

KL ethanol creates breakthrough

By Jessica Monday

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UPTON - Wood ethanol technology developed at a plant in Upton is going worldwide.

Two years ago, KL Energy Corp. built Western Biomass Energy in Upton to act primarily as a research facility. The Rapid City-based company is one of a handful experimenting with wood-based ethanol technology.

Company officials chose the location in Wyoming partly because the state tax credits for ethanol are 40 cents per gallon, the highest of any U.S. state, and also for reasonable proximity to wood sources. The company buys Ponderosa Pine slash - the branches, pine cones, needles and tree tops leftover from logging or thinning the forest - by the ton from the Black Hills and hauls it to the plant in Upton.

Chemical engineer Dave Litzen pioneered a thermal/mechanical pretreatment for KL Energy Corp. that uses heat and machinery to break down wood. The other two main types of pretreatment processing for ethanol are gasification and strong acid. Both have severe drawbacks, according to Dennis Harstad, vice president of plant operations for KL Energy and general manager of the Upton plant.

"Gasification is very expensive because of the high temperatures needed (to burn up the wood stock)," he said. "The strong acid uses large amounts of sulfuric acid to break down and separate the cellulose from lignin, and that is not very environmentally friendly, because then you have to use a strong base to neutralize the streams. Our process is just using steam and mechanical equipment."

Prior to any construction of a research facility, Litzen created a model plant and tracked molecules through that plant using a powerful computer program. The goal in Upton was to prove that the computer model pretreatment could work to break down the parts of the tree - lignin, cellulose and hemicellulose -- and successfully convert it to sugars to turn into ethanol.

Even the waste from the forest waste is reused. The byproduct lignin, which is leftover fiber, is made into a premium quality wood pellet that can be used as a solid fuel in pellet stoves. With some of the sugars removed, the pellets burn 10 percent to 15 percent hotter than normal pellets.

To date they have not taken any of the state tax credits, since all of the ethanol produced has been given away for promoting Litzen's pretreatment process as a success.

What is the downside? There really isn't one, according to Harstad.

"You can grow a tree in 20 to 40 years or some indications even less, where it takes (many) thousands of years to generate coal or natural gas underground," he said. "It's clean fuel and it's using a renewable waste product."

The Obama administration recently designated \$49 million in federal stimulus money for wood-based ethanol projects and some ethanol producers are sensing a shift away from crop bases.

"We were in the corn ethanol industry. We were running plants, designing and building plants, but we knew the future of ethanol was not in the corn ethanol industry," Harstad said. "We focused on wood biomass for basically two reasons. One is it's readily available in our backyard, the Black Hills. Second, the supply of cellulosic products that can be converted to ethanol is so readily available. There's enough waste cellulose to convert into an energy source to supply our needs six times over, so you're not limited to the Midwest where you grow corn. There's waste wood all over."

Success of the research plant means KL Energy is marketing the technology worldwide and looking for a commercial plant site in the Black Hills. In April they announced a deal with Add Blue Ltda. of Brazil, the world's second largest ethanol market. Working with the South Dakota School of Mines, they have done testing for companies from France, Finland, and Colombia as well as Brazil. A deal with a second foreign company is underway, but no details are being released yet, Harstad said.

Three sites for the commercial plant are being considered in the Black Hills. Once it is built, projections are five to 10 million gallons of ethanol per year, based on available feed stock within a close radius.

Research and development will continue at the facility in Upton. The plant currently employs 11 people and Harstad said he will add four positions.