ARENA Insights Spotlight: Gannawarra Energy Storage System (GESS)

An interview with Edify Energy

APRIL 2019

Australian Government
Australian Renewable Energy Agency

ARENA

INTRODUCING GANNAWARRA ENERGY STORAGE SYSTEM (GESS)

Gannawarra Energy Storage System (GESS) is one of the two large scale storage projects jointly funded by ARENA and the Victorian Government. GESS was developed and financed by Edify Energy in a consortium with Wirsol Energy as co-investors, Tesla as battery provider and EnergyAustralia as the long-term operator. The 25 MW / 50 MWh battery is retrofitted to the existing 50 MW Gannawarra Solar Farm located west of Kerang in north-west Victoria.

INTERVIEW WITH WAYNE GOODWIN, PROJECT DEVELOPMENT AND TECHNOLOGY, EDIFY ENERGY.

ARENA: What were the drivers for the GESS project?

WG: It was really about trying to help overcome challenges of integrating battery storage with solar energy. We had an amazing opportunity to leverage the existing infrastructure at Gannawarra Solar Farm, and a really driven team with our partners Wirsol, EnergyAustralia and Tesla. This has allowed us to truly demonstrate how battery storage can be retrofitted to an existing solar farm with application to other similar projects. The grant funding from both ARENA and the Victorian Government, as well as the support of the local community in Kerang, helped to make the project a reality.

ARENA: Why was this location chosen?

WG: We chose Gannawarra Solar Farm so that we could leverage the existing grid connection infrastructure of the solar farm. It also provides us the opportunity to co-locate the battery and take advantage of a behind-the-meter charging opportunity and the commercial advantages that come with avoided network charges. The site is also in a part of the network that has a number of electrical system challenges, meaning the battery can play a part in helping to strengthen the grid.

ARENA: The project uses a battery with 25 MW output and 50 MWh storage capacity. What determined the size of the GESS battery (MW/MWh)?

WG: It came down to a range of factors based on the expected operation of the battery and then optimising that sizing commercially. We also had to take into consideration the amount of grant funding and commercial revenue streams. We selected a 25 MW / 50 MWh battery as the optimal size for the export constraints at the current site. The optimal battery sizing depends on a large number of factors and it's definitely not a one size fits all approach.

ARENA: Can you explain how the battery works (alongside the solar)?

WG: The GESS battery has a wide range of capabilities, and its operation will likely change over its life to suit the systems needs at the time. At the moment, the battery is designed to shift electricity during daylight hours from Gannawarra Solar Farm into the evening when demand is highest and the grid needs the most power. It also operates in the FCAS market when the system needs support.

ARENA: What services does the battery provide?

WG: The GESS battery is able to provide a range of services, two of which include participating in the energy and FCAS markets. One interesting application we are now seeing is the ability for the battery to provide a load for solar farm generation during network outage events, so that lost generation from curtailment is minimised. In the future the battery is expected to be capable of fast frequency response (synthetic inertia) and a range of other requirements the grid might need.

ARENA: Could you take us through some of the regulatory challenges the GESS project has experienced?

WG: The GESS project truly was an Australian first in many respects. We were fortunate to have a really solutions-focused attitude from our partners, and AEMO, as we came up against new challenges that had not been encountered in the market.

One of the biggest regulatory challenges was the physical connection arrangement of the battery in conjunction with the solar farm, and how that is treated under the National Electricity Rules. We were required to establish a private registered network which connects both the battery and the solar farm. This was necessary to minimise commercial risk to the solar farm, whilst allowing the battery to be connected in its own right as a stand-alone project and still utilise the benefits of co-location.

It's amazing to see the pace of the regulatory changes occurring to help accommodate batteries into the grid. We are truly proud to have helped forge the way and have the project provide valuable lessons to help inform how batteries can be best retrofitted to large-scale solar farms in Australia.

ARENA: How do you balance the technical limitations of the battery with the commercial ambition?

WG: It's about flexibility. The GESS battery has so much technical capability that I think it's important to recognise that the way the battery operates today may not be what the grid needs in five years time. As an engineer it's easy to want to install the largest battery possible to provide complete flexibility, but there is a balance in evaluating commercial risks and market forecasts to provide a sensible commercial outcome. Right now, we are proving the commercial returns of a battery under an innovative leasing arrangement for GESS. Through the Knowledge Sharing Reports provided to ARENA, the GESS operational data and modelling will help to instill more confidence in the investors for the business case of batteries.

ARENA: Can you take us through the battery operations during the heatwave on 24 and 25 January where the grid entered a critical period?

WG: That was obviously a very challenging time for the Victorian grid and one of the types of scenarios where batteries and range of other technologies and generation play a part in helping to meet increasing demand. The battery did what it was planned to do under those scenarios in effectively charging from the solar farm during periods of lower demand on the grid, and then reinjecting that power into the grid at the time when generation shortage was at its worst.

We were really happy to see that despite the very high temperatures and difficult network conditions, that both the battery and the solar farm were available and worked to help provide power to the grid when this was needed.

ARENA: What are the biggest challenges and opportunities (future services) for battery projects going forward?

WG: I think the biggest challenges for battery storage remains to be identifying the business case and how the different revenue streams, both now and in the future, can be assessed and proven so that there is confidence that the revenue can be achieved. This certainty and predictability of revenue streams will come with greater deployment and demonstration of different use cases in the market. GESS is already demonstrating how batteries, coupled with solar, could be further leveraged in innovative new business cases to make both technologies more attractive and viable for other projects. Commercial demonstration of these revenue streams coupled with cost reductions in equipment and installation are likely to provide the best opportunity for batteries, and this will only come with supporting new projects as the technology class moves toward full-scale bankability.

As for future services, fast frequency response FCAS and synthetic inertia are obvious ones, but there are also some other ideas which we're currently looking into and hope to be able to demonstrate on new projects.