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PHOTOVOLTAIC MARKETS & TECHNOLOGY

Potential for dark days ahead

How a storm of policy ineptitude could cast a shadow on Australia's towering solar market.

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On track for broader horizons

Tracker companies are bringing onboard new investors and partners to optimize product offerings and branch out into new markets.

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Climate change is Australia's demand

Sometimes there's a first mover advantage. Sometimes there's a first mover mess. In the case of residential energy storage, Australia's early adoption has meant it's been at the center of a rapid technology evolution as the market decides: Why do homeowners need energy storage?

“Australians’ energy storage shopping list is still led by self-consumption, but buying a battery system that can’t provide backup now seems foolish”

In late 2015, when I helped launch a residential energy storage system, Australia was the first market targeted. Why? Because Aussies wanted to stick it to the utilities. As energy fed into the grid became worth a fraction of energy purchased from the grid, self-consumption began to make economic sense. And in areas of Queensland where backfeeding was banned, it seemed like the only smart choice. The desire for energy storage-as-arbitrage was born.

The first home battery offerings in Australia had more in common with German software-driven systems than with the off-grid options available in the United States at the time. The primary use case was to store solar-generated electricity during each day and use it in peak evening hours. However, in the rush to outfox the utilities, early adopters overlooked a basic issue: Some first gen batteries couldn't operate when the grid went down. Australia's history of grid reliability meant that power during blackouts seemed like a nice-to-have, not a need-to-have.

On the other side of the Pacific, utilities aren't loved, but they are rarely loathed with the passion that Australians feel towards their power providers. And solar is still relatively rare – Australia's residential penetration topped 25% in 2017, but barely nudged 1% in the U.S. – so Americans are more likely to wonder whether to go solar than whether the rate structure is fair. Hawaii is an exception: High elec-

tricity prices and state incentives had kick started solar, making it the only state considering self-consumption in 2015.

Motivation for energy storage in the U.S. was, instead, shaped by the outages that face our large and distributed population. Most of the country is prone to disasters that can take out power, sometimes for days: hurricanes along the Gulf and East Coasts, tornadoes in the Midwest, earthquakes, fires, ice storms ... the number of incidences may be relatively low, but their position in the national psyche is high – 2012's Superstorm Sandy was the first time it was acknowledged that, while it was not caused by climate change, its severity had been significantly increased by it. It was also one of the first events where the media noticed that most residential solar does not operate when the grid is down. The seed for batteries-as-backup was planted.

Grid stability

Grid stability accounts for much of the difference in motivation. Even in 2017, a record year for outages in Australia, Eaton's Blackout Tracker showed only 4.9% of Aussies had to deal with a blackout and the average duration was only 39 minutes. Compare this to the U.S. where 11.1% of the population was affected and the average outage was 81 minutes (not including U.S. territory Puerto Rico's devastating months-long outages following Hurricane Maria), and you can see

reshaping for energy storage

why backup capabilities are more top of mind Stateside.

But climate change is changing this: 2016 and 2017 brought Australia heat-wave-induced blackouts, some exacerbated by software glitches and others threatening viewership of key sporting events (a mortal sin if there ever was one), so the grid suddenly seems less reliable. Australians' energy storage shopping list is still led by self-consumption, but buying a battery system that can't provide backup now seems foolish.

Batteries can do both. It's a question of software, hardware, and design. Battery management software that optimizes use based on rate structures, weather forecasts, usage patterns, and more can be programmed to keep a reserve for outages.

Hardware is more challenging: A battery optimized to charge and discharge daily is different than one optimized to sit by the sideline in case of an outage. The reality of needing to do both results in a battery that does neither perfectly. You end up limiting the depth of discharge on a system designed for daily use so that

if the power goes down, there's enough energy to keep the beer cold.

Designing a system that runs when the grid is down also requires compromises: adding a critical load sub-panel, specifying a larger battery than self-consumption demands, and – the most important and difficult challenge – installing switching so the system is islanded when the power goes down and reconnects when it's back on. It's this final challenge that the technology companies are tackling today.

As much as it'd be better if we didn't have extreme weather events affecting grid stability, it's fortunate that Australia's epiphany came early. While the earliest of adopters may look to solar installers to design a workaround so that their existing energy storage can broadcast the Grand Final during a blackout, Australia can drive the move towards systems that do it all. And as utilities continue to play games with rates and as outages become more common globally, the whole world will benefit. [PV](#)

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Energy Storage North America

Energy Storage North America (ESNA) will be held from November 6-10 at Pasadena Convention Center, California. The event is set to bring together thousands of developers, energy users, utilities, and policymakers, to discuss and advance their understanding of energy storage technology and the landscape it exists within. At the event, keep an eye out for **pv magazine's** Energy Storage special edition for ESNA. The publication, being led by the **pv magazine** USA editorial team, will include feature articles on U.S. utility planning for large-scale storage, the EV and battery nexus, flow batteries versus lithium-ion, and commodity limits to lithium-ion production. All this plus selected highlights from the products on display will be included. Be at ESNA 2018 to pick up an edition and be a part of the landmark event!



About the author

Deborah Knuckey is Managing Director, Renewables Practice at Kiterocket. She is a former McKinsey & Company strategy consultant and journalist, and now focuses on renewable energy technology and big data startups.