University of North Dakota
Contact: Darren D. Schmidt
(701) 777-5120
dschmidt@undeerc.org

FACT SHEET
Commercial Scale Biomass Gasification Power Production

INTRODUCTION
The Energy & Environmental Research Center (EERC) located at the University of North Dakota is working to demonstrate the economic feasibility and practical nature of producing electric power from biomass gasification (wood chips, sawdust, agricultural residues, and by-products from commercial industries). Many commercial businesses and industries produce residues that are either unused, or are expensive to handle and dispose. These same industries typically require a large consumption of electric power on a regular schedule. What if this renewable residue resource could be utilized in a small power plant? The EERC is currently testing a system that can produce 150 kW of power, which is large enough to power a typical sawmill operation. Imagine the sawmill powering the processing of lumber from the bark and sawdust residue that it creates.

The EERC is currently involved in a number of projects to help commercialize the technology. All of the projects have a similar focus. They include demonstration at commercial sites including: a log home manufacturer in Arizona, a demonstration in Wahpeton, ND at a wheat straw particleboard plant, and various fuels testing at EERC involving clients from Massachusetts and Minnesota.

GOAL
Demonstrate a portable power plant in use at a commercial enterprise converting biomass residue to electric power.

Figure 1 – 100 hp Diesel engine in operation firing wood gas at EERC, and an example of a 30 kW microturbine shown to right.

PROCESS
The process will consume relatively dry sources of biomass, which can be small sawdust particles or large particles such as cut 2X4 ends. The material is conveyed to a gasifier. The gasifier partly burns the material converting it to a combustible gas, similar to natural gas. This produced gas is fired in an electric generator. The generator may be a spark ignited piston engine, diesel engine, or microturbine generator. Figure 1 shows the various engine applications. By-products of the process (5% of the incoming fuel) include wood based charcoal, and liquid condensate. The by-products may be used or discarded to the municipal sewer system.

PROGRESS
As of 9/30/04, the EERC has completed over 100 hours of continuous operation firing sawmill residue (sawdust and woodchips). Gas quality and cleanliness has proved adequate for firing in a generator, and the process is completely automated. Initial tests have been completed firing a 100 hp diesel engine, and tests are planned to operate a series of microturbines. Figure 2 shows the portable power plant in operation at the EERC.

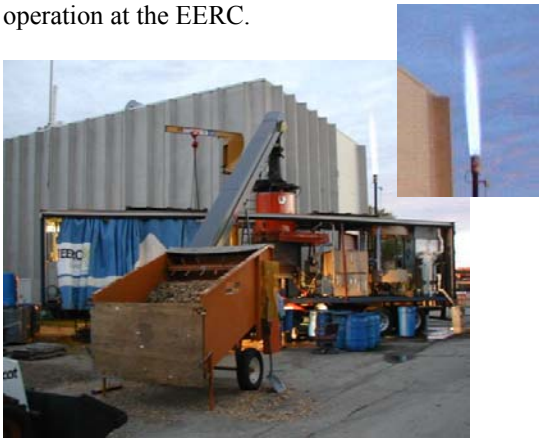

Figure 2 - 150 kW Portable Biomass Power Plant

CONCLUSION
This project will establish an economic base line and further commercialization. Small biomass power technologies provide a better fit to available resources than large power plants, and gasification provides an economic alternative to steam based power production. Outcomes will create value for under utilized species in fire risk or dead forest stands. Biomass produced power reduces emissions, creates opportunities in rural areas, and increases the cost effectiveness of businesses and ensures energy security.