

## Biotech report: companies switch course, from drugs to alternative fuels

by Terri Somers

BOSTON - Three or four years ago, someone attending the biotechnology industry's annual convention could walk into one of the panel discussions on industrial biotechnology and practically hear crickets. It wasn't exactly the hottest ticket in town.

That has changed.

"There's a mad rush into this space right now, said Mike Kagnoff, a partner with law firm Heller Ehrman in San Diego who meets regularly with investors interested in the sector.

Venture capital is pouring hundreds of millions of dollars into technologies that could play a role in alternative fuels or green technology, Kagnoff said.

Companies that once focused on aspects of the drug discovery process, such as San Diego's Diversa, have switched course and are now immersed in biofuels, which are expected to generate revenue in a much shorter time frame than drugs.

At the Biotechnology Industry Organization conference, which drew more than 20,000 people this week, panels on biofuels, biodegradable plastics and other industrial applications of biotechnology were well attended and dragged past their allotted time because so many people had questions.

The so-called industrial biotechnology sector is now so hot that the biotech group held a conference on the topic last month in Orlando.

A "perfect storm" of factors has propelled the sector, said Brent Erickson, who oversees industrial biotechnology issues for BIO, the industry's Washington-based trade group.

The science has progressed to the point that there are successful products on the market. Gas prices nationwide have pushed past \$3 a gallon, perking up public interest in biofuels and all sorts of so-called "clean" technology.

President Bush mentioned biofuels in his State of the Union address in 2005, "sending major ripples through

the sector and those who can finance it," Erickson said.

This year, the president proposed that the nation produce 35 billion gallons a year of biofuels by 2017. The Energy Policy Act requires that 7.5 billion gallons a /year of biofuels be produced by 2012.

Erickson said the industry has seen more than \$1 billion invested in cellulosic ethanol, a gas-extender made from biologically broken-down and fermented plant waste. And the government has already distributed several million in research grants with the pledge of loans to help build plants to product ethanol.

About 16 months ago, before all the pieces had come together, Diversa announced it was narrowing the focus of its research and putting more of an emphasis on the enzymes that could be used in industrial processes, including the fermentation of cellulosic ethanol.

Earlier this year, the company announced it would merge with Celunol, a Cambridge, Mass., company that builds energy plants, to form what they say will be the nation's first end-to-end cellulosic ethanol company. The merger is expected to be completed this month.

Celunol already has a small-capacity ethanol production facility operating in Louisiana. A larger-scale demonstration plant under construction there is expected to be operational by the end of the year. The company will use that larger plant to figure out how to scale up to commercial production of its goal: 25 million to 30 million gallons of cellulosic ethanol a year.

It hopes to be the first company to build a commercial cellulosic ethanol plant in the United States.

"There's currently no commercial production facility in this country so it's a pretty open game for companies involved in this area," Bill Baum, Diversa's vice president of business development, said Wednesday during a panel discussion on biofuels at the BIO conference.

The sector is not without its challenges.

Biotechnology still needs to develop better methods for increasing the amount of ethanol it can get out of numerous products such as sugar cane, forestry waste and other natural materials that can be harvested for their starch content, Baum said. The industry needs to increase ethanol yield tenfold to 20-fold to get the cost of the process down, he said.

And eventually the industry will need to work out how it will recycle the huge amount of water that will remain after the ethanol extraction process, he said.

Even with numerous challenges, New York-based Baemar Energy Ventures has invested in Diversa/Celunol.

When his firm started investing in the sector more than two years ago, a lot of people thought they were crazy, said Baemar's Bill Lese. Since then, there's been a big turnaround, he said.

The marriage of Diversa and Celunol technologies makes a particularly attractive investment because together they have proprietary technology in many facets of the production process, he said.

Diversa has terrific enzymes and the capacity to develop new ones that are needed, he said, and Celunol has the experience and technology needed to build the production facilities.

Diversa is not the only San Diego company hoping to make greenbacks out of the green movement.

Carlsbad, Calif.-based Invitrogen, which sells tools for drug discovery research, has formed a biofuels team to start putting together an offering of tools that scientists in the sector will need for research.

Chief Executive Greg Lucier said the team was a result of the growing interest in the sector worldwide.

At the World Economic Forum earlier this year in Switzerland, Lucier said he was "totally blown away by how much discussion there was on climate change and how bullish people were on a new industry around green fuels."