

AUSTRALIAN ENERGY STORAGE ALLIANCE'S VISION 2019



The Australian Energy Storage Alliance (AESA) is an independent advocate and information hub, whose mission is to advance the role of clean, safe and reliable energy storage solutions in Australia and Oceania.

1. AUSTRALIA'S ENERGY TRANSITION

The energy market in Australia is undergoing a transformation from dependence on centralised fossil fuel thermal generation to distributed systems utilising a suite of renewable energy and low emissions generation technologies.

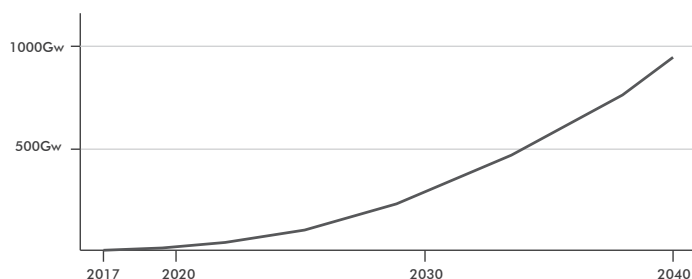
The energy market is increasingly being characterised by decentralised energy generation, where customers are using technology to gain greater control over their energy use by becoming both producers and consumers of energy. The two-way flow of electricity is changing requirements for management of the security and reliability of the network.

The role of energy storage: Storage technology has a fundamental role to play in the context of this changing energy market and significant deployment of additional energy storage is needed by 2030.

Global Leadership: By 2040, the global market for energy-storage is expected to increase to a cumulative 942 GW according to a new forecast from Bloomberg NEF.¹ This growth will require \$620 billion in investment.² Australia is one of eight countries expected to continue as a leader in innovation and deployment of energy storage and energy management solutions.

Battery Bonanza

Global energy storage rising to one terrawatt in two decades



Hornsdale Power Reserve

"Sustaining the growth of renewable electricity will further require additional attention to grid integration issues, including the incorporation of battery storage and smart grid technology to support management of variable generation resources."

- UN Sustainable Development Goal 7

¹ Bloomberg, The Battery Boom Will Draw \$620 Billion in Investment by 2040 (21 November 2018)

<<https://www.bloomberg.com/news/articles/2018-11-06/the-battery-boom-will-draw-1-2-trillion-in-investment-by-2040>>.

² As above.

2. POTENTIAL OF ENERGY STORAGE AND INNOVATION

Australia is a global leader in the deployment of energy storage solutions at all scales.

Grid Scale: Australia is a leader in the implementation of grid scale battery storage, supporting the increased uptake of renewable energy to deliver increased reliability and security to the grid. As of 2019, an impressive fleet of energy storage installations are operating across the country offering various values. The 100MW Tesla battery at the Neoen owned Hornsdale Power Reserve continues to impress with estimated savings to the market of \$40 million per year from frequency control ancillary services (FCAS) alone. Energy Australia / Ausnet's 30MW Fluence system in Ballarat serves as a peak power resource to help manage price volatility during high demand periods, adds network stability and congestion relief, and provides both arbitrage and FCAS across the year. Edify's 25MW Tesla system in Gannawarra provides renewable smoothing and network relief. In Alice Springs and Onslow (remote West Australia), Vector and Magellan have supplied systems which smooth (spinning reserve) and backup supply on a daily basis for these harsh desert based grids.

Grid scale storage will benefit from both fast and long duration storage. Pumped hydro energy storage accounts for 97% of the global electricity storage and is a key component of Australia's energy generation. Although there were no major developments in pumped hydro during the last 30 years in Australia, there is a renewed interest in pumped hydro projects of all sizes, including the innovative 250 MW Kidston pumped storage hydro project in Queensland, and the proposed projects in Tasmania and New South Wales.

The ability to deploy longer duration storage at lower cost and in shorter timeframes is attracting innovation, with a pilot CSP grid scale projects completed at Jemalong in New South Wales, and pilot projects underway in South Australia, using thermal storage (1414 Degrees) and compressed air technologies (HydroStor). South Australia also expects to see deployment of a vanadium CellCube system with longer duration grid scale battery storage.

Commercial and Industrial (C&I): Energy storage is essential at C&I levels to lower cost and emissions by enabling utilisation of more on-site renewable energy. Early adopters have been at a local (Cities of Sydney and Melbourne) and state level (notably South Australia, Western Australia, and the Australian Capital Territory), in universities, schools, businesses, farms and other industries, with shared storage developing in communities.

Storage can also play a fundamental role in microgrids, which are evolving as a way of improving affordability and access to electricity for consumers, in particular for regional and remote areas. One example of this is the Kalbarri microgrid project where a wind farm together with 2 MWh of industrial battery storage and residential solar PV is designed to maintain a reliable power supply to Kalbarri, a remote coastal town in Western Australia.

Off-grid solutions: Storage can play a key role in supplying electricity to off-grid mine sites, smoothing the intermittency of renewables and reducing the consumption of diesel. Hybrid renewable and storage off-grid projects can assist remote sites to achieve sustainability objectives, as well as provide significant cost reduction.

Residential: Rooftop PV, complemented by battery storage systems, has found its way into Australian homes, lowering costs for households and reducing network demand. Currently, at well over 2 million installations, Australia has the highest global per capita deployment of rooftop solar PV panels. Uptake of residential battery storage systems is now on a rising trajectory for both existing and new homes, boosted by incentives in some states and territories.

New Platforms: Australian companies are world leading in developing Virtual Power Plant (VPP) designs and building innovative decentralised energy markets, which have the potential to maximise the value of storage.



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Other Economic Opportunities: The emerging boom in energy storage provides economic opportunities for Australia with its rich mineral resources, particularly in the export of lithium, nickel, manganese and cobalt. The demand for these minerals is expected to dramatically increase with the demand for batteries in electric cars, homes, at electrical substations and for both on and off-grid storage. This represents a significant opportunity for Australia's manufacturing, transportation and electricity sectors.

Renewable hydrogen, generated from an abundance of renewable energy, is also expected to be a key export to land-limited countries, which are seeking a lower-emission alternative, such as Japan and Korea. Dr Alan Finkel, Australia's Chief Scientist, has driven this discussion and has commented that hydrogen's time has come.

Australian developed energy storage technologies and innovation in energy management are leading both in Australia and in the world. Innovation in electric vehicle charging infrastructure is also well underway. The Australian Renewable Energy Agency (ARENA) has provided support for some of these technologies, see www.arena.gov.au

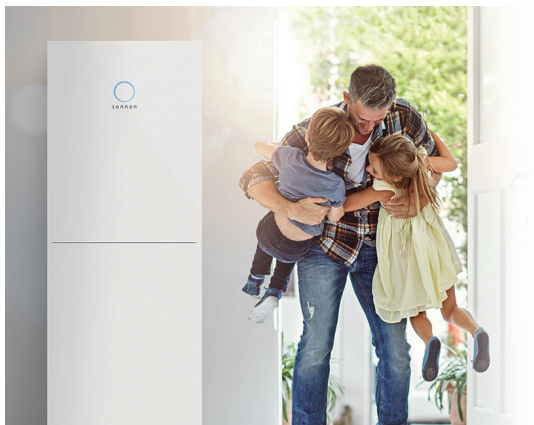
3. CHALLENGES TO IMPLEMENTATION OF ENERGY STORAGE IN AUSTRALIA

For Australia to remain in a leadership role in the energy storage sector requires vision and a strong partnership between government, market bodies and the energy storage industry.

In May 2019, the AESA sought input on the challenges and obstacles to further deployment of energy storage in Australia, at grid scale and behind the meter, via an industry representative survey.

At Grid Scale, the challenges and obstacles for further deployment were defined as:

- Lack of clear, long-term policy mechanism to value low-cost, low-emission, dispatchable energy (i.e. renewables firmed with storage),
- Lack of revenue certainty and limited contracted revenue streams creating additional financing risks (e.g. 'premium' fast, accurate services are not being valued via existing markets. There is a need for new markets and financial products to incentivise services provided by fast-responding assets such as battery energy storage),
- Long timelines and the need for more timely decision making in incentive schemes and grants,
- Inconsistent project costs, such as network charges and connection requirements,
- Lack of regulatory incentives for network service providers to support storage as a non-network solution.



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Ballarat facility, image AusNet Services/Fluence

The energy storage industry seeks policy certainty and less complexity. Development of specific markets which pay a fair price for the services of both fast-responding and longer duration energy storage assets, together with a clear direction and reliable incentive programs are essential to further growth of this sector.

For Behind The Meter (BTM), the challenges for both commercial and residential energy storage are:

- Lack of a Distributed Energy Resource (DER) strategy,
- Need for improved access to all markets where technical requirements are demonstrated. Currently, DER assets do not have access to the full suite of markets in the same way as utility scale assets,
- Lack of clear and consistent product and installation standards and regulation,
- Lack of transparent and consistent connection requirements across Network Service Providers (NSPs),
- Need for consistent financial incentive programs to enable better return on VPP and aggregation platforms,
- Lack of education and the ability of retail companies to clearly communicate the benefit of storage to residential home owners and project developers.

This fast growing sector of the Australian energy market also needs clear direction and a proper framework to provide remuneration for any grid services provided. Connection requirements need to be transparent and consistent across NSPs. In addition, all guidance material should be adopted in a way that creates consistency and does not limit consumer choice in respect to what can be installed behind the meter

Recommended Actions – Based on input received from the industry, the AESA recommends the following:

1. Implementation of a coordinated energy policy framework for energy storage that properly considers the value of firm energy, and values the range of additional grid services that both fast response and longer duration energy storage can provide.
2. Definition of clear deployment expectations and targets for both grid scale and BTM energy storage systems, which would be highly beneficial to underpin investor confidence.
3. Development of clear objectives and incentives to support a minimum threshold of distributed energy resources on the networks and to enable utilities to defer network augmentation.

The AESA recognises that energy storage solutions and the development of new energy markets, value streams and payment mechanisms are all essential elements to support the transition to a renewable and clean energy future. Energy storage solutions will provide the reliability and flexibility for a more distributed energy market, enabling the deployment of lower cost renewable generation and the increasing penetration of electric vehicle charging infrastructure.

4. LOOKING FORWARD, THE FUTURE AROUND ENERGY STORAGE

Need for targets to support Energy Storage Integration: Targets designed to encourage deployment of energy storage assets are important to support Australia's energy transition. These would align with proposed Australian state and territory targets for the uptake of renewable energy and to achieve net zero emissions, and could be based on the analysis by the Australian Energy Market Operator (AEMO) in the Integrated System Plan.

Current Targets for Renewable Energy:

	VIC	QLD	NSW	SA	TAS	ACT	WA	NT
Net zero emissions target	Net zero emissions by 2050					Net zero emissions by 2045	N/A	Net zero emissions by 2050
Renewable energy targets	40% by 2025	50% by 2030	20% by 2020	50% by 2025	100% by 2022	100% by 2020	N/A	50% by 2030

The Australian Government has also committed to reduce Australia's emissions by 26% below 2005 levels by 2030.

The Role of Energy Storage in Australia's Clean Energy Future

The 2018 AEMO plan shows that the power system of the future will be substantially different to the power system of today. This will require continued evolution and innovation to develop a future incorporating more resilient and decentralised systems. Energy storage is the enabler for many of these fundamental shifts in the structure and business models towards lower emission electricity systems.

Embracing a mix of energy storage solutions in Australia will:

1. Support the transition to a lower emissions future by underpinning the development of resilient and lower cost systems for electricity supply,
2. Provide the infrastructure to support the expected growth of electric vehicle charging stations, resulting in reduction in the quantity of imported refined fuels, and
3. Enable Australia to remain at the forefront of global innovation in energy management and market systems, with potential benefits for Australian companies to export technologies and solutions.

A call to action: The realisation of energy storage's potential in the Australian energy market is dependent on the implementation of an effective policy, and market and regulatory framework, which is the responsibility of the law makers and regulators. Market participants also have a fundamental role to play, with innovation and openness to new business models being essential to the success of the storage sector.

Clear and coordinated policy direction and review of energy markets to value storage is essential for Australia to maintain and expand its position as a global leader in implementing energy storage solutions to enable and support the transition to clean energy. The window of this opportunity is NOW.

"Energy Storage is the enabler, the key to unlocking a low carbon future for Australia. With good planning and a market based approach, energy storage solutions will be the drivers for Australian leadership in the global energy transition to a more distributed, resilient and equitable energy future."

- Mary Hendriks, Industry Executive, AESA



The Australian Energy Storage Alliance (AESA) was formed in 2014 and is guided by a Steering Committee.

The AESA shares market knowledge, prepares reports with government and industry support, presents regulatory submissions on behalf of the energy storage sector and participates in relevant events, including the annual Australian Energy Storage Conference and Exhibition.

For more information visit www.energystoragealliance.com.au

This document was prepared in May 2019 by the Australian Energy Storage Alliance, with input from industry participants, content contributions provided by Baker McKenzie, and artwork by Positive Good www.positivegood.com.au