# Advanced VRLAs Taking Hold in Stationary Energy Storage

- Advances in lead-acid battery technology are enabling manufacturers to meet the growing demand for dynamic energy storage, particularly for renewable distributed energy generation.
- Lead-acid battery vendors are expected to retain significant market share despite persistent competition from other technologies.
- According to a report from Navigant Research, the world-wide installed capacity of advanced lead-acid batteries will grow from 77 megawatts in 2013 to 5,044 megawatts in 2020.
- Innovations made possible by ALABC research and development have allowed valve-regulated lead-acid (VRLA) batteries to emerge as a viable option for stationary applications in terms of performance and cost-efficiency.
- Resulting technology is now helping to bridge the gap between the storage batteries of years past and the future market.

## ALABC Research Optimizing Technology for Grid-Scale Supply, UPS and Other Stationary Applications


As the market continues to grow for enhanced stationary applications, such as smart-grid frequency regulation facilities and advanced uninterruptible power supply (UPS) systems, lead-acid batteries continue to be one of the most efficient, reliable and cost-effective energy storage solutions for many of these operations. However, because several of these systems require batteries that can perform well and overcome the life-limiting processes of high-rate partial-state-of-charge (HRPSoC) operation, the need for more advanced storage technologies has become more apparent – which is why the ALABC has invested a significant amount in optimizing VRLA technology for stationary energy storage.

The early work of the consortium in identifying and addressing the contributing factors to the leading forms of premature capacity loss (PCL 1 & 2), as well as other advances, paved the way for advanced VRLA designs, such as absorbent glass mat (AGM) batteries, to become a viable option for stationary deep-cycling applications. Eventually, ALABC R&D efforts led to the inclusion of carbon into advanced lead-acid designs as a mechanism for limiting sulfation and enhancing battery life. As a result, novel lead-carbon chemistries are becoming a more effective solution for not only micro- and mild-hybrid electric vehicle systems, but also smart-grid demonstration facilities and renewable energy storage systems.

In fact, the popular lead-carbon UltraBattery first developed by the Commonwealth Scientific and Industrial Research Organisation (CSIRO) in Australia and Furukawa Battery of Japan, has been the main power source in several high-profile power-regulation and energy storage demonstration programs. The technology currently serves as the key storage component of a smart-grid demonstration facility in Lyon Station, PA, operated by Ecoult and East Penn Manufacturing that provides three megawatts (3 MW) of continuous frequency regulation services to the northeast grid of the United States. Ecoult is also using the UltraBattery system in the Tasmanian region of Australia as part of the 3 MW / 1.6 MWh King Island Renewable Energy Integration Project, which is considered one of the world's largest battery-based renewable energy storage systems.

Other ALABC members such as CPqD in Brazil and Narada in China have been working with advanced VRLA and lead-carbon batteries revealing several positive effects in stationary applications. In recent years, we have seen designs such as the BAE valve-regulated tubular plate OPzV battery that have been proven through ALABC-sponsored research to be capable of achieving 4,400 cycles in photovoltaic applications with a service life of more than 14 years. Since PV panels have a life of approximately 20 years, these particular batteries would only need to be replaced once in the lifetime of the unit. When combined with the batteries' low-cost and maintenance-free characteristics, the prospect of extended service life under these conditions make these VRLAs a particularly attractive chemistry for not just PV operations but also telecom backup, grid equalization and other stationary applications.


In today's rapidly-changing energy landscape, VRLA batteries have been proven as a low-cost, highly-efficient energy storage system for many of the stationary applications that are becoming more common across the globe. Even in remote areas where entire populations are disconnected from the electrical grid, supply systems with VRLA batteries now can have a substantial, cost-efficient impact on providing sustainable energy to households and businesses that have previously been without. These are the types of systems that can change the face of the power industry, and meet the demands of the developing world marketplace.

ALABC

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