

CASE STUDY

Energy Storage Enhancing Australia's T&D Networks and Providing Flexible Peaking Capacity



SUMMARY

AusNet Services and EnergyAustralia are working together to maximize the value of an energy storage asset for the benefit of all consumers.

The increased adoption of grid-scale energy storage technology has the potential to increase reliability and stability, enable further integration of renewables and, in turn, reduce pressures on energy costs. Ensuring those benefits, however, requires the right commercial structure to maximize the benefits provided.

LOCATION

Warrenheip (Ballarat), Victoria, Australia

The Opportunity

The Australian grid faces an increasing mix of challenges including a high reliance on coal, the rapid installation of new intermittent resources, such as wind and solar energy, and limited flexibility and transfer capacity between regions. These challenges translate into high costs for energy consumers, electricity reliability issues, and the potential curtailment of clean energy generation. Energy prices in the wholesale market have been volatile, creating uncertainty and risk for generators and generation retailers ('gen-tailers').

Figure 1 highlights the impact of volatility on energy prices in Australia's National Electricity Market (NEM). In the first quarter of 2018, volatility from high-priced events caused a ~\$20/MWh increase in the average energy price in Victoria.

Energy storage is a fast-responding flexible tool that can balance mismatches

between supply and demand and deliver real and reactive power simultaneously to strengthen the grid and increase reliability. Battery-based energy storage resources can help alleviate transmission congestion and assist with integrating more renewables.

However, uncovering the right commercial structure to maximize the value delivered by energy storage assets can be challenging — particularly in a deregulated market such as in Australia.

Figure 1. Average Wholesale Electricity Prices in Q2 2018 in Australia's NEM



Note: The average quarterly price is broken up into two parts, energy and volatility. Volatility refers to the contribution of high priced events (above \$300/MWh) to the average price more commonly known as cap returns. 'Energy' is therefore the remainder.

Source: AEMO Quarterly Energy Dynamics, Q2 2018, Aug 2018

EnergyAustralia owns generation assets and serves retail load in the country. The company supplies customers with energy from wholesale markets and from its own coal and gas-fired power stations and renewable energy sources. As a retailer, EnergyAustralia is exposed to the volatility of wholesale market prices which have a direct impact on the company's capability to serve customers in a competitive manner.

Transmission and distribution companies can utilize battery storage technology to help with network congestion or other constraints (including stability) and, in turn, help reduce or delay network replacement or augmentation needs as well as resulting costs.

The Solution

A 30 MW/30 MWh Fluence energy storage solution is being deployed in Victoria to provide a number of solutions. EnergyAustralia, as the market operator of the battery storage system, can utilize the technology to achieve a number of market and grid benefits. Broadly, the system can be utilized to provide flexible peaking capacity, to provide ancillary frequency control services, and the potential for other network services by agreement with a transmission or distribution network provider. The layering of these services enables the storage asset to deliver maximum value to the benefit of all customers in the region.

The energy storage asset is owned by AusNet Services and is sited at the Ballarat Terminal Station about 100 km west of Melbourne. Spotless Sustainability Services is the lead engineering, procurement and construction contractor responsible for delivering the project and Fluence is the energy storage technology supplier and will provide long-term operational services.

EnergyAustralia will operate the energy storage system, using the capacity from the battery as needed to store energy for periods of critical demand when the sun is not shining or the wind is not blowing.

In addition, the battery will help regulate frequency in the NEM by participating in all Frequency Control Ancillary Services (FCAS) markets.

A Blueprint for Creative Commercial Structures

The Ballarat project demonstrates how to bring market participants in different parts of the grid value chain together to enhance the value of a storage asset. This model can be replicated in any market around the world to facilitate multiple uses of a storage asset for market and grid benefits, maximizing the utilization of such technology and the resultant benefits.

Customarily, the approach to using energy storage has been fragmented by applications. For example, a transmission and distribution company that chooses to deploy a storage asset may only utilize it for 3-5 months of the year during peak transmission loads. In this case, the storage asset is sub-optimally utilized. The commercial structure used for the Ballarat project (Structure #1 in Figure 2 below) could serve as a blueprint for solving optimization challenges that exist in some

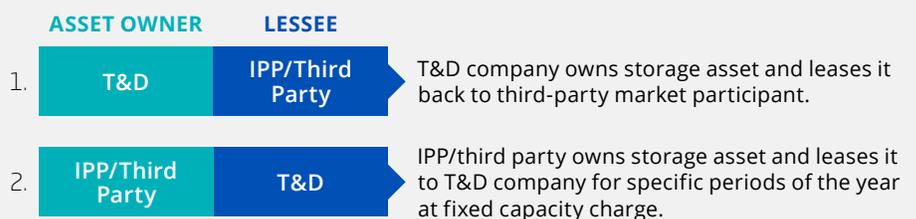
markets. Bringing together multiple market participants and layering energy storage applications unlocks value across both the energy supply market and networks.

In some markets, the reverse arrangement (Structure #2 in Figure 2) can also solve certain regulatory and ownership-related challenges. For example, in the United Kingdom, India, Germany, and Texas in the United States, transmission companies are not permitted to own storage, and therefore do not have direct access to energy storage as a tool for solving reliability needs.

Conclusion

The retirement of existing generation and a massive influx of intermittent renewables is adding to transmission and distribution limitations and reliability issues on the grid, increasing the need for storage. Energy storage provides significant value to the Australian grid, including by adding much-needed flexible peaking capacity and by relieving voltage/network constraints in the system. Storage is a proven technology that is ready to be deployed at scale today. Regulatory and commercial challenges remain in Australia to unlock additional value from storage deployments. Addressing these challenges will increase network security and reliability while enabling a higher penetration of renewables.

Multiple Commercial Structures for Value Creation



About Fluence™

Fluence, a Siemens and AES company, is the leading global energy storage technology solutions and services company that combines the agility of a technology company with the expertise, vision, and financial backing of two industry powerhouses. Building on the pioneering work of AES Energy Storage and Siemens energy storage, Fluence's goal is to create a more sustainable future by transforming the way we power our world. Fluence offers proven energy storage technology solutions designed to address the diverse needs and challenges of customers in a rapidly transforming energy landscape, providing design, delivery, and integration in over 160 countries.