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ARENA



Australian Government
Australian Renewable
Energy Agency



Australian Energy Storage Knowledge Bank (AESKB)

MOBILE AND FLEXIBLE MICROGRID TEST PLATFORM

Expert support, flexible connectivity, Internet of Things (IoT) architecture, diesel microgrid with network connection available

We can help you develop your battery storage technologies, from laboratory to power grid, embedded microgrid and off-grid applications.

A closer look at our system

Over the last three years, the University of Adelaide and ARENA together with industrial partners have invested more than \$3 million building a highly configurable battery inverter platform, supported by either a stand-alone facility, or a connection to SA Power Networks' distribution network, which can facilitate advanced testing and demonstration of battery energy storage systems.

The Australian Energy Storage Knowledge Bank (AESKB) testing facilities comprise two key components, the University's mobile test platform and the diesel microgrid at its Thebarton campus.

The test system is Internet of Things (IoT) ready, with a flexible electrical connection architecture to provide seamless interactions between loads and generation sources. The system also offers conventional data recorder and high-speed logging capability.

Expertise to solve the difficult problems

The University's expertise in battery storage technologies is unique in Australia. Interdisciplinary teams can be brought together on your project and have capabilities ranging from testing new battery chemistries, through to the development and implementation of control algorithms and communication systems. Together we will be able to ensure that your on-grid and off-grid battery storage project achieves its goals.

Our facilities at your site

Our mobile test platform means we can come to you, enabling your staff to work on your technology at your facilities, assisted by our mobile test platform.

Implementing and testing new changes sooner shortens your product development cycle. Robust testing throughout development means problems are identified and rectified sooner, reducing commissioning times on client sites and the risk of unexpected failures in the field.

Our capabilities have got you covered

Our facilities can help you in different stages of the development of your project or product. With the ability to test on our simulated microgrid we can create a range of grid conditions to make sure your technology or product responds as it should, before connecting to the grid.

Performance insights

Our high-quality, time-stamped data capture system is able to provide insights into technology performance. Sampling electrical wave forms at 500kHz provides unparalleled clarity into dynamic system performance. Environmental data is also gained using an external weather station and temperature probes embedded throughout the test system.

Better data means you won't be left in the dark about system performance, which can be used for design optimisation of a specific application and site.

Our system can handle it

No matter what your project configuration requires, our test system can handle any setup from running parallel to mains, managing an entire embedded microgrid, islanding and 'bump-less re-integration'. The IoT-based control system means controllers for additional generators and loads can be built and integrated easily, catering to even the most complicated microgrid configurations, load control scenarios, spot market trading, peer-to-peer schemes and maximising self-consumption within an embedded microgrid.



The Mobile Test System with the Diesel Generator Set at the Thebarton Campus

An overview of our infrastructure

Mobile test platform

The mobile test platform can be used for a variety of tests to help you learn the most about the value of energy storage with a minimal capital investment.

The mobile test platform is a 270kW/270kWh complete battery storage system (expandable to 350kW/350kWh) capable of connecting and demonstrating system operation on electricity networks, in “behind-the-meter” applications or on remote diesel microgrids.

The flexible and adaptable control system uses an IoT based control system that means it can easily be adapted to the specific interfaces and scope that your project requires. Controlled or reported quantities at different locations are easily accommodated provided a 3G/4G service or internet connection exists. A local WAN can also be established if required.

The system can either be used for trials in the field or to create a simulated environment to test your technology. The use of the platform to create a test environment can provide high quality, immediate data feedback, accelerating your technology development.



The crane in action



The Mobile System heading to a test site

Microgrid test centre

The microgrid test centre, located in the University of Adelaide’s Thebarton campus, can create an embedded microgrid using an onsite diesel generator and wind tunnel motor drives as large loads to simulate an electricity grid.

With the addition of the mobile platform, custom software can be introduced to simulate specific PV solar profiles, problem loads, or to mimic equipment failures while monitoring the performance of the energy technology of your choice.

Future developments may include the ability to create a range of network conditions such as over/under voltage and rapid frequency changes.

The Thebarton facility can switch from a stand-alone diesel microgrid to a network connected mode (without diesel) at the twist of a single switch. The performance of a device under test can be easily observed in both operating environments and continue to be monitored with high accuracy.

The ability to test energy storage technologies at any stage of technology readiness – from lab scale prototypes through to fully functioning technologies capable of grid connection – is truly a leading capability that will eliminate the unknowns and uncertainties in your energy storage project delivery.



Capability to integrate wind and PV renewable energy sources to battery storage

Putting the capabilities to use

The mobile test platform and Thebarton facilities are available for industry use through a variety of collaboration models. For example, solving difficult issues may require people and expertise, as well as the test platform with a long-term lease. We have both long and short lease arrangements available.

In addition, there are a variety of small and large grant schemes available that can match industry contributions to collaborations, particularly for larger, complex and/or longer trials.

Groups considering investing in energy storage projects can use the mobile test platform to demonstrate the viability and learn about site specific nuances before making a major capital investment.

Cape Jervis trial

SA Power Networks has contracted the University of Adelaide to run a range of trials with our mobile microgrid platform on their power network in Cape Jervis, which is expected to start in April 2018. The trial will enable the distributor to have a full control of the test system and to trial a range of battery storage applications, including peak shaving of upstream assets, voltage stabilisation and islanding of selected houses in the area.

The trial is expected to continue for 12 months, enabling SA Power Networks to monitor the steady-state and dynamic system performance and effect on their network through all four seasons.

SA Power Networks are using this trial as an opportunity to gain familiarity with this new test platform in a location on the network where it could yield the greatest benefit. This experience will be used when deciding when and where future energy storage systems could be used, and the functionality that may be required.

Training and student projects

Our facilities are available to train students and engineers in the areas of battery storage system design, associated standards, technologies, operation and control.

Companies may also engage with the University and the test system through the establishment of student projects. These small scale, 10-month projects require some initial investment from companies to define and review. The projects are then worked through in collaboration by final year Bachelor or Master students. Larger and longer-term projects can often begin as, or evolve into, PhD research.

University projects give students an opportunity to work on relevant industry problems, while acting as a low-risk way for companies to familiarise themselves with the capabilities of the test system and to identify complexities and solutions.

Examples of previous student project level collaborations include the effects of battery storage on power system inertia and power system modelling for Electranet, the battery storage system for household applications for ZEN Energy, and the modelling and development of home energy management systems with batteries for SA Power Networks.



Three phase cable connections to the bidirectional inverter and sensors



The Mobile Test System at Cape Jervis for SA Power Networks Trials

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To discuss your potential projects or for training or for site visits, contact us via the following details

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For further information refer to *Technical Specifications* and *Summary of Applications* leaflets.

For detailed information and self-reading about battery storage systems and to access real test data, visit the Australian Energy Storage Knowledge Bank (AESKB) website at www.aeskb.com.au or www.energystorageknowledge.com.au