



South Dakota Department of Agriculture  
Division of Resource Conservation and Forestry

## Determining the Feasibility of Using Biomass Products for a Heating Source in Schools or Other Buildings in the Black Hills of South Dakota

Final Report to the Western Governors Association  
August 18, 2006

In early 2005, the SD Department of Agriculture, Resource Conservation and Forestry Division (RC&F) received a grant from the Western Governors Association (WGA) to conduct studies to determine the feasibility of using woody biomass as a feedstock for heating schools and other facilities in the Black Hills area. The grant was made available as part of a pool of funding from The National Biomass Partnership, and was designed to pay up to 90% of the cost of feasibility studies. Biomass Energy Resource Center (BERC) of Montpelier, VT <http://www.biomasscenter.org/> was hired to complete the studies.

### The Project



A public meeting was held in November, 2005 in Rapid City to announce the project and encourage groups to apply for feasibility studies. Invitations were sent to Black Hills area K-12 school districts, post-secondary educational institutions, engineers, woody biomass suppliers (contractors), and landowners. Over 40 people attended the meeting representing the full spectrum of invited guests. The meeting received media coverage from the Rapid City Journal, and local

television news broadcasters KOTA and KNBN. At the meeting, school and public facility representatives were encouraged to pick up an application and schedule a site visit. During the week, a representative from BERC conducted site evaluations at 14 facilities in the area where there was interest in the project.

In January 2006 the Division teamed up with the Black Hills National Forest to sponsor a tour of the woody biomass boiler and feedstock supply system of Chadron State College in Chadron, NE. Hosted by Ed Hoffman of Chadron State College and Doak Nickerson of the Nebraska Forest Service, a group of 39 people were given a presentation of the history, functionality, and economics of the only working woody biomass boiler in the area. The group also saw the chip bin, boiler room, absorption chiller, and in-woods chipping operation that supplies the college.



A total of seventeen applications were received from administrators interested in having a feasibility study completed for their facility. Projects were chosen for studies based on an application process developed by BEREC and RC&F. Projects approved under the WGA grant included feasibility studies for the following facilities: Lead-Deadwood High School, Hot Springs K-12 school system, Rapid City Stevens High School, Rapid City Catholic School System, Spearfish East Elementary school, and Belle Fourche Middle School. The schools represented a variety of sizes, building configurations, fossil fuel boiler systems, and geographic locations within the Black Hills.

## Results

The studies for the six school systems have been completed and reports have been delivered to the schools. Economic analysis on each project revealed a positive net present value, indicating the conversion for each facility would pay for itself over an expected 30 year life span. Annual savings for the schools ranged from \$10,600 to \$75,000



per year depending on the size of the school, current fossil fuel cost and usage, and type of woody biomass heating system installed. The total biomass needs of all the facilities add up to less than 3,400 tons of wood chips and 523 tons of wood pellets annually. This is a small fraction of the estimated 83,000 tons of sawtimber harvest residues, and 260,000 tons of sawmill residues generated each year in the Black Hills. There is currently one manufacturer of wood pellets in the Black Hills.

Conversion projects for Spearfish East Elementary, Belle Fourche Middle School, and St. Elizabeth Seton/St. Thomas More schools are conditionally feasible; that is, they will be feasible only if changes occur to the existing facilities before the conversion to biomass occurs. Conversion projects at Hot Springs, Lead, and at Stevens High School in Rapid City would be feasible immediately. Recommended heating systems varied from pellet boilers, to semi-automated wood chip systems, to fully automated wood chip systems.

All facility representatives were very receptive to the study results, but expressed similar concerns about financing the high cost of conversion. The initial cost of conversion ranged from \$190,000 for the smaller pellet system to \$1.34 million for the larger fully automated system.

## Budget

Facility	WGA Grant	Facility Contribution	State Contribution	Total Cost
Lead-Deadwood High School	\$ 5,850	\$ 650		\$ 6,500
Hot Springs K-12 Schools	\$ 4,653	\$ 517		\$ 5,170
Rapid City Stevens High School	\$ 11,610	\$ 1,290		\$ 12,900
Rapid City Catholic School System	\$ 3,833	\$ 426		\$ 4,259
Spearfish East Elementary	\$ 2,867	\$ 319		\$ 3,185
Belle Fourche Middle School	\$ 5,387	\$ 599		\$ 5,986
Administrative Expenses	\$ 8,414		\$ 3,794	\$ 12,208
Totals	\$ 42,614	\$ 3,800	\$ 3,794	\$ 50,208