

**Chadron Bio-energy Field Trip**  
**Sponsored by Colorado State Forest Service, CSU – College of Natural Resources, and Peak to**  
**Peak Bio-energy Task Force**  
**June 5 & 6, 2003**

Chadron State College, in Chadron NE, has the unique situation of utilizing forest residues from fuels reduction activities in the Pine Ridge forest of Nebraska to heat the college. We had the opportunity to visit the college and forest operation of John Hahn.

Hahn's operation consists of fuels reduction by harvest of ponderosa pine for the purpose of reducing the number of trees. Merchantable logs are removed during the operation and the remaining trees are chipped for bio-energy and other uses. Hahn hand falls, operates a grapple rubber tired skidder (\$60/hour), Morbark 30/36 chipper (\$300/hour), and two 10 ton chip vans (\$50/hour).

The site visited was an 8 ½ acre private ownership fuels reduction project. Hahn produced 21 truck loads of chips and 2 loads of saw logs. His chip trucks hold 11 tons/load. Saw logs are 16 ft or less. This was approximately 230 tons of chips or 30 tons/acre. On the average the ratio of chips to logs was 1 ½ chips to ½ sawlogs in these pine ridge area.

Average production is 5 loads of chips delivered to the college per work day. The college is currently paying \$15.76/ton (green) and price is determined by use of a predetermined sliding scale based on moisture content. For example, if wood is 5% moisture, the value would be \$45 per ton. Moisture can run as high as 50%, but typically ranges from 30 to 40%. Haul distance for chips on this job is approximately 7 miles. Hahn prefers to limit haul distance to 20 miles or less. Another source of biomass is slash piles or harvest residue remaining from harvest operations.

Logs are sold to the Nieman Sawmill in the Black Hills. This is approximately a 150 mile haul one way. Pope & Talbot is another purchaser in that area.

On this particular site, the state pays \$165/acres for fuels treatment, the owner contributes \$125/acre in cost share and the Hahn receives the value of the wood. Hahn is under contract to supply chips to the college and has been their supplier for 13 years.

Some chips are sold to nursery operations, animal bedding and some are used for covering the "circle tracks" of pivot irrigators. Overall 85% of chips produced go to Chadron State College. This ranges from 4,000 to 9,000 tons per year. Peak use is in the winter when 5 loads of chips are burned per day.

Chadron State College has been operating a wood fired heating system for 13 years. This system heats 1.2 million cubic feet of space. Facility has a bottom storage pit that holds 100 tons. Screw augers and conveyor move chips from the pit to 2 Hurst boilers. Air fan and fuel in the boilers create steam for distribution to the college buildings. Ash particles are collected and transported to Chadron landfill. Boilers are 97% efficient and produces 3% ash. Wood heating saves the college 30% versus natural gas. Chips from the field work (handle) better than chips from the sawmill. Sawmill waste sometimes has foreign material (metal) that causes handling problems. Conveyors work best compared to screw augers. Screw augers require more maintenance.

Maintenance is common requirement. Series of controls have been added to the original system. There is a natural gas backup. The heating system originally operated on fuel oil. The facility is operated 24 hours/day and 7 days/week. The facility requires a crew of 5 ½ full time employees.

There is a nearby storage area that holds 1000 tons of chip inventory and chips will not be carried in storage for more than one year.

Quality of chip and moisture content is very important. Desired moisture content ranges from 10% to 40%. Conveyance issues had to be addressed in the beginning. Trough versus screw, chips versus saw dust, and the need to minimize friction were issues that had to be addressed. Quality of fuel is important. The secret is in the fuel. Ideal moisture content is 20 to 25% and maximum moisture used is 50%.

Facility was a \$1 million investment. Too much air supply results in increased fly ash and too much wood fuel results in increased smoke. There have been no emissions problems. The college has paid up to \$24 per green ton for chips.

The college recently opened bids for construction of a 700 ton steam absorption chiller. This will give them a choice of electric or wood to cool and a choice of wood or gas for heating. This will utilize another 700 tons of wood chips per year and construction of the “chiller” will begin in August of 2003.

Recently the college submitted a proposal for the “Biomass Initiative Grant”. This would involve the move or upgrade to cogeneration and “dry” steam or high pressure system would be needed. Currently their system is a medium pressure system. Water treatment of “new” water into their system costs \$1,000 per month. They may partner with Nebraska Power and time generation to fit into the utility’s schedule.

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**Bio-Energy Field Trip, Chadron, Nebraska  
Fuels Reduction Operation and Utilization, John Hahn  
Prepared by Dan Len, USFS Forest & Rangeland Management, Ft Collins, CO**



**Chip Van With 11 Ton Capacity**



**Morbark 30/36 Chipper**



**85% Of Chips Produced Are Used For Fuel**

**Quality Of  
Chips Is  
Important**



**Residual Slash Can Be Processed Into Chips**



**Saw Logs Represent Much Of The Value In Restoration**

# Chadron State College Heating Facility



Chadron State College Heating Facility



Chip Van Unloading Dock

Chip Van Unloads By Using "Walking Floor"



Facility Has 2 Hurst Boilers



Boilers Are 97% Efficient And Produce 3% Ash.



Wood Fired Heating System Has Been In Operation For 13 Years

