

MORE ABOUT CELLULOSIC ETHANOL AND ABENGOA BIOENERGY

As a matter of fact, Abengoa Bioenergy is at the forefront of developments in lignocellulosic ethanol, as it is currently building a 5 million liter per year plant in the Salamanca region of Las Vilas in Spain, which will be the world's first commercial cellulosic ethanol plant.

The company is taking a multi-pronged strategy to improve ethanol production researching different technologies.

One approach is the alliance mentioned in our previous post with Dyadic International. (see terms of the agreement at Energy – Seeking Alpha) They have signed a three-year research and development (R&D) agreement and a stock purchase agreement. Under its terms, Abengoa Bioenergy will invest \$10 million in Dyadic, for which it will receive 2,136,752 shares of Dyadic Common Stock.

Dyadic will use the proceeds from this private sale to fund R&D obligations called for in the agreement, whose objective is the development of a cost-effective enzyme production system for commercial application in Abengoa Bioenergy's bioethanol (cellulosic ethanol) production process. The R&D agreement calls upon Dyadic to use its proprietary technologies to develop one or more enzyme mixture manufacturing systems customized to ABRD's proprietary biomass substrates.

Dyadic International, Inc. is engaged in the development, manufacture and sale of biological products using a number of proprietary fungal strains to produce enzymes and other biomaterials, principally focused on a system for protein production based on the patented *Chrysosporium lucknowense* fungus, known as C1.

Dyadic is applying its technologies to produce enzymes for use in converting various agricultural products (e.g. corn) and waste products (e.g. switch grass, wheat straw, sugar cane bagasse, etc.) into fermentable sugars, which can then be

used in the production of traditional and cellulosic ethanol as well as other products currently derived from petroleum. It has identified and tested highly effective enzyme mixtures for the efficient conversion of renewable cellulosic biomass to ethanol. The C1 genome has been sequenced, which will reduce the time required to bring a specific gene to market from years to months.

Besides this effort, Abengoa is already working with the U.S. Department of Energy in other complementary technologies. The D.O.E. and Abengoa Bioenergy R&D signed a 4-year, \$35.5 million contract in 2003.

Under this contract Abengoa Bioenergy R&D, in collaboration with Novozymes North America, Inc., the National Renewable Energy Laboratory [NREL], and Stake Technology, is developing novel biomass-derived process technology that utilizes advanced bio-refined Distiller's Grain and Corn Stover blends to achieve significantly higher bioethanol yields while maintaining the protein feed value.

As for its expansion plans in the US, it is currently building a 88 million gallon per year corn ethanol manufacturing plant in Nebraska that is scheduled for completion in early 2007. The company has already invested a total of more than \$400 million on ethanol in that state.

There are plans to build "copycats" in Kansas, Indiana and Illinois. That series of projects will begin in the second quarter of 2007 with a \$175 million to \$180 million Kansas plant.



Ethanol plant in York, Nebraska. Courtesy of Abengoa Bioenergy

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