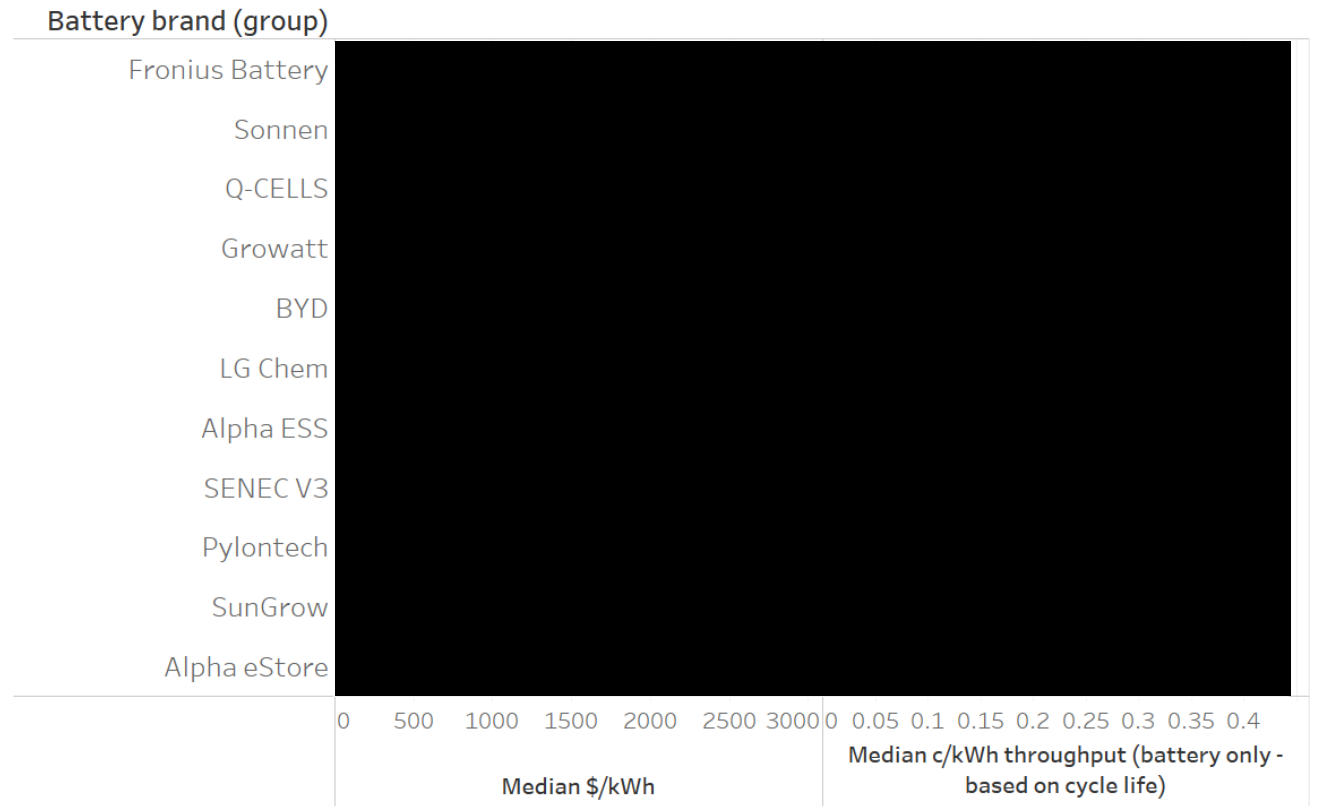
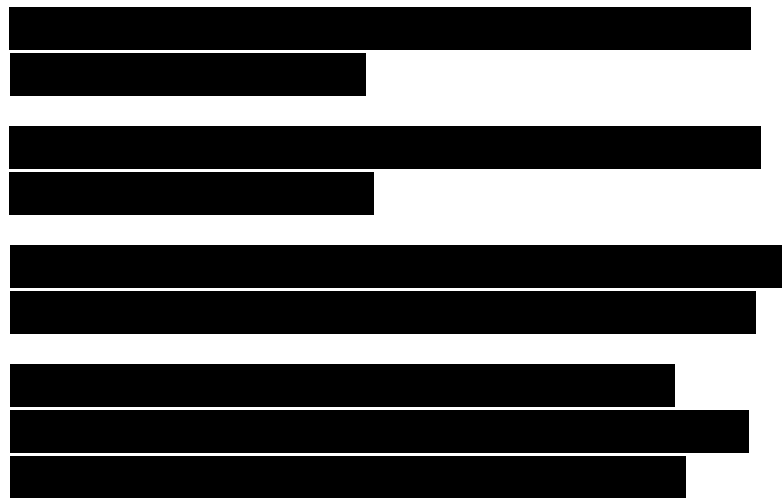


Price falls for



Price per Utilisable Capacity (2020)

As at February 2021 SolarChoice calculates two KPIs for upfront purchase (\$/kWh-rated) and lifetime (\$/kWh-lifetime), for the most popular capacity range (6-11kWh) which are displayed on the right. Key takeaways:



Price Relationship: Battery Inverter 2020

The system price does vary depending upon the inverter that's coupled with the battery.

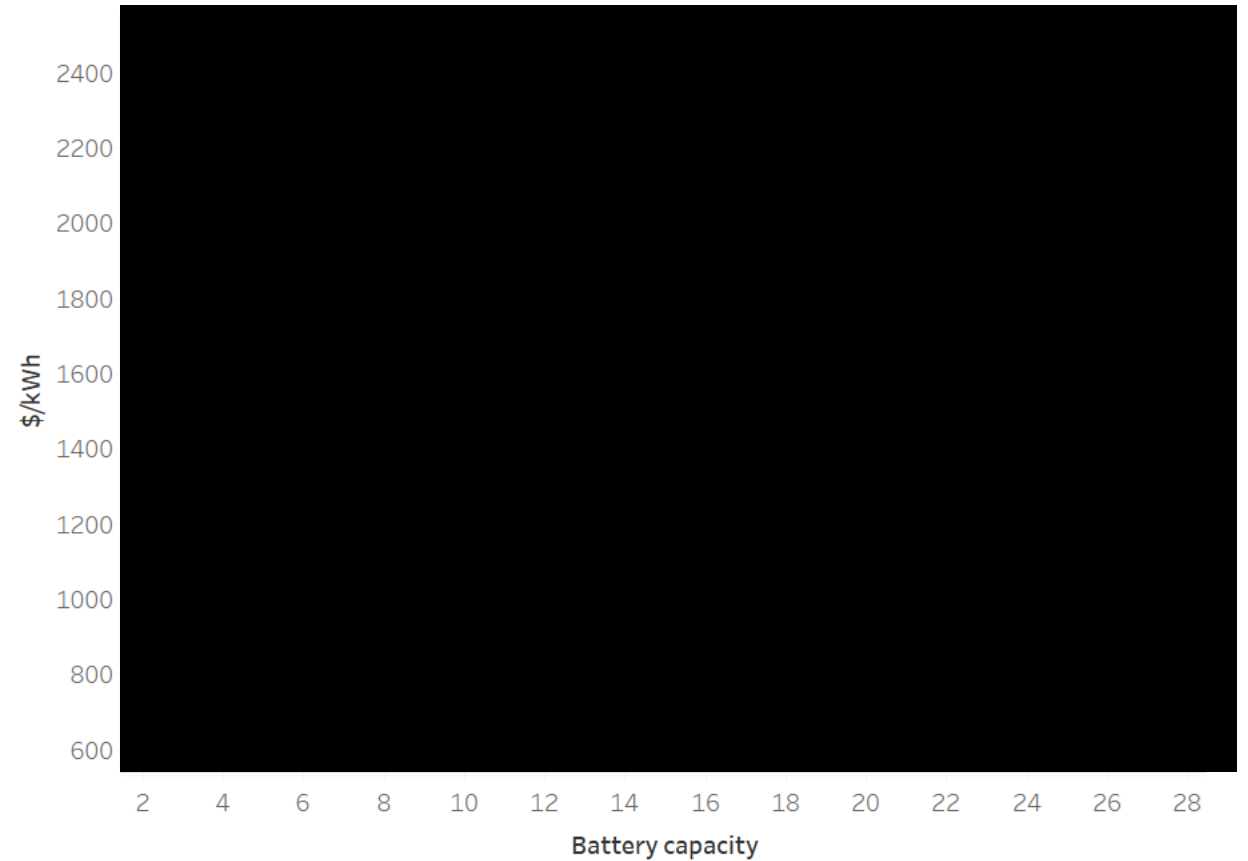


| Battery brand (group) | Inverter brand (group) | | | | | | | |
|-----------------------|------------------------|--------|---------|---------|-----|-----------|-------|----------------|
| | Fronius | Goodwe | Q-CELLS | Redback | SMA | Solaredge | SolaX | Sungrow Hybrid |
| Fronius Battery | | | | | | | | |
| Q-CELLS | | | | | | | | |
| LG Chem | | | | | | | | |
| Alpha ESS | | | | | | | | |
| Pylontech | | | | | | | | |

Price-Size Relationship

This chart illustrates the relationship between size and price.

Larger battery sizes cost proportionately less than smaller battery sizes. The exception is



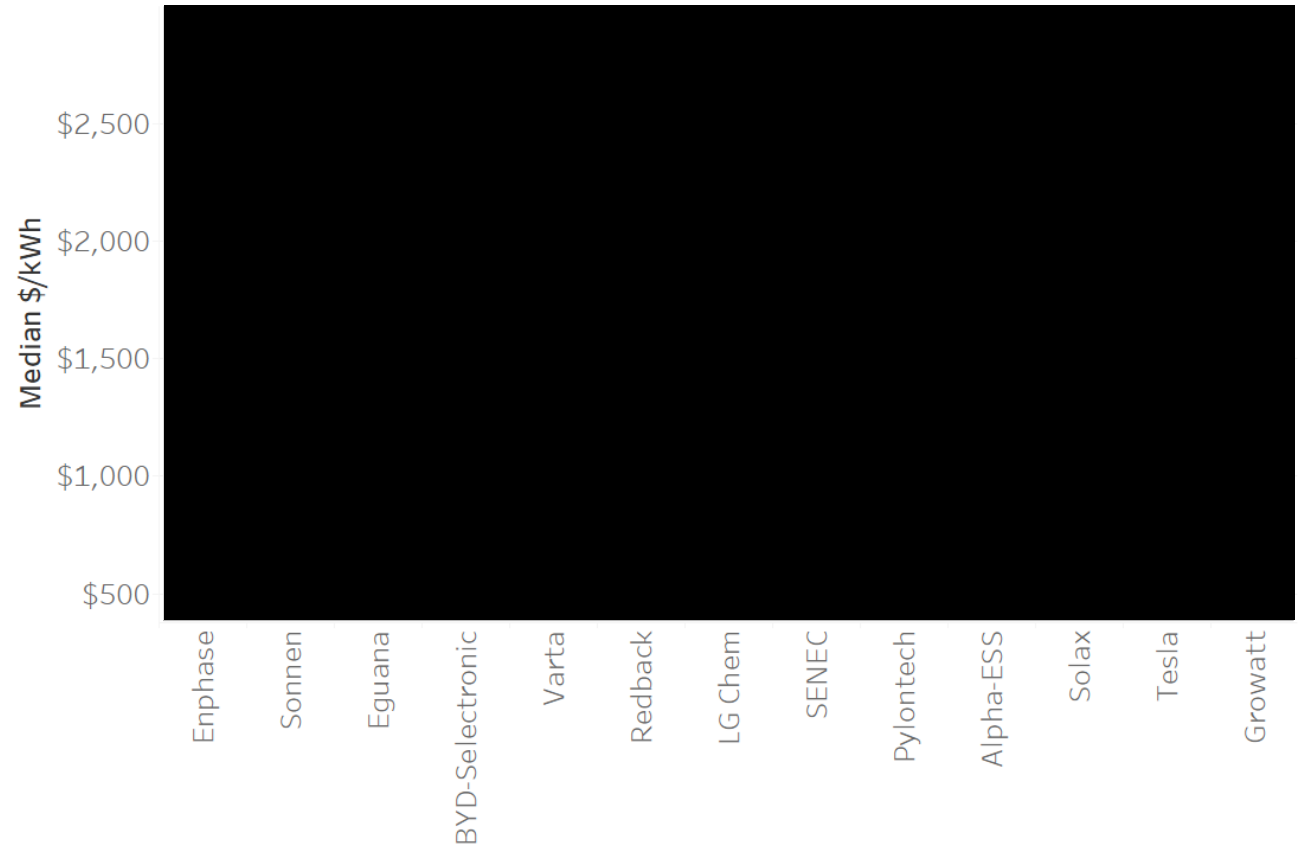
South Australian HBS Price guide



| Battery system (Not including solar panels).. | Inverter | | | | Avg. Median \$/.. |
|-----------------------------------------------|----------|-------------|-----------|--------|-------------------|
| | Other | Selectronic | SolarEdge | Goodwe | |
| Enphase | | | | | |
| Sonnen | | | | | |
| Eguana | | | | | |
| BYD-Selectronic | | | | | |
| Varta | | | | | |
| Redback | | | | | |
| LG Chem | | | | | |
| SENEC | | | | | |
| Pylontech | | | | | |
| Alpha-ESS | | | | | |
| Solax | | | | | |
| Tesla | | | | | |
| Growatt | | | | | |

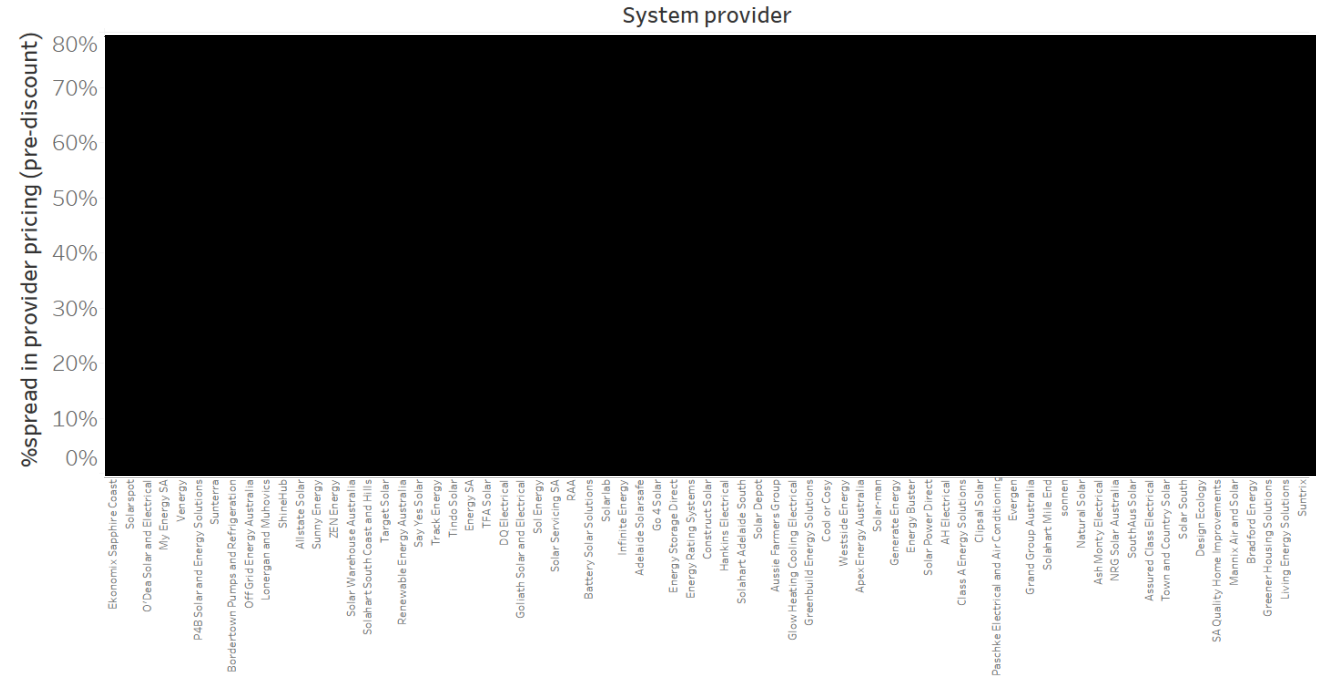
Distribution of HBS Pricing

The previous page showed the average of each provider's median price per product (before 2020 subsidy deducted). This boxplot (median, quartiles, and extremes) chart illustrates a wide variance in the median price offered on each product across the range of providers (battery retailers).



Price by systems providers (HBS)

We analysed the difference between each vendor's best price listed in the HBS System Price Guide, compared to their median price. This chart shows the range of prices (pre-discounting) that occurs for each vendor.



Pricing Outlook

- Some manufacturers predict [REDACTED] pricing reduction, some see prices could rise by a similar amount, [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

Financial Analysis

- SunWiz performed detailed energy and financial analysis using its PVsell engine, for PV & batteries of various sizes
 - in each major state, in each DNSP zone
 - for flat rate tariffs (Peak/off-peak in Victoria)
 - for flat rate export tariffs (plus TOU export in Victoria)
 - for a range of PV system sizes (7kW, 10kW, 13kW)
 - For a range of battery sizes (0kWh, 6kWh, 10kWh, 14 kWh)
 - For three levels of consumption (15, 20 and 25 kWh/day)
- In previous years we showed:
 - Payback is best for higher levels of consumption
 - Payback is best for smaller batteries

[REDACTED]
- The Following is an update of our 2020 analysis, updated for current pricing of batteries, PV, and electricity import & export.

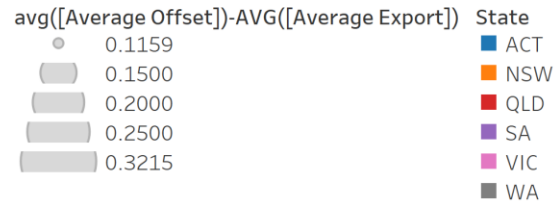
Financial Analysis: Electricity prices 2018 v 2020 v 2021

The annual benefit from a solar and storage system is largely dependent upon the price of import electricity and the feed-in tariff for exported energy.

This chart shows the evolution of electricity price by state, tracking 2018 2020 and 2021.

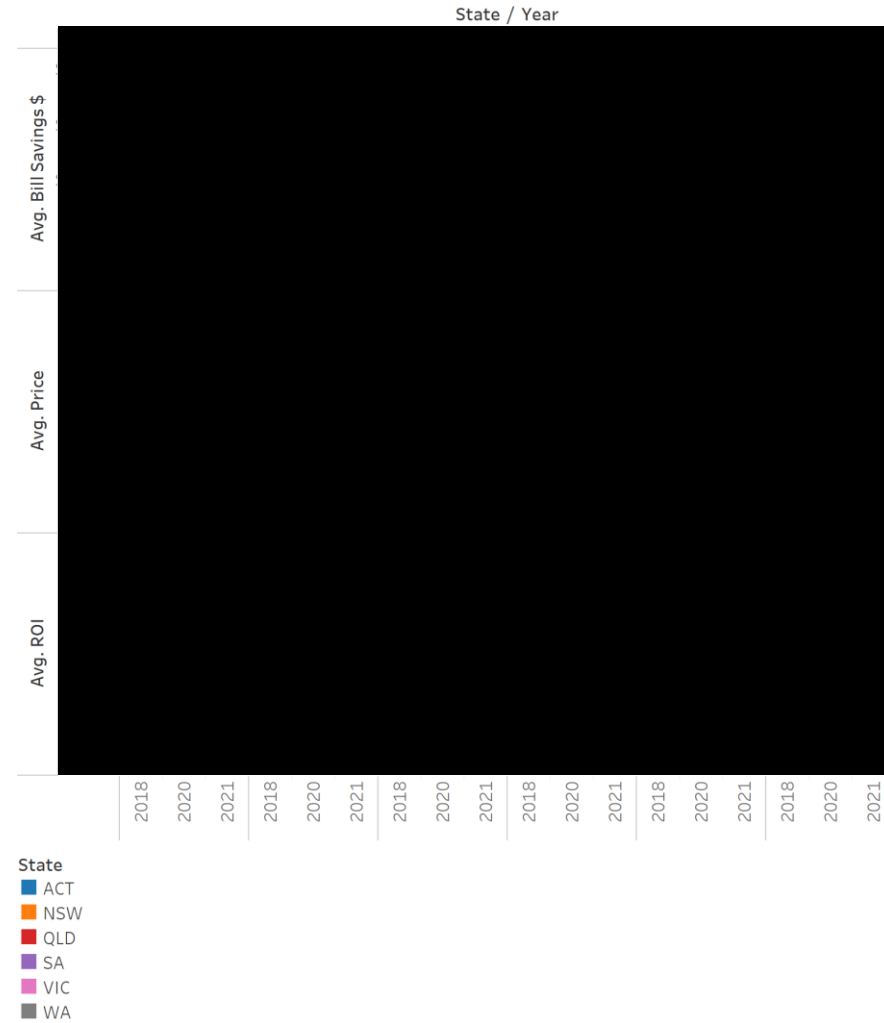
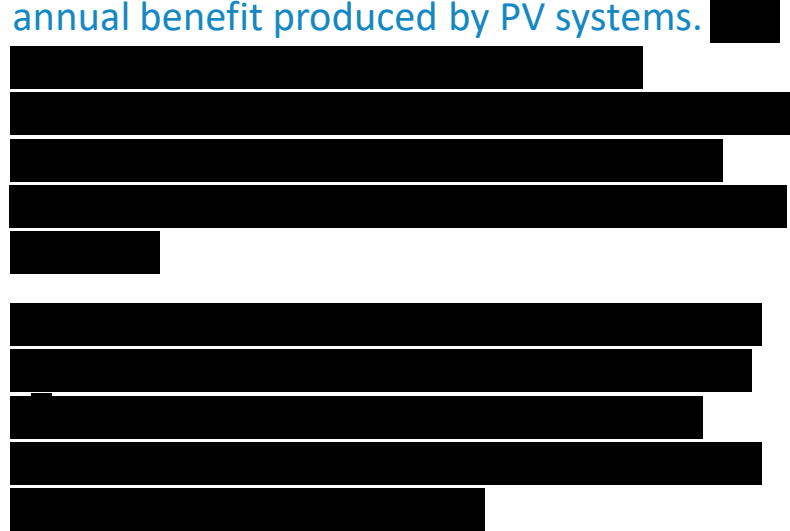
The average value of energy that is offset by PV+storage (i.e. imported grid) has recently [redacted] in [redacted]

The feed-in tariff has recently fallen dramatically in the [redacted]

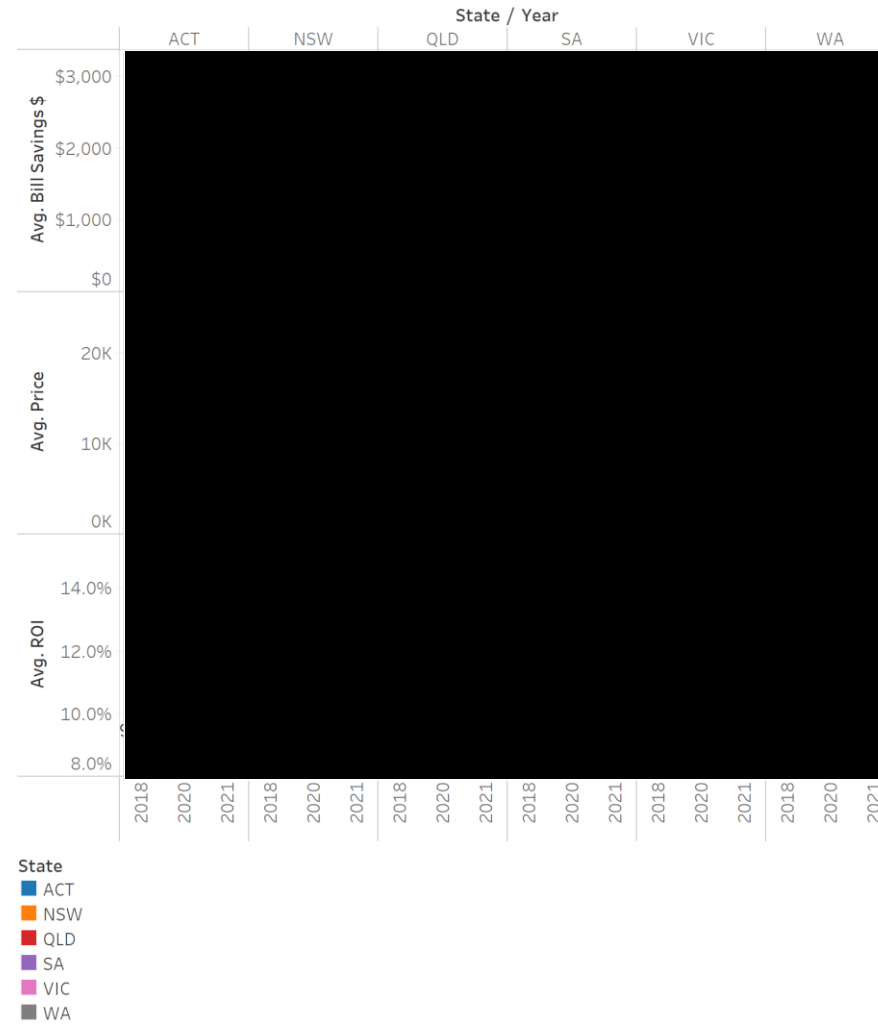
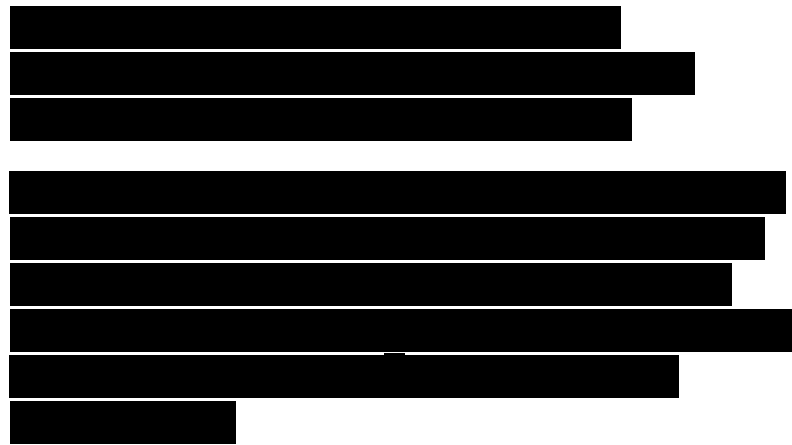


Financial Analysis: PV benefits

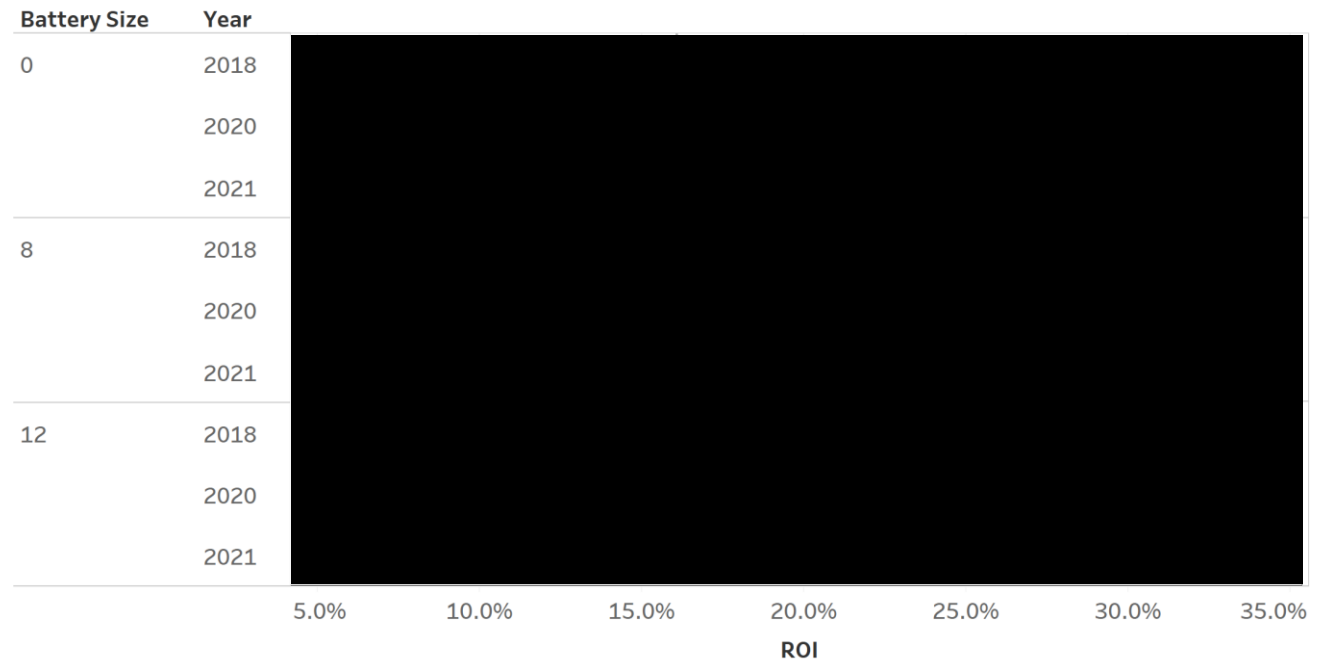
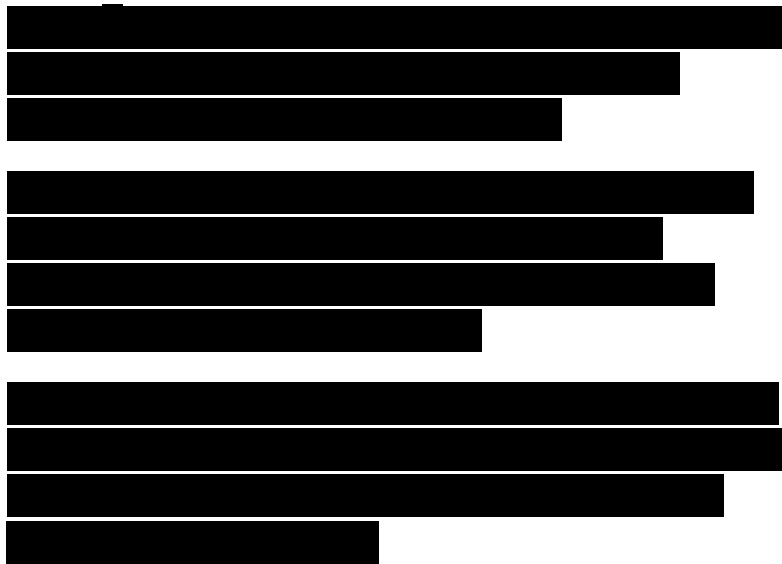
The various changes in the price of imported and exported electricity has reduced the annual benefit produced by PV systems.



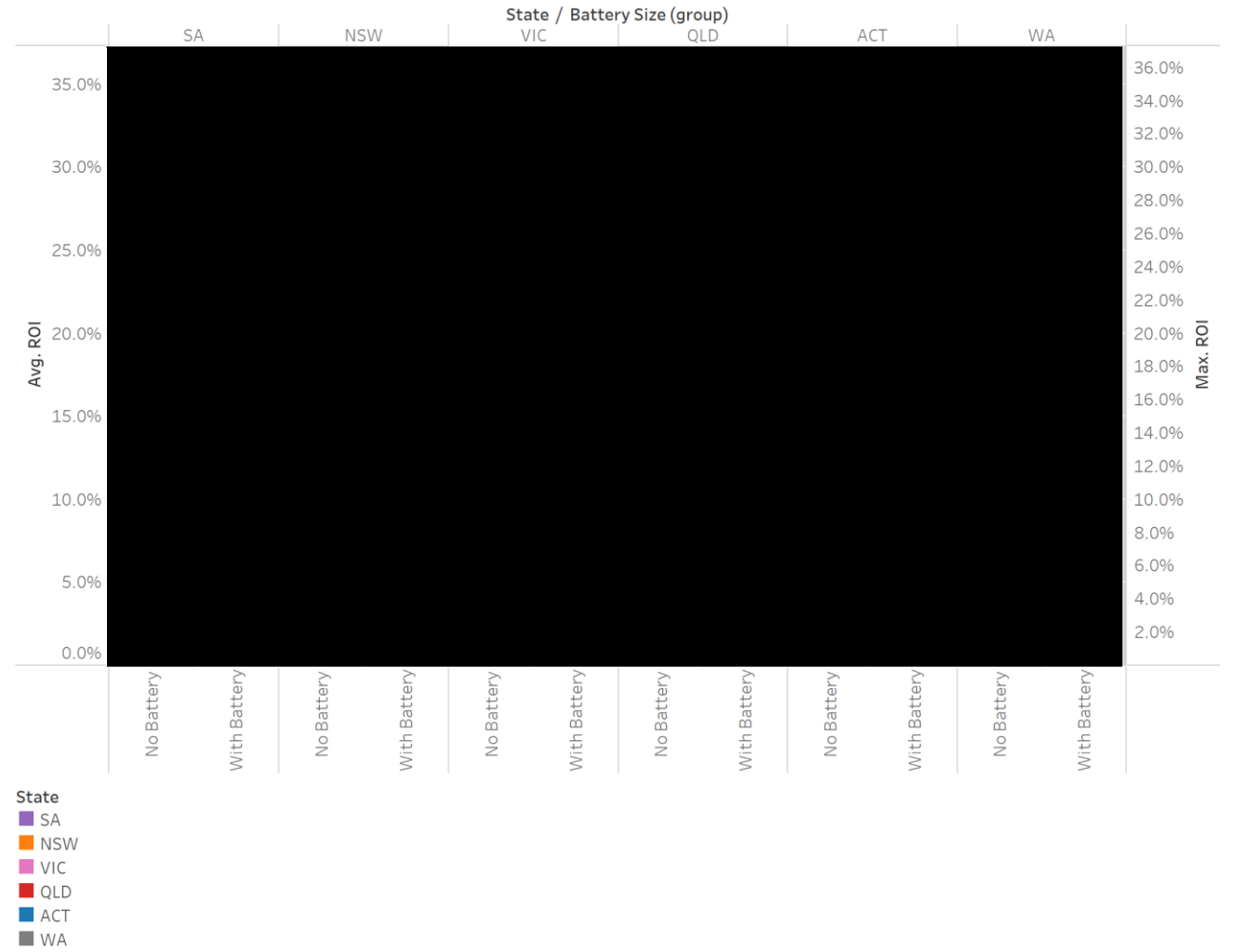
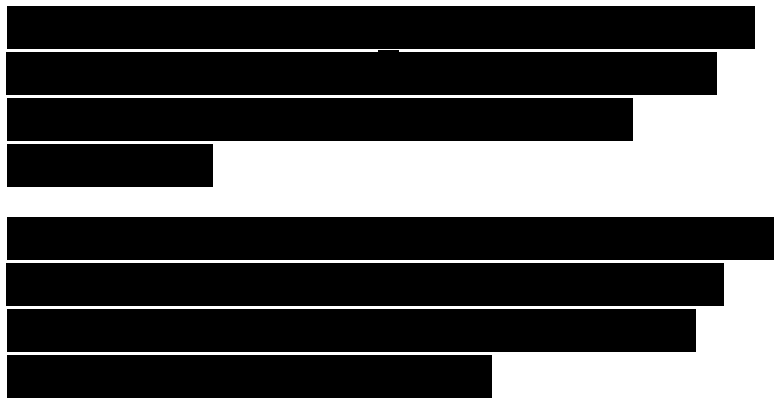
Financial Analysis: PV + storage payback



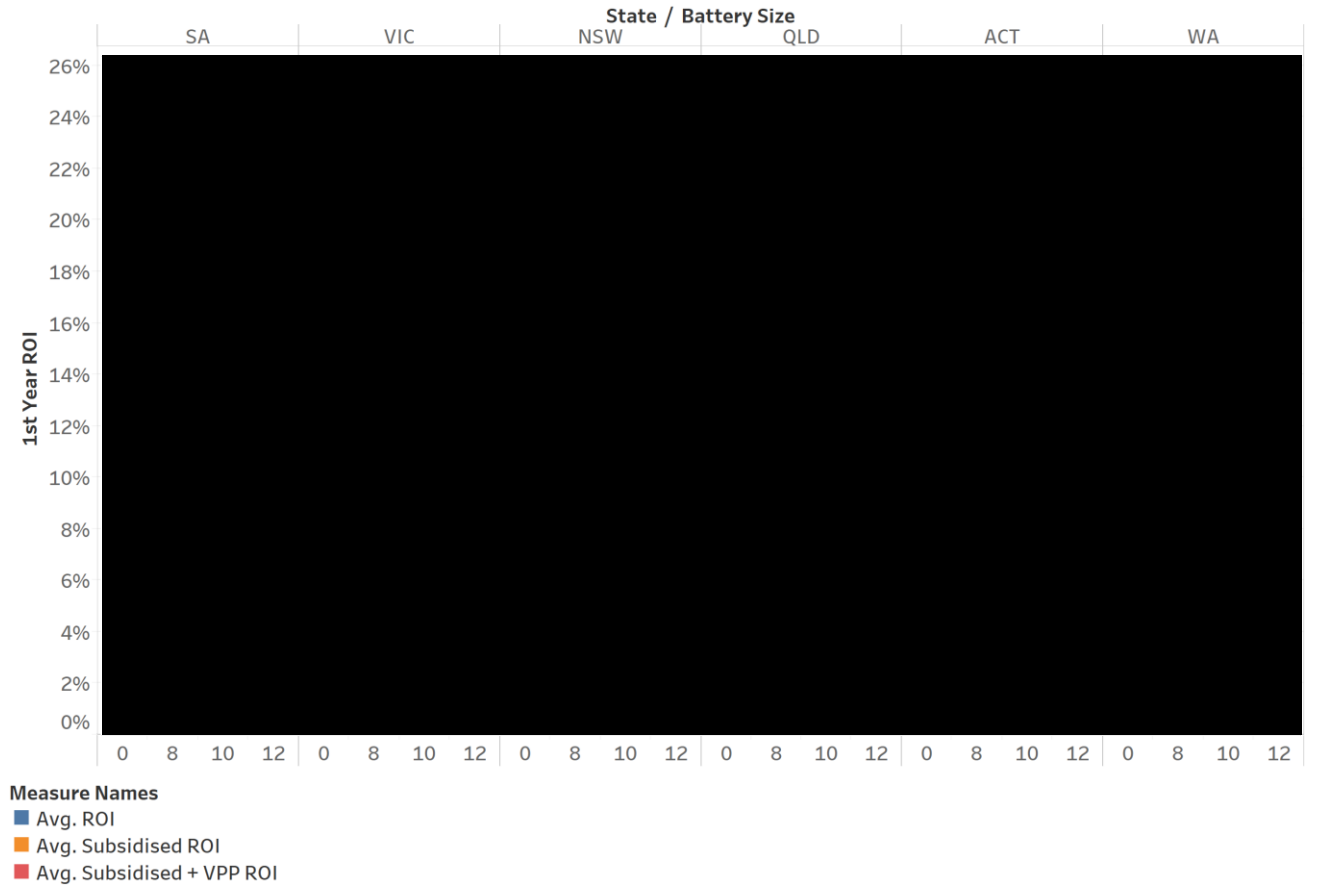
Financial Analysis: Variability of ROI



Financial Analysis: Best State (unsubsidised)

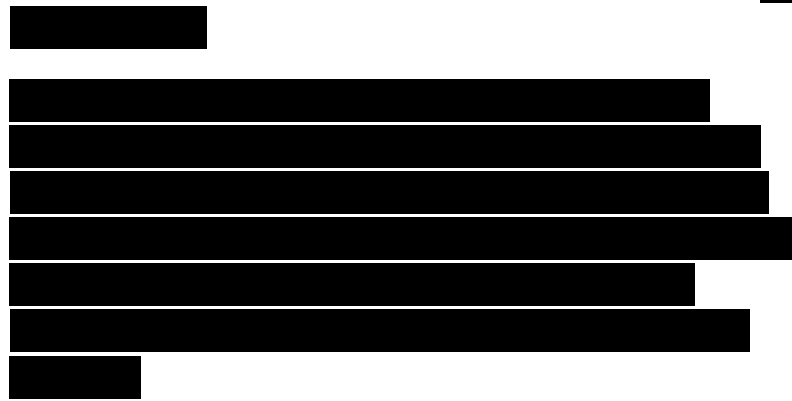


Best State: including Subsidy + VPP



Financial Analysis: Put on a bigger PV system

This chart shows that for the first time its better to put on a [redacted] PV-only system than a 10kW PV-only system, but only if you live [redacted]



| State | PV Size | Battery Size | | | |
|-------|---------|--------------|-------|-------|-------|
| | | 0 | 8 | 10 | 12 |
| ACT | 7 | 21.4% | 9.8% | 9.4% | 8.9% |
| | 10 | 14.5% | 9.3% | 9.0% | 8.6% |
| | 13 | 15.5% | 10.2% | 9.8% | 9.5% |
| NSW | 7 | 22.6% | 10.7% | 10.3% | 9.8% |
| | 10 | 15.2% | 10.0% | 9.8% | 9.5% |
| | 13 | 16.2% | 10.9% | 10.7% | 10.4% |
| QLD | 7 | 21.3% | 10.0% | 9.6% | 9.2% |
| | 10 | 18.2% | 10.5% | 10.2% | 9.8% |
| | 13 | 13.9% | 9.7% | 9.5% | 9.2% |
| SA | 7 | 29.3% | 13.9% | 13.3% | 12.6% |
| | 10 | 22.3% | 13.7% | 13.3% | 12.8% |
| | 13 | 24.6% | 15.2% | 14.7% | 14.1% |
| VIC | 7 | 22.2% | 9.0% | 8.4% | 7.9% |
| | 10 | 17.3% | 9.5% | 9.1% | 8.6% |
| | 13 | 19.8% | 11.2% | 10.7% | 10.1% |
| WA | 7 | 22.3% | 10.8% | 10.5% | 10.1% |
| | 10 | 12.9% | 9.2% | 9.2% | 9.0% |
| | 13 | 10.2% | 8.4% | 8.4% | 8.3% |

Avg. ROI



Customer Characteristics

Key Learnings— Buying Triggers

The 2020 survey conducted by Simply Energy identified reducing electricity bills as the primary driver for interest in a home battery. This is consistent with every other survey we've read and has been the significant motivator Y-o-Y.

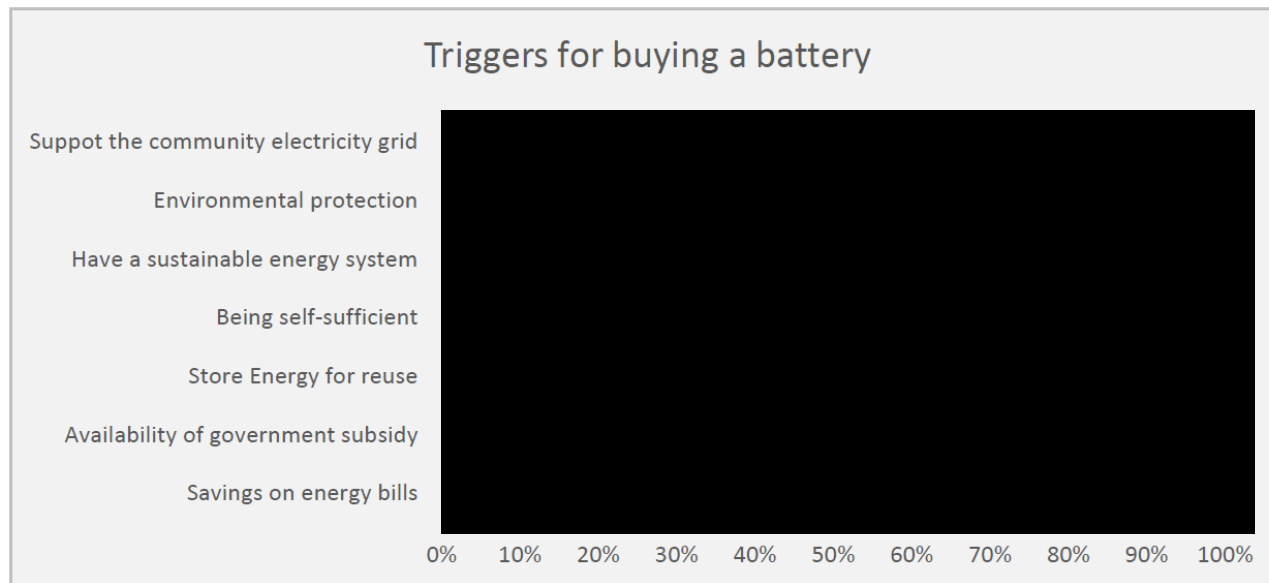
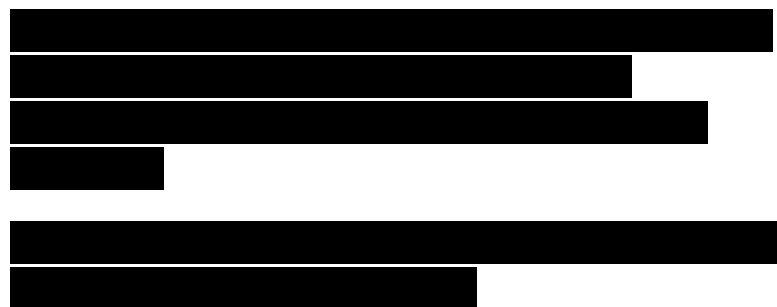


Figure 5: **Question:** What initially triggered you to look for an energy solution for your home?

Key Learnings— Consumer Purchase Considerations

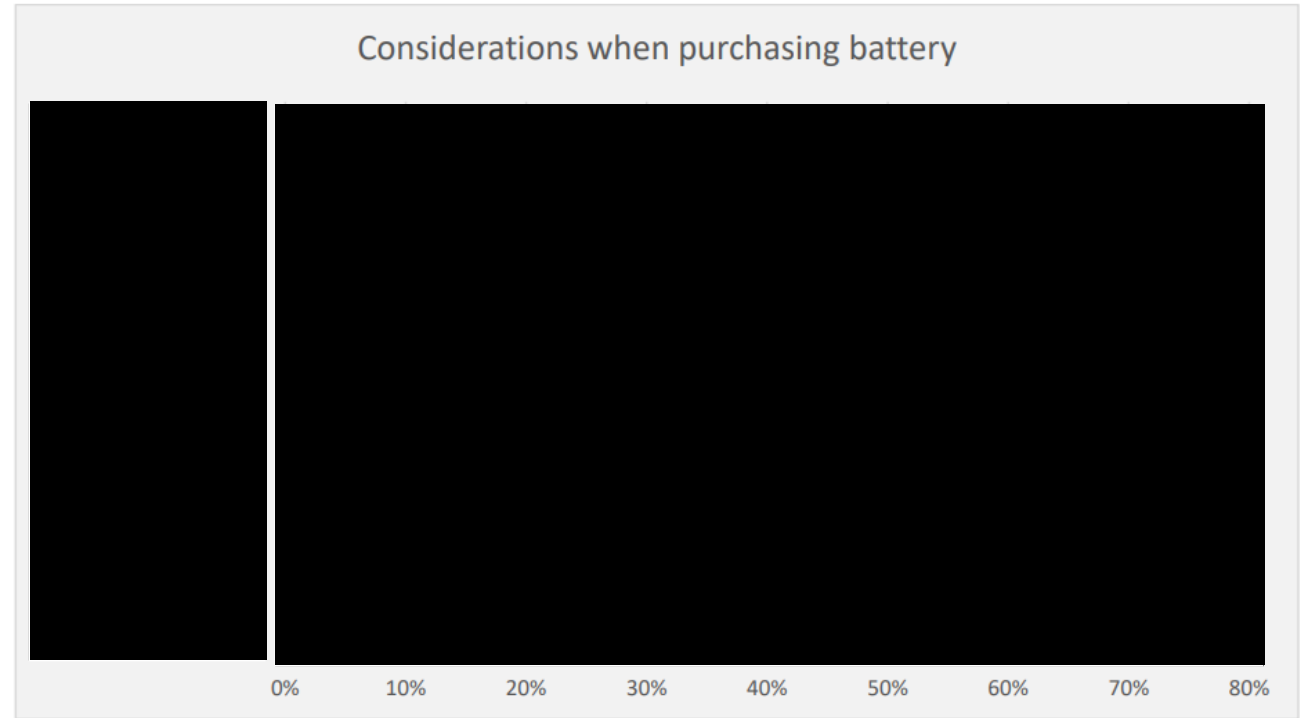


Figure 9: **Question:** What are/were your primary sources of information when considering an energy solution?

Key Learnings— Purchase Barriers

The 2020 survey conducted by Simply Energy identified the major barrier to purchase was

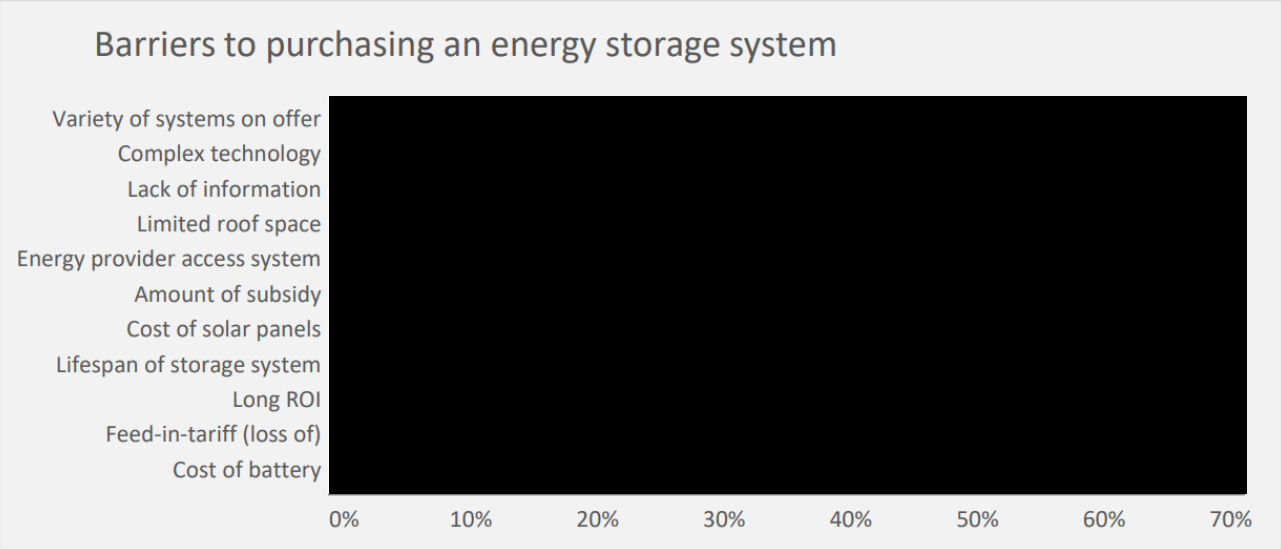


Figure 8: **Question:** Overall what did you consider to be the key barriers to having an Energy Solution Product?

COVID-19 Impacts- Battery Purchase Decision

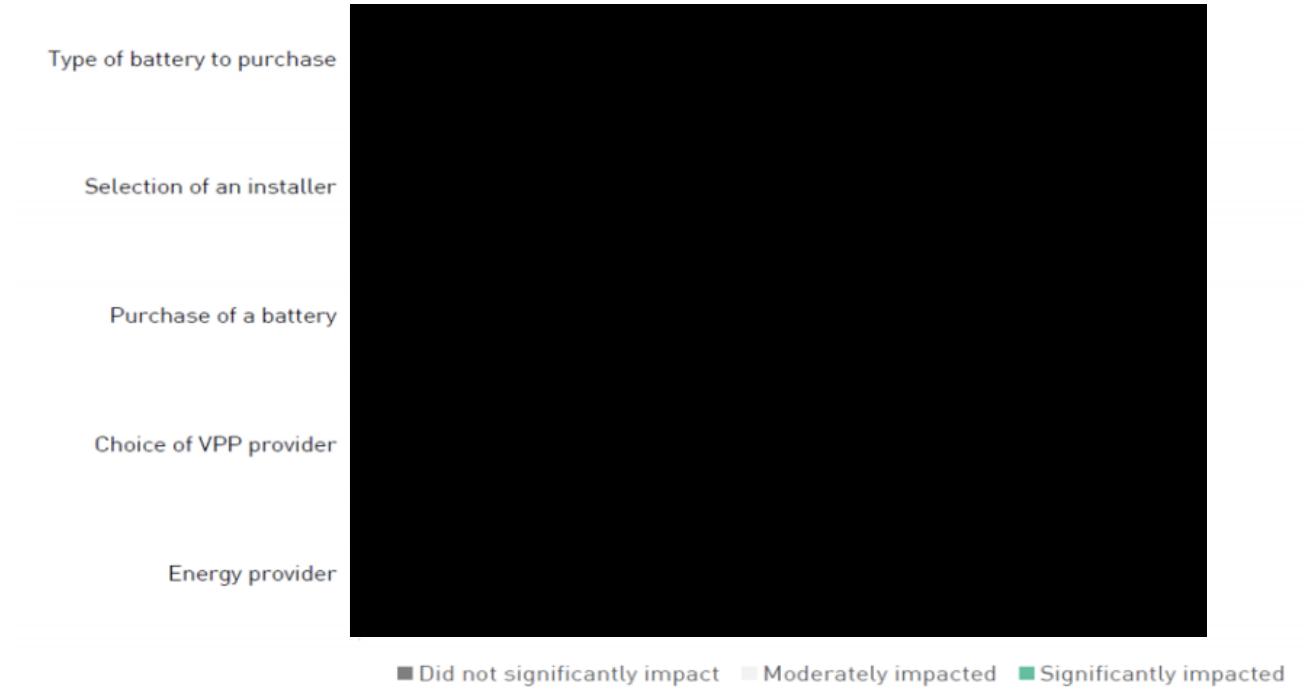
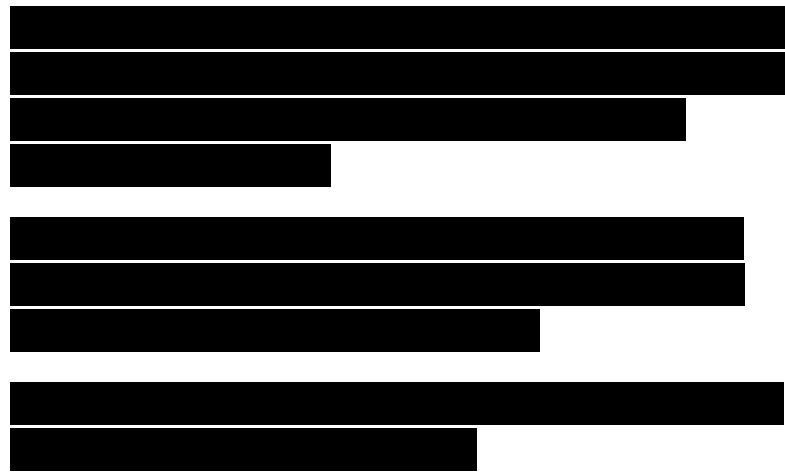


Figure 2 Question: Has COVID-19 impacted your purchasing decision on the following?

VPP Consumer Profiles

- Qualitative research indicated that consumers can be classified into four categories based on their primary motivations for participation in a VPP. Motivations are defined by two dimensions: the level of engagement with the VPP and a community vs individual focus on the benefits.

[Redacted content]

Installer/Retailer Survey

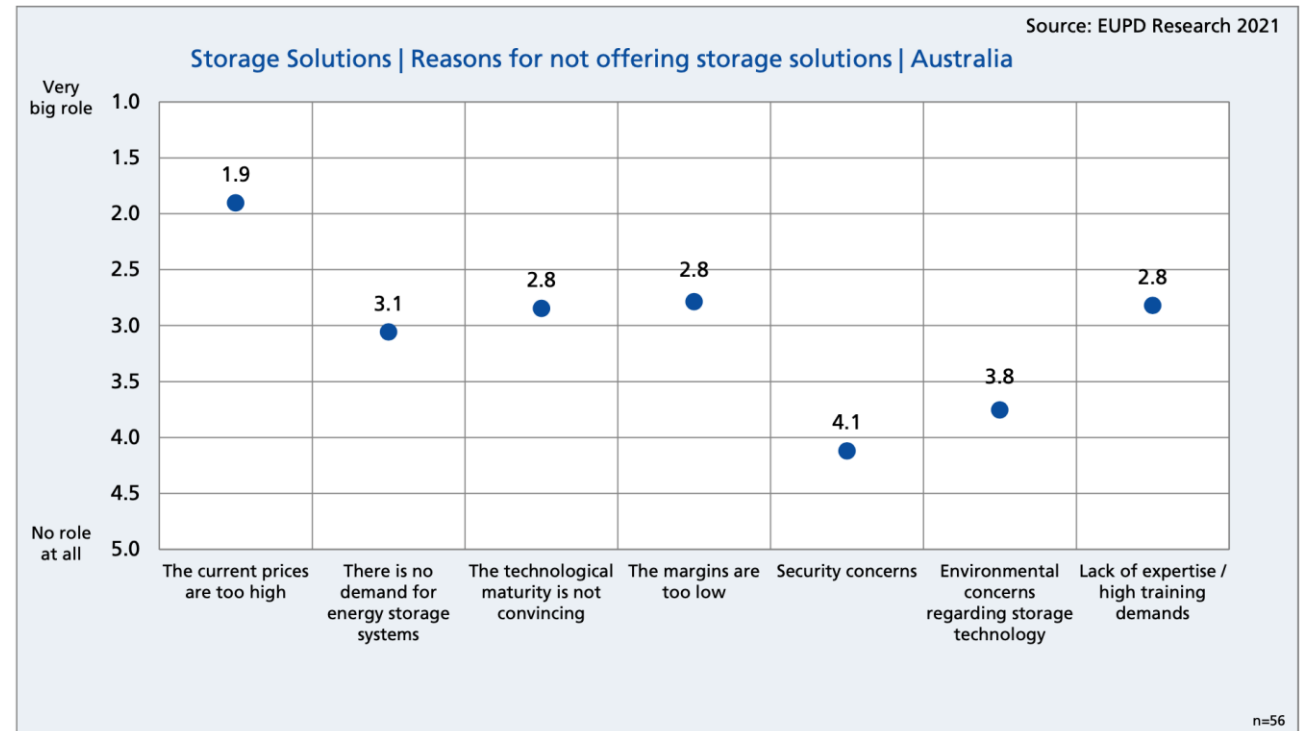
Summary of results from SunWiz-EUPD Research survey of over 200 Retailers, 2021

Reasons for Not Offering Storage

EuPD Research in combination with SunWiz runs an annual survey of Australia retailers/installers, with impressive results.

The chart to the right shows of the 30% of respondents not offering storage solutions, price remains the biggest barrier, followed by a tied lack of technological maturity, low margins and lack of expertise. Security and Environmental concerns aren't seen as such an issue.

The EuPD survey reported 18% of HESS systems were retrofit (down from 23% last year), with 13% of systems exceeding 15kWh, and 70% below this figure. New installations account for 72% of storage solutions supplied.

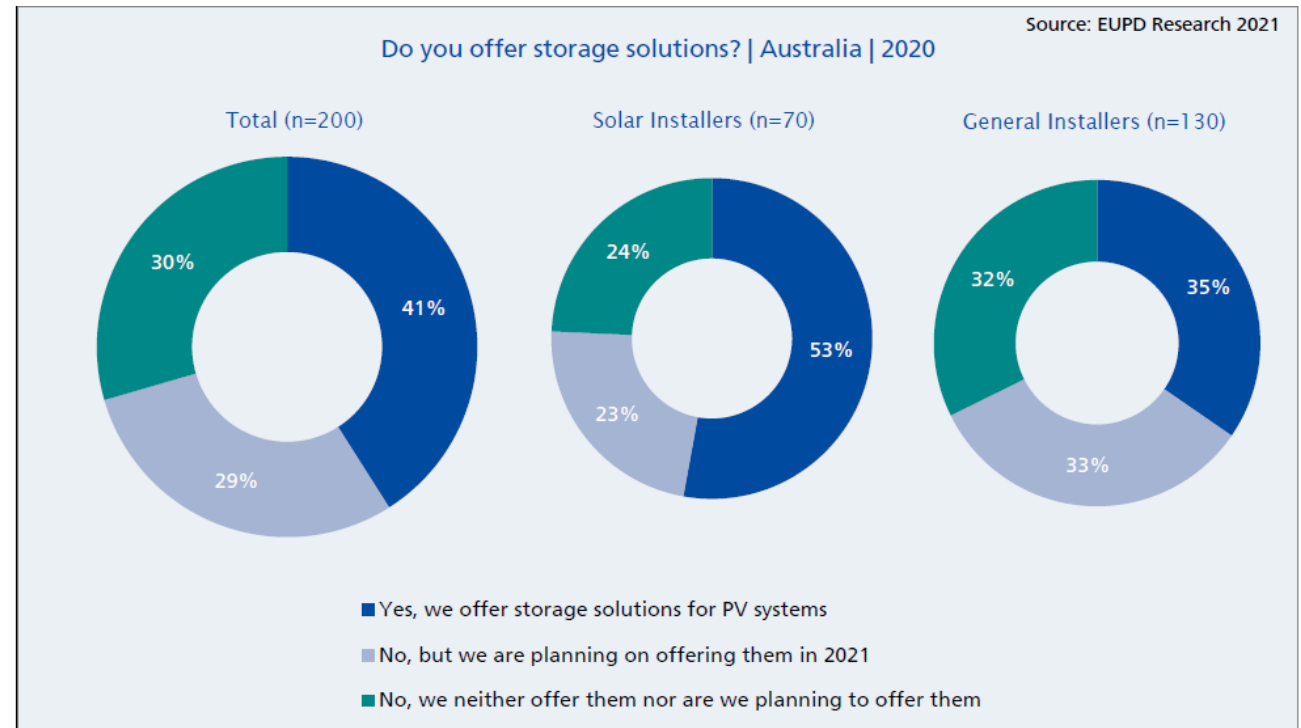


EUPD+SunWiz: Key Insights

Solar installers were less interested in selling batteries in 2020 than in 2019. However, more plan to do so in 2021.

The number of installers offering storage solutions decreased by 17% from 2019 to 2020.

The number of installers planning on offering storage solutions for the proceeding year increased by 12% from 2019 to 2020.

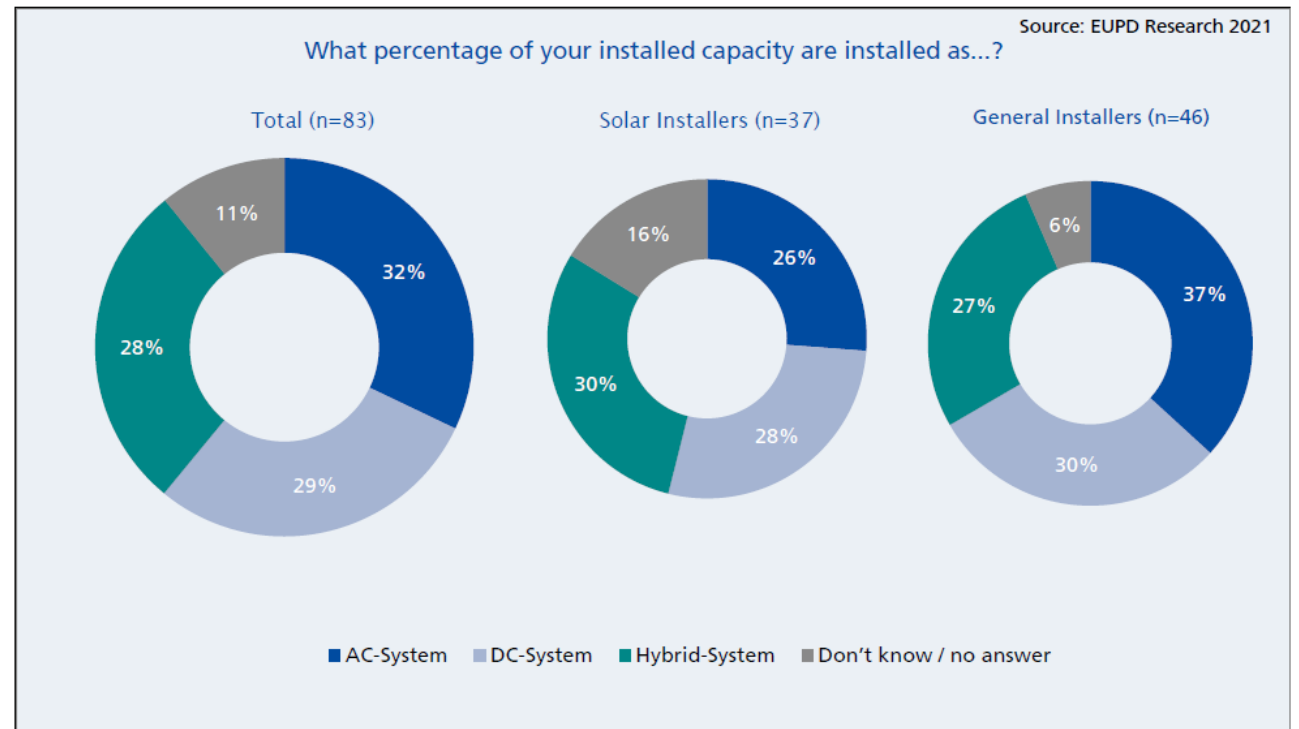


EUPD+SunWiz: AC/DC

Overall the number of storage systems installed has increased by 52% from 2019 to 2020 despite fewer installers offering a storage solution. This reflects a divergence of market agents with greater specialization.

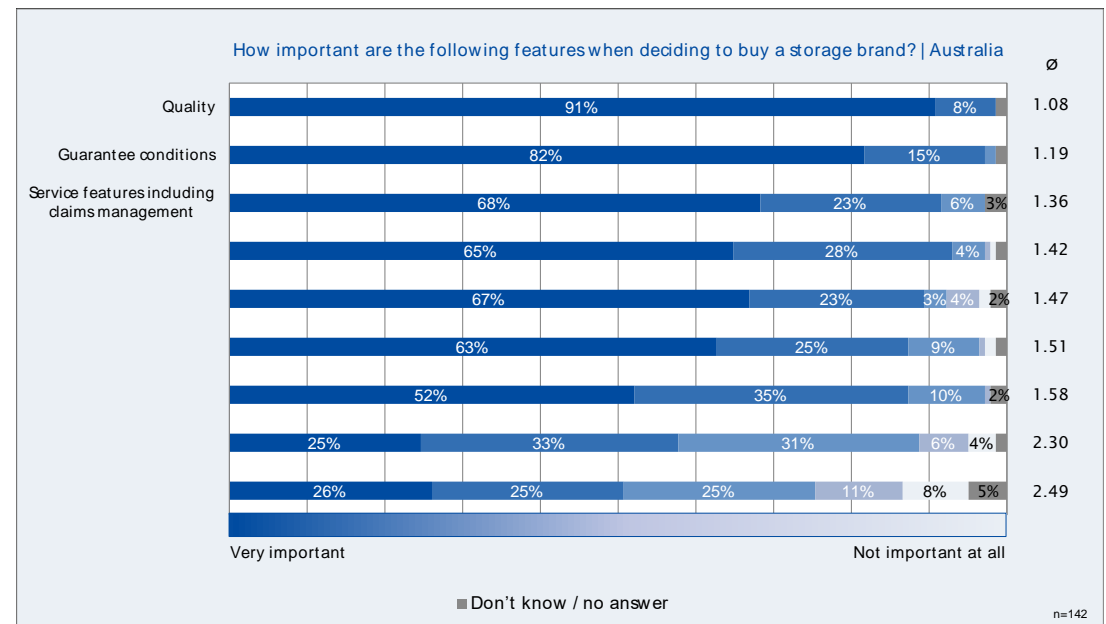
In 2020 the percentage of installed storage capacity by 'Solar Installers' was predominantly a hybrid system (AC & DC). 'General Installers' opted primarily for AC-Systems. 32% of all storage systems installed were AC-Systems.

Low-voltage storage solutions accounted for 59% of all installs. 'Solar Installers' installed more high-voltage systems compared to 'General Installers' (33% and 28% respectively).



EUPD+SunWiz: Battery Features Affect Brand Decision

- There are many factors that influence which brand installers select.
- ‘Quality’ was the highest rated feature with 91% of survey participants ranking it as very important.
- Followed by 82% for ‘Guarantee Conditions’
- Then 68% for ‘Service Features Including Claims Management’ respectively.



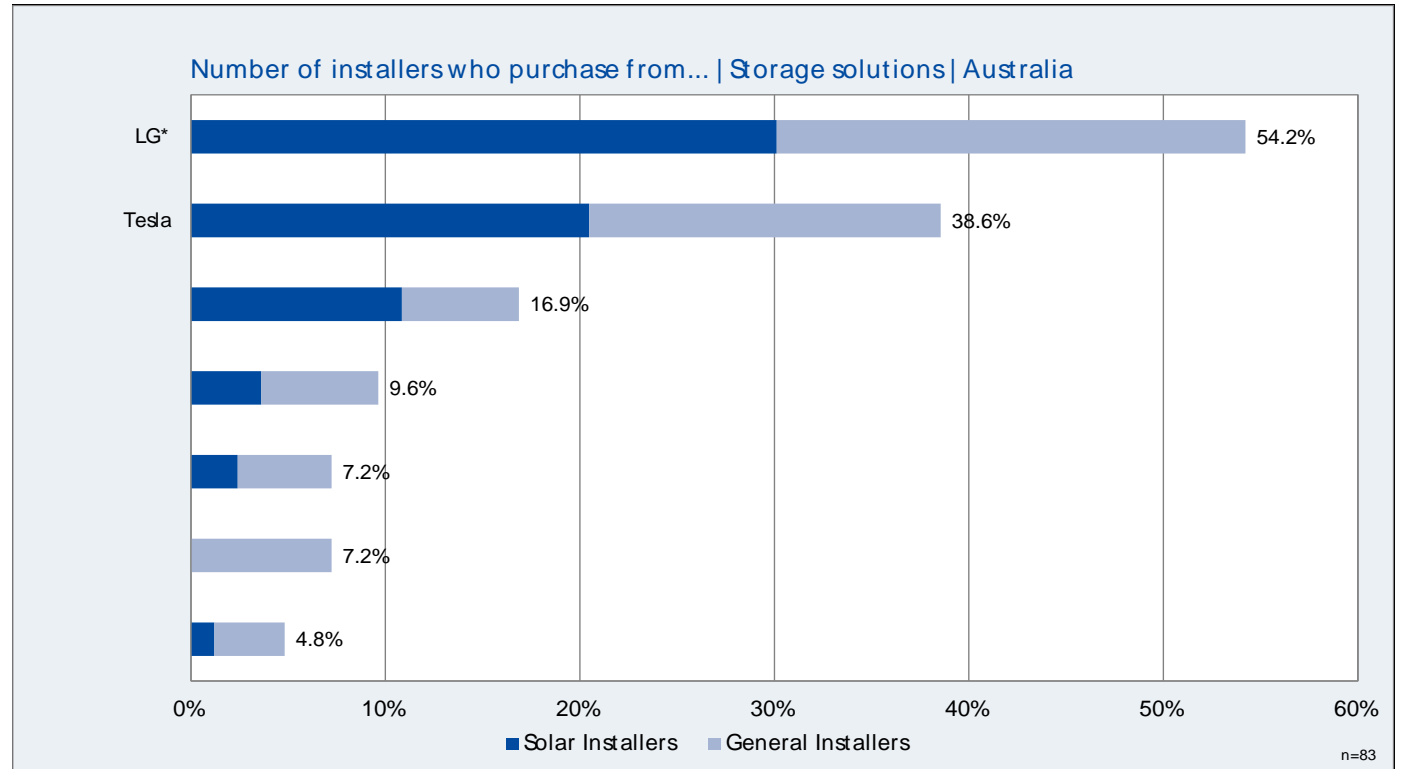
Source: EUPD Research 2021

EUPD+SunWiz: Brand Popularity

Among the surveyed installers LG and Tesla were the most used storage brands at 54.2% and 38.6% respectively.

Approximately half the installers purchasing from LG and Tesla were 'Solar Installers' with the other half belonging to the 'General Installer' group.

This does not infer market share.

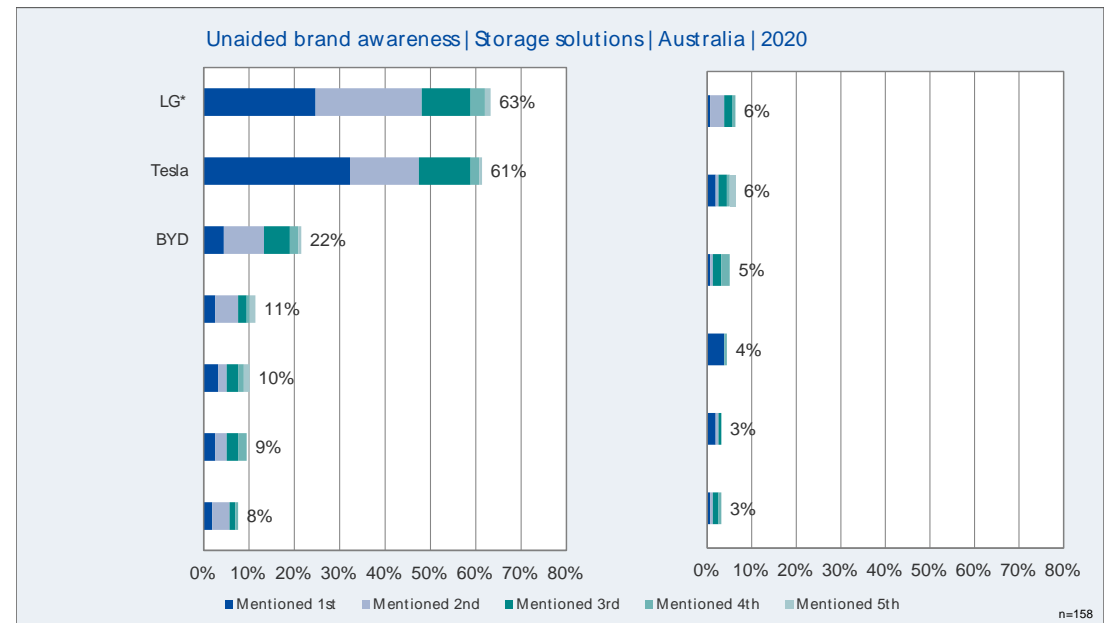


* LG summarizes LG Chem and LG Electronics.

Source: EUPD Research 2021

EUPD + SunWiz: Brand Awareness

- LG, Tesla and BYD were the most mentioned brands in regards to customer awareness over 2019 and 2020.
- Awareness of LG & Tesla increased significantly from 2019 to 2020 (by 4% and 25% respectively, mostly at the expense of BYD and other brands).
- In contrast to LG, Tesla was mentioned first more often in 2020 compared to 2019. LG however still held the greatest number of mentions.



EUPD + SunWiz: Brand Evaluations

40% of installer's utilising Sonnen used the brand exclusively (proportion of brand utilised in installer's portfolio $\geq 95\%$). 83% of installer's utilising Alpha-ESS allowed the brand to dominate their portfolios (utilisation $\geq 50\%$). Although BYD was one of the most mentioned brands 31% of installers only allowed the brand to take a complementary role within their portfolios (utilisation $\geq 25\%$).

PowerPlus Energy, Pylontech and Tesla had the highest net promoter scores. All (100%) survey participants utilising PowerPlus Energy and Pylontech would promote both brands. Whereas only 75% would promote Tesla (22% were passive and 3% were detractors).

In order of importance: 'Quality', 'Guarantee Conditions' and 'Service Features Including Claims Management' were the top three most important aspects of a purchase decision. The table to the right shows the top two ranking companies in each category. The figure on the following slide provides further detail.

| Ranking | Quality | Guarantee Conditions | Service Features |
|---------|---------|----------------------|------------------|
| First | Tesla | LG Chem | Sonnen |
| Second | Enphase | Tesla | Tesla |

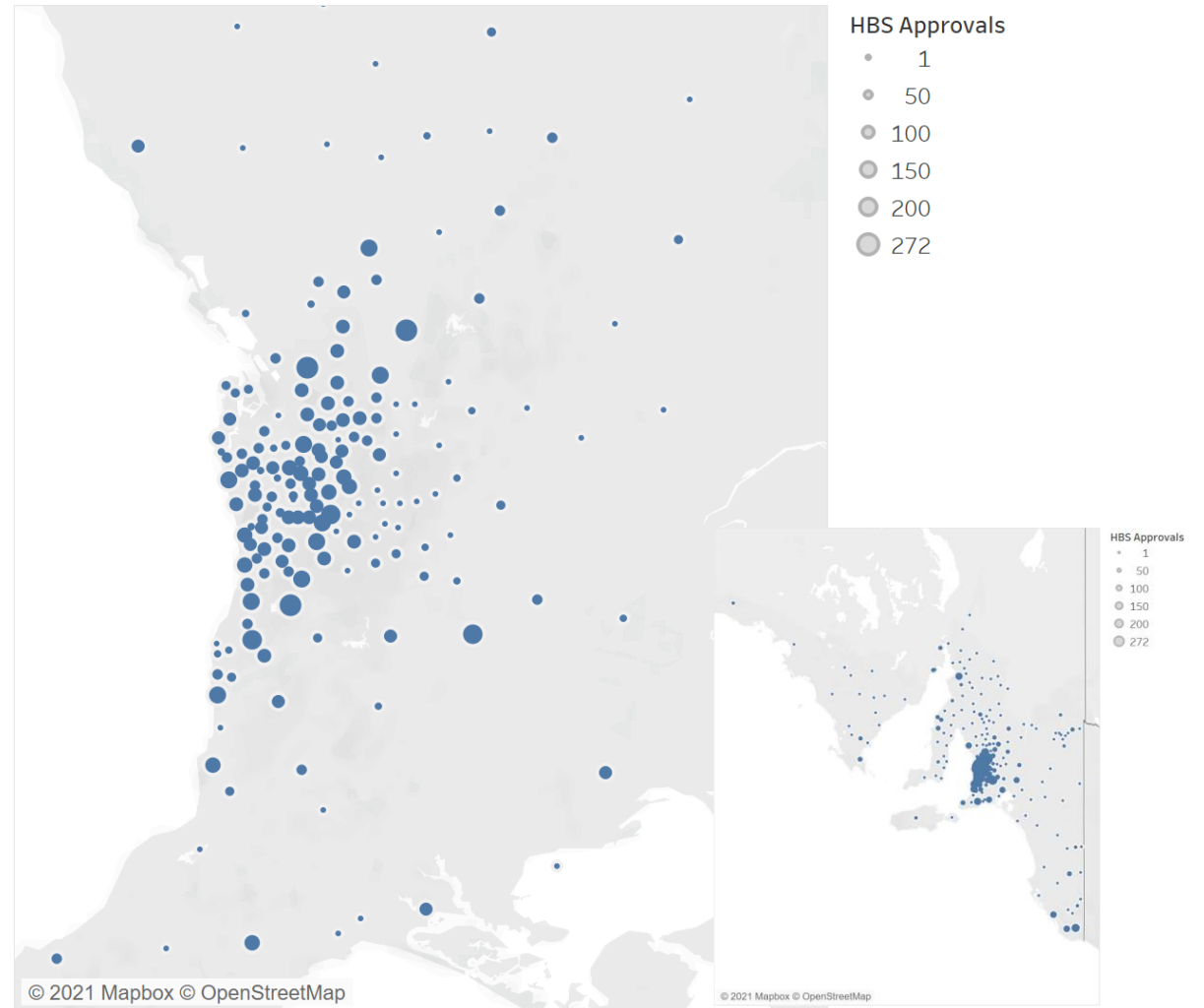
Much More inside

- The full report covers unredacted detailed insights and breakdowns of this summary as well as:
- Procurement
 - Sourcing
 - Positioning of wholesalers
- Brand Awareness & Management
 - Top players / manufacturers
- Market Penetration
 - Distribution of most used energy storage suppliers
 - Brand positioning
- Customer Satisfaction
 - Customer satisfaction
 - Importance of features for purchase decision (ranked)
- AND LOTS MORE..

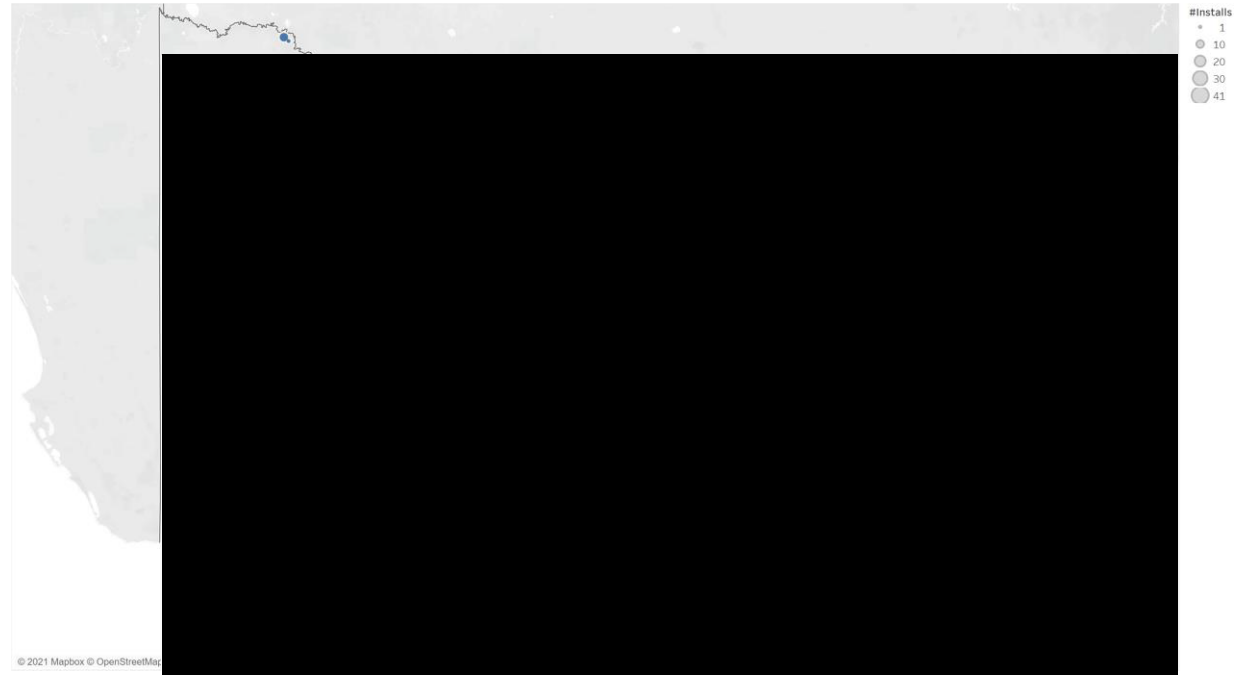
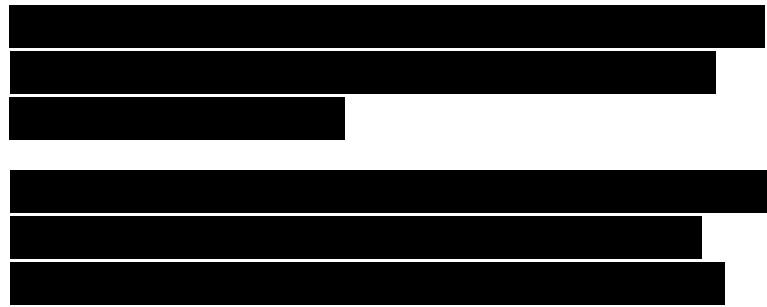
- If you're looking for an edge or just want to learn more about the battery market order your full report today by reaching out to warwick@sunwiz.com.au

Where are batteries being installed?

Key Program Data – Distribution of Panels HBS



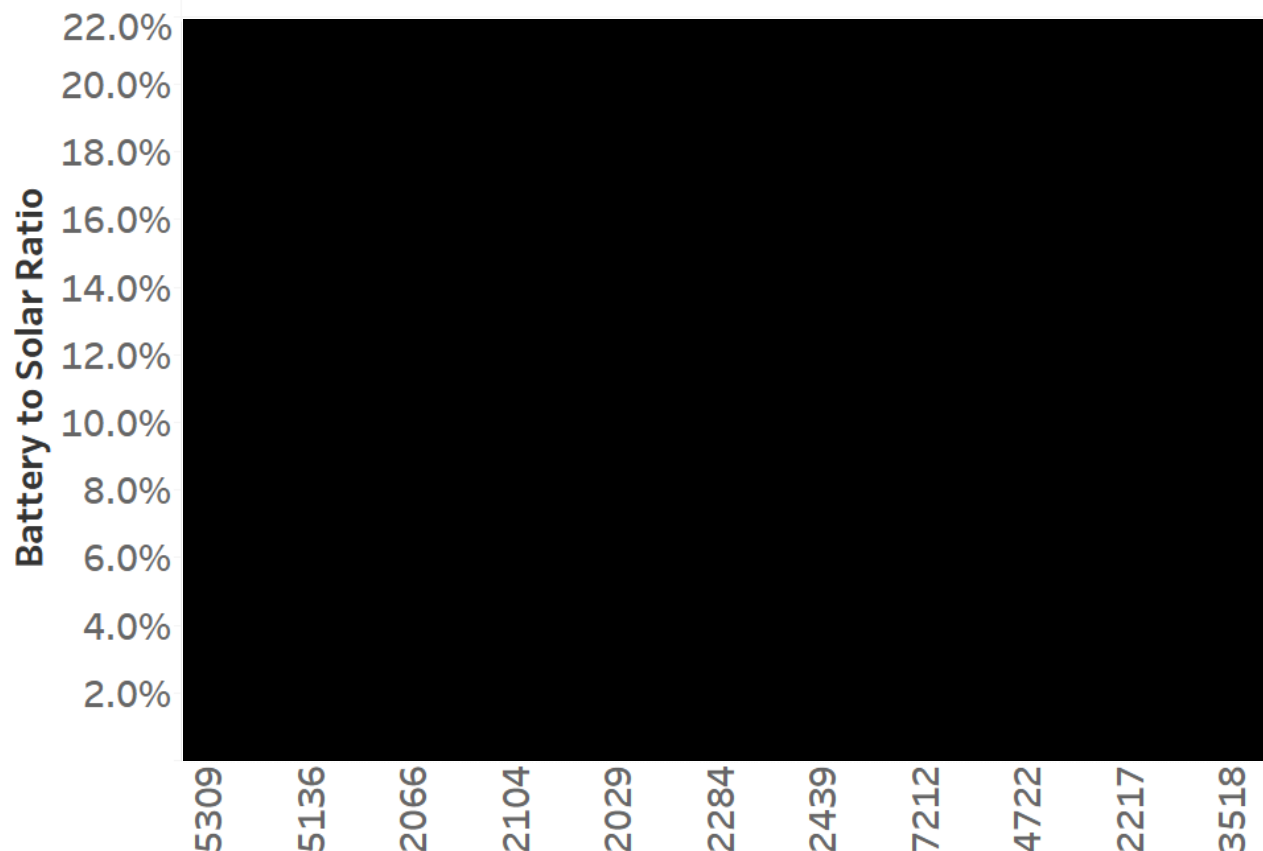
Key Program Data – Distribution of Panels VSR



DER Register

- The DER Register provides a postcode-level view of where batteries are being installed in the NEM.
- While we have hesitations about the completeness of the DER Register at this time, given that the data collection processes prior to go-live were not consistent, it still illuminates the distribution of battery installations within each state.

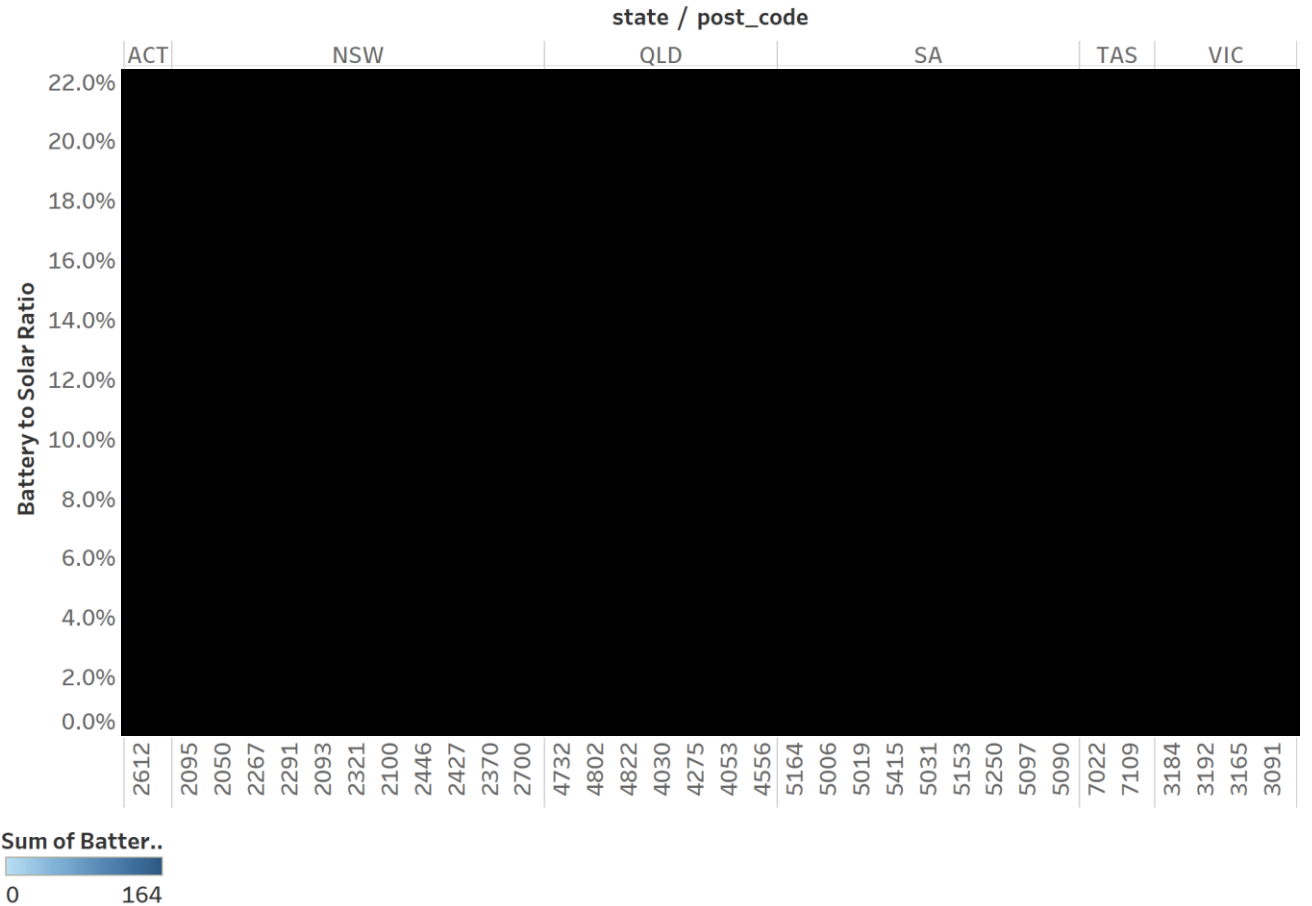
Total Residential Batteries to Solar Connections Ratio – DERR



Battery:Solar Ratio

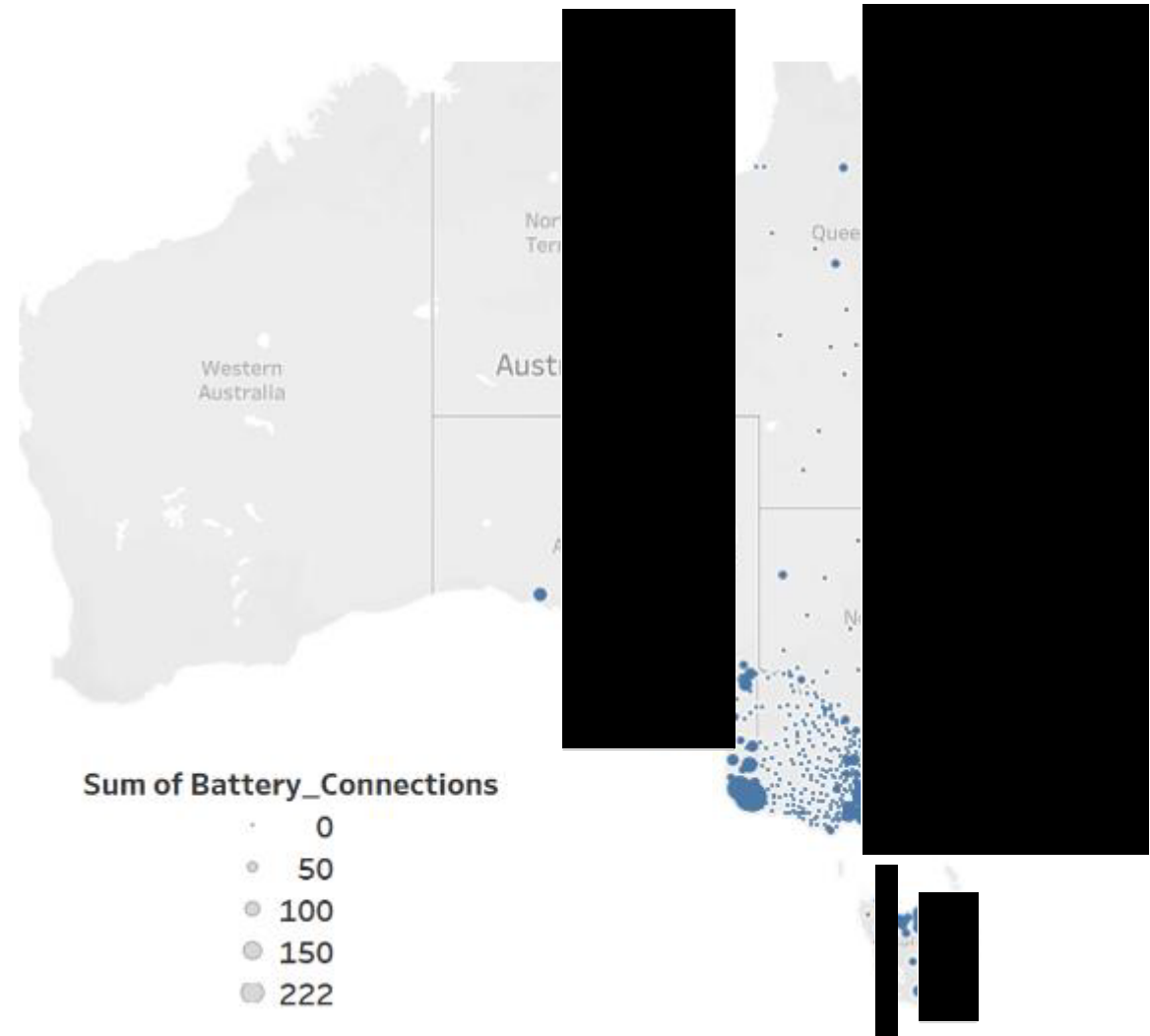
This chart shows the postcode-level distribution of battery to solar ratio, by state, according to the DERR.

It reveals the highest ratio [redacted]
 [redacted]
 [redacted]
 [redacted]
 [redacted]



DER Register Total Connected Batteries – Australia

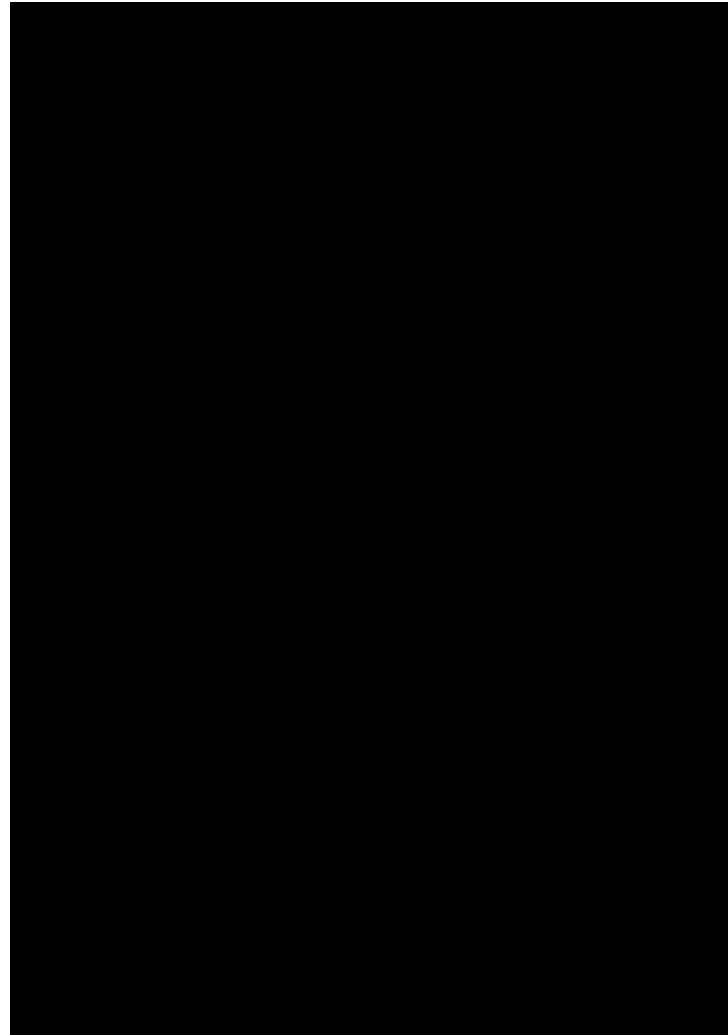
This map shows the distribution of the batteries recorded on the NEM in the DER Register to the end of December 2020.



DER Register Total Residential Batteries to Solar Connections Ratio – National

This shows the ratio of battery connections to solar connections at a postcode level according to the DER Register. Only postcodes with >0.1% battery:solar ratio are shown.

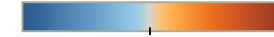
You can see there are high uptake areas in Adelaide and south-east SA, the ACT, and parts of Sydney.



Sum of Battery_Connections

- 0
- 50
- 100
- 164

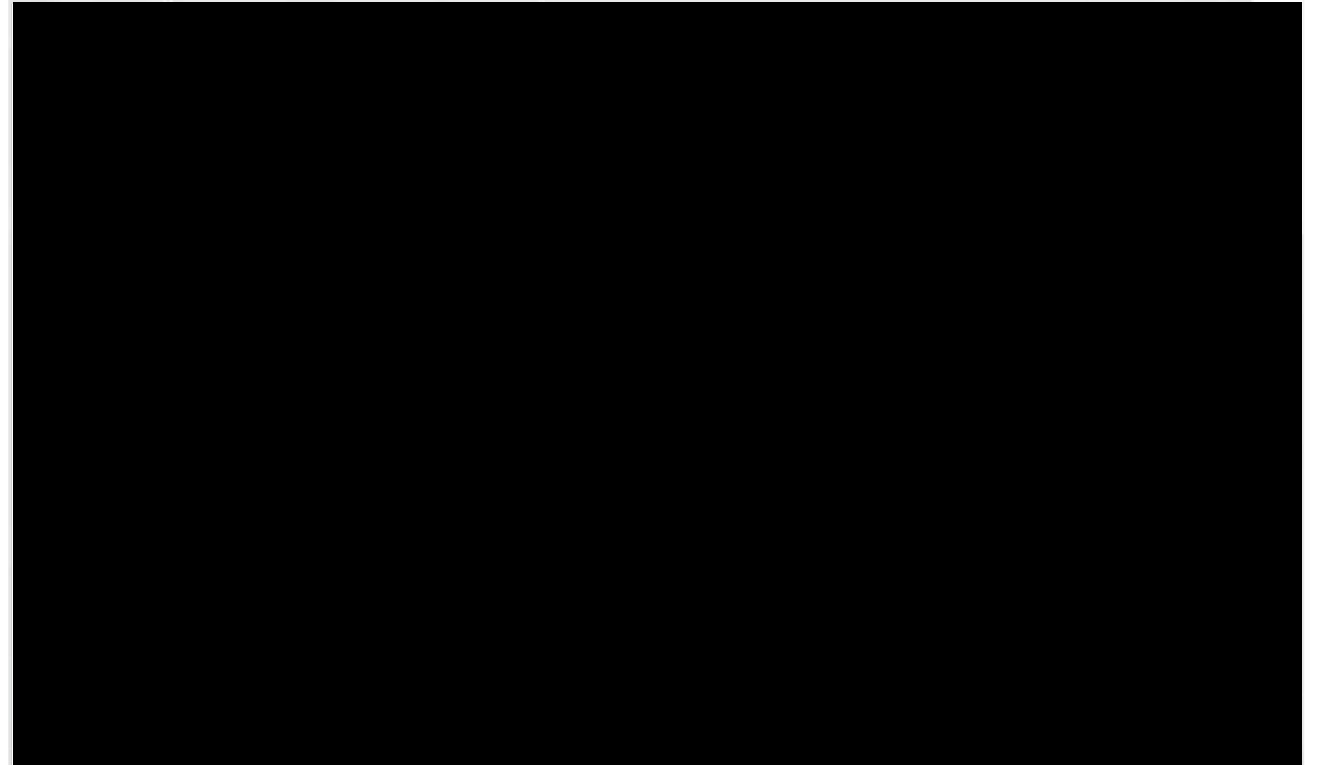
Battery to Sol..



0.0% 10.0%

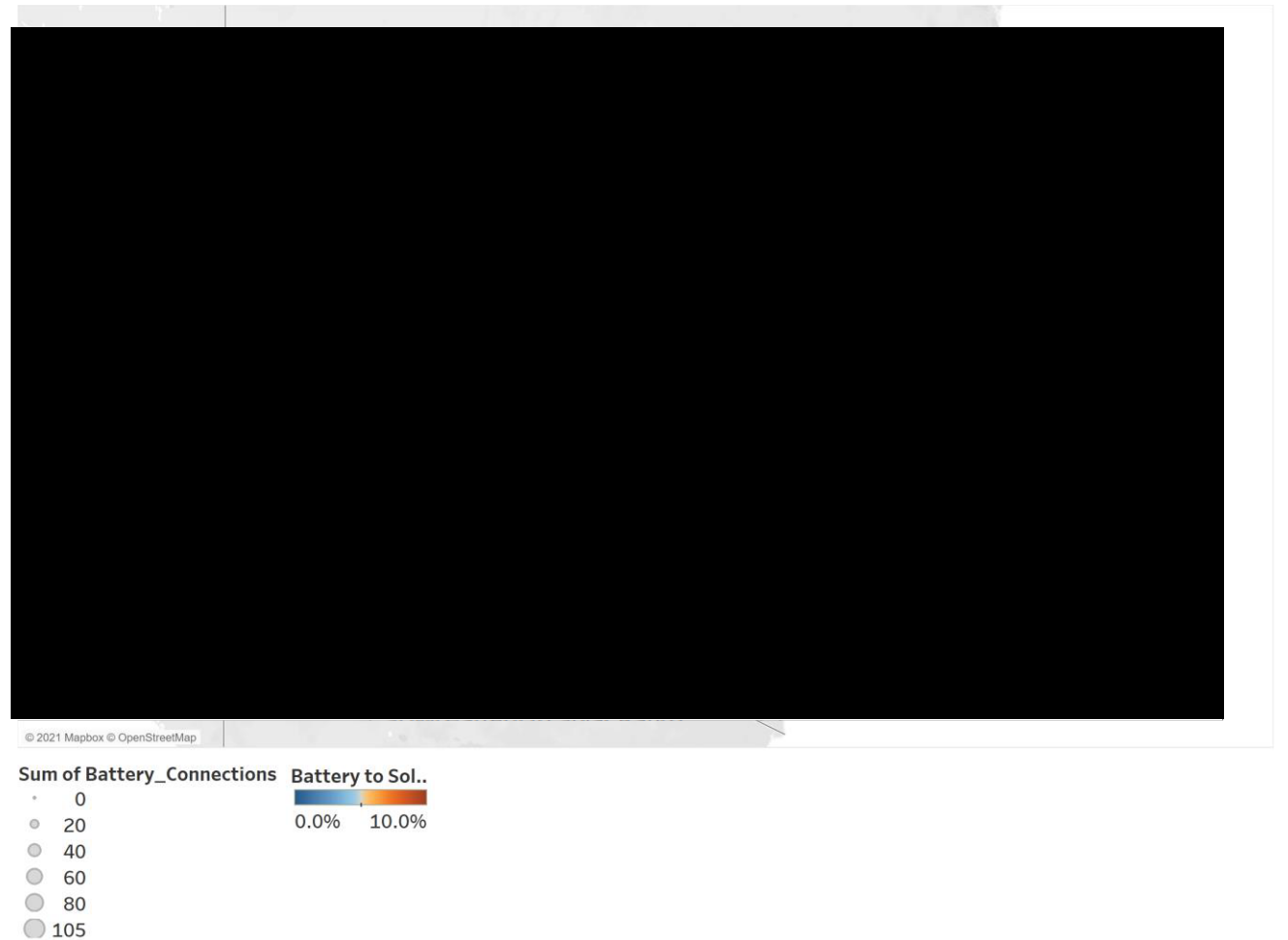
DER Register Total Residential Batteries to Solar Connections Ratio – ACT

There's a large number of postcodes with battery to solar ratios [REDACTED]

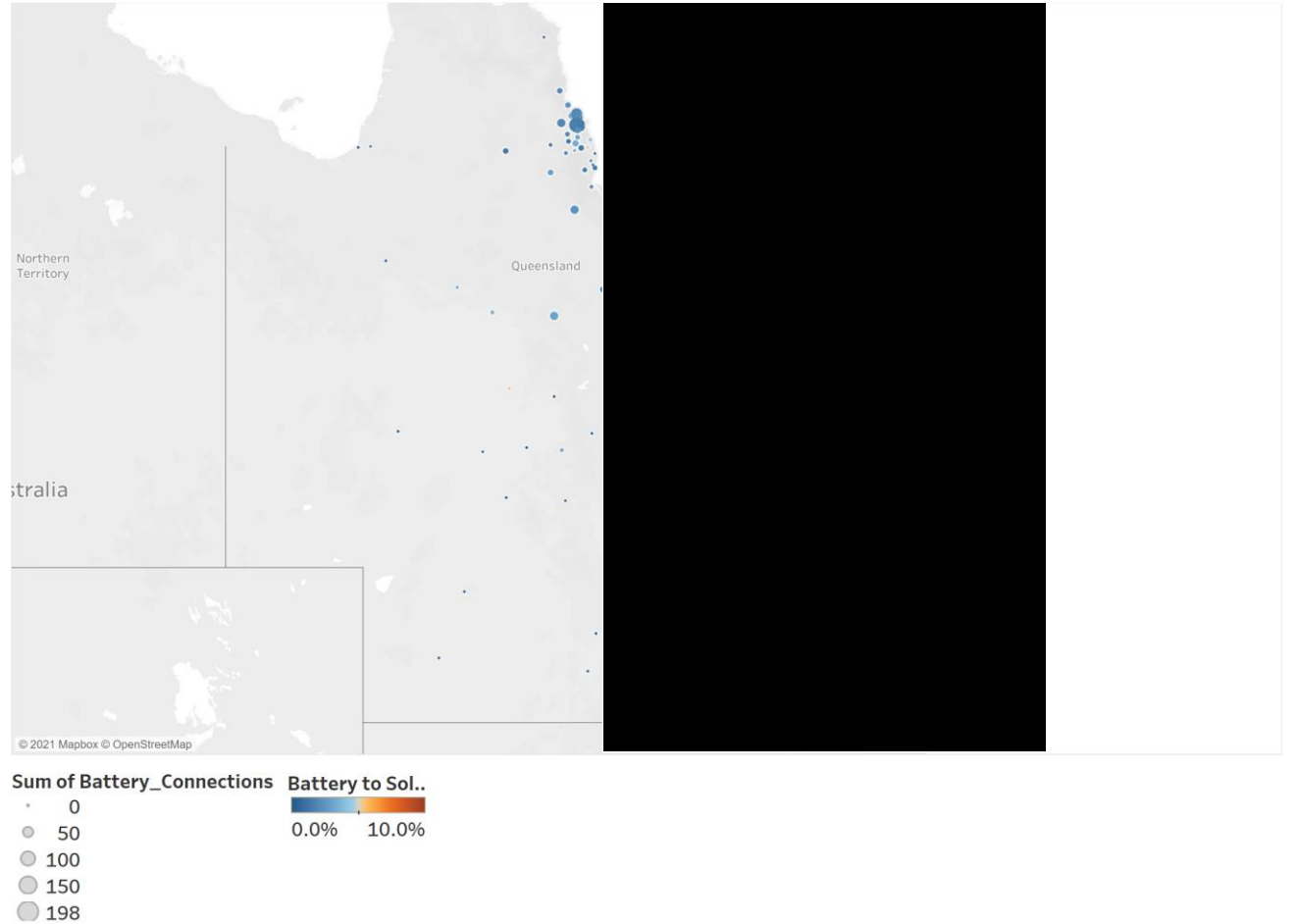


DER Register Total Residential Batteries to Solar Connections Ratio – NSW

In NSW, the highest battery-to-solar ratios are on [redacted]



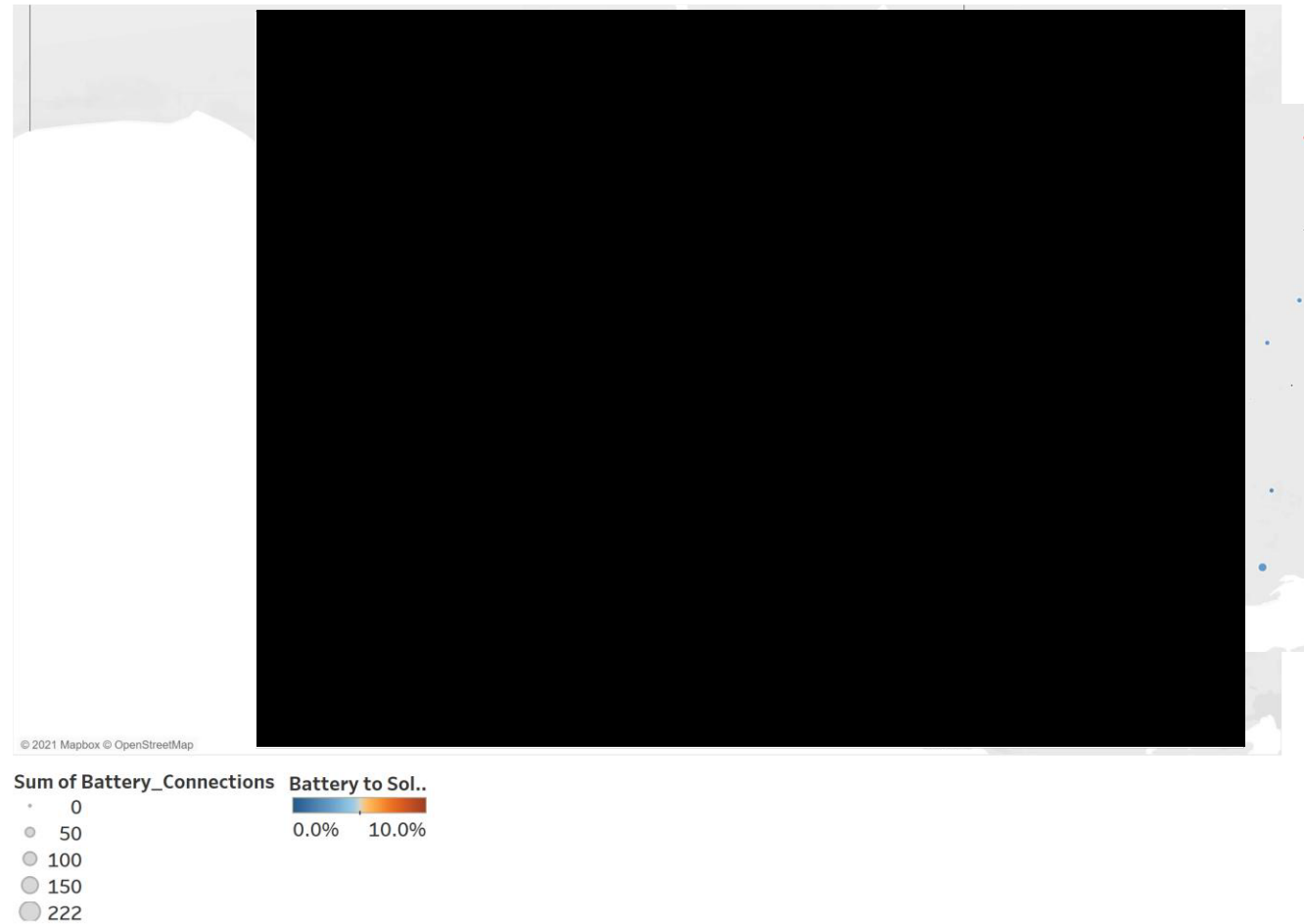
DER Register Total Residential Batteries to Solar Connections Ratio – QLD



DER Register Total Residential Batteries to Solar Connections Ratio – SA

In SA, there are concentrations of high battery to solar ratios in [REDACTED]

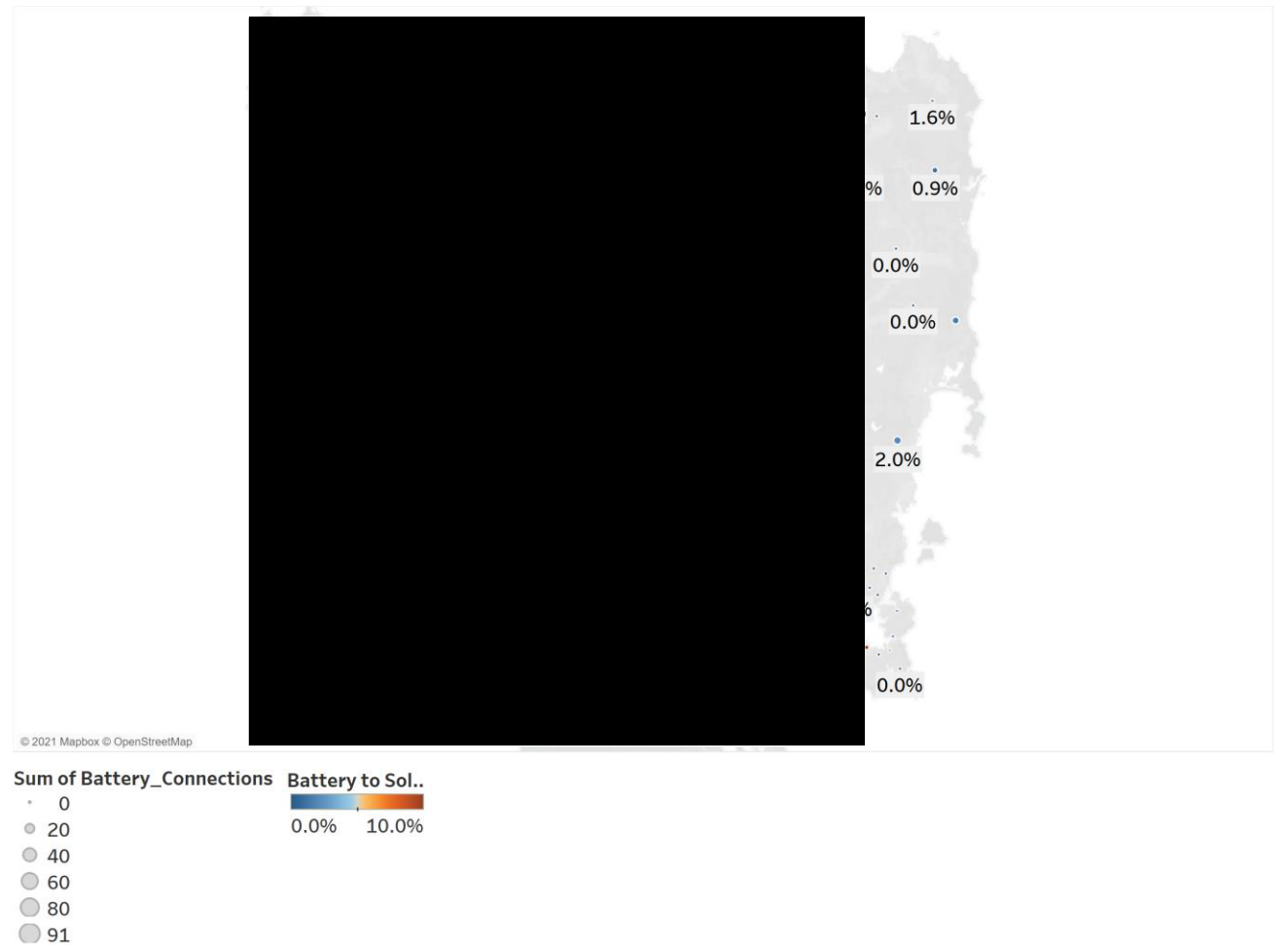
In Adelaide, the concentration is towards the [REDACTED]



DER Register Total Residential Batteries to Solar Connections Ratio – TAS

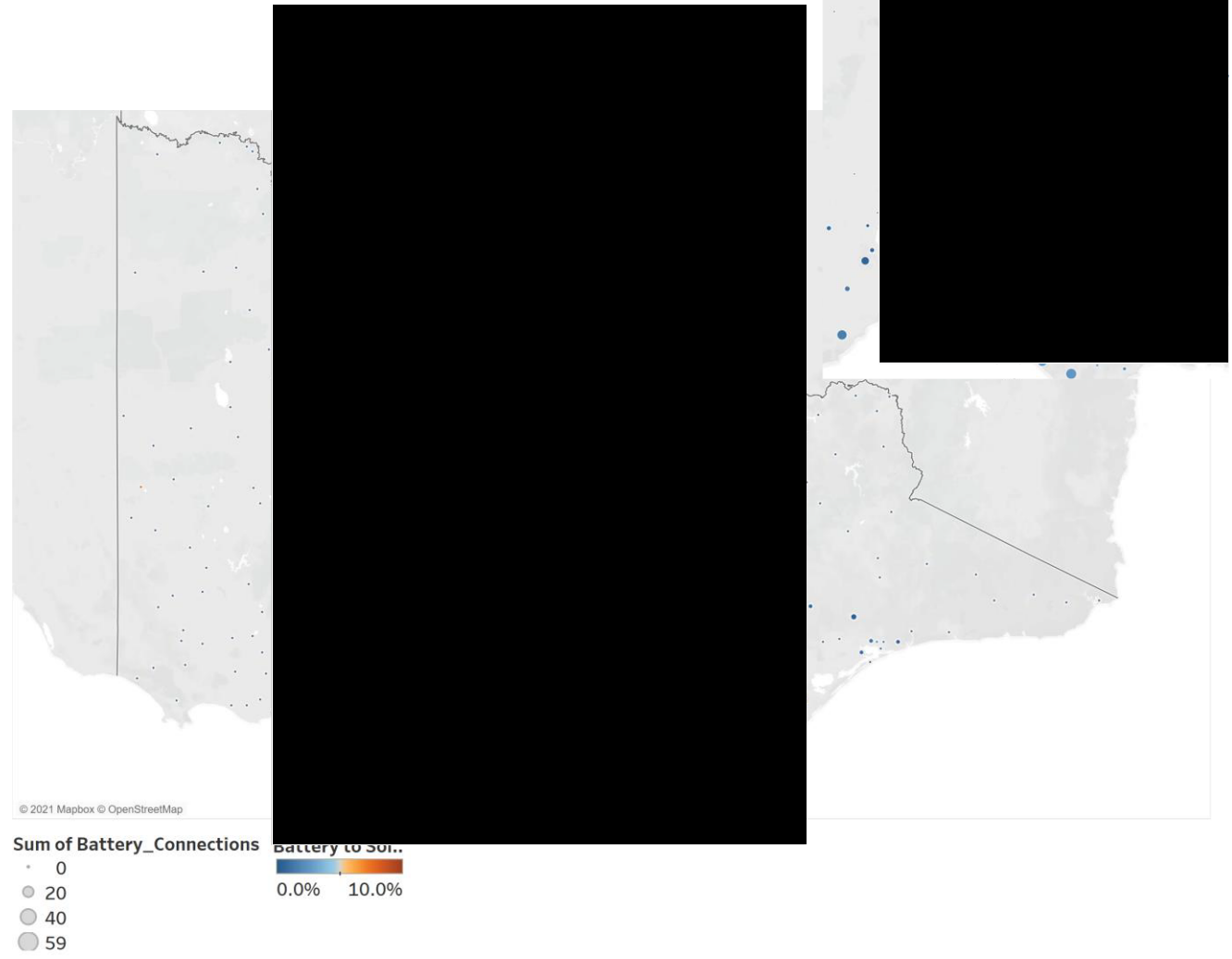
Tasmania doesn't have a huge volume of batteries, [REDACTED]

[REDACTED]



DER Register Total Residential Batteries to Solar Connections Ratio – VIC

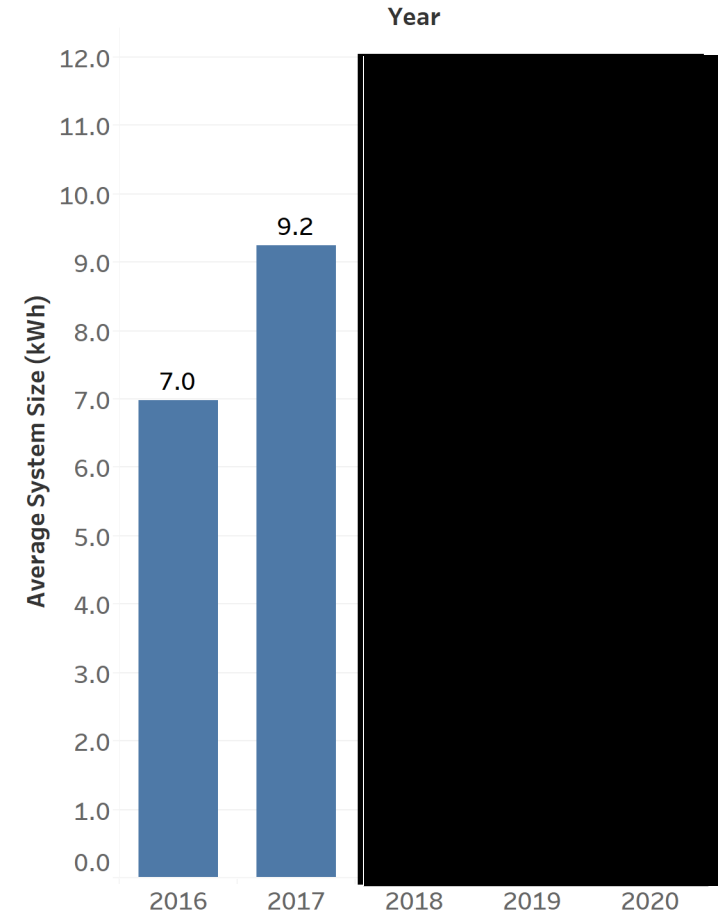
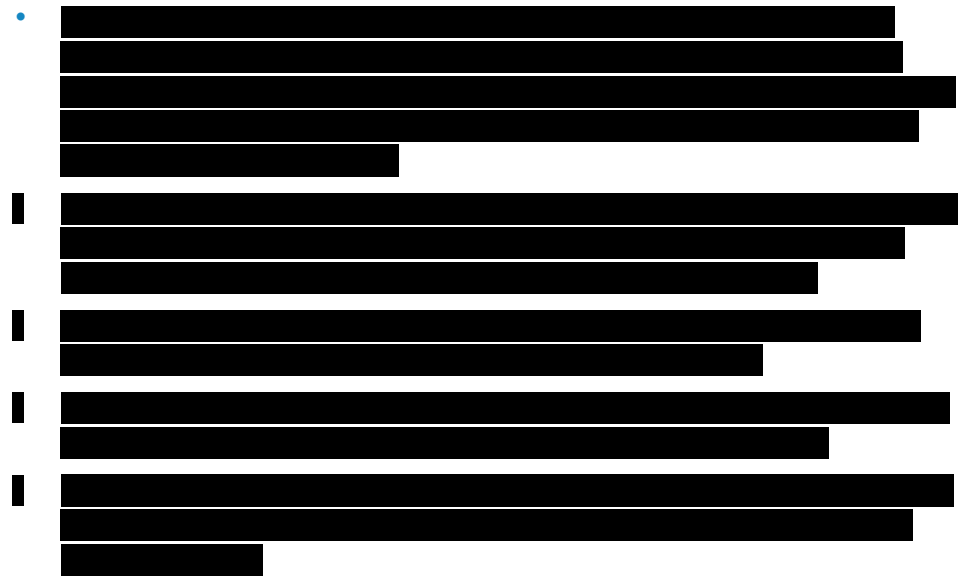
Victoria's batteries are mostly concentrated in [redacted]
[redacted]
[redacted]



Residential Market Characteristics

Residential Trends

- Battery size increased
 - Average system size has increased again, after the effect of Queensland's flat-rate subsidy in 2019 dissipated.
- Retrofit & AC-coupled vs New-build & DC-coupled



Residential Trends (cont'd)

- Grid-connect



- Battery Backup



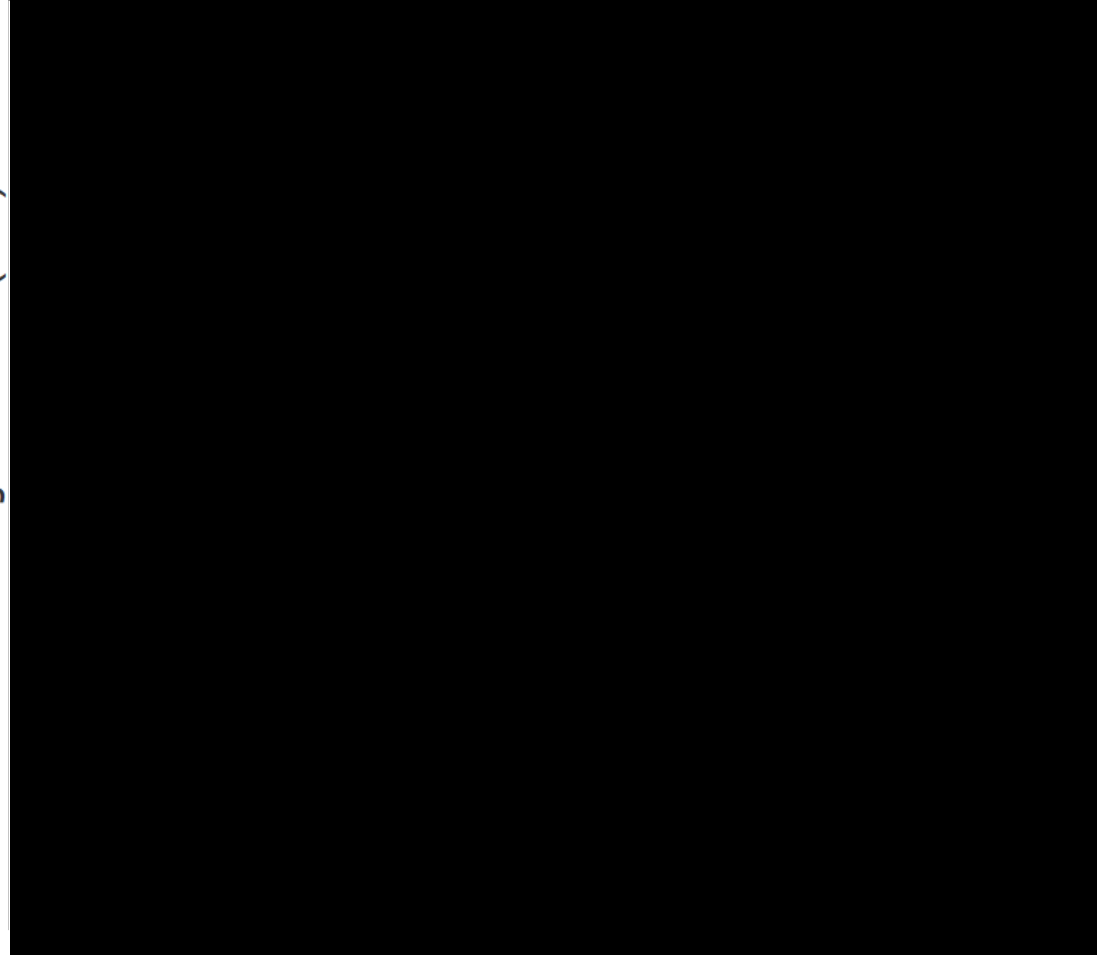
- Made in Australia



SA HBS— % of Systems Installed with Battery

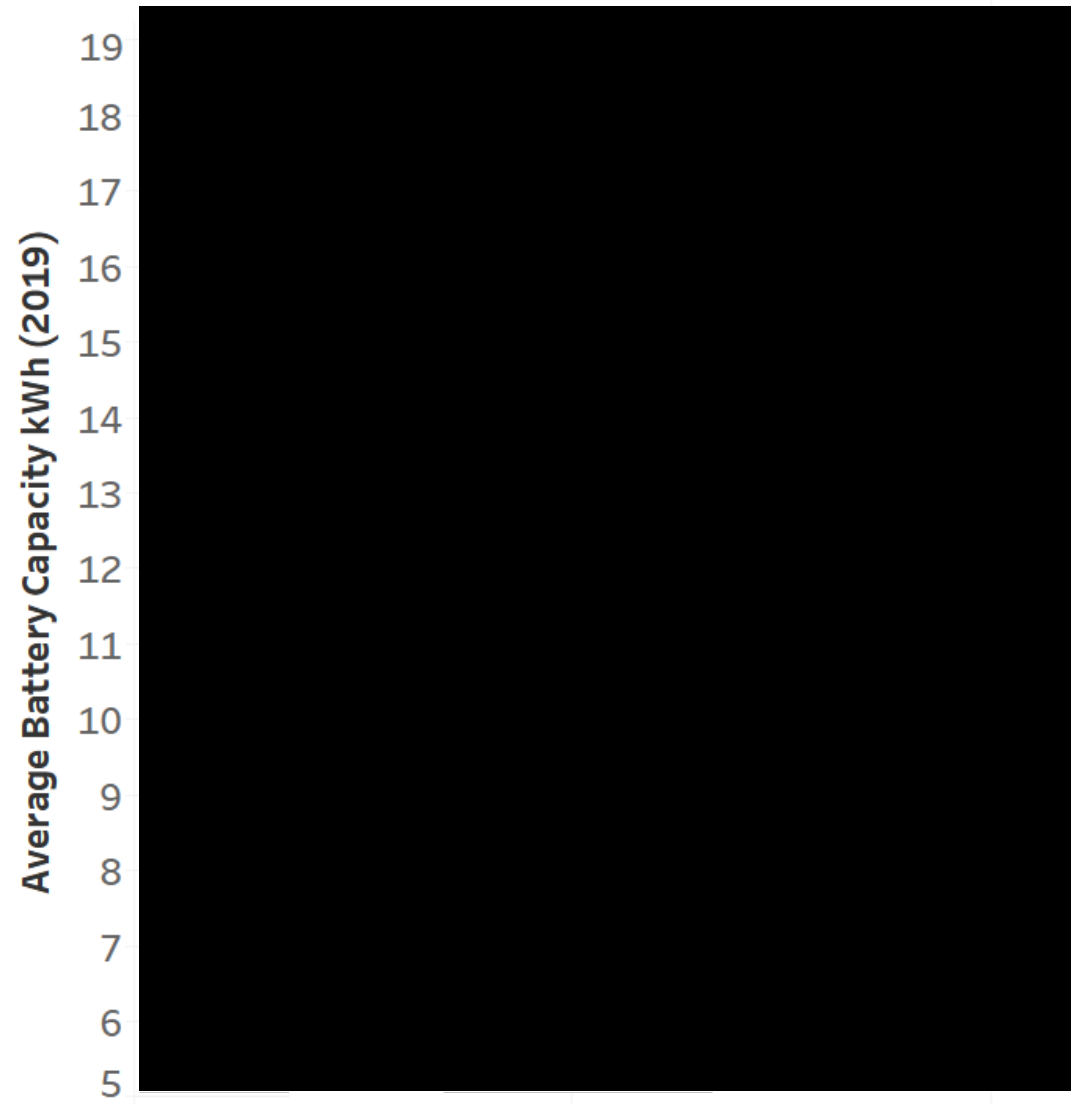
The median number of batteries installed with a solar system in the SA HBS (at a postcode level) has [REDACTED]

% with Existing Solar Panels (2019)



SA HBS – Average Capacity

From 2019 to 2020 the average capacity of batteries installed under the HBS by postcode has increased



NSW Empowering Homes Program

The NSW Government's Empowering Homes Program provided SunWiz with data that illuminates the grey area between a battery retrofit to an existing PV and a new-build PV+storage. When existing PV is on site, it is often removed and replaced and therefore can easily be classified as a new system OR a retrofit system.

The program shows that [REDACTED] are completely new – no PV existed on site before.

[REDACTED]

| | Retrofits | Expand PV + new battery | Brand New PV + Battery |
|--------------------|-----------|-------------------------|------------------------|
| PV size (kW) | ■ | ■ | ■ |
| Battery Size (kWh) | ■ | ■ | ■ |
| Loan | ■ | ■ | ■ |
| Loan (%) | ■ | ■ | ■ |

Batteries drive a small amount of PV retrofits

- According to Green Energy Markets analysis, in 2020 there were [REDACTED] PV installations that represented system upgrades (i.e. installations at the same address as a previous installation).
- This is up from [REDACTED]

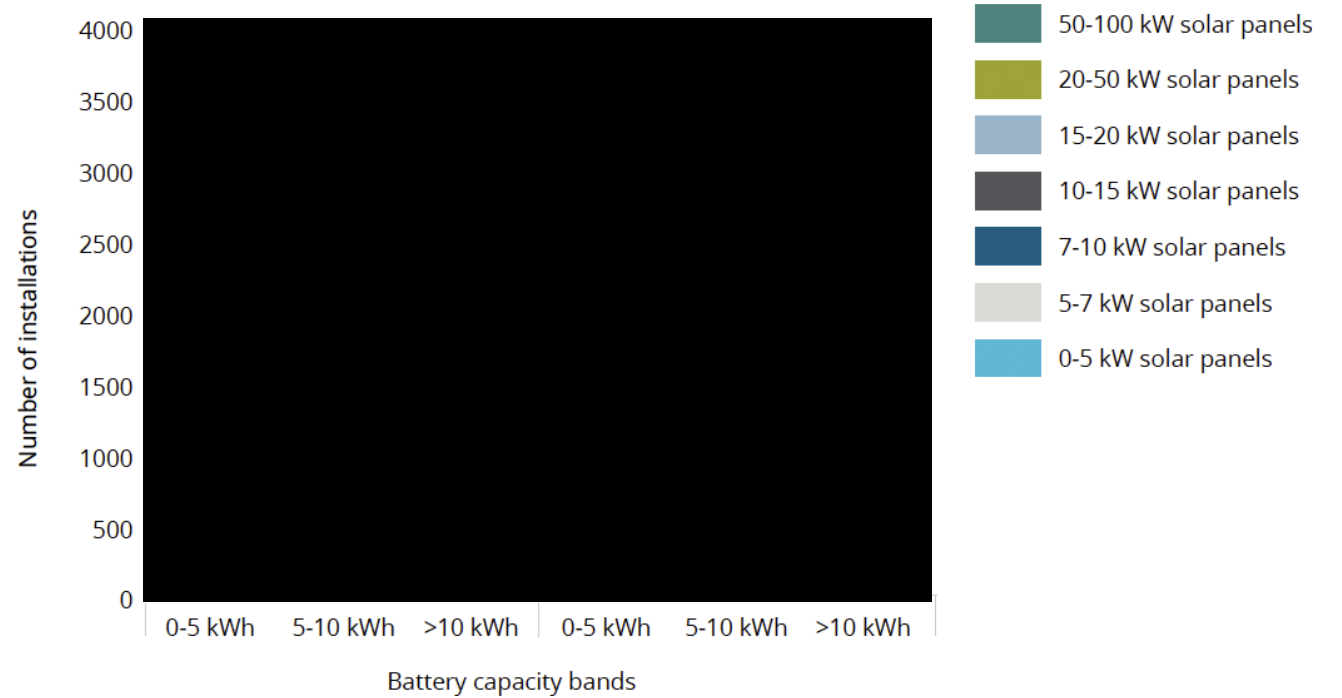


Sizes of PV & Storage combined



Two panes show 2018 (left) and 2019 (right) breakdowns. They illustrate:

- The growth in the >10kWh market.
- The shift away from [redacted]



Commercial & Grid-scale Market

Commercial Batteries – DER Register

According to the DER Register, there are [REDACTED] batteries installed on business premises in the NEM. [REDACTED] % are in Queensland, with SA NSW hosting [REDACTED] %, and SA and VIC having [REDACTED] % of the tally.



| NMI_Bus.. | state | Sum of Battery_Connecti.. | % by #installations |
|--------------------|-------|---------------------------|---------------------|
| BUSINESS | ACT | [REDACTED] | [REDACTED] |
| | NSW | [REDACTED] | [REDACTED] |
| | QLD | [REDACTED] | [REDACTED] |
| | SA | [REDACTED] | [REDACTED] |
| | TAS | [REDACTED] | [REDACTED] |
| | VIC | [REDACTED] | [REDACTED] |
| Grand Total | | [REDACTED] | 100% |

| | NMI_Bus_res | state | | | | | | Gra.. |
|---------------------|-------------|------------|------------|------------|------------|------------|------------|-------|
| | | ACT | NSW | QLD | SA | TAS | VIC | |
| % by #installations | BUSINESS | [REDACTED] | [REDACTED] | [REDACTED] | [REDACTED] | [REDACTED] | [REDACTED] | 2% |
| | RESIDENTIAL | [REDACTED] | [REDACTED] | [REDACTED] | [REDACTED] | [REDACTED] | [REDACTED] | 98% |
| % by kVAh | BUSINESS | [REDACTED] | [REDACTED] | [REDACTED] | [REDACTED] | [REDACTED] | [REDACTED] | 5% |
| | RESIDENTIAL | [REDACTED] | [REDACTED] | [REDACTED] | [REDACTED] | [REDACTED] | [REDACTED] | 95% |

Key Projects – Commissioned 2020

A list of key commercial projects commissioned in 2020 is shown here. This list represents 9.4MW of battery capacity

This list certainly under-states the volume of commercial projects: We've seen DNSP data indicating businesses represent a fraction of total battery connections.

| Vendor company (group) | Owner 1 | Name | State | kWh | kW |
|------------------------|---------|------|-------|-----|----|
| Tesla | | | SA | | |
| | | | WA | | |
| Unknown | | | WA | | |
| | | | SA | | |
| Grand Total | | | | | |

Key Projects – Under Construction

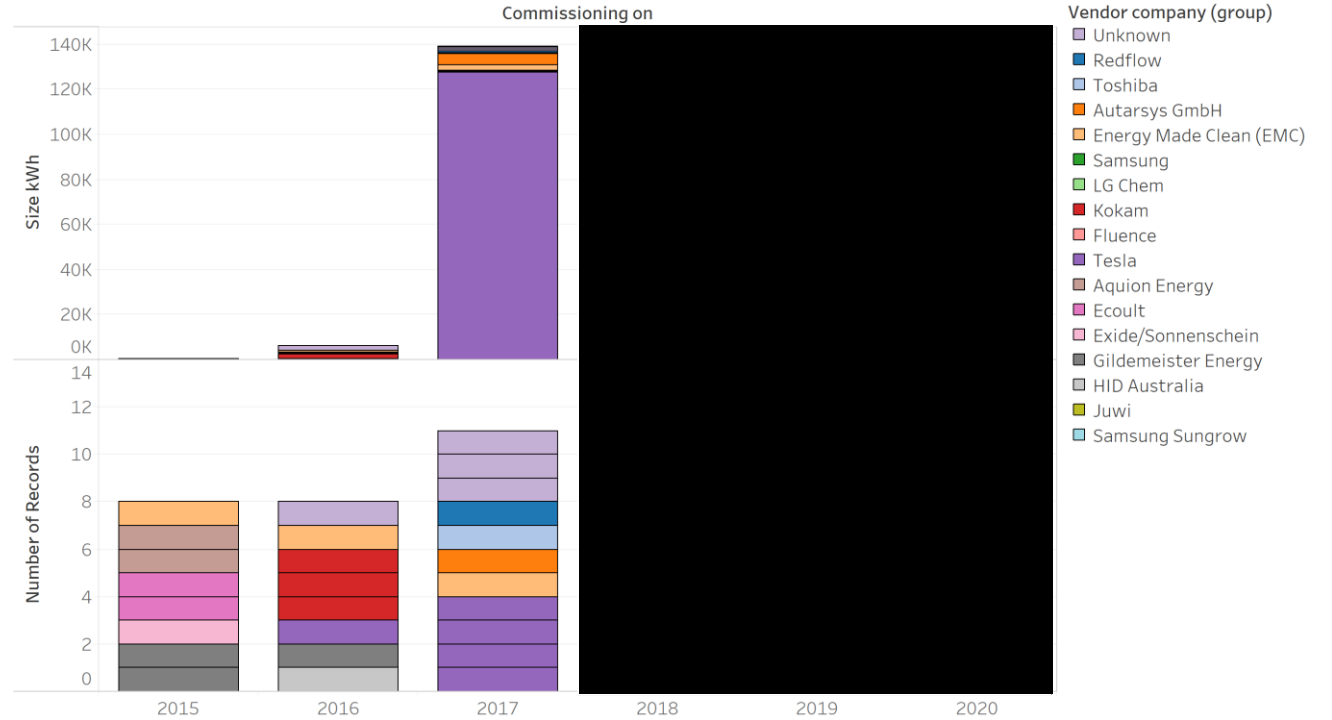
A list of key commercial and utility-scale projects currently under construction in 2020 are shown here.

This list certainly [REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]

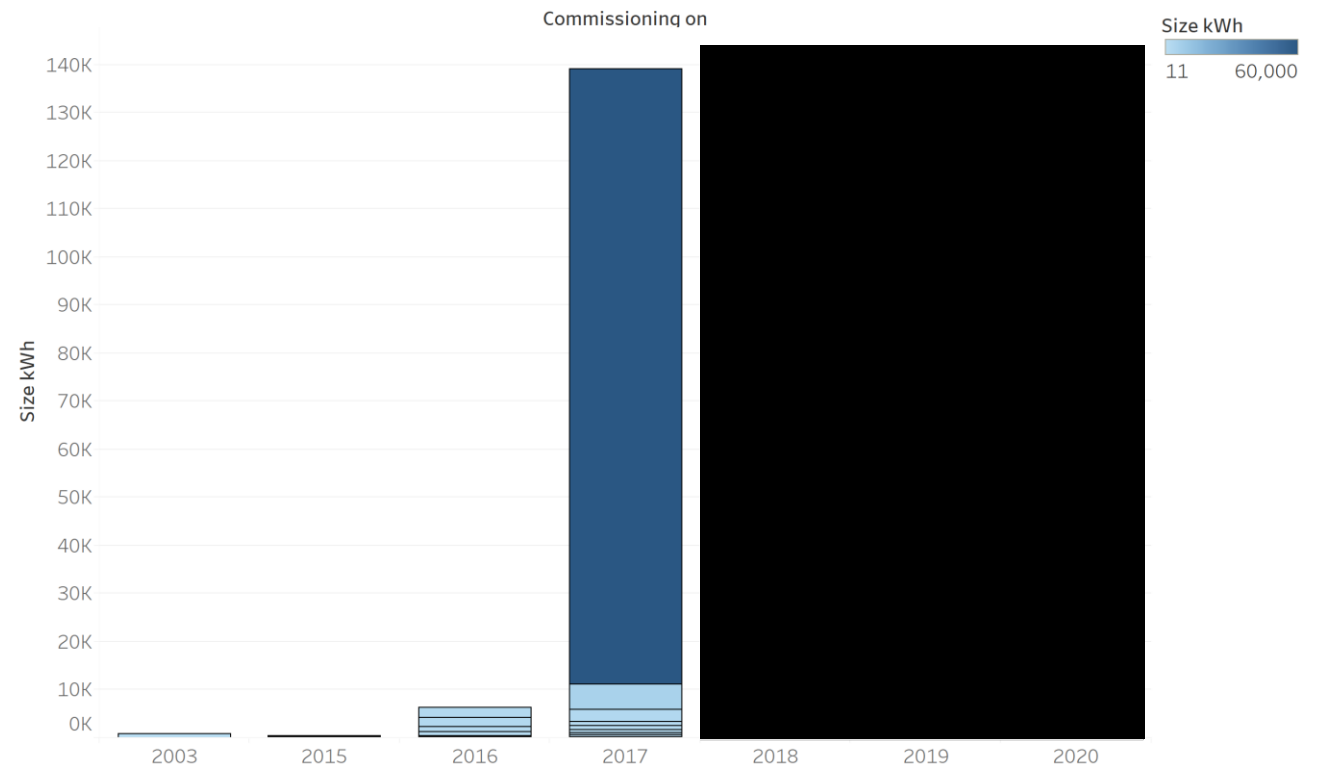
Please note that expected commissioning dates have been used if further data is unavailable.

| Name | kWh | kW |
|----------------------|------------|------------|
| Sunraysia Solar Farm | [REDACTED] | [REDACTED] |
| Wandoan BESS | [REDACTED] | [REDACTED] |
| [REDACTED] | [REDACTED] | [REDACTED] |
| [REDACTED] | [REDACTED] | [REDACTED] |
| [REDACTED] | [REDACTED] | [REDACTED] |
| [REDACTED] | [REDACTED] | [REDACTED] |
| [REDACTED] | [REDACTED] | [REDACTED] |
| Grand Total | [REDACTED] | [REDACTED] |

Market Share – Non-residential



Commercial & Grid - Scale Volume



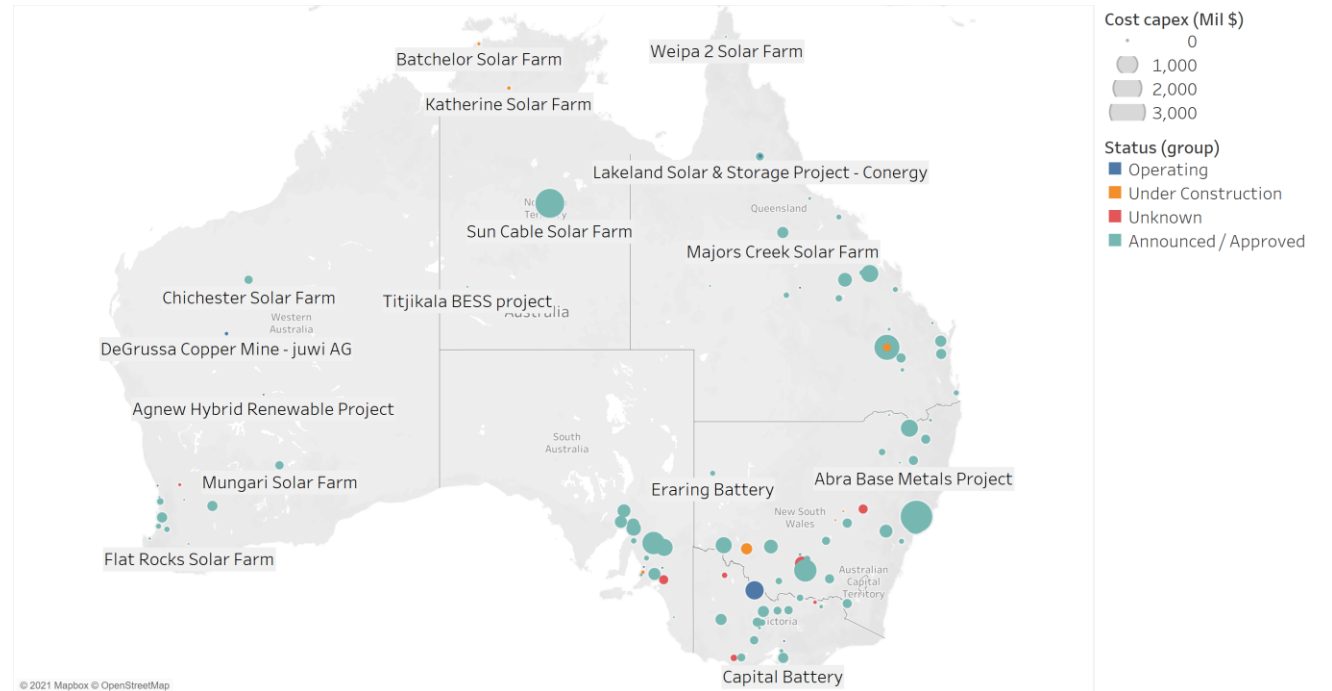
History of Non-residential Projects

This table shows the kWh and commissioning date of known non-residential projects that are operating.

| Name | 2015 | 2016 | Commissioning on 2017 | 2018 | 2019 | 2020 |
|------------------------------------------------|------|-------|--------------------------|------|------|------|
| Hornsedale Power Reserve 100MW / 129MWh .. | | | 128,000 | | | |
| Hornsedale Power Reserve Expansion | | | | | | |
| Lake Bonney 1 Wind Farm | | | | | | |
| Gannawarra Solar Farm | | | | | | |
| Ballarat (Warrenheip) | | | | | | |
| Kanowna Solar Farm | | | | | | |
| Gina Rinehart Mine 30MW / 11.4MWh | | | | | | |
| Lincoln Gap Wind Farm | | | | | | |
| Dalrymple 30 MW / 8 MWh battery | | | | | | |
| Bohle Plains Battery | | | | | | |
| Dalrymple ESCRI-SA Battery Project | | | | | | |
| Lakeland Solar & Storage Project - Conergy | | | 5,297 | | | |
| South Australian Produce Market Solar & Sto.. | | | | | | |
| Agnew Hybrid Renewable Project | | | | | | |
| Kennedy Energy Park - Windlab / Eurus | | | | | | |
| Alice Springs | | | | | | |
| CSIRO Murchison Radio-astronomy Observat.. | | | 2,500 | | | |
| Powercor 2 MW Grid Scale Energy Storage - K.. | | 2,000 | | | | |
| DeGrussa Copper Mine - juwi AG | | 1,980 | | | | |
| Shalom College Bundaberg | | | | | | |
| Synergy / EMC Alkimos Beach Community Bat.. | | 1,100 | | | | |
| Monash Uni | | | | | | |
| Nauly Community Solar + Storage | | | | | | |
| Onslow Distributed Energy Resources Project | | | | | | |
| Western Power Perenjori BESS | | | 1,000 | | | |
| University of Queensland Gatton Campus PV .. | | 762 | | | | |
| The Cathedral College Rockhampton | | | 684 | | | |
| RedFlow 300 kW Adelaide | | | 660 | | | |
| Heron Island Research Station | | | | | | |
| City of Sydney Alexandra Canal | | | | | | |
| Coober Pedy Renewable Hybrid Power Projec.. | | | 500 | | | |
| Garden Island Microgrid | | | | | | |
| UNSW | | | | | | |
| Tesla community battery | | | | | | |
| Chanel College Gladstone | | | | | | |
| St Luke's Anglican School | | | | | | |
| Visy Board Gepps Cross | | | | | | |
| Flinders Island - Hydro Tasmania | | | 300 | | | |
| Cape Jervis | | | | | | |
| Flinders Island Hybrid Energy Hub | | | | | | |
| Bundaberg Christian College - Gem Energy Au.. | | 250 | | | | |
| Domino's Pizza 135kW / 135kWh Tesla Power.. | | | 135 | | | |
| 30 kW / 130 kWh - University of New South W.. | 130 | | | | | |
| University of New South Wales 30 kW / 130 k.. | 130 | | | | | |
| Busselton Farm Property - VSUN Energy Pty L.. | | 100 | | | | |
| Round Mountain Chlorinator | | | 95 | | | |
| Pilbara Meta Maya Regional Aboriginal Corpo.. | 76 | | | | | |
| Newtown Housing | | | 60 | | | |
| HIDDEN per AESDB - Residential Aquion proje.. | 55 | | | | | |
| Regional Queensland Off-Grid Installation ES.. | 50 | | | | | |
| Jamberoo - Battery | | | | | | |
| Newtown Stucco Cooperative Living ESS | | 40 | | | | |
| Cedarvale: Small Commercial Storage: Health.. | 20 | | | | | |
| Emerald Remote Off-Grid Container - Gem En.. | 20 | | | | | |
| Moora Moora: Residential Storage: 100% Off-.. | 20 | | | | | |
| Newcastle City Council Newcastle Sportsgrou.. | | 11 | | | | |
| Canberra's National Arboretum Off-Grid .. | | | | | | |
| Gatton Solar with Storage | | | | | | |
| Mannum Solar & Storage Project | | | | | | |
| NT Defence Solar Project | | | | | | |
| Peak Hill Solar Farm | | | | | | |
| Stanhope Solar Farm | | | | | | |

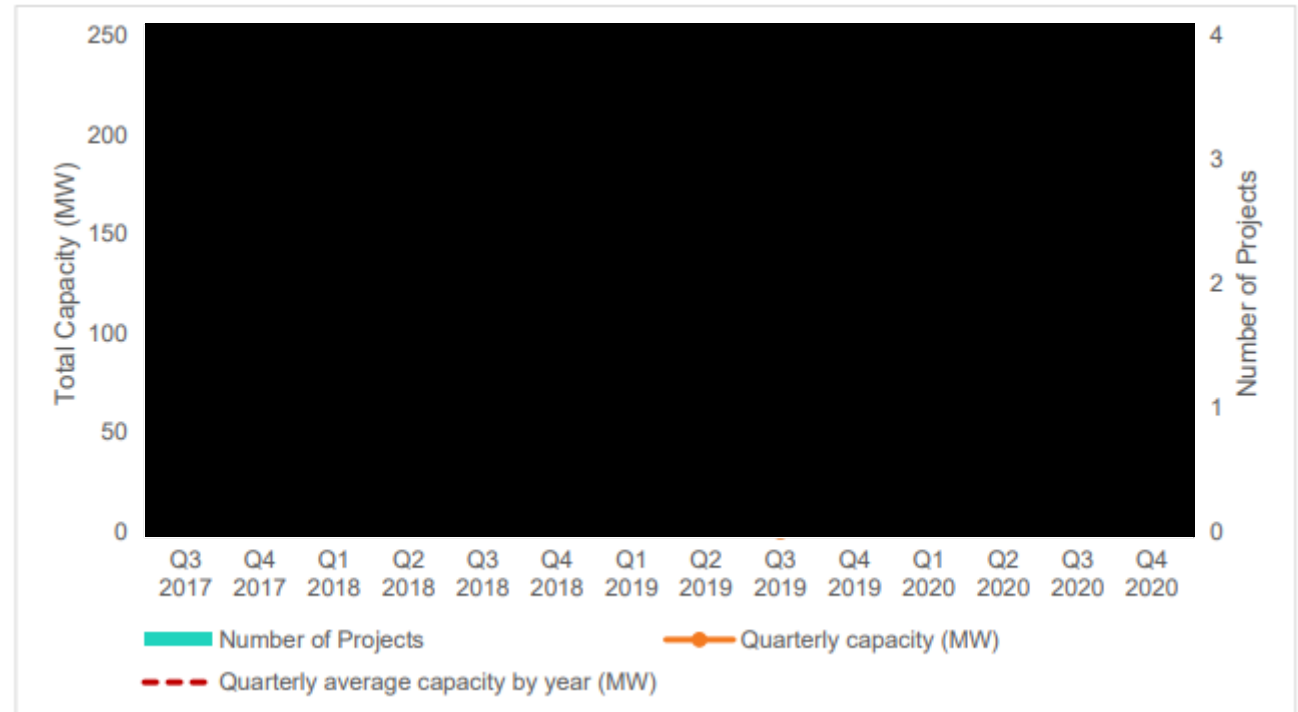
Commercial & Grid - Scale Locations

The map shows the locations and size of many of the grid-scale batteries scattered across the country.



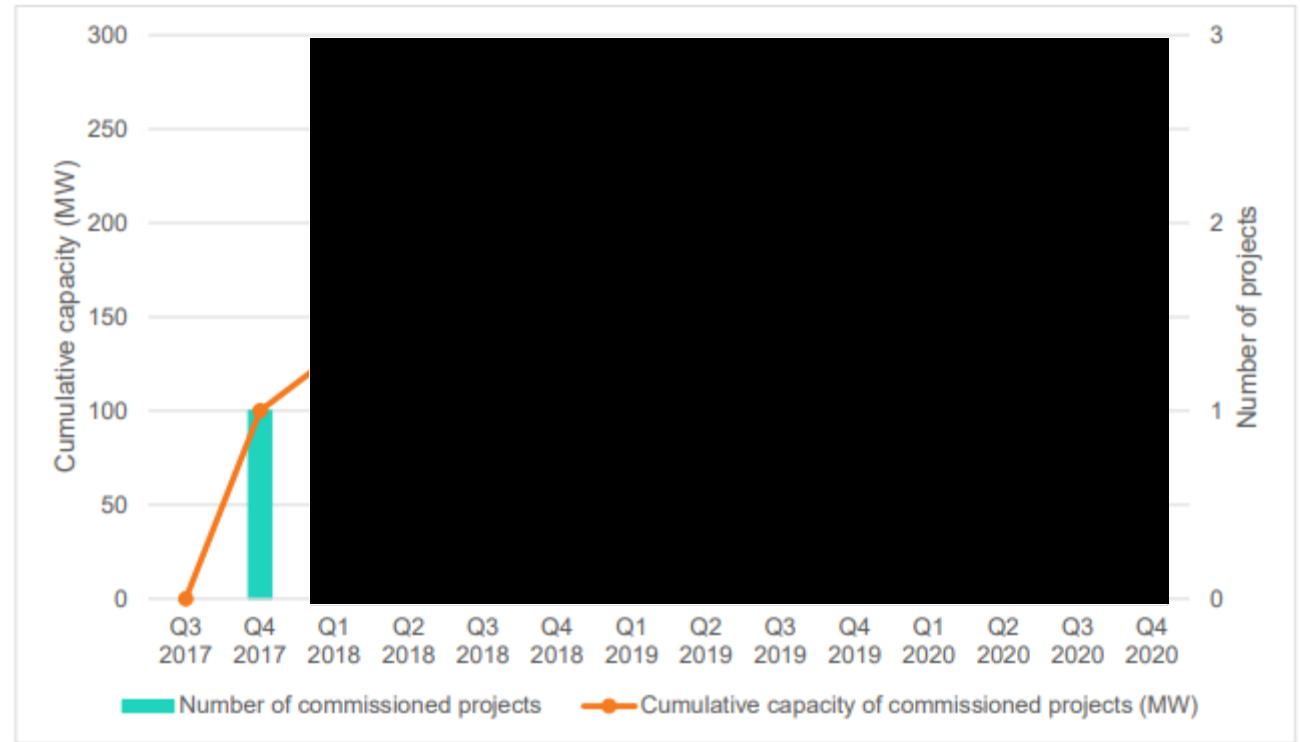
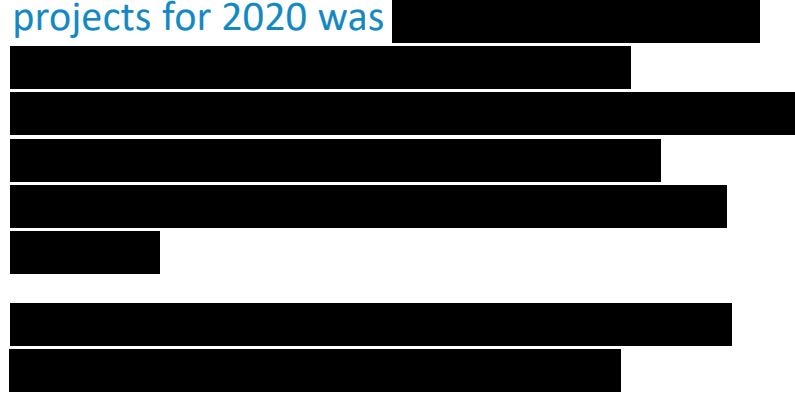
Financially committed energy storage projects

CEC data shows the number of financially committed battery projects in Q4



Cumulative capacity of commissioned energy storage project

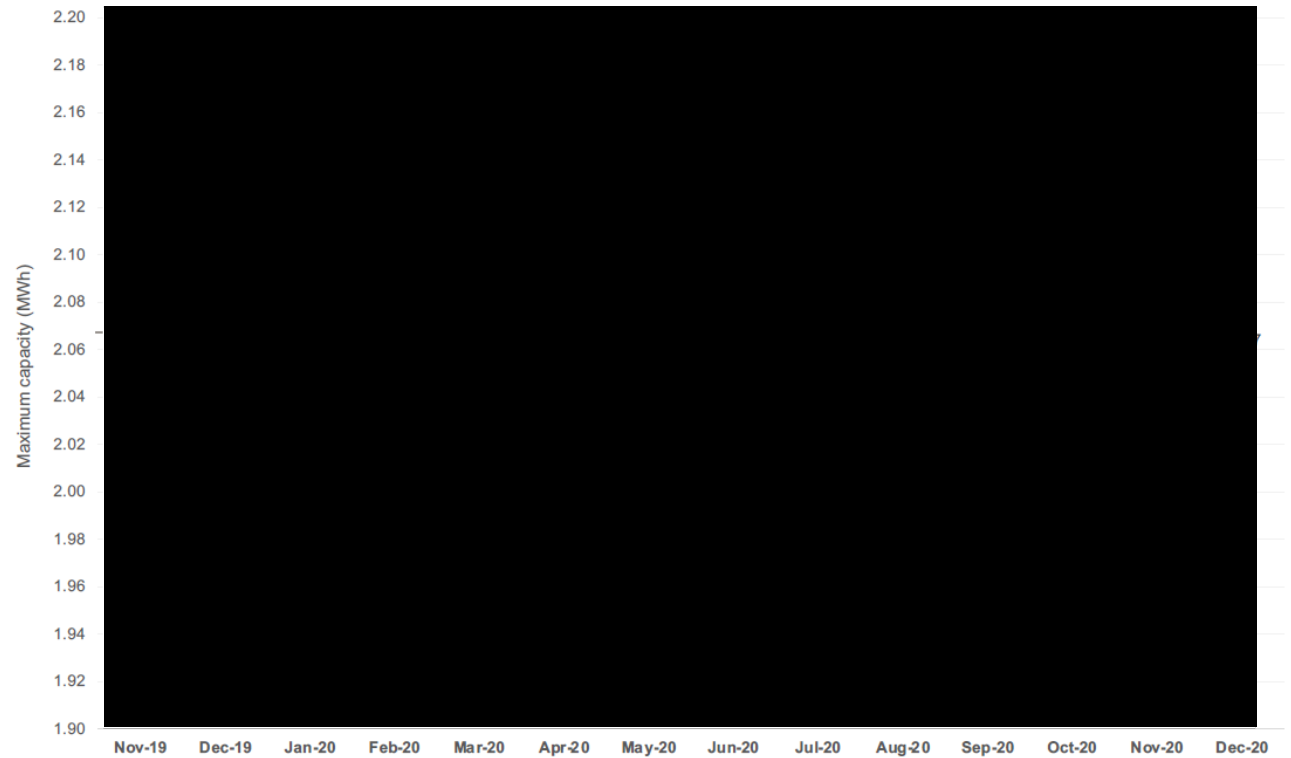
Our research aligns with CEC data and shows the number of commissioned battery projects for 2020 was [REDACTED]



Battery degradation already happening



Figure 3: Battery maximum capacity (MWh)—monthly



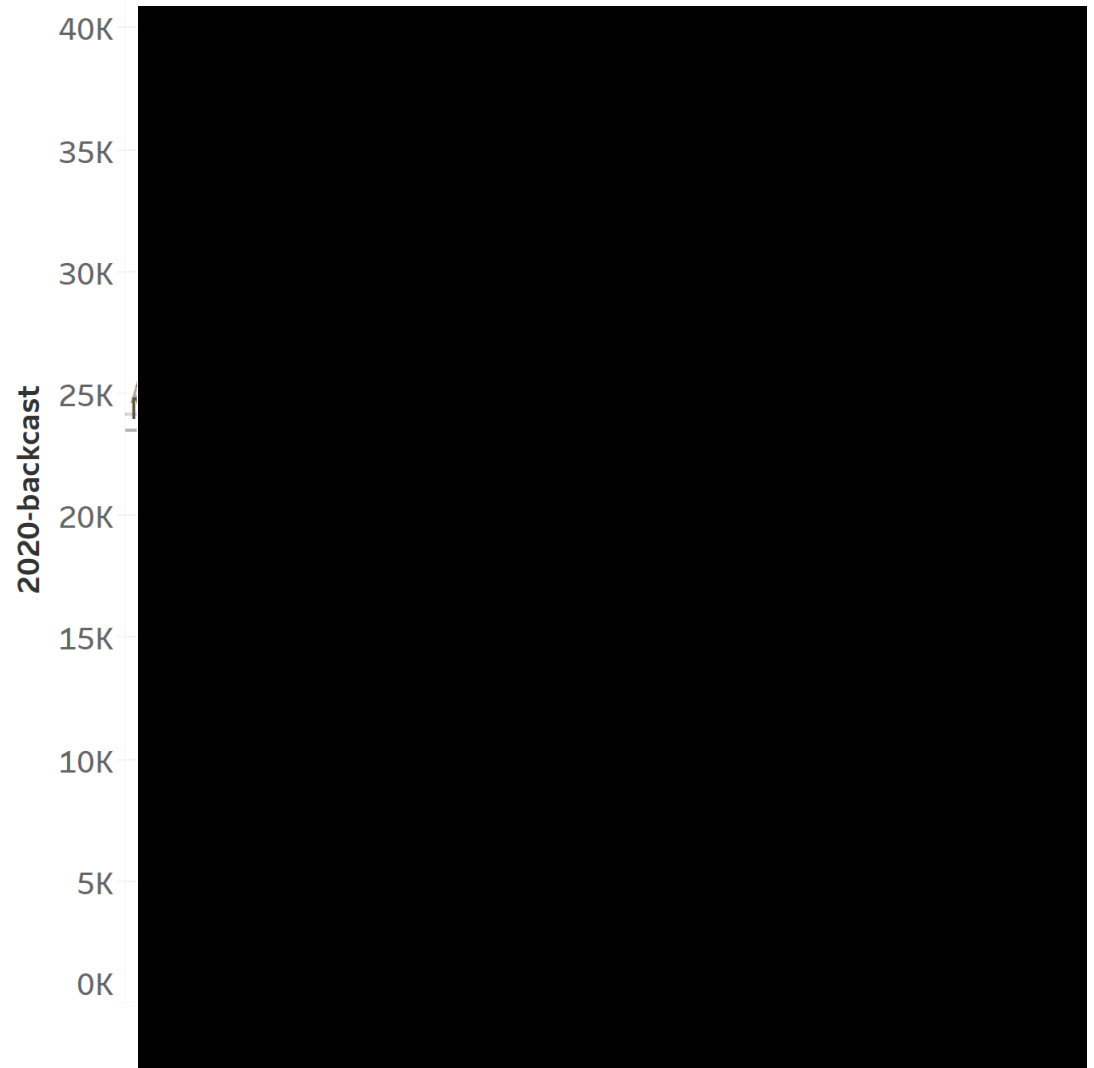
2020 Tally

Tally: Methodology

- Its very, very (very) difficult to come to a conclusive answer on the market size. We have taken a multi-pronged approach and attempted to thread together a cohesive answer by building up data from the following channels:
 - Public announcements;
 - Databases of installations and projects;
 - Interviews with key manufacturers;
 - Interviews with key wholesalers and;
 - Interviews with DNSPs and AEMO
- The key difficulty with reporting what was installed in 2020 is that manufacturers know their sales figures to wholesalers, yet don't know how much stock wholesalers are holding. As retailers don't hold much (if any) battery stock, wholesalers' sales figures are the best proxy for 2020 installation volume. However it is difficult to get a complete dataset from the large number of wholesalers. So we have performed cross-checks where possible and applied appropriate factors to manufacturers numbers.

Tally: Manufacturers' Market Assessment

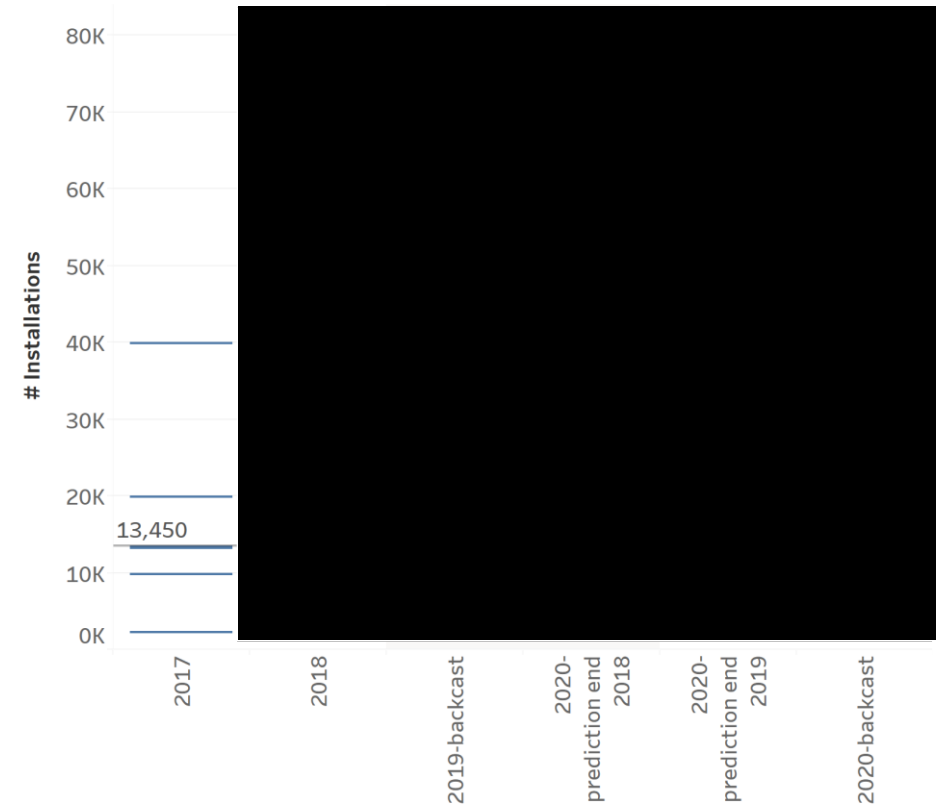
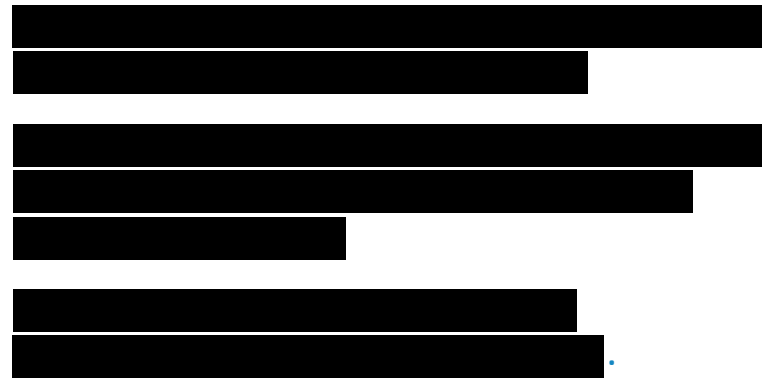
This chart shows the market size estimate of a range of different manufacturers. The spread in estimated market size is noteworthy, with the largest estimate being [redacted]



Tally: Manufacturers found 2020 better than expected

This chart shows the manufacturers' estimates of market size *forecast* for 2020 at the end of 2018 and the end of 2019, compared to their 2020 market size *estimate in hindsight the end of 2020*.

The median expectation of 2020 market size

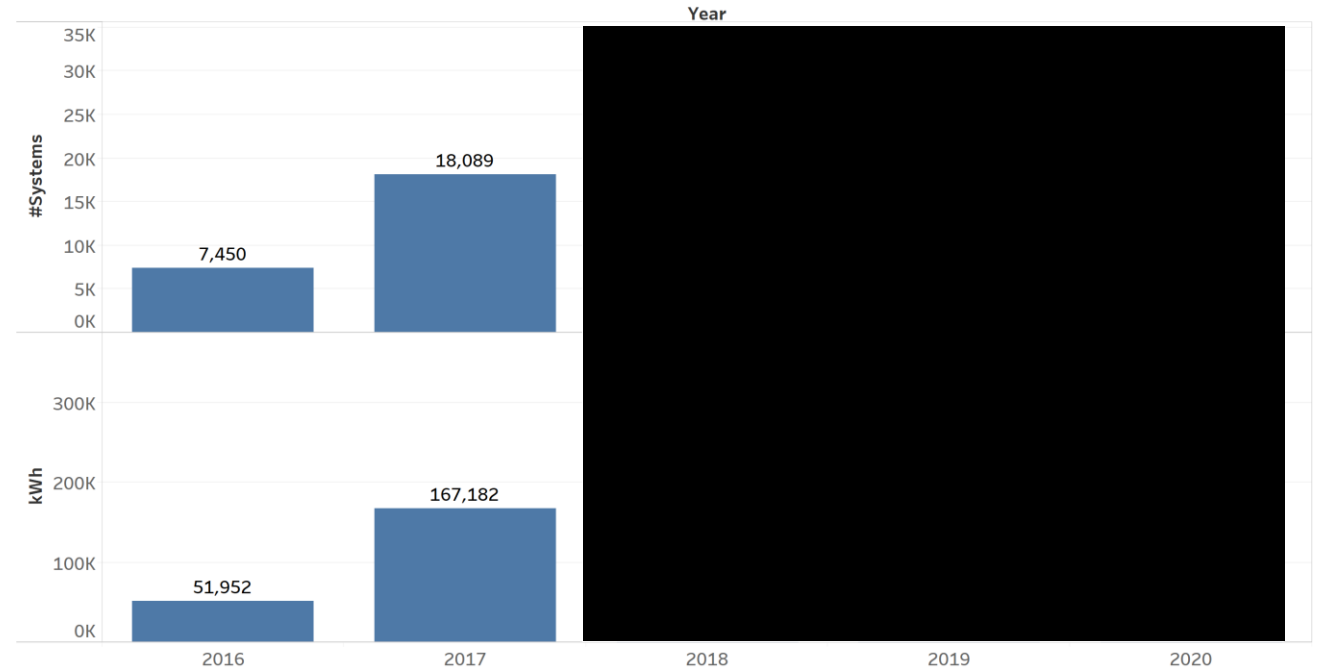
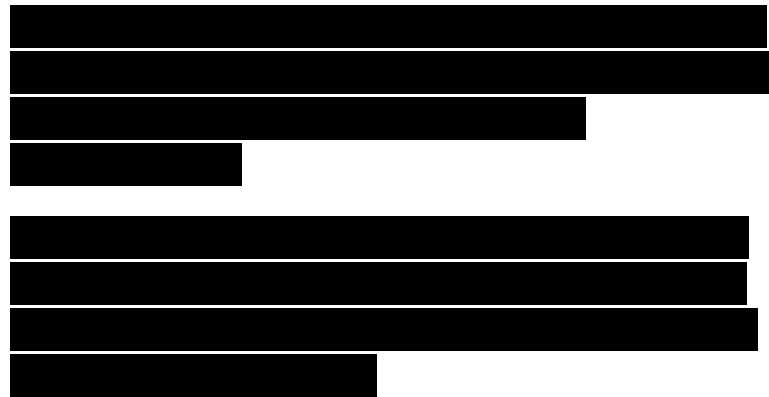


- Measure Names
- 2017
 - 2018
 - 2019-backcast
 - 2020-prediction end 2018
 - 2020-prediction end 2019
 - 2020-backcast

National Tally - Manufacturers

SunWiz has obtained sales/installation data from most major (and many minor) manufacturers.

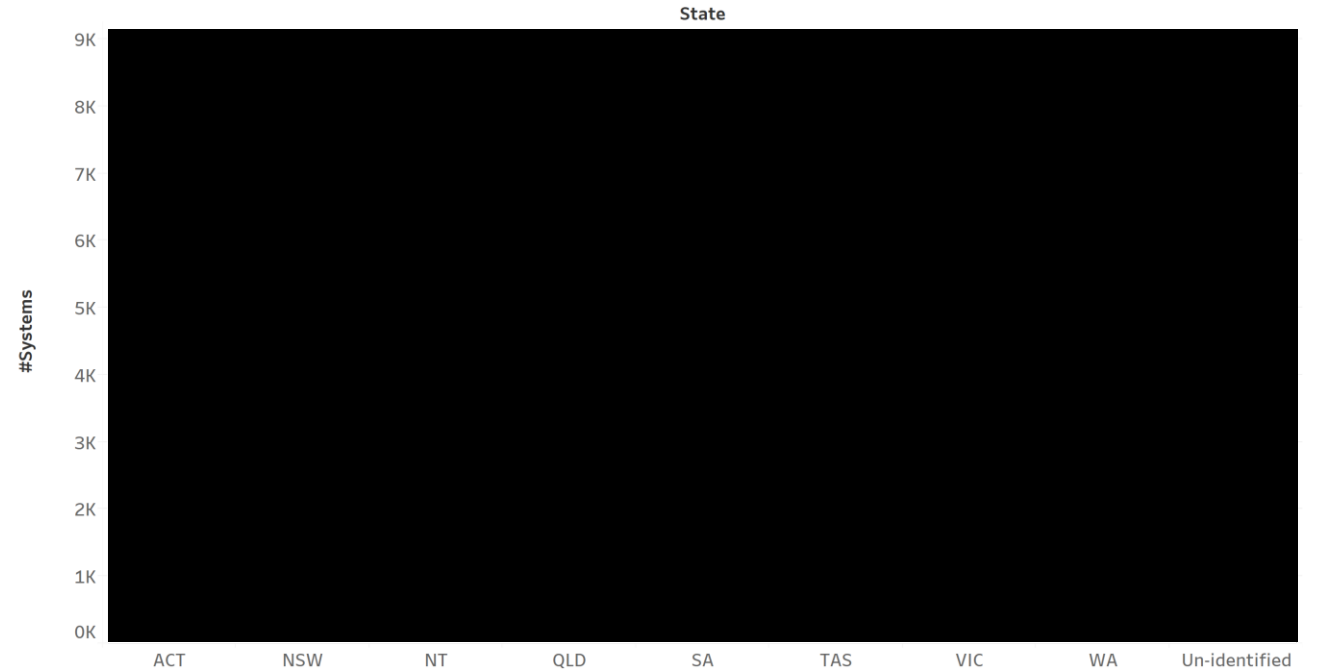
Their combined data shows a year that there was [REDACTED] growth on 2019 installation numbers and [REDACTED] growth on [REDACTED]



State Tally - Manufacturers

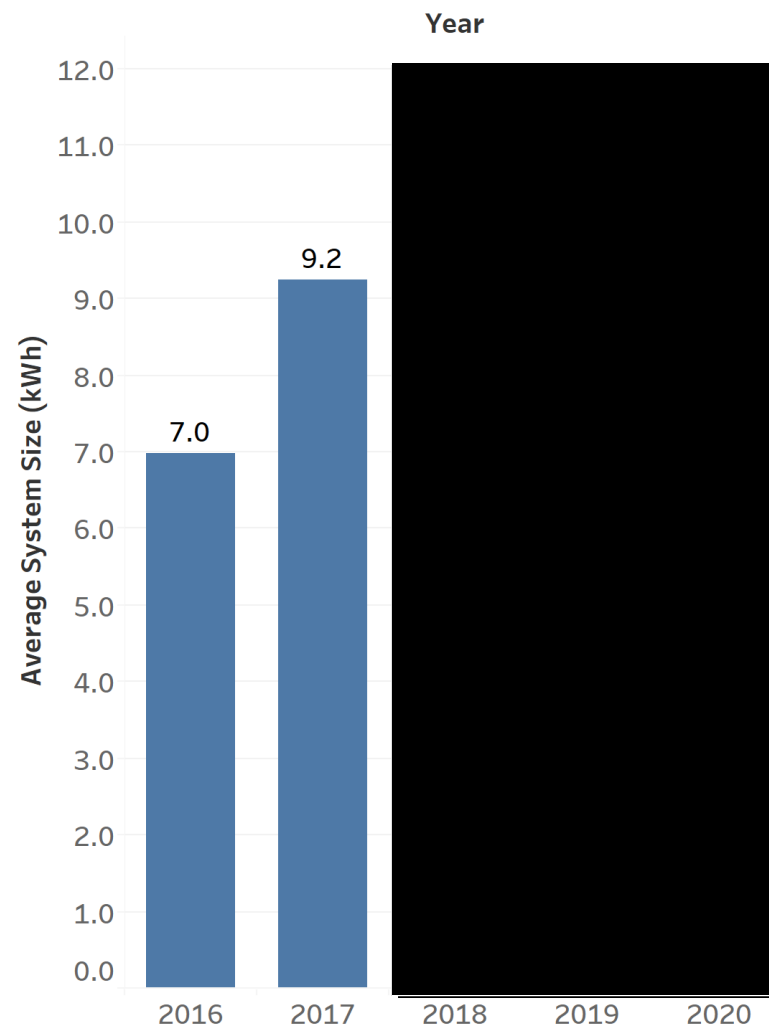
The Manufacturers' tally by state is shown in the chart to the right.

Their assessment shows [redacted] as the leading state on [redacted] followed [redacted]



Average Capacity: Manufacturers

The average capacity of installations
[redacted] on average.

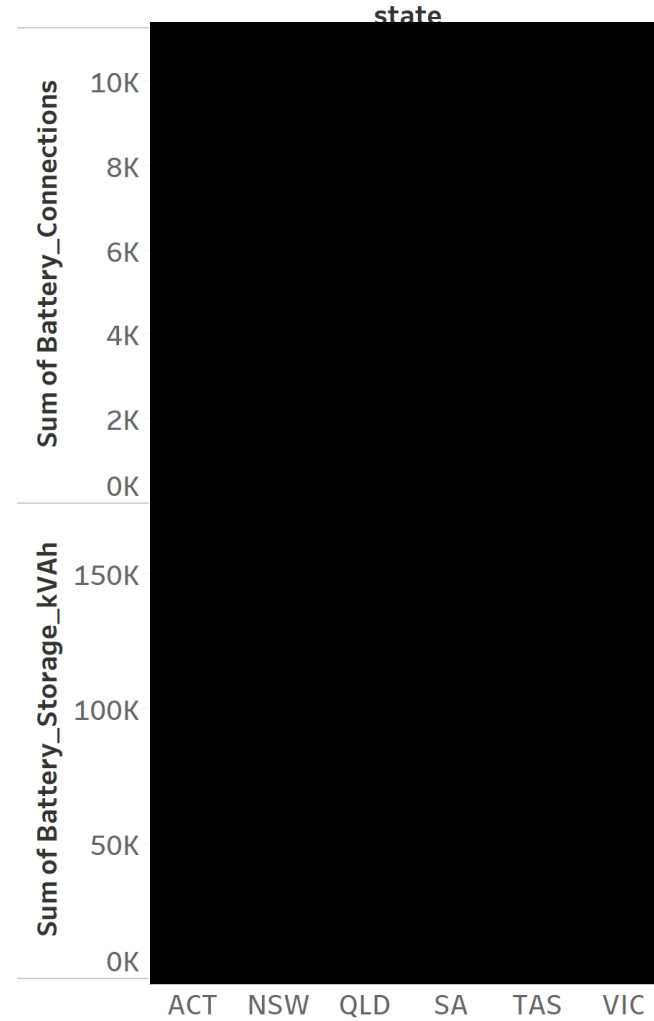


DER Register

- At the start of 2020, AEMO pulled together data from all DNSPs in the NEM to create a DER (Distributed Energy Resource) Register.
- It was acknowledged that DNSPs didn't have a complete record of the number of batteries in their network, with quite a variance amongst DNSPs in accuracy/completeness.
- Therefore the historical DER Register data is of interest but not particularly useful.
- Since March 2020 DNSPs have been reporting to the DER Register on all ESS installations they know about, via connection notifications from ESS installers.
- Since ESS installers face additional paperwork (and negligible benefit) when notifying DNSPs of a new battery connection, it's certain that not every battery installed will be reflected in the DER Register. This can vary considerably (e.g. Solar Victoria and the NSW government programs require network connection forms be completed).
- The big question we have is the degree to which the DER Register under-reports recent installations.

Cumulative Tally – DER Register (online)

According to the DER Register, there were [REDACTED] battery installations in the NEM totalling [REDACTED].



DER Register (AEMO) – 2020 Monthly

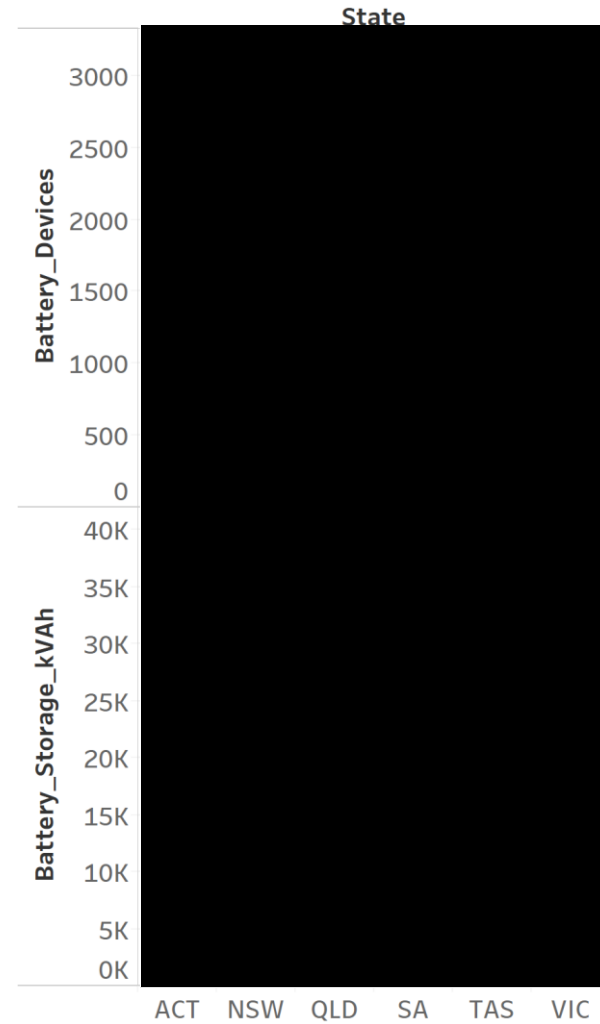
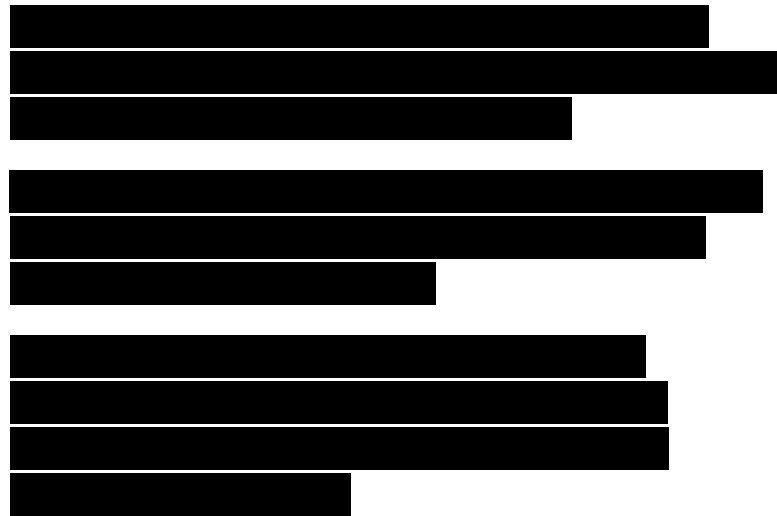
AEMO supplied SunWiz with a monthly extract of the number of batteries added to the DER Register in 2020.

It's worth noting the data doesn't cover the complete year and DNSPs have an obligation to provide the data within 20 days of installation being completed, so when this report was generated (mid December) there would have been records still to be submitted.



DER Register (AEMO) – 2020* Tally

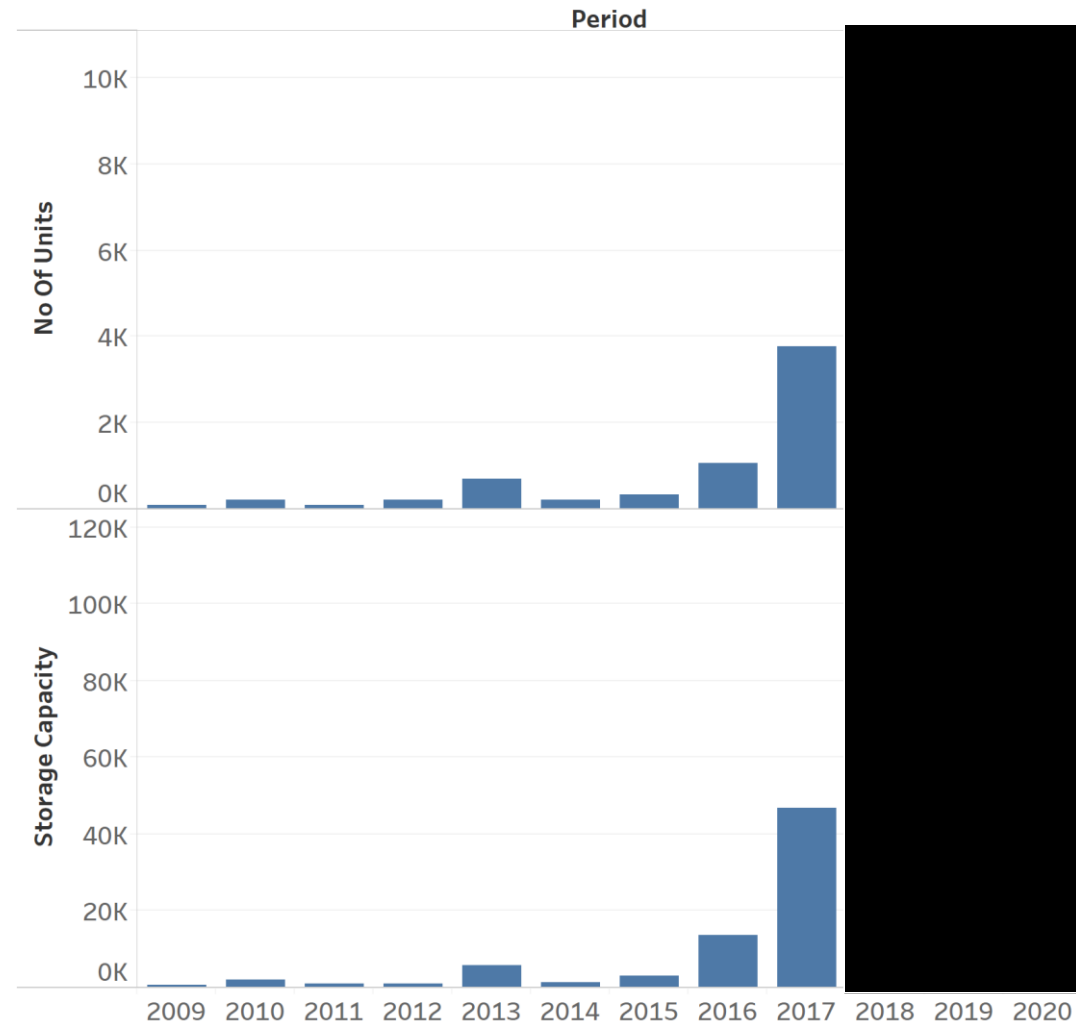
Noting recent data is yet to be received, the chart shows the number of battery installations and battery capacity added over the period January-November 2020



DER Register (online) - Historical

The DER Register data dashboard <https://aemo.com.au/en/energy-systems/electricity/der-register/data-dashboard-der> shows the number of battery installations recorded each year, along with their capacity.

Noting our belief in the inaccuracy of the historical information, and noting the incompleteness of the 2020 year, this shows another perspective on the uptake of storage.



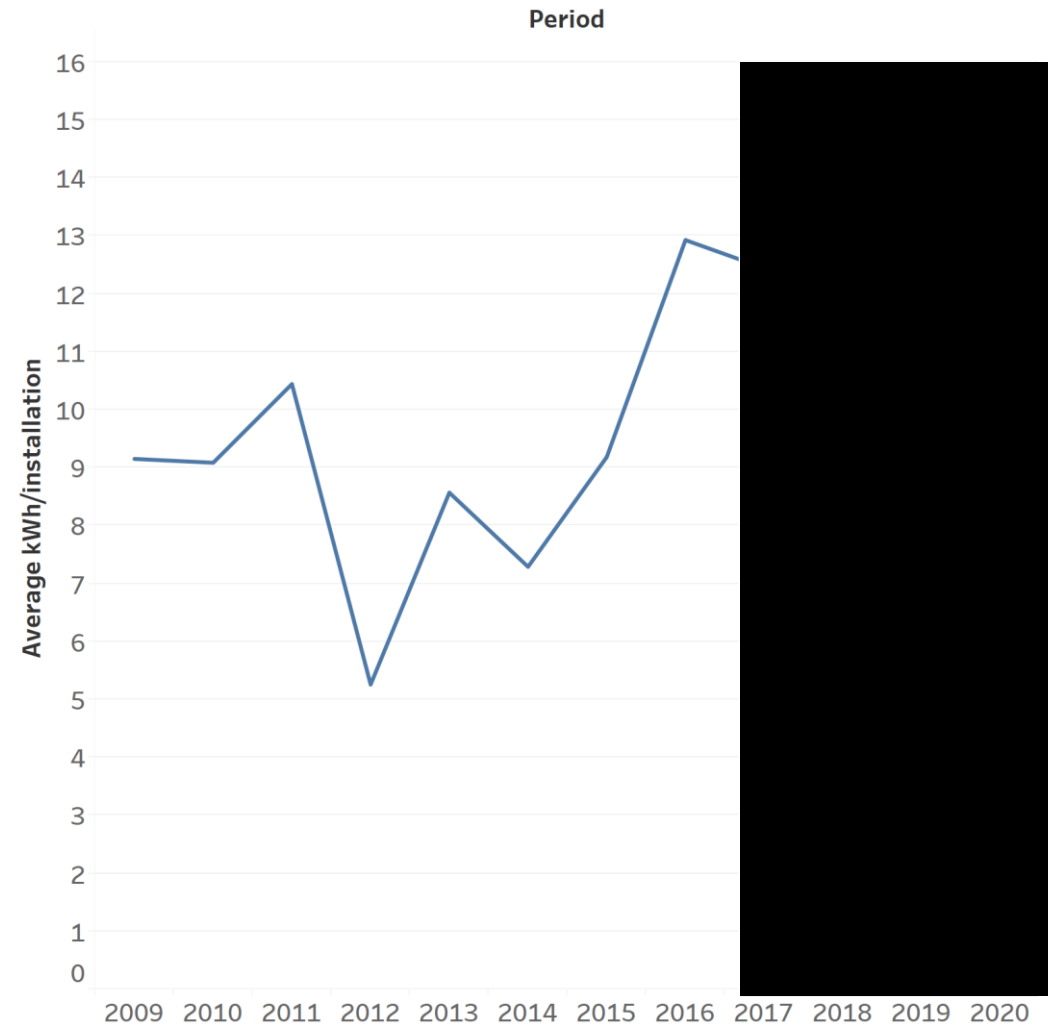
DER Register (online) – Average System Size

The DER Register can be used to identify the average battery system size (storage capacity divided by number of units) as it has evolved based on historical data.

Though the historical data may not be so accurate in calculating the market size, it should produce a reasonable view of the average system size.

In this case, it appears that [REDACTED]

[REDACTED]

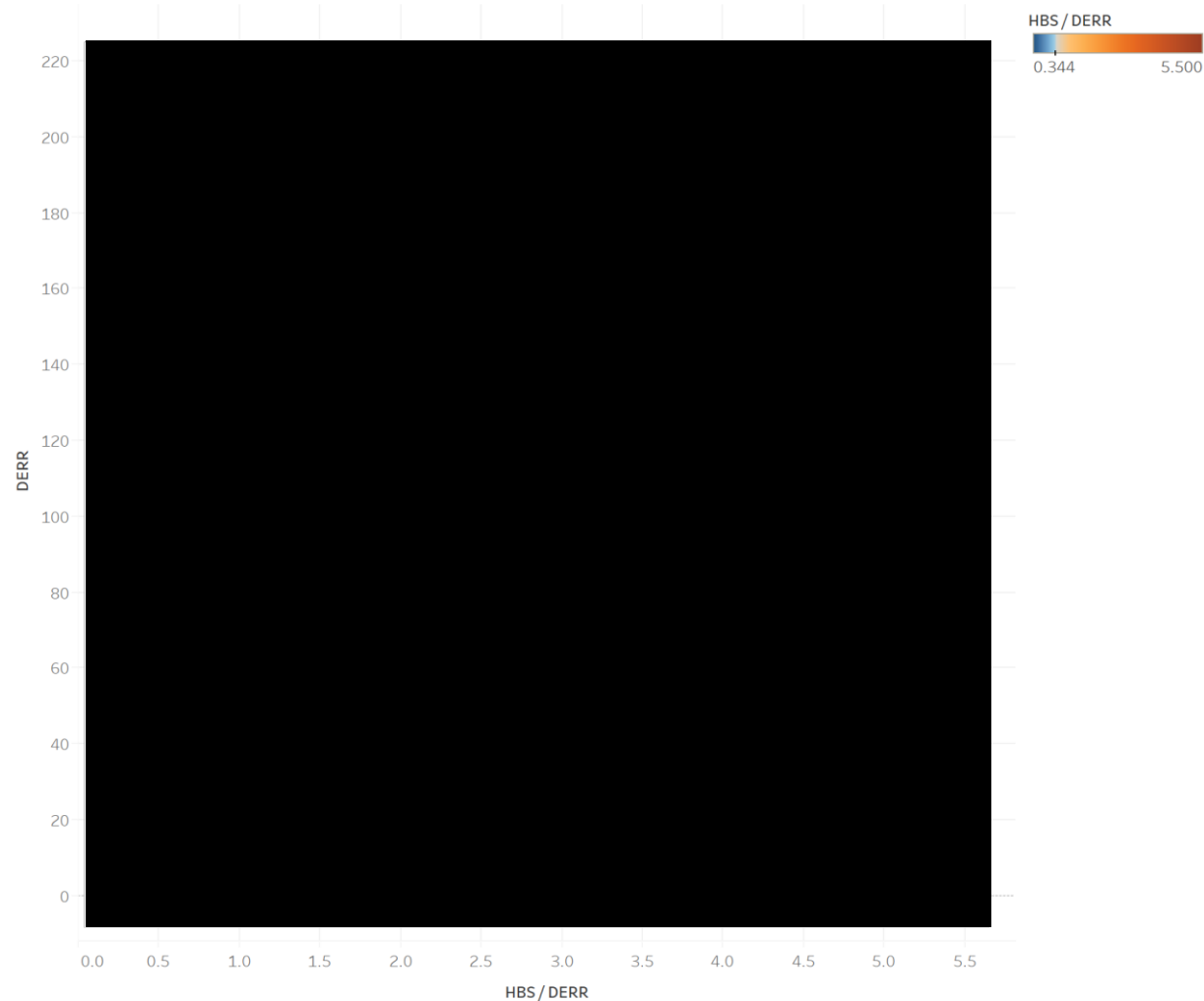


Discrepancies: DERR compared to HBS

SunWiz has compared data from the DERR online data with HBS (SA) data at a cumulative postcode level.

It's worth noting that the HBS data is based upon quotes conditionally approved, which average 10% higher than the actual number installed. The DERR data is likely to understate historic installations. The question is: by how much?

This chart shows 50% of South Australian postcodes have



Discrepancies: DERR compared to SV

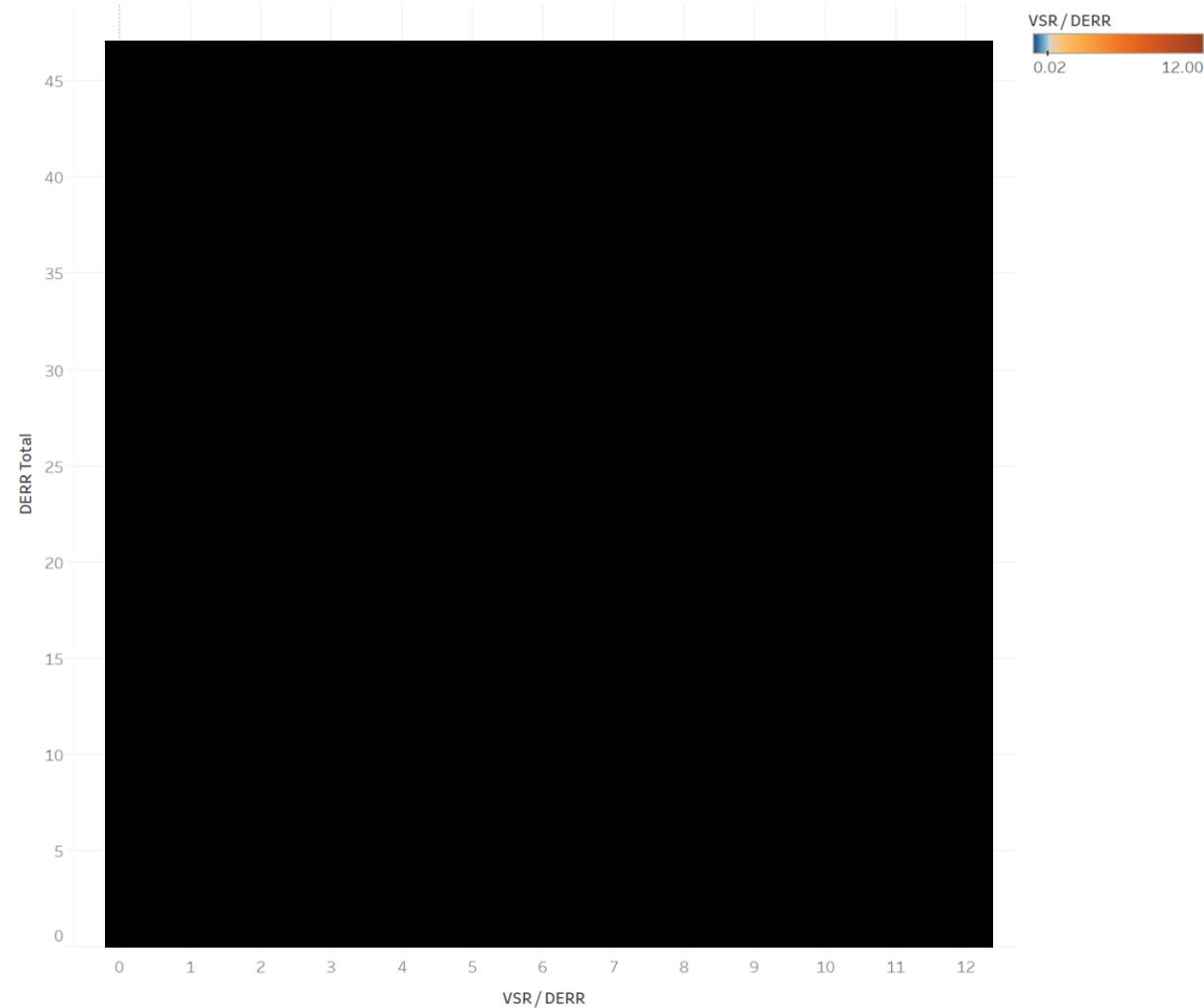
SunWiz has compared data from the DERR online data with SolarVictoria data at a cumulative postcode level. Solar Victoria provided monthly postcode data of actual installations.

Noting:

- some lag between installation and DERR data updates, accentuated by the build-up of installations in December.
- the SV program doesn't represent the total market
- the cumulative nature of the DERR data is compared to the annual nature of the SV data
- this analysis excludes postcodes where there were no SV rebates (ineligible postcodes)

the following holds true:

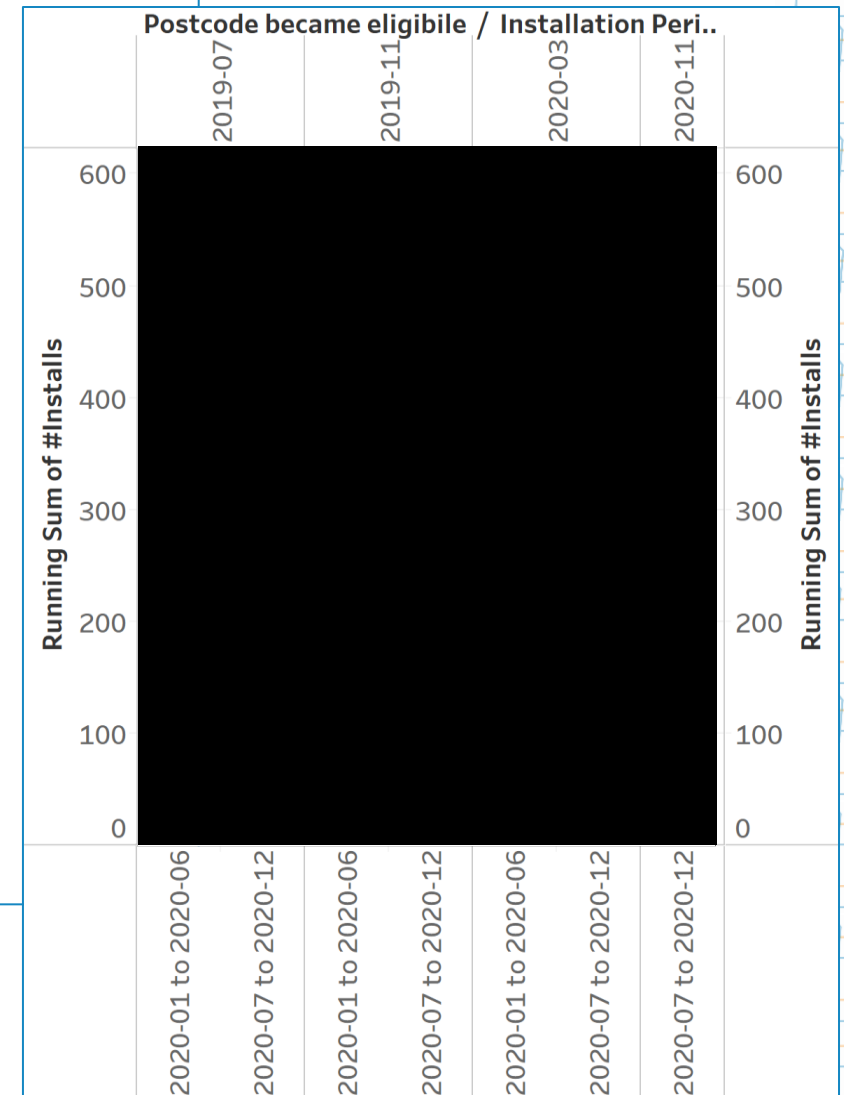
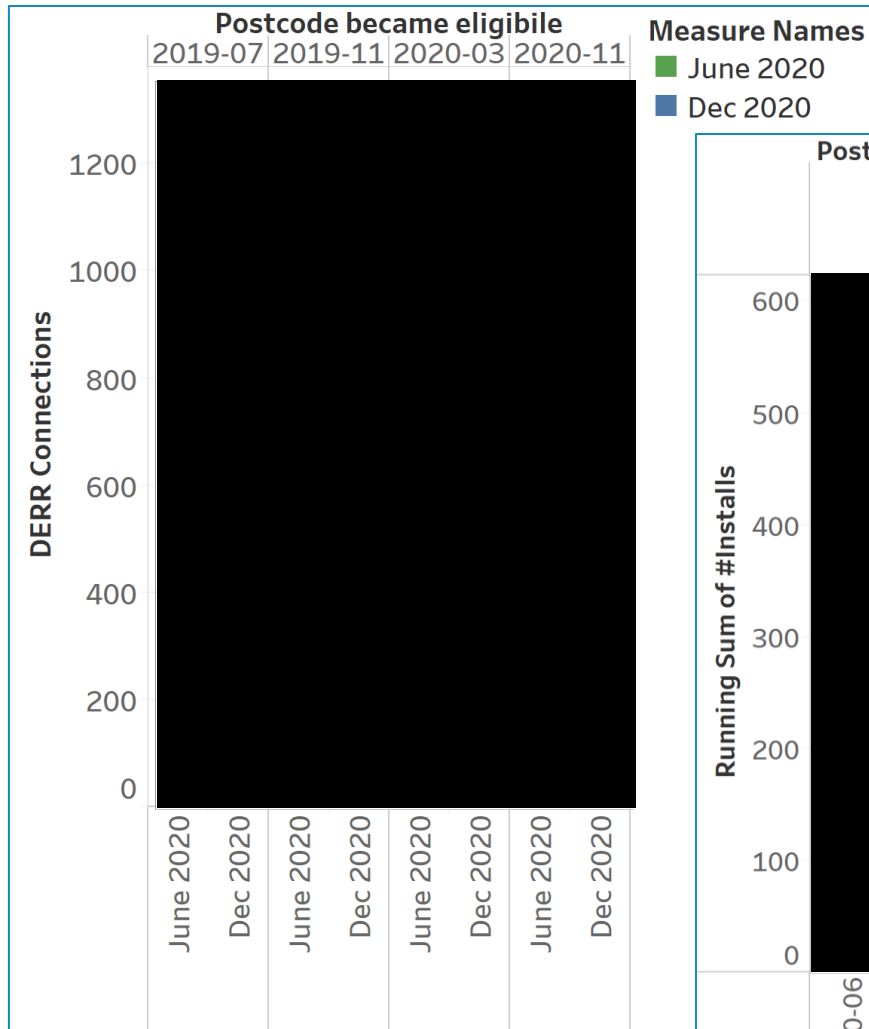
- 50% of postcodes had [REDACTED]
- [REDACTED]
- [REDACTED]



Inference: DERR installations without SV Rebate

SunWiz analysed the number of Solar Victoria rebated battery installations in 2020 at a postcode level, and compared that to the cumulative uptake of batteries in all Victorian postcodes according to the DERR. Postcodes were grouped by the date they became eligible for the Solar Victoria battery rebate.

Two data snapshots were available in the DERR: one at the end of June, and another at the end of December. The cumulative tallies at these dates were compared to the running total of 2020 SV rebated installations over equivalent periods (noting the SV data didn't include pre-2020 figures). Hence the important comparison is the change in figures over these two dates, rather than the absolute numbers. The analysis shows Postcodes eligible in:



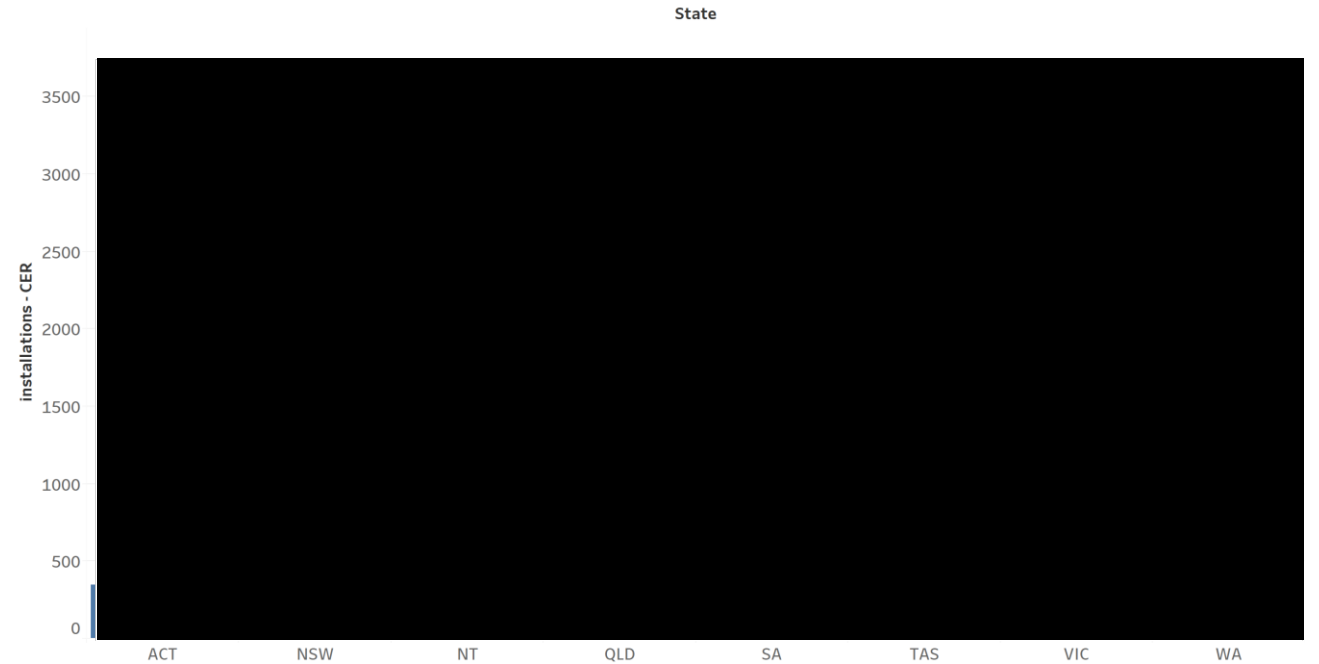
Tally: CER Data

- The Clean Energy Regulator publishes data on the volume of installations that declare they are installing a battery system when installing a solar system.
- This self-reporting is neither complete, nor accurate. It certainly doesn't capture retrofit batteries (~20% of the market). And self-reporting on the CER STC form isn't an accurate indicator of an actual installation.
- However, it occurs in sufficient numbers to highlight some interesting trends and is therefore worth inspecting.

Tally – CER: 2020 by State

Despite limitations with the CER data, we do see some interesting trends:

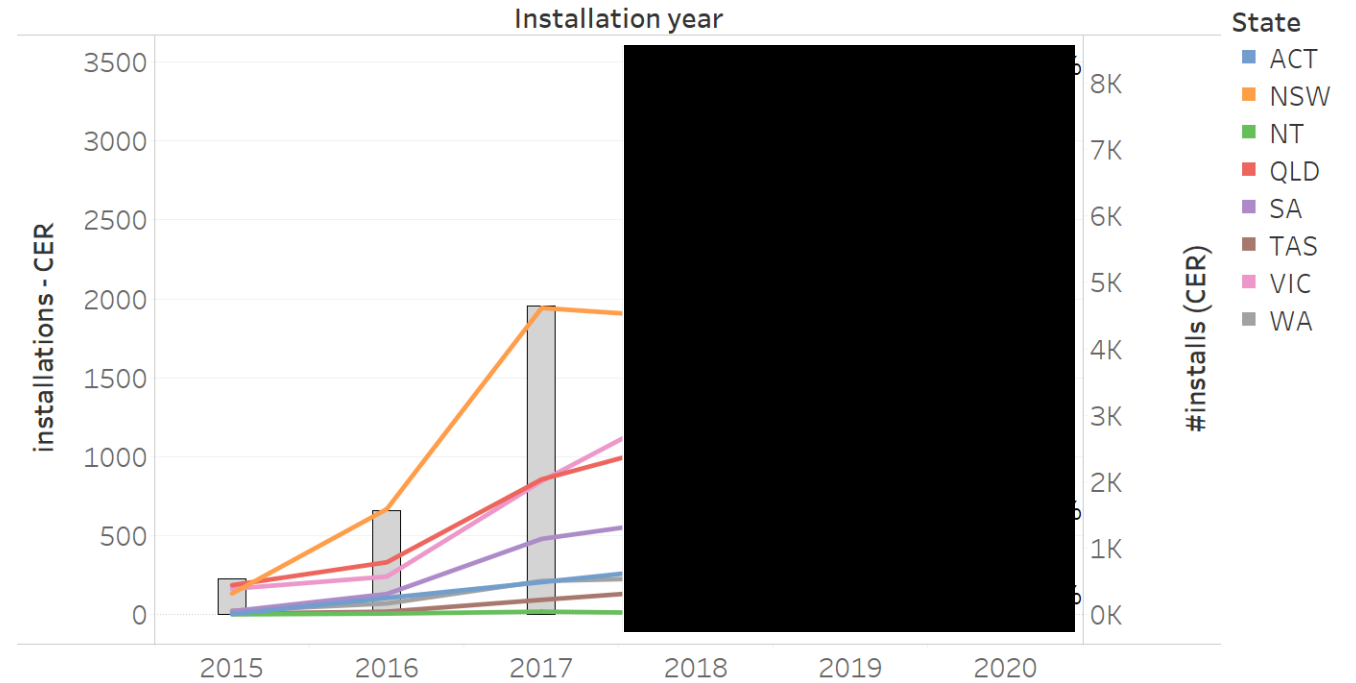
- [Redacted]
- [Redacted]
- [Redacted]
- [Redacted]



Tally: CER – Growth Rate

Despite limitations with the CER data, we do see some interesting trends:

- CER’s reported total number of battery installations for 2020 was [REDACTED]
- Queensland [REDACTED]
- SA, WA and NT [REDACTED]
- [REDACTED]



State Distribution: PVsell Data

Over 400 solar retailers use PVsell software to produce customer proposals that occasionally include batteries.

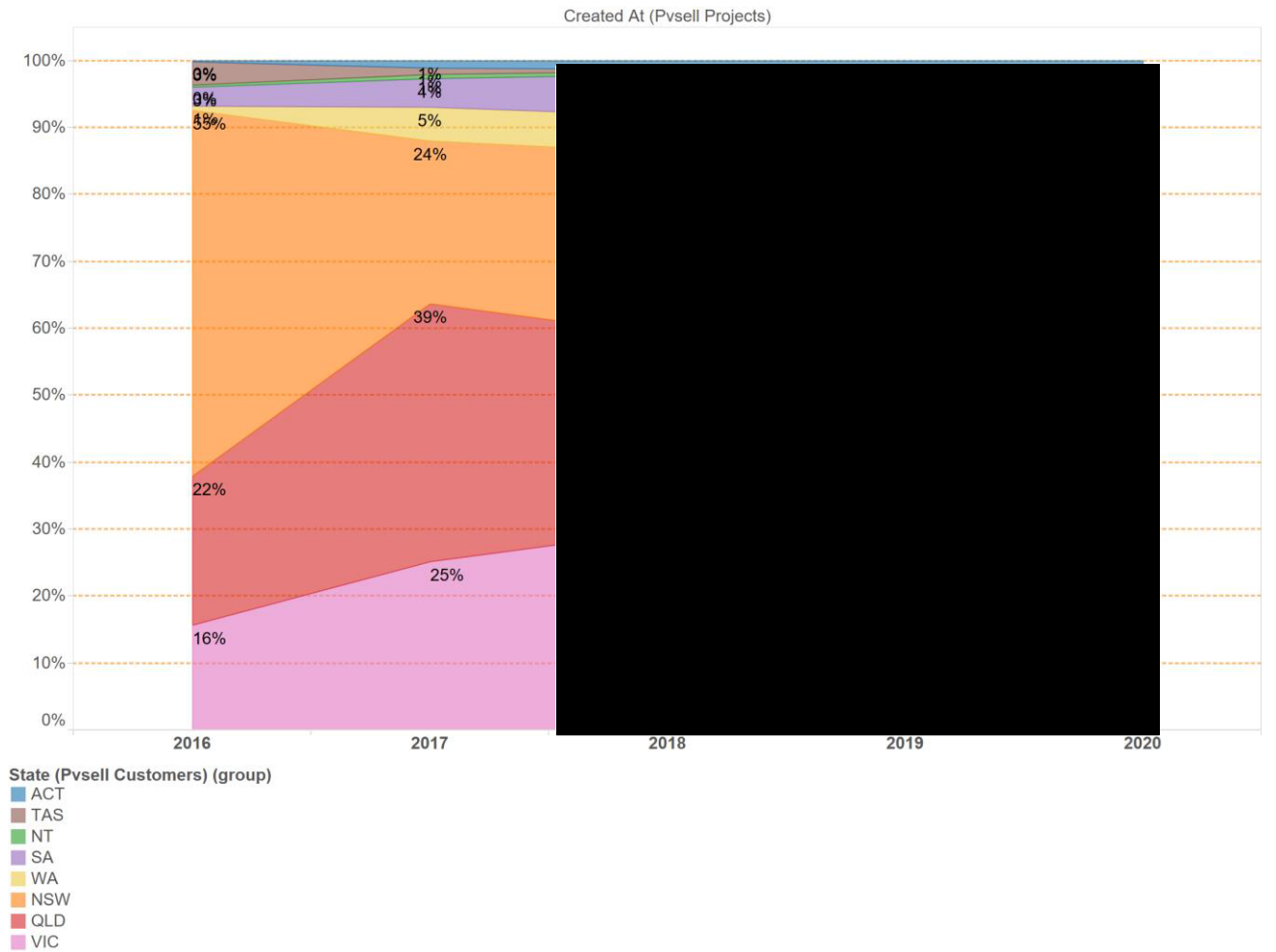
This chart shows the market share of each state when it comes to battery proposals in PVsell.

The trends by state [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

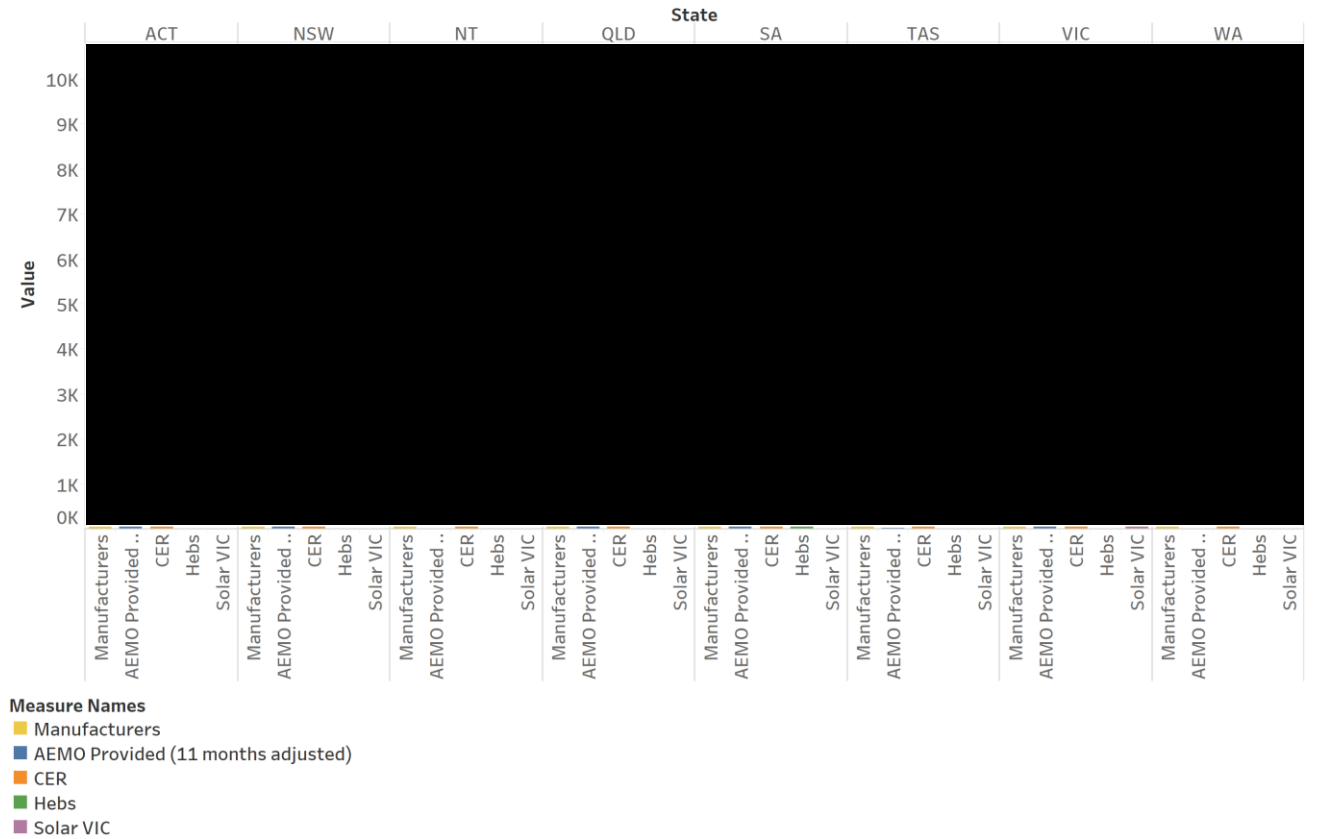


Which figure is right?

This chart compares the figures we have from a range of data sources in an effort to understand the market.

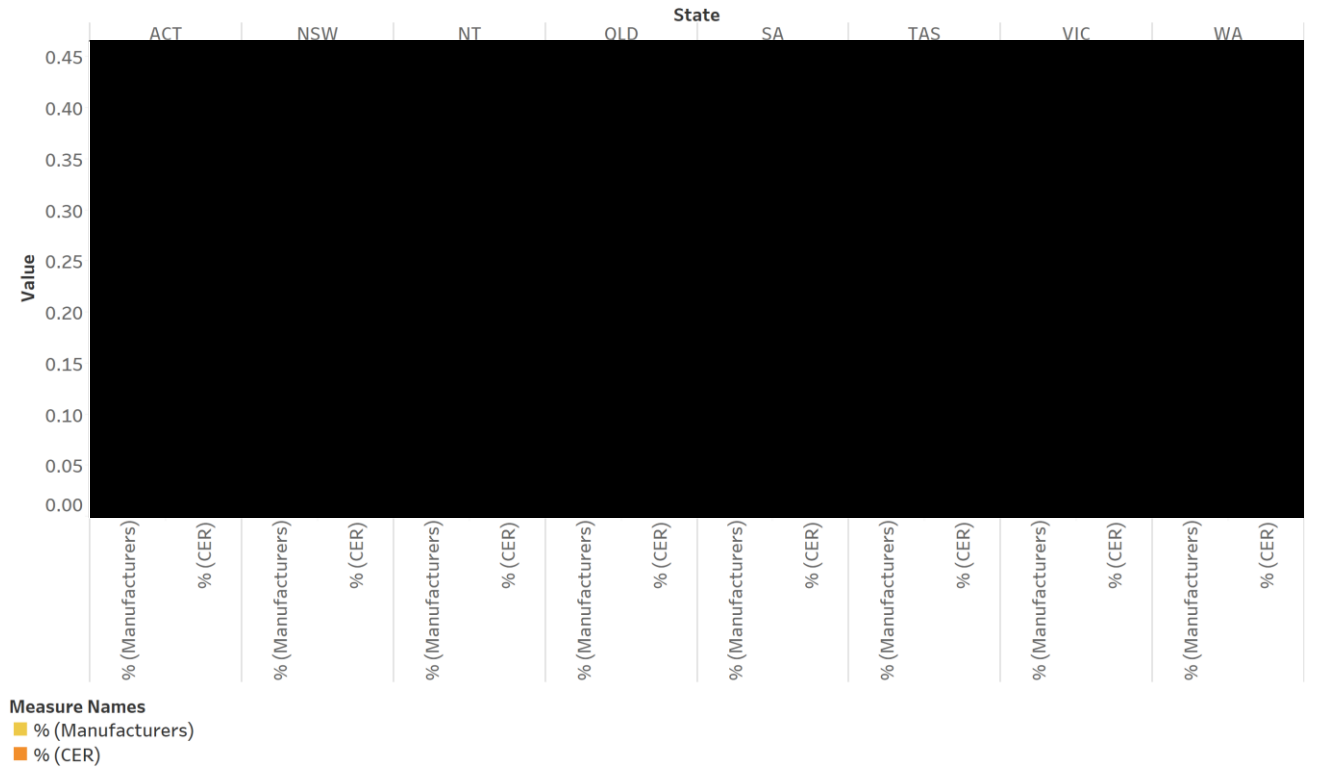
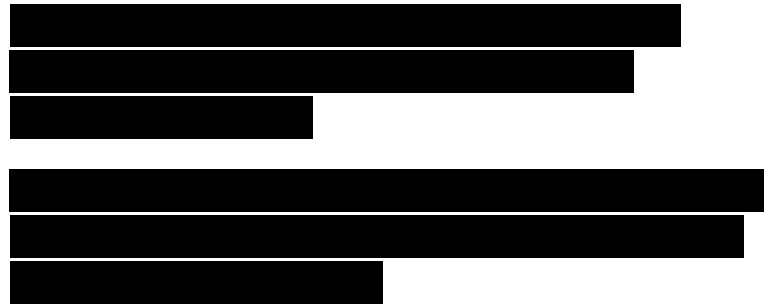
Fingerprinting of interval metering data in some DNSPs has shown only ~50% of historic battery installations obtained network approvals.

In SA, the manufacturers report volumes consistent with the SA HBS, at a level what AEMO reports.



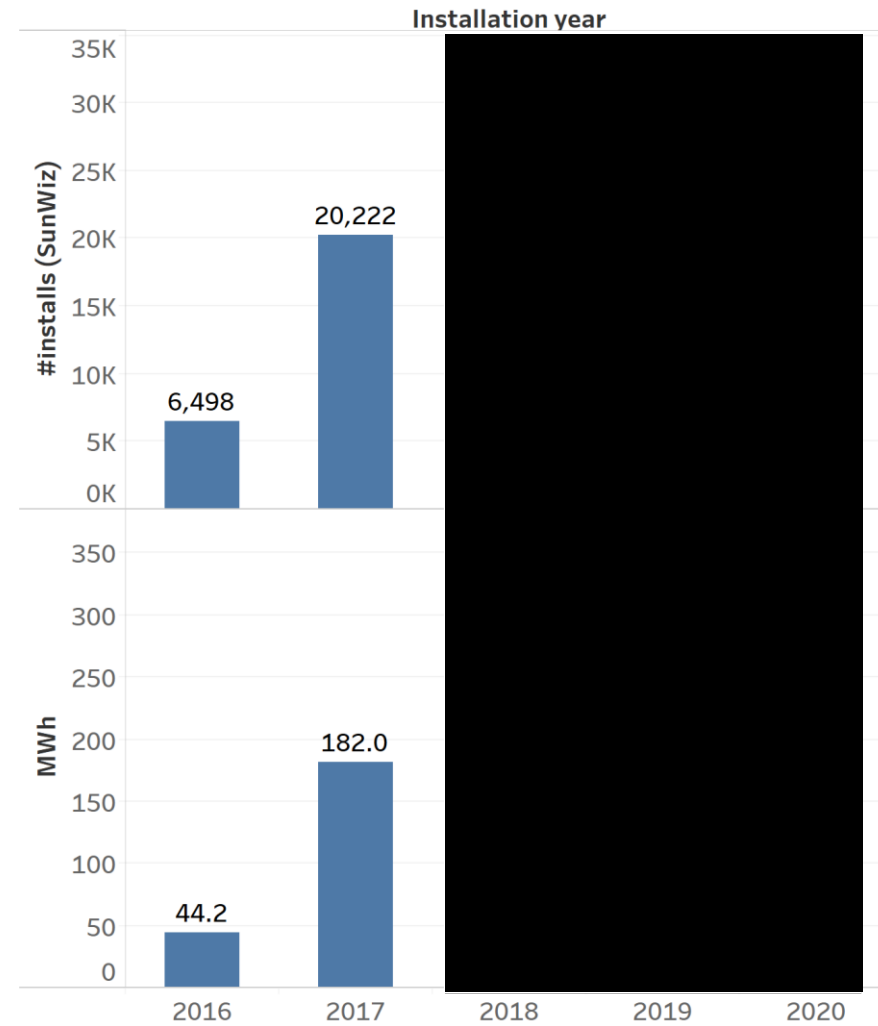
State distribution

Whereas manufacturers report a more even distribution across NSW SA and VIC, the CER data shows a concentration in SA, with NSW and then VIC.



SunWiz: Number of Installations

Based upon figures reported by leading manufacturers to SunWiz, the market for home energy storage systems increased substantially for installations in 2020.

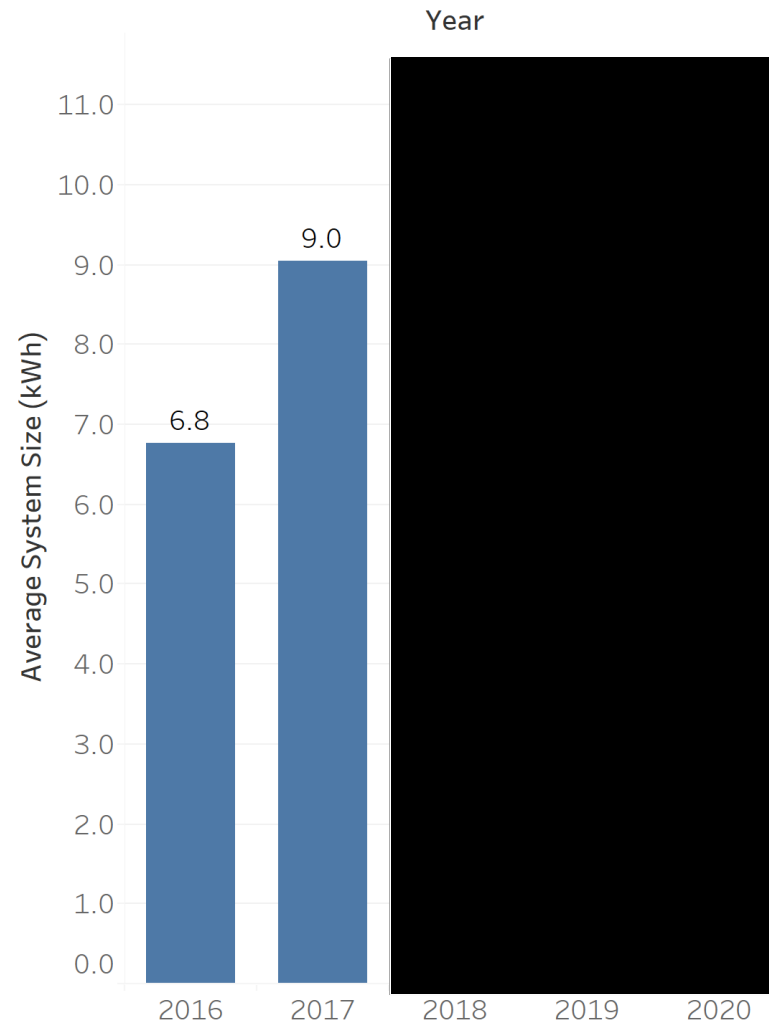


SunWiz: Average Capacity

The average capacity of installations rebounded to [REDACTED] on average.

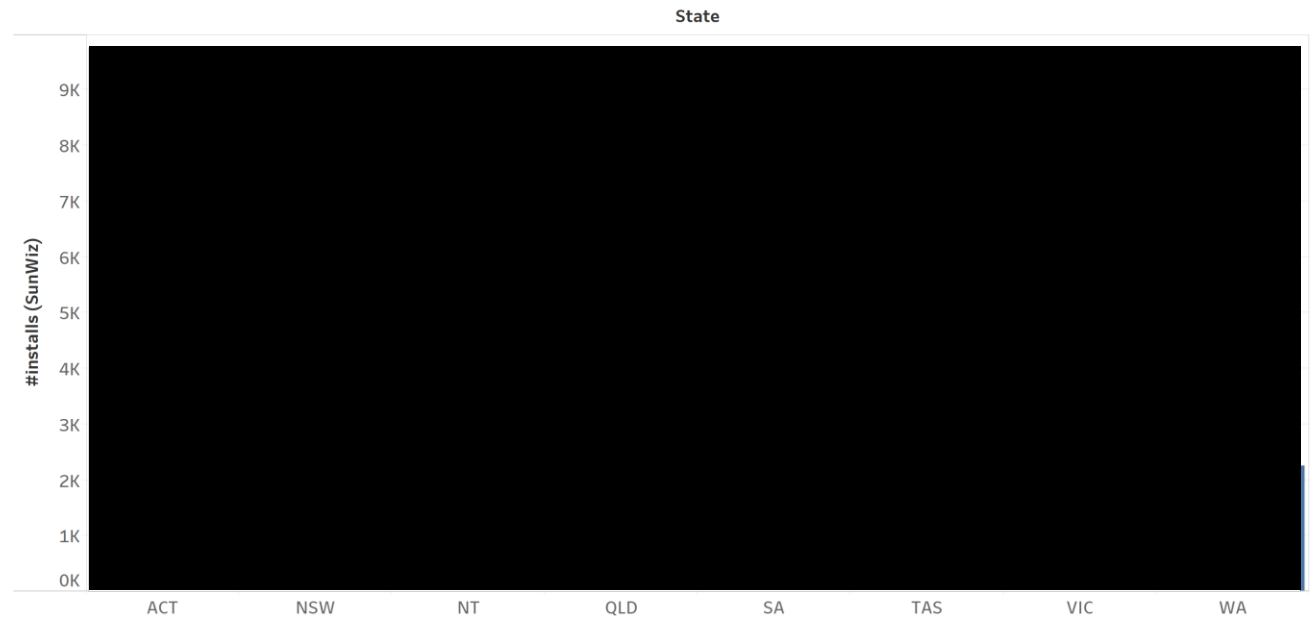
This is due to:

- [REDACTED]
- [REDACTED]
- [REDACTED]
- [REDACTED]



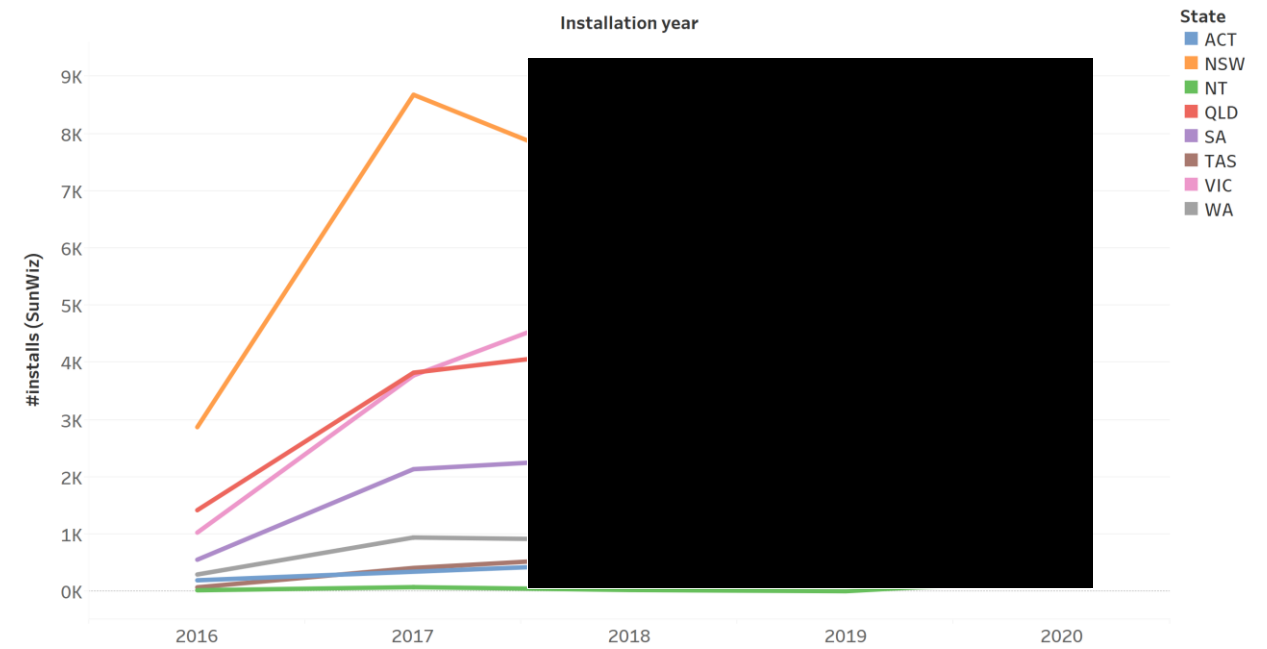
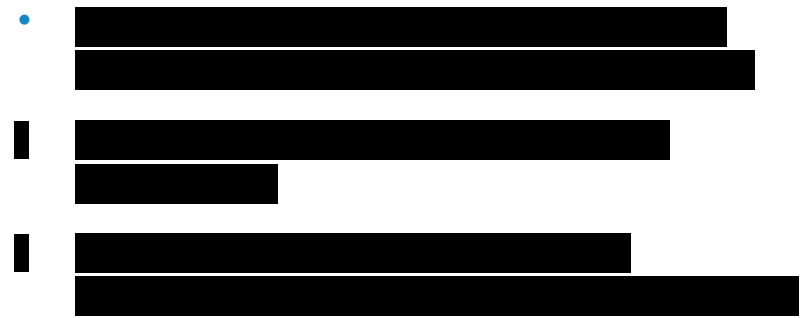
SunWiz: Volume by State

CER data shows that [redacted] had the most amount of battery systems installed at [redacted]

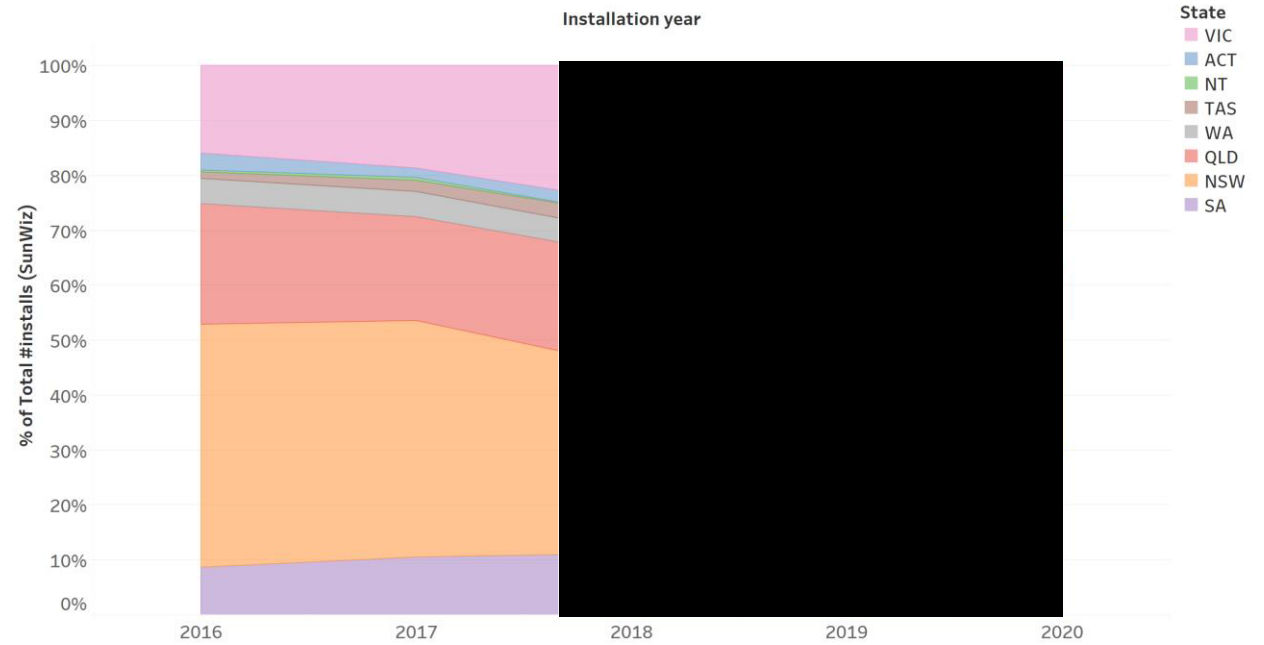


SunWiz: State Volume

This chart shows the breakdown by state. It shows:



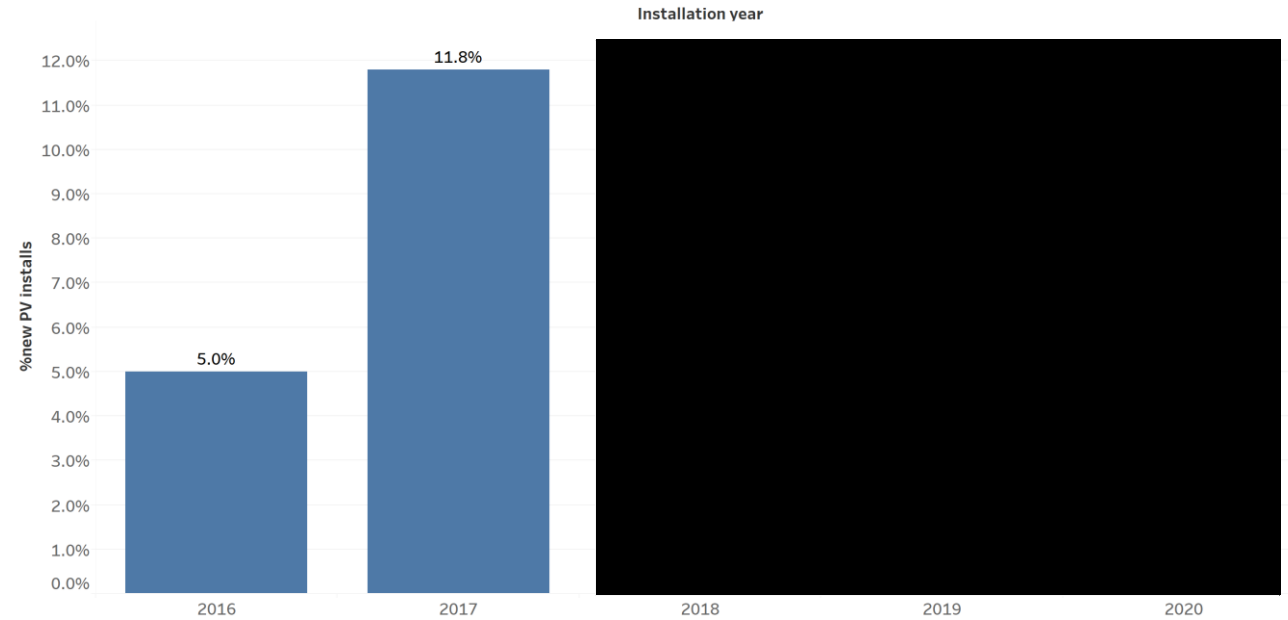
SunWiz: Share by State



Penetration: New PV

The number of battery installations as a percentage of the number of PV installations increased to [REDACTED] in 2020.

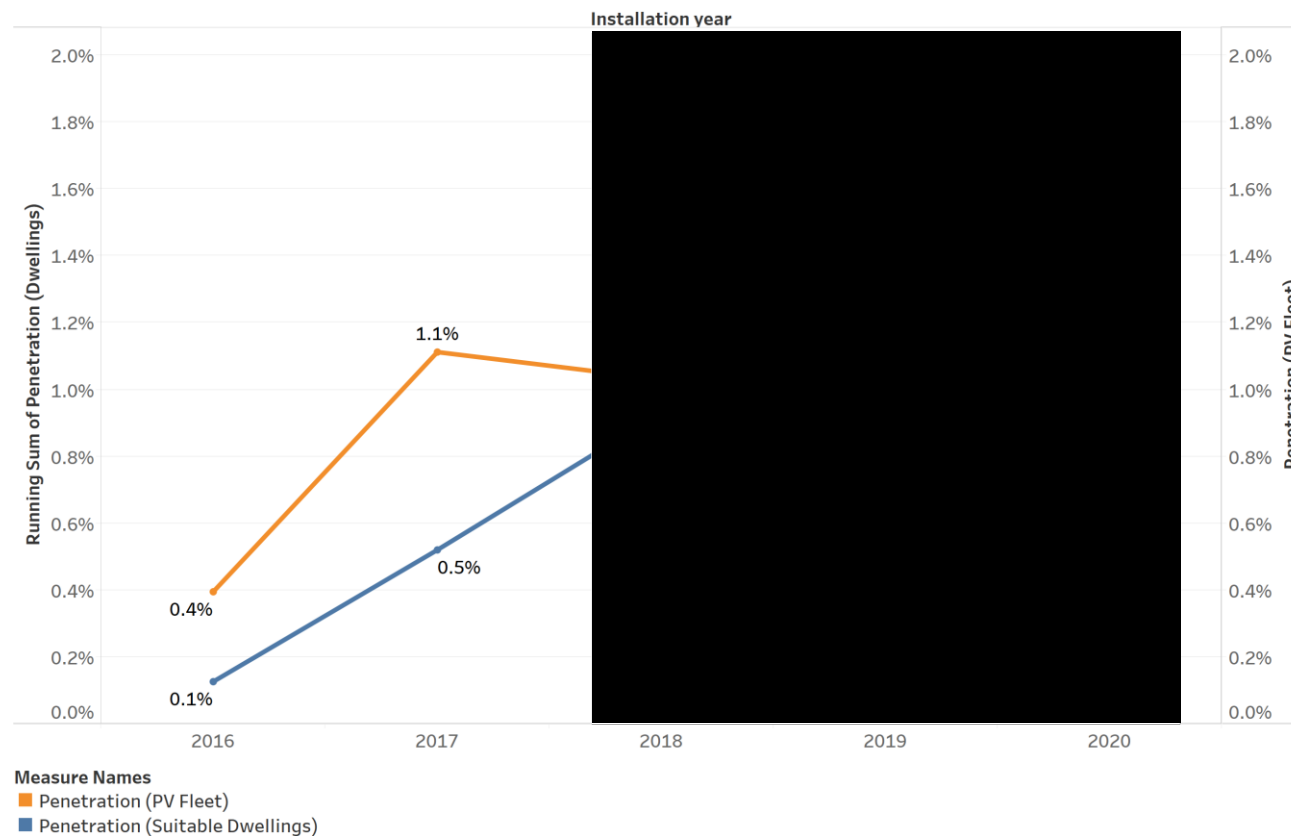
This illustrated that the battery market [REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]



Penetration into Addressable Market

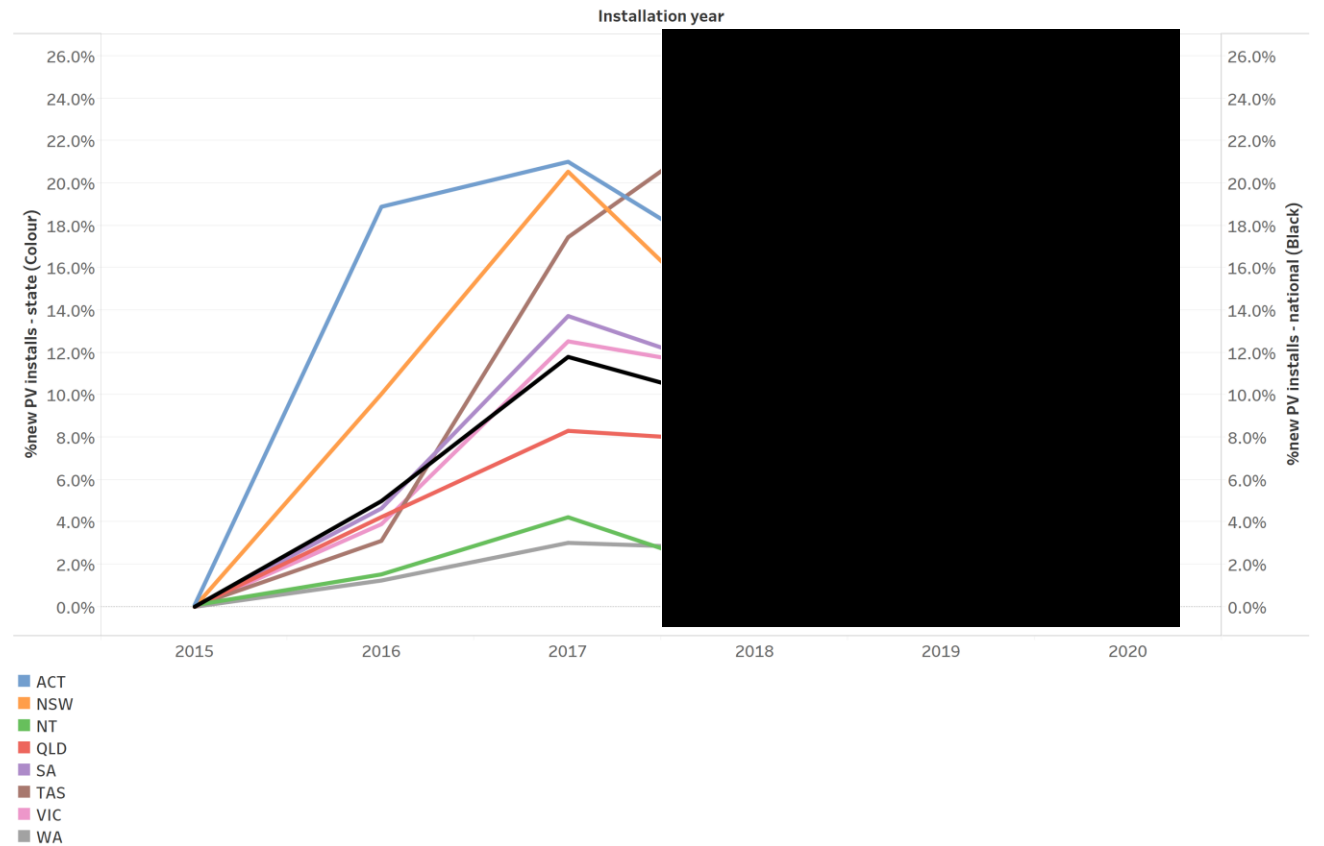
This chart shows the penetration of batteries into the total addressable market (TAM), using two (imperfect) ways of calculation:

[Redacted content]



Penetration: New PV Installations (by State)

Though batteries are included in a low percentage (~15%) of new installations nationally, this varies considerably by state.



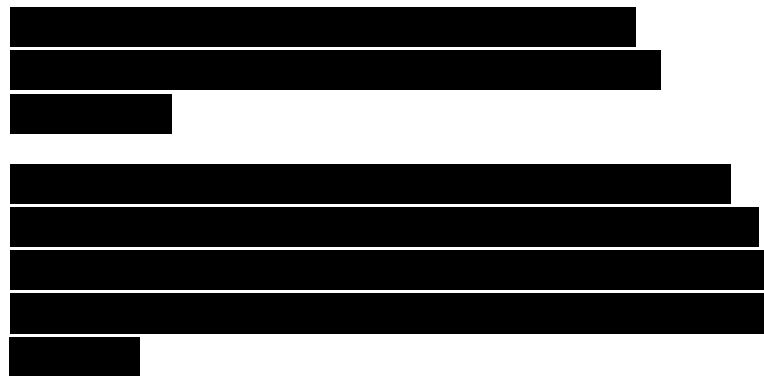
Thoughts on Triangulation

- We see signs that support the overall market growth revealed by manufacturer's combined data: 16% growth in CER data, despite a drop in DERR data.

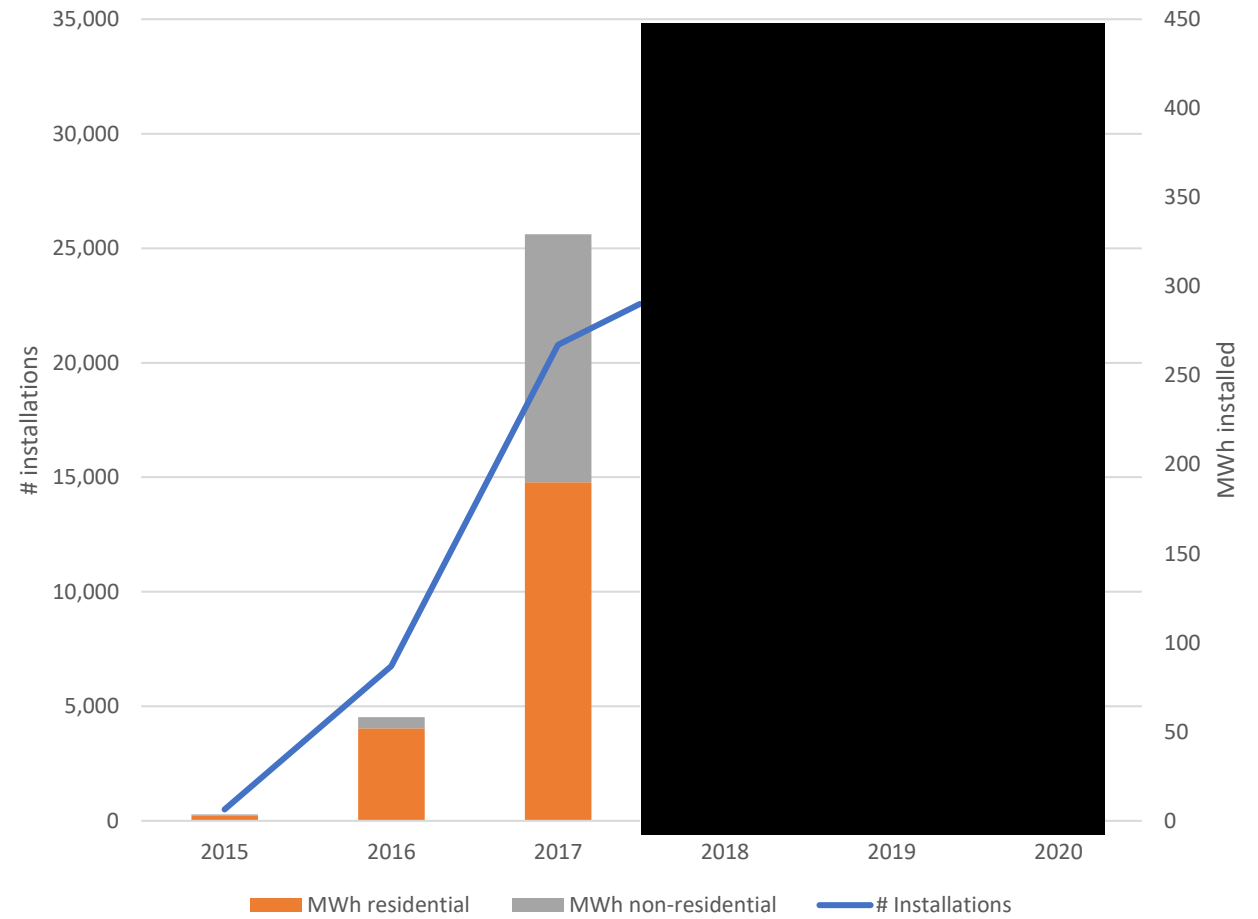
- [REDACTED]

Combined Market Installation Tally

SunWiz's market estimate for 2020 is for 31,269 installations of home energy systems, worth 341MWh.



Energy Storage System installations: 2015-2020



Cumulative Market Installation Tally

- The cumulative tally for Australian battery installations for 2015-2020 was:



Market Share

Retailer Market Share – HBS (SA)

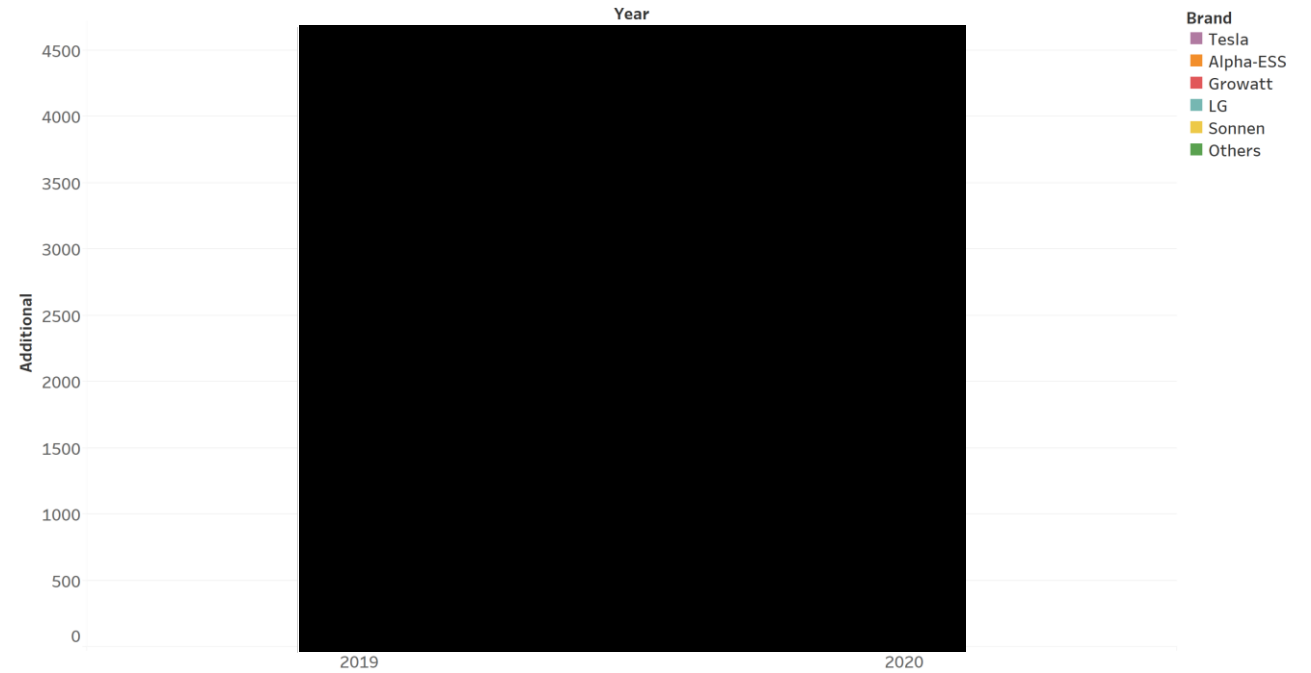
This chart shows the percentage of allocated battery rebates in the HBS program in SA for the leading retailers in the program.

The #1 retailer captured 13% of the rebates, closely followed by the second-largest retailer on 11%. The top 5 retailers together captured 41% of rebates.

Source: SA Home Battery Scheme Data

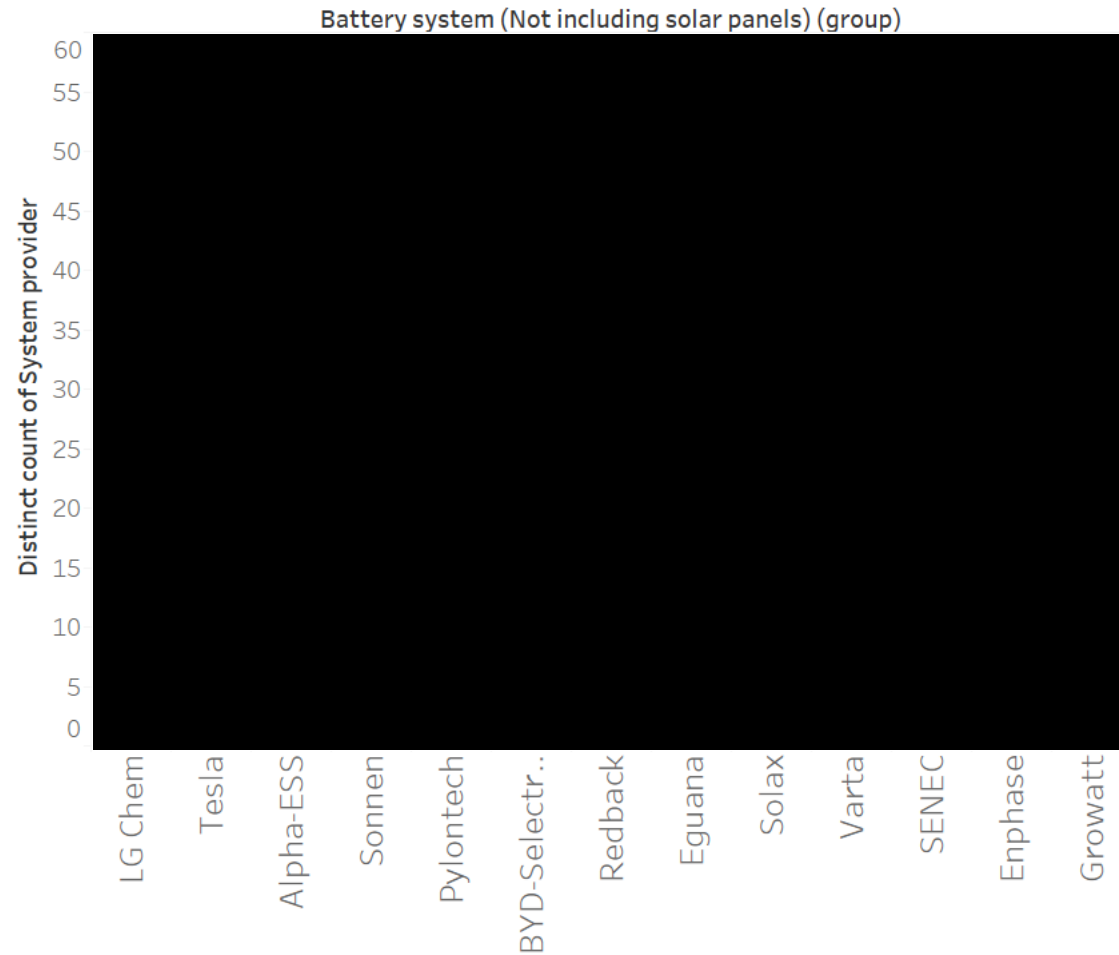
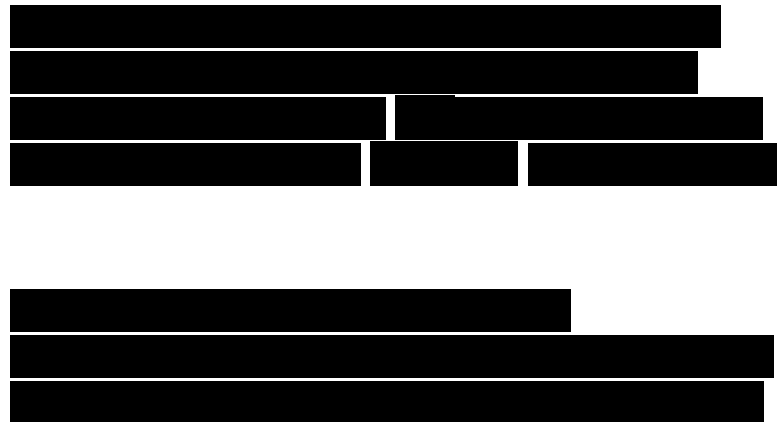


Manufacturer Market Share – SA Home Battery Scheme



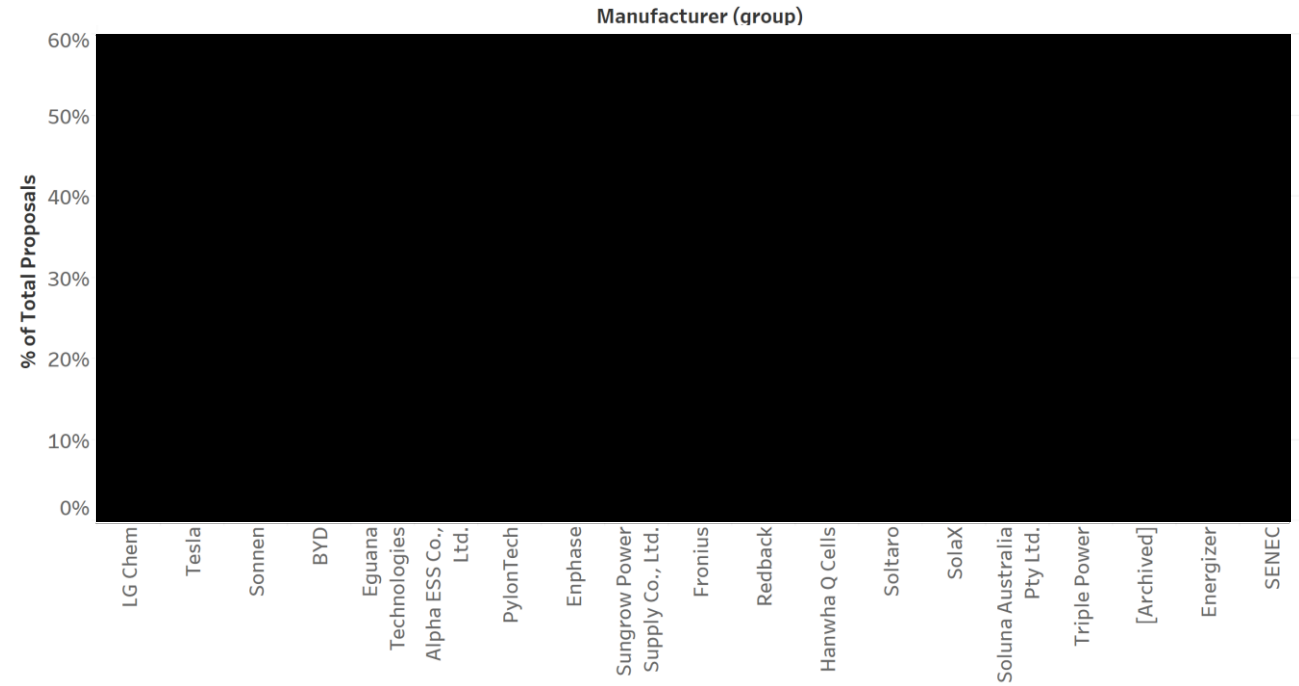
How many vendors per product in HBS

This chart shows the number of Systems Providers (retailers) of each brand of battery listed in the HBS System Price Guide. It is not an indication of market share.



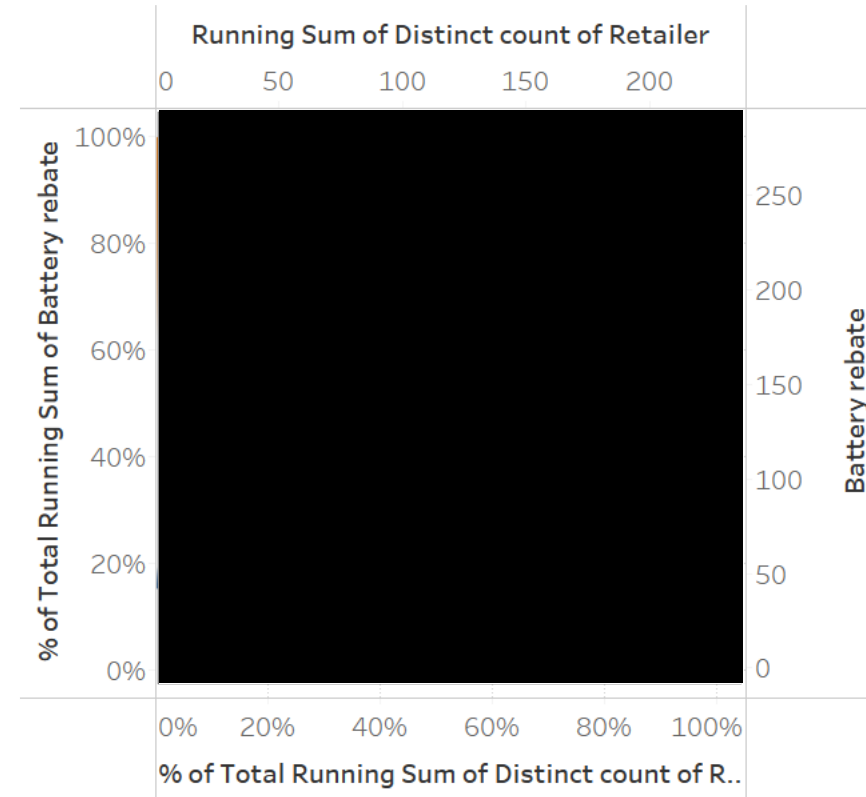
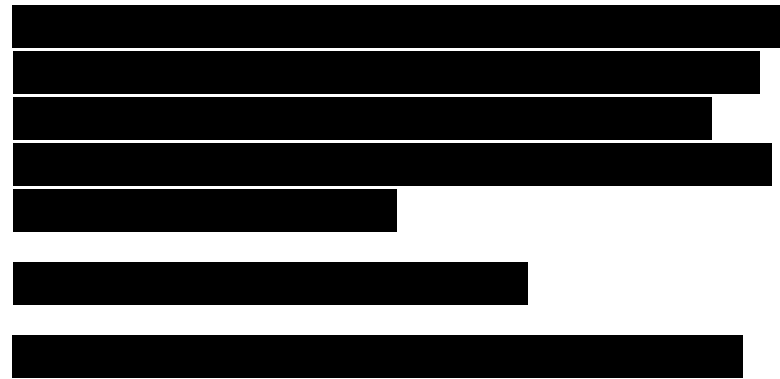
Manufacturer Market Share - OpenSolar

SunWiz is an expert partner of OpenSolar, who share anonymised aggregated data with us.



Battery Rebates – Victoria (Battery Application Approval)

The Pareto chart to the right shows the number of rebates secured by customers, per retailer participating in the Solar Homes program.

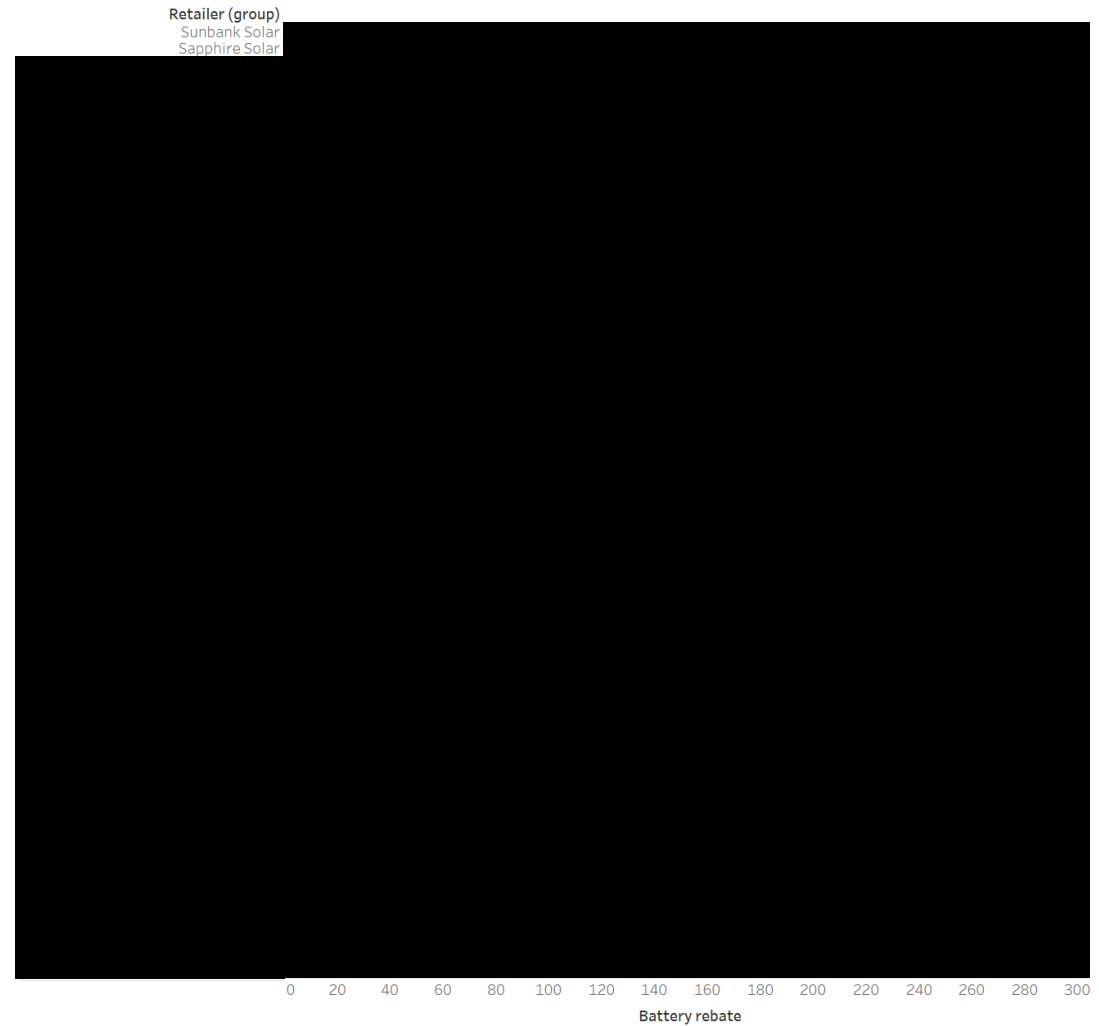
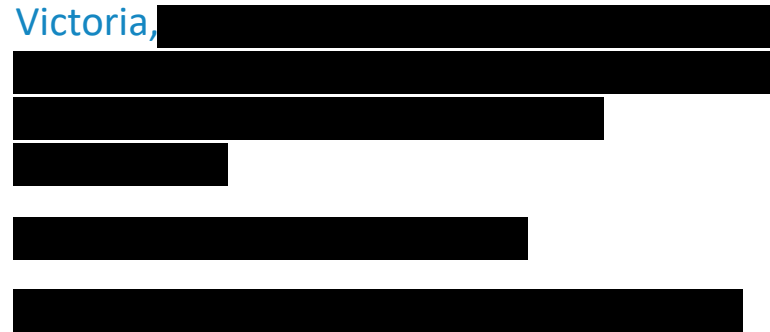


Measure Names
■ % of Total Running Sum of Battery rebate
■ Battery rebate

Retailer Market Share – Victoria (Top Players)

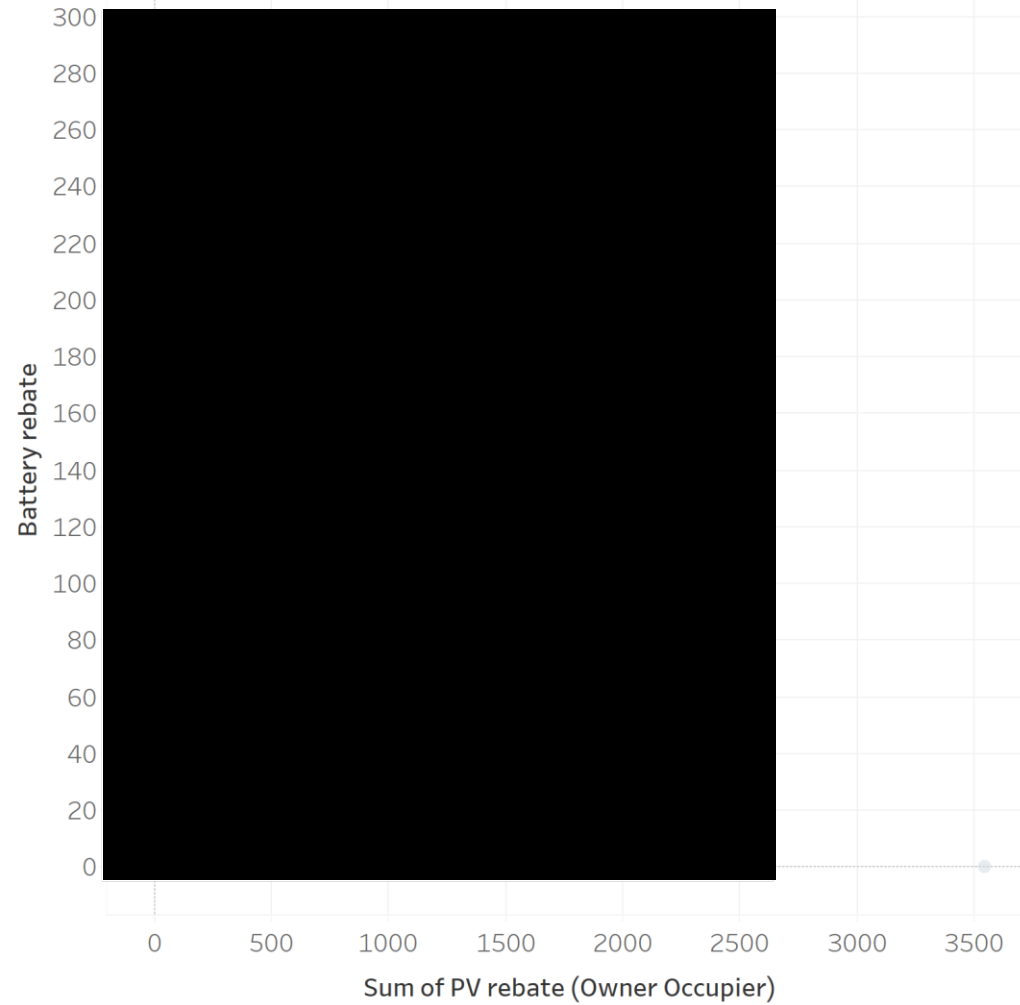
The chart to the right shows the top retailers who have claimed battery rebates over 2020 and Jan 2021. The graph starts from a minimum claim of 5.

As is observable Sunbank Solar is the top player claiming 284 battery rebates within Victoria,



Retailer Specialization – Victoria (Battery Penetration)

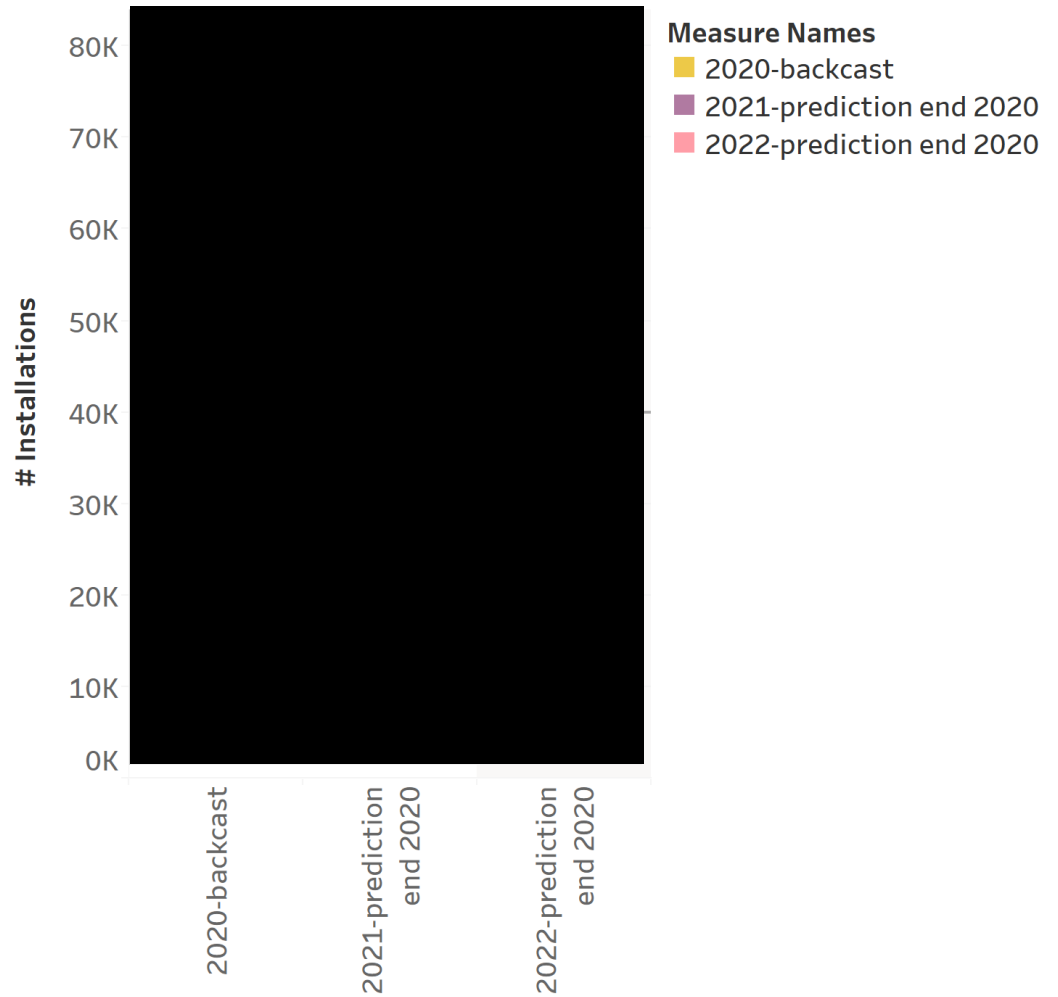
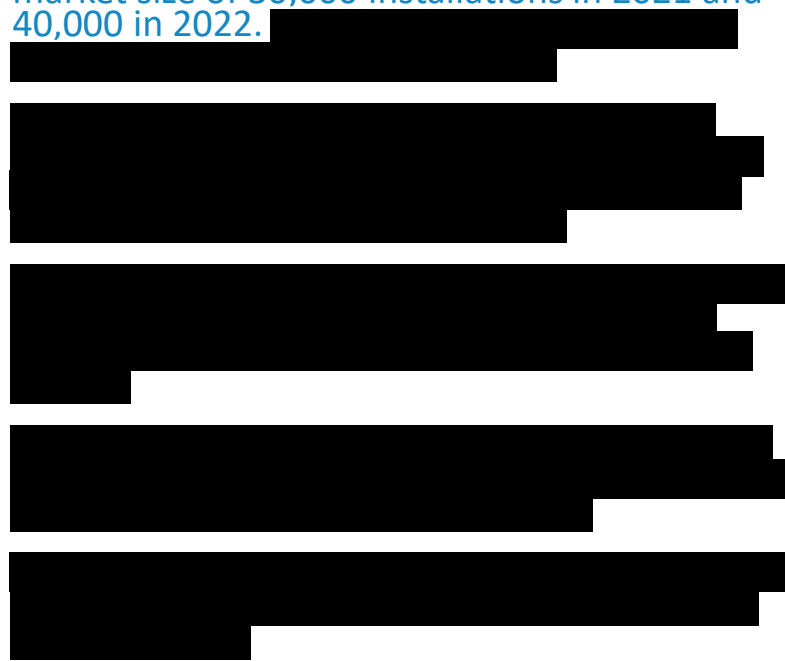
This chart of the relationship between retailers quantity of battery rebates vs solar rebates, and reveals a widely varying degree of battery specialisation.



Outlook 2021 and Beyond

Manufacturers' Predictions for 2021 and 2022

Manufacturers' predictions show a median market size of 30,000 installations in 2021 and 40,000 in 2022.



2021 Market Prediction

- SunWiz predicts a market for [REDACTED] home energy storage systems in 2021.

[REDACTED]
[REDACTED]

[REDACTED] [REDACTED]
[REDACTED]

[REDACTED]
[REDACTED]

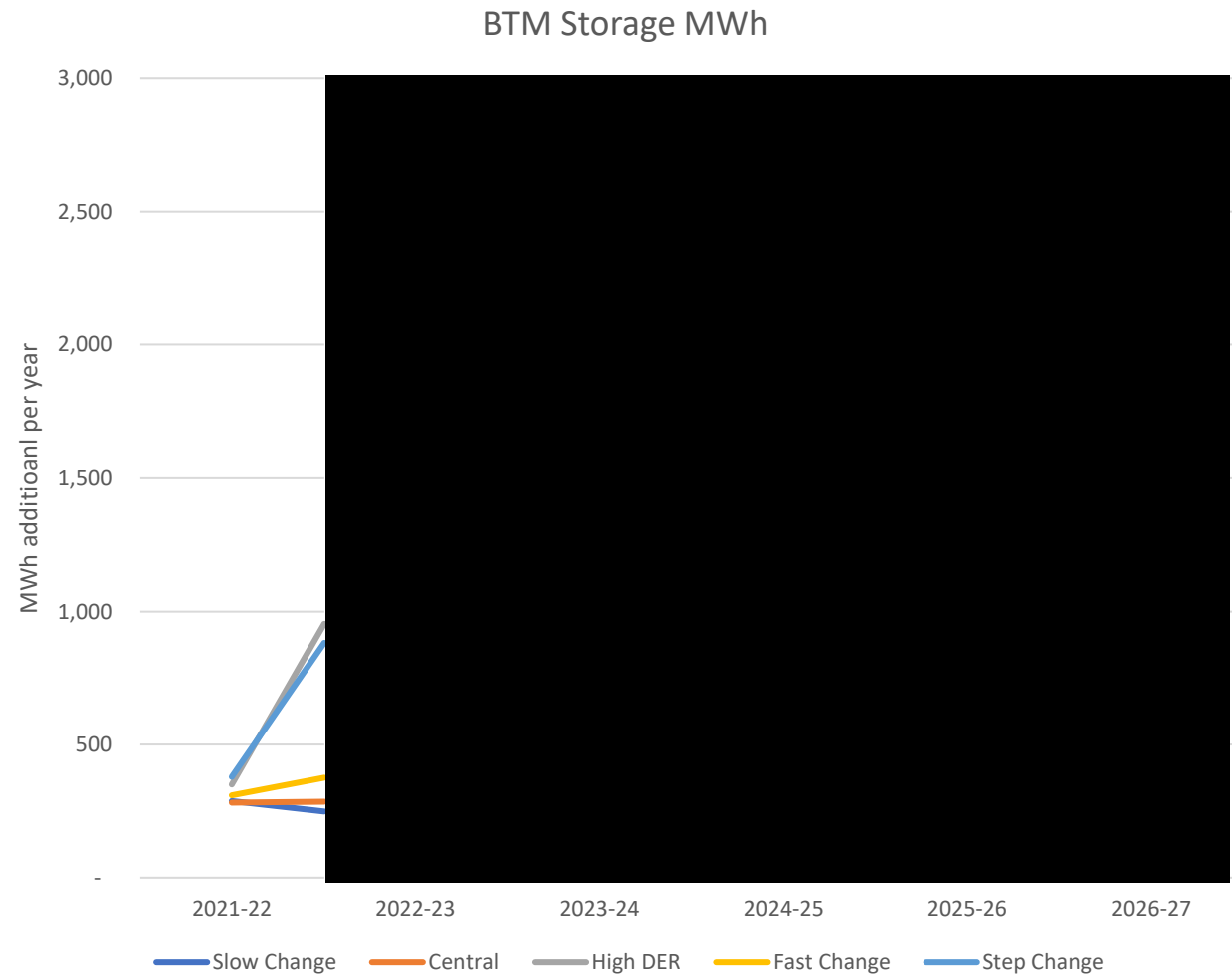
[REDACTED]
[REDACTED]

AEMO – Behind the Meter Storage Outlook

The 2020 ISP workbook of assumptions shows a behind the meter storage outlook (MWh additional per year) as seen in this chart.

The values have a range of 282MWh (Central) to 379MWh (Step Change) forecast by AEMO to be added in 2021-22 in the NEM.

These compare to SunWiz’s calendar 2020 tally of 314MWh in the NEM-states only.



Green Energy Markets – Cumulative Battery Deployment

GEM produced a DER Forecast for AEMO that shows possible future trajectories of cumulative battery installations.

Though the current levels are indiscernible on the chart, it's plausible that there is almost 3 million battery installations by the end of the decade (averaging 322,000 installations per year).



Figure 1-5 National cumulative number of battery systems by scenario

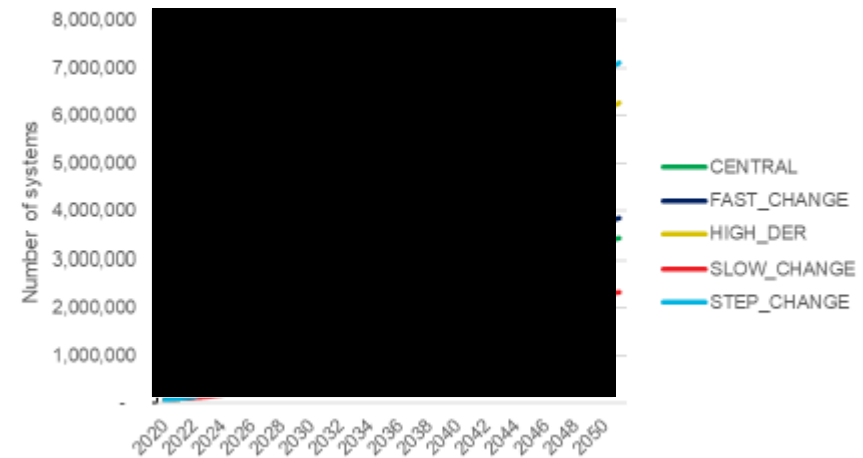
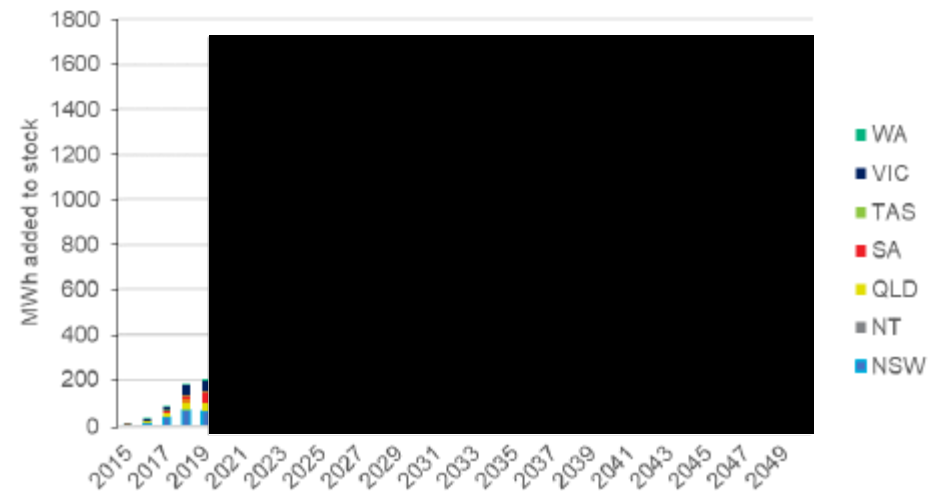


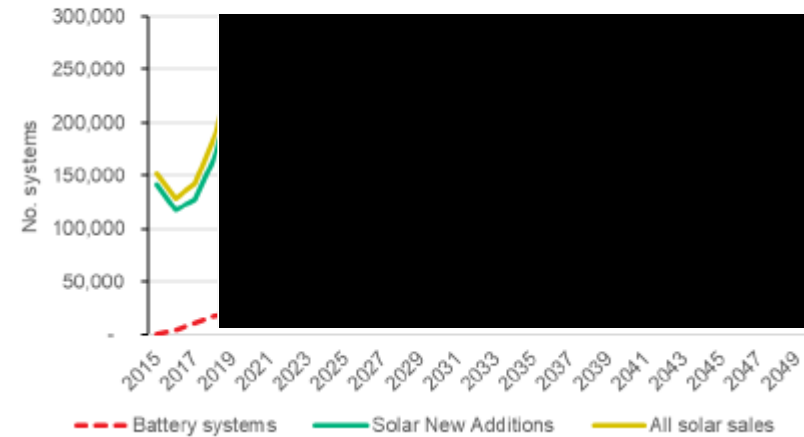
Figure 5-18 Megawatt-hours of residential batteries added to stock by year (Central Scenario)



Green Energy Markets – Cumulative Battery Deployment

GEM forecasts that batteries will remain a small but growing fraction of PV installations until 2027, before ramping up the point where every PV installation over 2030-2045 includes a battery

Figure 5-17 Number of additional residential battery systems relative to solar system additions and sales (Central Scenario)



Two Other Great SunWiz Products

- **Market Insights – monthly updates of the rooftop solar market**
 - Total volumes nationally and by state.
 - Most important news, trends and opportunities.
 - Top PV Retailers.
 - Most popular system sizes.
 - System Pricing.
 - Origin of panel import .
 - Commercial Market.
- **Large Scale Tracker – monthly updates of all solar projects > 100kW: \$3500/year ex GST**
 - Status watch of publicly announced utility-scale projects.
 - List of all approved solar power stations systems, with recently approved highlighted.
 - List of all solar power station applications, with recently applied highlighted.
 - Solar LGCs by power station, grouped by state, with System Name & Accreditation Code:
 - by registration month.
 - By Generation Year.
 - Full list of every known Australian PV system over 100kW; containing many project details.
 - LargeScale Solar Power News summary.

Please call 0413361534 or email warwick@sunwiz.com.au for details.