



## LEAD BATTERIES: ENERGY STORAGE CASE STUDY



# Ecoult Energy Storage Solutions MW-Scale Services to Balance and Smooth USA's Largest Grid

### Pennsylvania, USA

There is an increasing need for regulation services due to the large-scale integration of intermittent wind and solar generation which affects the physical operation of the modern grid.

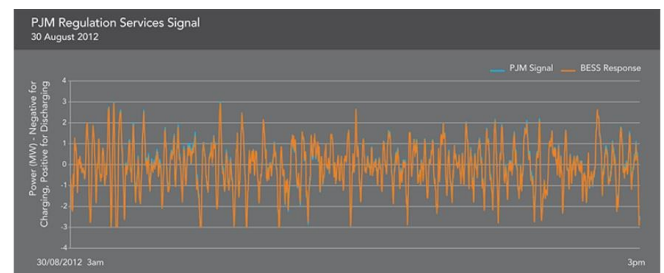
The grid scale energy storage system, operational since 2012, provides 3 MW regulation services on the grid of PJM Interconnection, which is the largest of 10 Regional Transmission Organisations / Independent System Operators in the USA.

Regulation services are necessary to provide fine tuning in real time for the network to match supply and demand and keep a constant frequency. The PJM energy storage project demonstrates the efficiency of UltraBattery® technology for managing regulation services. Ecoult has shown that lead technology is not only capable of continuous cycling, it can also equal or outperform any other battery technology in grid frequency regulation, one of the most demanding applications for any battery.

### Technical Specification

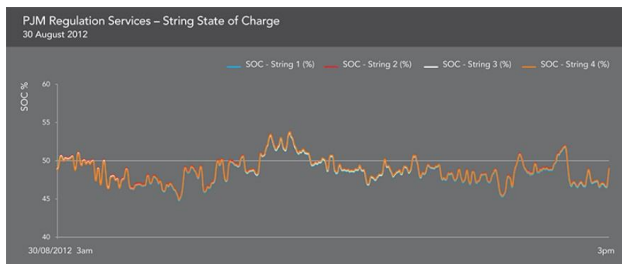
The Ecoult 3 MW UltraBattery Energy Resource is implemented both in a building and in a containerized format, to demonstrate flexibility in approach for prospective adopters.

Using four strings of UltraBattery cells, it connects to the grid from inside the East Penn Manufacturing site in Pennsylvania. The project provides continuous frequency regulation services bidding in to the open market on PJM, and the system responds to PJM's fast response signal (see below). The project also provides peak demand management.

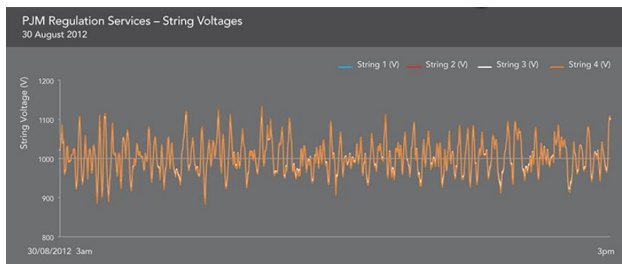




For frequency regulation services, the batteries roam in approximately 40% Partial State-of-Charge band. Ecoult implements an application that follows the PJM signal and maintains the State-of-Charge (see below).



The frequency regulation services system tracks the string voltage and individual voltage of the cells, which are maintained in conservative bands to extend longevity (see below).



### About the Company

Ecoult is the global energy storage arm of the world's largest single-site lead battery manufacturing facility, East Penn Manufacturing (EPM), known worldwide for its quality and environmental excellence.

Ecoult provides software, hardware, systems integration and engineering to monitor and control the energy storage systems and maximize their capabilities. EPM manufactures the Deka UltraBattery cells inside every system.

**“Lead batteries are perfect to provide the short term instantaneous boosts and soak up instantaneous oversupply for grid frequency regulation. Our PJM system has been performing since 2012, continuously responding to the requirements of the USA's PJM grid.”**

John Wood, CEO, Ecoult

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