



<b>Project Title: Sodium Sulfur Battery Energy Storage</b>		
Contract Number: RD3-12	Milestone Number: 3	Report Date: May 20, 2009
Reporting Period: August 2008 – April 2009		
Milestone Description: Milestone 3 – Construction and Installation		
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## **MILESTONE SUMMARY REPORT**

Project funding provided by customers of Xcel Energy through a grant from the Renewable Development Fund

### **Executive Summary:**

The entire Distributed Energy Storage System (DESS) includes the battery; the power conversion system (PCS); the wind farm and grid interfaces; backup power for emergency battery temperature regulation; and equipment for local and remote performance monitoring, data collection, system control and other communications. We've contracted with S&C Electric, a Chicago-based company that provides equipment and services for electric power systems, to design and build the PCS and to provide turnkey installation services for the DESS.

GridPoint Inc., a leading innovator in smart grid technology, is providing the communications and control system for system integration, remote control and data access. This system will allow the battery system to be the first of its kind to act like a power plant, including selling power into the MISO market and responding to Automatic Generation Control signals.

The third milestone was completed in phases. The first phase was completed in late October, when the battery and the PCS was commissioned. The next phase was completed in January 2009, when the battery could be charged and discharged remotely. The final phase was completed in April 2009, when the battery controls were fully integrated with the Xcel Energy EMS system as well as full functionality with Gridpoint.

### **Technical Progress:**

- In August 2008, construction began with the installation of conduit and pouring of concrete.
- In September 2008, the PCS was shipped and placed, as was the pad-mounted transformer
- In October 2008, the battery enclosures were delivered and erected in one week, followed by the delivery and installation of the 20 battery modules the following week. The PCS was wired and terminating cables installed in other equipment. The new steel structure and equipment for the Minwind substation was also installed.
- Testing and commissioning began on 10/27 and the system was energized on 10/31.
- In January 2009, site communication construction began and telecommunications lines were connected.
- On 1/29/2009, a successful initiation of a discharge command for 400kW to the battery from Denver occurred, proving the ability to remotely control the battery.
- Throughout the first four months of 2009, S&C designed and installed a software upgrade to the PCS to enable all modes of operation, and Gridpoint designed interface and control systems and prepared for integration with the EMS and the PCS.
- On 4/28/2009, remote operations were administered via the Gridpoint Administrator Webpage.



Building the battery enclosure



The modules have been placed



Another view to give a sense of scale. The PCS can be seen behind the battery. The backup generator is on the near right. One of the turbines powering the battery can be seen in the distance.

**Additional Milestones:**

- ❑ Milestone 4 addresses development of the research plan for analysis of project results
- ❑ Milestone 5 includes the actual analysis of system performance and economic benefits and will be conducted over the next 12 months.

**Project Status:**

Milestone 3 is 100% complete

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