



## Feasibility of Woody Biomass for Heating Project

South Dakota Department of Agriculture  
Resource Conservation & Forestry Division

The Black Hills of South Dakota has long been plagued with a large volume of underutilized woody biomass. Small diameter trees from non-commercial thinning projects, top wood and limb wood from sawlogs, and a weak market for medium size trees has resulted in thousands of tons of slash left on the ground to rot, become fuel for the next wildfire, or piled for disposal by burning. Estimates indicate over 200,000 tons of slash are created in the Black Hills every year. Another 200,000 tons of wood chips are created every year from primary wood processing facilities in the Black Hills.



In 2005, the SD Department of Agriculture, Resource Conservation and Forestry Division obtained a US Department of Energy National Biomass Partnership grant from the Western Governors Association (WGA) to determine the feasibility of using woody biomass as a feedstock for heating schools and other public facilities in the Black Hills area. Funds from a USDA Forest Service Economic Action Program grant were also dedicated to the project. Biomass Energy Resource Center (BERC) of Montpelier, VT was hired to complete the feasibility studies.

A public meeting was held in November, 2005 in Rapid City to discuss the project. 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. School and public facility representatives were encouraged to pick up an application for a feasibility study and schedule a site visit. During the week, a representative from BERC conducted site evaluations at 14 facilities. 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.



A total of seventeen applications were received requesting feasibility studies. Projects approved included six feasibility studies for schools, one preliminary engineering study, and five feasibility assessments for district energy systems. Facilities chosen for the study ranged from 77,000 square feet to over 900,000 square feet, were located across the Black Hills, and currently rely on natural gas, propane, fuel oil or some combination of these fuels.

BERC evaluated the sites for application of fully automated, semi-automated, slab-on-grade fully automated, and pellet boiler systems to determine the best fit. Life Cycle Cost analysis revealed that conversion of eight of the facilities would yield a positive net present value over 30 years without significant changes to existing facilities. Another facility had a positive NPV if an additional building is added according to future expansion plans. A tenth facility would become positive only if modifications are made to the existing heat distribution system. A positive NPV indicates the conversion will pay for itself in fuel cost savings over a 30 year boiler life span.



As a result of these studies, two State facilities are pursuing conversion to woody biomass boiler systems: the State Veterans Home in Hot Springs, and Evergreen Star Academy in Custer. These systems are expected to be on-line by the 2008 heating season. A study to determine wood chip fuel specifications and procurement strategies for the Black Hills is being commissioned.

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**Related Sites:** <http://www.state.sd.us/doa/Forestry/index.htm>

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