

### Coal Combustion Product Type

Fly Ash

### Project Name

North Dakota Heritage Center & State Museum

### Project Location

Bismarck, North Dakota

### Project Participants

State of North Dakota, Great River Energy, HGA Architects and Engineers, Lightowler Johnson and Associates, Braun Intertec, Comstock Construction, Blackhawk Drilling, Strata Corporation

### Project Completion Date

November 2014

### Project Summary

First opened in 1981, the North Dakota Heritage Center is the headquarters of the State Historical Society of North Dakota and home to its largest museum. In 2009, the state's Legislative Assembly authorized \$51.7 million for a 97,000-square-foot addition—nearly doubling the size of the facility—to house an expanded exhibit/collection space, state-of-the-art research technology, improved public amenities, and additional office and support space.

### Project Description

A primary objective in designing the addition was to embrace sustainable building methods, including using recycled and low-carbon construction materials and incorporating renewable energy for heating and cooling. To that end, Great River Energy donated \$500,000 of fly ash generated from its nearby Coal Creek Station, which was incorporated into all of the addition's concrete components.

Engineers specified a range of high-volume fly ash concrete mixes with minimum 25 percent, and maximum 50 percent, substitution in place of portland cement. The 50 percent mixes were used in the construction of foundations and walls, while 35 percent replacement mixes were specified for flatwork and pan/joist systems.

"This donation is an opportunity for the North Dakota Heritage Center to use a local—and a recycled—product as part of the building materials," noted Al Christianson,

Great River Energy's director of business development and North Dakota governmental affairs. "It's another great story that demonstrates the energy industry's many positive contributions to North Dakota's economy and quality of life."

Use of fly ash helped the building meet Leadership in Energy and Environmental Design (LEED) Silver standards. Other sustainable features included tapping geothermal energy wells that lie underneath the facility's parking lot for heating and cooling purposes and the recycling of communication and electrical wiring removed from the building, which were woven into containers and sold in the museum's store.

The building expansion—completed in 2014 in time for the 125th anniversary and celebration of North Dakota's statehood—earned a Gold Star Award for Sustainability in Design from the North Dakota Ready Mix and Concrete Products Association.



Photo: State Historical Society of North Dakota