

**Assessing the Environmental Impacts of Cellulosic Bioethanol Production: An Ongoing Case Study of Switchgrass Production around Vonore, TN**



**Aerial view of the Vonore Biorefinery**

A demonstration-scale cellulosic ethanol biorefinery has been constructed in East Tennessee through the state-sponsored University of Tennessee Biofuels Initiative. Managed by Genera Energy LLC and operated by DuPont Danisco Cellulosic Ethanol, the Vonore facility has the capacity to produce 250,000 gallons of ethanol. The Vonore facility came online in January 2010 and will soon be ready to make the change from processing corncobs to processing switchgrass. A total of 5,162 acres of switchgrass are already in production within an hour’s drive of the facility thanks to contracts with 63 farmers in 10 surrounding counties. Based on the success of the project thus far, DuPont Danisco is making plans to build a nearby commercial-scale biorefinery with a capacity of 25-50 million gallons of ethanol by 2014.

**ORNL’s Role**

There is a critical need for studies that can help land managers evaluate bioenergy crop options within the framework of a sustainable landscape design. We are currently using the Vonore area to test the idea that perennial crops, such as switchgrass, may have positive impacts on the environment. Through a combination of watershed-based hydrologic modeling and field sampling, we plan to gain a better understanding of the changes to water quality that may occur when land is converted from annual crops and pasture to switchgrass. Using a spatial optimization model developed for the Vonore area, we will relate these changes in water quality to changes in economic criteria (e.g., target production, profits).

**Watershed Experimental Design**

Field data gathered over 3-5 years will be essential to testing and possibly recalibrating a spatial optimization model that incorporates both environmental and economic criteria into the landscape design process.

We have proposed a watershed-based experimental design that will test for changes in phosphorous and nitrogen concentrations, sediment loads, and water throughput across the Vonore area using a minimum of eight paired watersheds (8 watersheds planted with switchgrass compared to 8 similar watersheds planted with traditional crops).

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