

THE POWER AND POPULARITY OF HOME-MADE ELECTRICITY

Australia can proudly lay claim to being a global leader in rooftop PV uptake and there is no slowing of momentum. Here we shine the light on smart technologies and developments that are driving the fast-paced evolution of distributed energy resources which are reshaping the energy market.

THANKS TO A HAPPY COMBINATION of factors not least of which are the financial and environmental benefits of rooftop PV and increasing appeal of battery storage, along with ever smarter monitoring systems that optimise the value of home energy systems, the decision to install PV these days is something of a no brainer. And you could say the 'family' of distributed energy resources which also includes EVs and appliances are collectively and successfully putting the 'smart' into the energy market.

That makes for a clever nation, for Australians are world leaders with more households per capita, nearly three million homes or one in four homes, investing in home energy generation by the end of calendar year 2020. Despite the limitations imposed by the COVID-induced lockdowns of last year, 378,451 new systems were installed adding 3GW of small-scale solar capacity, along with almost 24,000 small-scale batteries with an aggregate capacity of 238MWh. And the thirst continues, helped along in no small measure by appealing finance options including 'Buy now, pay later' offered by the likes of Humm, Brighte and Plenti.

Rooftop solar systems sized from 1kW through to 5MW equalled 13.8GW of renewable capacity by the end of 2020. This year, rooftop PV installed was tracking toward 3.5-4GW but COVID lockdowns in NSW and Victoria might change that. Still, numbers are impressive. According to the Clean Energy Regulator rooftop solar could realise an additional 20GW by 2025. In short, solar homeowners are fundamentally and irrevocably transforming the energy market. And that is causing a shake-up among regulators, generators and policy makers.

Addressing Smart Energy Council's NSW Smart Energy Summit, leading DER specialist **Gabrielle Kuiper** said "Rooftop solar is small but mighty, it's more than double that of large-scale capacity and by the end of 2020 more than \$4 billion worth of households' and businesses' capital had flowed into rooftop solar generation alone, that's not even counting battery storage or smart appliances."

As **Jon Dee** of RE 100 illustrates, the boom in commercial solar indicates we are nowhere near the peak. Also significant is the New South Wales government's support for electric vehicles which is an incredibly important part of decarbonisation infrastructure, Gabrielle said, that will also help us manage the electricity grid into the future.

So much so that policymakers now need to consider the ability of EVs or 'batteries on wheels' to provide significant support in two-way charging for grid support, she said, mobile batteries [EVs] need more policy and financial focus.

"Beyond that we need to electrify everything which means getting households off gas by electrifying hot water, cooking and heating which will save households money and reduce greenhouse gas emissions."

The main message is to establish the right policies and settings for the integration of distributed resources; however a series of challenges have arisen not least of which is AEMO's intent to switch off household solar at the bottom of the lunchtime duck curve when there is minimum system demand.

Happily, Gabrielle's critique of AEMO's mechanism delivered a positive response with a new approach to minimum system load through a series of levels and thresholds, and businesses and households being paid to decrease or increase generation, with solar cut-offs only activated as an absolute last resort.

"This is an example of getting the basics of DER integration right," said the IEEFA Australia strategist whose former role with the Energy Security Board specialised in the integration of distributed systems.

Another stumbling block for solar systems is the 'solar export tax' which Gabrielle characterises as "two steps forward, one leap backwards" for electricity consumers and an unhelpful solution to a problem that's already been solved.

The absence of modern-day standards also needs to be addressed and good governance of those standards, said the Smart Energy Council senior adviser who is promoting the crucial need for technical integration and increased focus on EVs. She also highlighted the opportunities for standalone distributed energy resources and microgrids that are not dependent on poles and wires for increased resilience during bushfires.

"DER delivers all round benefits and these need to be taken in to account in all deliberations over the energy market future including the vital need to address the significant level of emissions currently generated by the energy sector," Gabrielle said.

If **Ben Hutt** gets his way, coal will get an early retirement. The Evergen CEO's stated

mission is to "kill coal plants as rapidly as possible" and he's optimistic, saying "the truth is the planet is heating up much faster than anyone wants to believe, however humanity is likely to get its act together quickly and we are seeing the transition to renewables in parts of the world scale up fast and that's exciting."

Savvy software systems

Ben's one of several at the cutting edge of smart software technologies that are paving the way for the smooth integration of more renewables. Evergen's key role lies in enabling smarter energy systems that generally involve batteries, either in standalone sites or more commonly now in large fleets or VPPs.

"Batteries of all sizes are going to be a much bigger part of the global energy system. In addition to the thousands of small batteries we deal with, we're working on projects that involve roughly 500MW of storage – really big batteries around the place – in front of the meter and behind the meter," he said.

"We are seeing disruption of the energy system on a range of different fronts at the moment. We are being as collaborative as possible with regulators and policy makers ... resilience and system security as an example is a key priority in transitioning from the old world to the inevitable future world which is 100 per cent renewable, and smart software can really help with that," he told *Smart Energy*.

According to BloombergNEF Australia is home to the world's most decentralised energy system and consumer research reveals people genuinely want to participate in the future, they are increasingly conscious of the choices they make. The digitalisation of infrastructure will assist in the energy transition by enabling participation, and putting power and independence in the hands of consumers, he said.

"There are many changes that would enable the system to evolve faster. As an example, everyone should have a smart meter irrespective of whether they have rooftop PV because it would allow us to make much better decisions.

"We should have a separate body to deal with storage and a regulatory framework that allows for certainty around investment. It's inevitable that we will get to a 100 per cent renewable grid, navigating the regulatory framework for orderly retirement of coal is challenging but not impossible," Ben said. "It must be a priority that we accelerate and remove all barriers. It's not optional."

Collaboration is key

Andrew Mears of energy management software SwitchDin agrees and is optimistic over what he says is industry's collaborative response that is enabling flexible coordination of rooftop solar to work with the electricity systems.

The Newcastle-based business is gaining lots of traction working with Energy Queensland, Horizon Power, AusNet, AusGrid and large electricity retailers Simply Energy and Origin Energy.

"The more proactive distribution networks are now engaging in new technologies to help them solve the problems, and electricity retailers are connecting with the interests of customers who want to be more engaged in the energy market and in some cases now presenting VPPs as a standard retail offer.

"There is already enough maturity in the market that those options are seen as being key value enablers which will ultimately reduce electricity costs for all," he told *Smart Energy*.

"With reasonably simple changes we can really increase the amount of renewables in the system, for example in South Australia

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"Flexibility is everything, and the way forward is much more inclusive."



IMAGE BY GIOVANNI GARGIULO FROM PIXABAY

the flexible export system is trebling the amount of renewables we can have in the system.

"Flexibility is everything, and the way forward is much more inclusive."

It's also an important hook for consumers, says **Nigel Morris** of Solar Analytics which is successfully achieving its goal of making solar systems more efficient and delivering on the company's promise to "get more from your solar" through its digital solar service delivery tools.

"Essentially, it is the best way for consumers to save more and the key is access to home data via the monitoring service," Nigel Morris told *Smart Energy*. "Net feed-in tariffs (as distinct from gross) mean that self-consumption is the name of the game for best economic outcomes, and to understand that you need to examine and understand energy use patterns."

Consumption metering now features in the majority of installations and dividends are widespread: smart software services are boosting the uptake of PV by providing greater value, and installers are more easily able to describe the benefits. Hence the popularity among solar businesses.

"Beyond that we have looked at more value-adds for our 25,000 customers such as the best energy plan, and have launched Plan Optimiser which will catapult us and is part one of a suite. We are looking at VPPs, EVs and battery optimisers down the track," he explained.

"I'm eternally optimistic about solar. Despite the federal government's intransigence and political opposition to renewables, you cannot stop momentum. Solar is now mainstream.

"The future is looking very bright indeed," Nigel said. "We are excitedly watching that with batteries – and EVs are next."

Storage batteries are the core mission of Reposit Power whose tantalising tagline "No electricity bill for five years" is optimising the uptake of battery systems linked to solar systems and delivering 'Genius for your Solar Battery'.

Driving mass adoption: finance for renewable energy systems

Finance providers are proving pivotal to the uptake of renewables by pumping millions into the sector, driving confidence and popularity up while driving emissions down. Industry has much to be thankful for in the likes of Plenti (previously RateSetter) which has provided more than \$130 million of finance for clean energy products in the home, and Plenti executive Louis Edwards cites renewables as a key market segment in which they can make material difference,

Brighte is likewise "on a mission to make every home both comfortable and affordable, without compromise... and not have to wait until tomorrow". Brighte – the sixth-fastest growing technology company in Australia – has approved more than \$600 million in finance for about 75,000 households, allowing them to install energy products such as solar panels and batteries, as well as helping fund home improvements.

Late last year Brighte raised \$100 million in capital funding led by Mike Cannon-Brookes' injection of \$78m. Ever on the move, Katherine McConnell is now steering Brighte as an energy gentailer, both the generator and retailer of energy.

Buy Now Pay Later provider humm (previously flexigroup) has to date financed a phenomenal \$2.2bn worth of solar systems, 265,000 at last count that are delivering an impressive 1GW (1 billion watts) of electricity generation capability representing 1.7m tonnes of CO₂ offset.

Chief executive Rebecca James has identified VPPs and energy trading as the dominant vehicle for solar and battery sales, and partnered with LG Energy to tap into the VPP market that she says will effectively render solar and battery systems installed on houses free of charge.

LG Energy's Philip Crotty believes the virtual network and energy storage market potential sits at more than 10,000 homes by 2023 and he is keen to help create the largest residential VPP network in Australia.



The now vertically integrated Canberra-based installer business designs, supplies and installs the smart Reposit-controlled system and takes responsibility for electricity bill fees, charges and taxes, and who can resist the low cost, ease and convenience?

Unsurprisingly, sales are ‘insane’ **Dean Spaccavento** says.

“Our hands are very full with leads and we are making lots of sales because it’s a great sales proposition and easy for customers to calculate benefits. We take all the risk and they get no bills. There’s no guilt over carbon emissions or dread from a large bill after a hot spell. No solar tax worries or system maintenance, we do it all, they literally don’t have to worry about anything.

“Our mission is to make energy limitless and free, and we consider our no-bill product to be the first step in this.”

To date Reposit has installed nearly 23,000kW.

The brains of the offering stems from the software the Reposit team spent eight years developing which is reliably reducing the costs from networks and wholesale markets.

“We participate in seven grid services and earn revenue on long-term contracts, and we make enough money from using the batteries and

recover any residual expenses incurred in providing electricity to our customers,” Dean explained.

“Our focus is on DER because it provides the best economics for controlled megawatt of any firming source in the grid, and the market dictum is that the most economic will win,” he says.

“Distributed assets will inevitably form the majority of electricity service providing capital in the future grid, and for anyone to try and ignore it and hope it will go away is in contravention of the national electricity objective.”

Jemma Green of Power Ledger concurs and, back in 2016, foresaw the need to disrupt traditional energy to make way for new energy markets to track and trade energy through flexibility trading platforms that allow households, organisations and the grid itself to trade with each other. AKA blockchain technology of which Power Ledger is a supremo with its suite of platforms that facilitate or address VPPs, carbon market trading, building-to-building trading, PPAs, trading across the renewables grid and more.

It’s all about the democratisation of energy, Jemma maintains.

Distributed Energy Resources Laboratory

The DER Lab is a \$1.5 million project funded by the ACT Government and supported by the ANU, ITP Renewables, UNSW, and Evoenergy examining safe testing of new technologies such as monitoring and communication devices, smart controllers, aggregation (eg VPP) and market participation software. Researchers also look into other innovative new products under development, in a multi-platform environment that simulates real-world conditions prior to roll-out.

The DER Lab mirrors the electricity network with transformers, batteries, and solar generators on the roof connected to EV chargers, where researchers and industry can work together to design technology for the future energy system.

Reflections and projections

Long-term industry participant Nigel Morris vividly recalls all the “scoffing and scepticism in board rooms over rooftop solar [ever] generating into the grid” of three decades ago.

“Admittedly all the economics were wrong at that stage, but since then we have gone through all the phases from early adopters to uneconomic systems followed by momentum with solar systems quickly paying for themselves.

“Now we are well and truly into the phase of mass adoption... look where we are with around three million PV rooftops and about 300,000 more being installed each year.

“Growth has been phenomenal; I call it the solar snowball.”

A snowball, perhaps, that is gathering enough momentum to eventually obliterate coal plants.