University of Nebraska Lincoln | NEBRASKA CENTER FOR ENERGY SCIENCES RESEARCH

Cycle 5 – Energy Research Grants

Self-X: An Intelligent large-Scale Battering System For Renewable Energy Storage

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ABSTRACT:

The goal of this project is to design and prototype an ambitious and paradigm-shifting design of cost-effective grid-scale energy storage technologies capable of addressing emerging intermittency and ramping challenges for the transmission of renewable electric energy.

The principle shortcomings of existing battery energy storage design are: 1) using fixed structure with high O&M cost; 2) acting as a pure passive device in power management; 3) having low energy conversion efficiencies and weak fault tolerance capabilities.

In this project, based on our proposed Self-X architecture (*Self-configuration, Self-optimization, and Self-healing*), we will design and prototype an adaptive reconfigurable energy storage system at 2kWh. The prototype developed in this project will significantly enhance our capability to attract external funding from public- and private- sector organizations and companies, especially to our ongoing effort for federal funding from the National Science Foundation and the Department of Energy.

This ambitious project is transformational and will revolutionize renewable energy storage design, which will contribute to economic development in Nebraska, meet the DOE Grand Challenges of the 21st century on clean energy by reducing CO2 emission, ensure the leading position of the United States on battery energy storage system technology, and create strong growth point for U.S. workforce.