

Campus Woodchip Heating System

Heating Capacity (output): 6 MW (20 MMBtu/hr)

Annual Woodchip Use: 9,000 tons

Emissions Reduction and Combustion Control Equipment: Cyclone, O₂ sensor control

Year Installed: 1991

Thermal Output: Steam



BERC

Renewable • Reliable • Resourceful

Biomass Energy Resource Center

CHADRON STATE COLLEGE, CHADRON, NEBRASKA

In Nebraska, Biomass System Models a Use for Forest Thinnings that Cut Fire Hazard

Forest fires are the urgent impetus for biomass energy in Nebraska.

Although the Great Plains state is only two percent forested, its woodlands—long allowed to grow over-dense, and thus fire-hazardous—erupted in the summer of 2006, in several complexes of blazes that altogether destroyed more than 68,000 acres.

“This was the first time in the state that we lost homes to forest fires,” notes Doak Nickerson of the Nebraska Forest Service. “It’s unprecedented, really, and it’s a reflection of fire hazard in the woods.

“Our forests are a product of years of little to no management. So you end up with a heavily stocked forestland, way more trees grown per acre than there should be,” he explains. “That becomes a big fire hazard.”

Concern over that danger and those losses—“catastrophic fires threaten our forests and rural communities,” declared State Forester and Forest Service Director Scott Josiah—has spurred a new interest in using wood from fire-reduction thinning, and from non-commercial timber, in biomass energy plants.

There is a model in place. The last year that saw a major forest-fire eruption in the state was 1989, when more than 20,000 acres were lost. That outbreak led to the 1991 construction of a woodchip heating plant at Chadron State College in northwest Nebraska.

Near the sites of the 1989 and 2006 fires, Chadron State has cut its overall energy costs by 50 percent as it burns over 9,000 tons of wood each year to heat and air-condition its campus. The fuel supply comes from logging waste and forest thinning to reduce fire hazard. Producing 20 million Btu per hour, Chadron State’s large system heats and cools more than one million square feet of building space.



PHOTO COURTESY TOM COSTON

Both within and outside Nebraska, others are noticing. The wood burned at the state college “is one-half of one percent of the total wood grown in Nebraska each year,” said the 2007 annual report of the Nebraska Forest Service.

The potential benefits also go to the economy, the Forest Service notes.

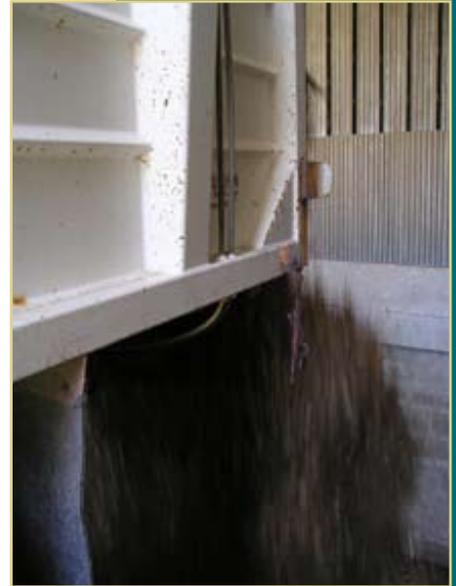
“Years of steadily rising energy costs have negatively impacted Nebraska’s rural communities, some of which were already facing serious economic decline,” says Josiah. “Woody biomass utilization serves as a catalyst for rural economies.”

A Bet that Continues to Pay Off

“Twenty years ago, the administration of this college and the community leaders made a bold step forward,” Nickerson says of Chadron State.

“Back when natural gas was super-cheap, they went on a bet that fossil fuels would escalate over the next 20 years—and that turned out to be right. Now we continue to get visitors from other parts of the country, to take a look at how this college is saving tax dollars as well as doing a good deed for the forestland.”

Pictured on front: Chadron State College's fuel supply comes from logging waste and forest thinning to reduce fire hazard. Right: Chipped fuel is delivered to the fuel storage bin at the college's woodchip heating plant.



“Some of that is the momentum that we have toward alternative fuel in the country,” notes Jane Darnell of the US Forest Service (USFS). But in Nebraska, she adds, the new interest is spurred largely by the “wake-up call” that the 2006 forest fires sounded.

“That heightened the awareness and interest,” Darnell says.

“I think folks are saying, ‘Look what they’re doing at Chadron State.’ The forests are here, and they’re under-utilized.”

The state Forest Service has taken up the cause. “Woody Biomass Is Nebraska’s Untapped Resource,” trumpeted the headline of a Forest Service news release in early 2009.

Analysis funded by a USFS grant led the state service to conclude that “Nebraska has 1.3 million acres of timberland containing more than 41 million oven-dry tons of standing woody biomass,” according to the news release.

“Woody biomass is the low-hanging fruit for alternative energy applications,” Josiah said in the article, which noted that annual “net growth in Nebraska timberland produces nearly one million net tons of wood.

“Additionally, 270,000 tons of wood are generated each year from forest fuels treatment programs, range improvement activities, timber harvest operations, urban wood waste, and wood-processing operations.

“Currently, less than 10 percent of this waste wood is used.”

Up-Front Costs vs. Long-Term Payback

The Hurst biomass system at Chadron State cost about \$1 million when first installed, Nickerson says. “They just added on to the existing energy building that was there,” which had been housing natural gas-fired district energy boilers.

“Since then they’ve made about a \$1.3 million upgrade to the air-induction system, to make the two boilers more efficient,” Nickerson adds. “They’re getting more Btu out of the chips; it’s also really enhanced the air quality of their emissions.”

Chadron State also added an 800-ton air-conditioning chiller—using steam from the wood boiler—to cool some of the college’s buildings in summer, and thereby reduce electrical demand.

“The true success of this system was that the original engineering study said the savings in using woodchips, for the college, would create a payback of 10 years—and they actually paid the system off in six,” Nickerson says. “And that was before natural gas prices went where they are today.”

The up-front costs of wood energy plants can be higher than comparable fossil-fuel systems, he adds.

“Because of the up-front costs of capital investment, it’s a tough sell,” Nickerson notes. But “in those paybacks, wood continues to shine over fossil fuels.”

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