PROJECT FACTSHEET

Verenium Demonstration Plant At-A-Glance

LOCATION:
Jennings, Louisiana

FEEDSTOCKS:
Sugarcane bagasse, dedicated energy crops, wood products and switchgrass

CAPACITY:
1.4 million gallons-per-year (MGY)

EMPLOYMENT:
60 to 80 permanent on-site jobs

CAPITAL INVESTMENT:
$77M including non-recurring engineering (NRE)

GROUNDBREAKING:
February 2007

MECHANICAL COMPLETION:
March 2008

ENGINEERING PARTNER:
AMEC

CONSTRUCTION PARTNER:
Cajun Constructors, Inc.

CORPORATE CONTACT:
Corporate Communications
617.674.5300
media@verenium.com

Jennings Demonstration Project

Project Overview

Verenium's 1.4 million gallon-per-year (MGY) cellulosic ethanol plant in Jennings, LA is the nation's first true demonstration-scale plant capable of producing ethanol from non-food cellulosic biomass sources. It is located on a 140 acre Verenium-owned parcel on the Mermentau River, adjacent to the company's pilot-scale facility (modernized in 2006) and a reclaimed brownfield site that is envisioned for a potential-future commercial facility. The demo facility is the centerpiece of Verenium's leading-edge biofuels R&D program.

The demo plant is now being optimized. Throughout this process, Verenium will test and confirm economic and performance goals for cost-effective ethanol production at commercial scale.

The Jennings demo plant is the culmination of a staged, fifteen-year effort to commercialize cellulosic ethanol using Verenium's landmark technology. Experience gained from the Jennings plant will be highly valuable as the company, with its partner BP, pursues plans to construct next-generation commercial-scale (30-60 MGY) cellulosic ethanol facilities, the first of which will be Highlands County, Florida. In July 2008, the Jennings Facility was selected for an award under a $240 million federal program, operated by the Department of Energy, to support the development of up to nine small-scale biorefineries in the United States.

Extensive Intellectual Property Profile

Verenium owns a robust intellectual property portfolio with patents covering key technologies in the discovery, optimization, production and use of novel protein-based products. In addition, the company maintains numerous compositions of matter patents covering novel enzyme products and product candidates. Verenium currently has about 300 issued patents, and about 350 patents pending (as of June 2009), and holds exclusive rights to commercialize University of Florida technology for cellulosic ethanol production.

Verenium's state-of-the-art demonstration facility in Jennings, Louisiana, dedicated in May 2008.

Project Objectives

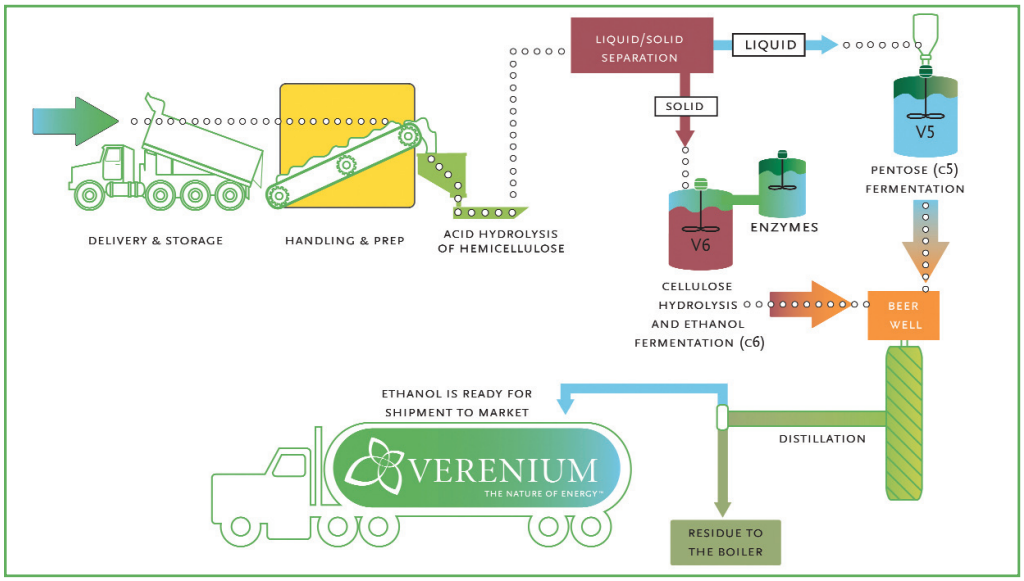
The Jennings demo plant serves several critical functions including:

- **Mitigation of scale-up risk**: The step-up in scale from Verenium's Jennings pilot plant will provide invaluable experience, results and insights that are expected to be important to efforts to finance future commercial facilities. The Demo Plant will process roughly 50 tons per day (TPD) of biomass, compared to 2TPD for the pilot plant and approximately 1000TPD for full-scale commercial facilities.
- **Research and Development**: The demo plant is the centerpiece of Verenium's leading-edge biofuels R&D program. It enables the rapid introduction of process modifications and the transfer of technology from the company's laboratory and pilot facility into a commercial operating environment.
- **Feedstock testing**: The demo plant is designed to validate Verenium's process using a wide range of feedstocks available in different parts of the nation and the world, including bagasse from locally-grown sugarcane, energy cane, and other crops.
- **Training**: Verenium has established the Jennings site as a permanent cellulosic ethanol "Center of Excellence," where future plant operators will be trained for roles in other commercial sites. It affords Verenium employees the opportunity to broaden their expertise in the areas of material handling and processing, enzyme production and fermentation, control systems and data collection, and water and wastewater systems.
- **Experience in the Commercial Marketplace**: Output from the Jennings facility will be available for marketing and blending into fuel supplies in the Gulf Coast region, affording real-world experience with markets and logistics.

TECHNOLOGY OVERVIEW

Field to Pump: Verenium's Proprietary Process to Produce Cellulosic Ethanol

Verenium's technology enables conversion of nearly all the sugars found in cellulosic biomass, including both five-carbon and six-carbon sugars, into ethanol. This efficiency advantage, combined with the low input cost of cellulosic biomass, results in superior economics in the production of ethanol. Verenium's process of converting biomass to ethanol includes:



- **Step 1, Biomass Handling and Preparation:** Biomass is delivered to the facility, and is prepared for processing by milling and washing.
- **Step 2, Pentose Syrup Production and Cellulose Fiber Preparation:** The biomass is hydrolyzed using steam and mildly acidic conditions. This portion of the process creates five carbon sugar (pentose) syrup from the hemicellulose found in the biomass, and prepares the remaining cellulose fiber for further enzymatic conversion into glucose. The cellulose fiber and pentose syrup slurry is then sent to a liquid/solid separation step where the pentose syrup is separated from the fiber solids.
- **Step 3, Fermentation:** In one tank, the pentose syrup is fermented directly through the action of a proprietary industrial fermentation microorganism to make a pentose (C5) beer. In another tank, the cellulose fibers are mixed with specialized enzymes and additional proprietary industrial fermentation microorganism. The enzymes and the microorganism then work in concert with each other to simultaneously breakdown the cellulose into glucose, and ferment the glucose into a hexose (C6) beer.
- **Step 4, Distillation:** The C5 and C6 beers are combined and sent to distillation for recovery of the ethanol from the beer. Distillation residues are collected, dewatered, and sent to the biomass boiler as fuel to create steam and power used for the entire facility.

VERENIUM
THE NATURE OF ENERGY™

KEY PROJECT PARTICIPANTS INCLUDE:

amec · CAJUN INDUSTRIES, LLC · DEPARTMENT OF ENERGY UNITED STATES OF AMERICA · LSU AgCenter Research & Extension · UF UNIVERSITY of FLORIDA