CASE STUDY
NON-WIRES ALTERNATIVES

S&C ELECTRIC COMPANY
Excellence Through Innovation

S&C Improves Power Quality in Australia's Outback

S&C Featured Solution: Integration Services

Location: Queensland, Australia

Customer Challenge

Electricity utility Ergon Energy was looking to improve power quality on its Single Wire Earth Return (SWER) lines, which were developed a century ago to bring power to remote parts of Australia and New Zealand. A single SWER line may stretch for hundreds of kilometers, with distribution transformers positioned at intervals along its length. The primary purpose of the SWER schemes was to accommodate basic domestic and farm loads.

Initially each customer used a relatively small amount of electricity. For these situations, SWER systems provide the best balance of technical and commercial returns. The high capacity and higher cost, three phase systems were not necessary to supply the relatively small loads.

Through the years, the population growth in these areas has been limited; however energy consumption on the SWER network has been growing at an average of 1% per year due to increased penetration of air-conditioning and other electrical appliances. Load types can vary from typical household loads to intense farming loads, which creates a situation where there is low diversity and load profiles exhibit a lot of variability.

The growth in demand has meant that many SWER feeders are reaching capacity and/or are experiencing significant long term voltage issues. The conventional solution would be to upgrade the line from a SWER to a two- or three-wire system to provide additional capacity and improve power quality. However, such a strategy would be very costly because these lines can reach distances of 700 kilometers and often run through the inaccessible Australian outback.

Instead, Ergon Energy conceptualized using an energy storage system placed toward the end of the SWER lines to improve the power quality and reliability experienced by its customers. Widely regarded as the world's leading developer of innovative SWER-line technologies,

Twin Grid Utility Support System units providing extra support along a SWER line.

Ergon Energy developed a proprietary energy storage control algorithm to provide the optimal mix of both real and reactive power to the line. But the energy storage solution still had to also withstand the harsh and remote Australian outback environment without the use of maintenance-intensive refrigeration-based cooling systems.

"It's been a rollercoaster of a ride working on delivering an energy storage platform to support a lot of our rural customers. It entails using the same storage technology used in residential applications, but it's significantly larger. It's certainly been amazing to be at the leading edge of a lot of new technology that's been rolled out."

—Stephen Richardson,
Innovation Technology Engineer,
Ergon Energy

S&C combines an energy storage system with an Ergon Energy algorithm to bring stable voltages to customers along its remote SWER lines.

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S&C Solution

Ergon Energy chose to partner with S&C Electric Company because of S&C's extensive energy storage experience and proven history of developing new and innovative technological solutions for the grid. S&C's task was to oversee product design, manufacturing, shipment, and commissioning, and to provide all project-management services.

S&C overcame significant technical challenges to meet Ergon Energy's specifications. It ultimately provided an integrated solution that included a comprehensive communications interface to the utility, a community energy storage system, and a lithium-ion battery.

S&C developed an ultra-robust, utility grade, skid-mounted solution capable of withstanding harsh weather conditions. S&C worked closely with Ergon Energy to integrate and test Ergon Energy's SWER-support algorithm and to deploy the Grid Utility Support System units in the field.

An installed Grid Utility Support System unit in the field.

Valued Outcome

Ergon Energy was satisfied with S&C's solution and the overall delivery of the project. S&C maintained an open and transparent relationship with the customer and carefully managed the battery supplier's and subcontractors to overcome any issues as they arose. S&C worked with Ergon Energy closely throughout proof of concept testing, which proved to be very beneficial to fine tune the technical solution and continue to build on the working relationship.

S&C was able to successfully enable one of Australia's most influential utilities to improve the quality of power delivered to their remote customers and to integrate energy storage into its grid. As a result, Ergon Energy's remote customers now experience voltages equal to that found in urban areas at a fraction of the cost of upgrading the lines.

After the final unit was installed and commissioned, the Ergon Energy project went on to win the Excellence Award for Innovation, Research and Development at the 2016 Australian Engineering Excellence Awards for Queensland.

Delivery of the Grid Utility Support System units to Ergon's stock yard.

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