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Up next: Switchgrass into fuel

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The Kansas City Star

The year is shaping up as pivotal for the ethanol industry, and a Kansas company has a major role in how things will turn out.

ICM Inc., based in Colwich, Kan., has been involved in designing and building more ethanol plants in North America than any other company. But those plants, including several in the region built over the last decade, have relied on turning corn into fuel.

The industry's future growth will depend on turning cellulose from a solid material — such as prairie grasses, wood and corn stalks — into liquid ethanol. Missouri and Kansas could be big sources of cellulose, with farmers growing switchgrass.

But it's not a simple transition. Companies across the country are trying to figure out the best way to produce the billions of gallons of ethanol that will be needed.

ICM's innovative approach — using the resources of a nearby corn ethanol plant — will get off the ground with a demonstration project being built this year in St. Joseph.

"We're confident that this is going to work," said Scott Kohl, technical director for ICM.

Technical improvements at the new plant are expected to boost the amount of ethanol produced from cellulose. But the real breakthrough could be in the development of a successful business model for an industry that is struggling with a credit squeeze and financial losses.

Cellulosic ethanol plants are more expensive to build and operate than corn-based efforts, and investors need to be convinced that the plants will be profitable and work as promised.

ICM's idea is to build the cellulose plant adjacent to an existing corn ethanol plant. The operation then can save on construction and operational expenses — sharing storage tanks and transportation facilities, among other things.

"It makes a great deal of sense," said Matt Hartwig, a spokesman for the Renewable Fuels Association, adding that potentially it could cut costs by as much as half.

USDA likes the idea

The U.S. Department of Energy is taking ICM's approach seriously enough to provide most of the \$31 million it will cost to build the St. Joseph plant. The effort, though, is just one of 19 new government-supported demonstration projects that will look at ways to produce biofuels.

The federal agency also has announced financial assistance for construction this year of a plant near Hugoton, Kan.

Global ethanol producer Abengoa, based in Spain, expects the Hugoton plant to produce 13 million to 15 million gallons of ethanol per year from cellulose, including prairie grass.

Analysts say it's unlikely that just one approach to cellulosic ethanol will prevail.

Both the ethanol industry and the U.S. have plenty at stake. A federal renewable fuel standard requires growing production of biofuel, culminating in 2022, when 36 billion gallons are to be produced annually. In 2009, about 11 billion gallons of ethanol, almost entirely from corn, were produced. Most of the growth needs to be met by cellulosic ethanol, which will eventually need to provide 16 billion gallons of fuel annually. The federal quota this year is for 100 million gallons of cellulosic ethanol, a target unlikely to be met.

Among those rooting for the new ethanol approach are environmentalists who prefer cellulose instead of corn because it can be made with nonfood ingredients and doesn't cause as much pollution.

"There are short-term challenges," said Jeremy Martin, a senior scientist for the Union of Concerned Scientists. "But it really highlights the alternative sources for fuel other than oil wells and grain silos."

From corn to grass

The St. Joseph plant is a five-year project, but ICM believes its success will be evident before then. While freestanding cellulosic ethanol plants will be major players as the industry matures, ICM said, taking advantage of existing corn ethanol facilities will allow the industry to gain traction faster.

"We need to look at what can be done," said Kohl.

Many of the corn ethanol plants, for example, have land for expansion and infrastructure that can be shared. Cellulosic ethanol also can use part of the kernel that can't be made into corn ethanol.

ICM has had a role in about half the 200 ethanol plants built in North America. Dave Vander Griend, ICM's founder, president and chief executive officer, is a former welder and Iowa farm boy who in 2006 was called "the father of ethanol" by the trade magazine Farm Futures.

ICM expects to build the St. Joseph plant for just over \$31 million, with the federal government picking up \$25 million of the cost. It will be situated by Lifeline Foods in St. Joseph, which in 2007 began making corn ethanol with a capacity of 50 million gallons per year. Lifeline also makes products such as corn meal and ingredients for breakfast cereal.

ICM is one of the partners in the Lifeline plant, which is 51 percent owned by AgraMarke Quality Grains, a farmer cooperative with members in Kansas, Iowa, Missouri and Nebraska who supply the corn.

ICM will own the cellulosic plant, which will have a capacity of 500,000 gallons per year. Subsequent plants would be much larger.

Making cellulosic ethanol is complex, and ICM is using a process that includes acid to make the cellulose's cells accessible. The process is completed by enzymes and "novel yeast" that convert the cellulose into sugars and ethanol. The process as developed by ICM will use fewer enzymes, which are expensive, and the yeast is able to convert more of the sugar into ethanol.

ICM expects to tap into Lifeline's supply network. Some farmers have already grown test plots of switchgrass, which takes about two years to establish. But with 10 tons of cellulose needed daily for even ICM's small plant, it will take time to provide that much cellulose. Initially, the facility will rely more on corn fiber provided by Lifeline's plant and an energy-rich version of sorghum.

The cellulosic plant, like the Lifeline facility, also will produce much of the energy it needs.

The science says it will work, but going from the laboratory to producing large amounts of ethanol can produce problems that will have to be fixed for the process to become commercially viable.

ICM figures the time has come to show it can be done. Success will encourage the needed private investment. A favorite industry saying about cellulosic ethanol is that everyone wants to be first to be second — someone has to be the first to show it will work.

"Now it comes down to how well does it scales up," Kohl said. "This will be a great win for the farmers, the plant owner and the nation."

On the Web

Go to KansasCity.com for a diagram of how ICM's plant near St. Joseph will convert cellulose into fuel.

Another deal for ICM

ICM Inc. announced Monday that it will retrofit a New York ethanol plant owned by Sunoco Inc.

The Fulton, N.Y., ethanol plant, the largest in the northeast U.S., was not producing when purchased last year by Sunoco, which plans to use the ethanol from the retrofitted plant to blend with gasoline sold by its retail stations. Sunoco, based in Philadelphia, is one of the country's largest independent refiners and marketers of petroleum products.

ICM said dozens of its employees will be involved in the retrofit, which will also require up to 150 subcontractors.

Energy sources: Algae to wood

The federal government in December awarded \$564 million in grants to help accelerate the design and building of facilities producing biofuels and figure out which ones are the most promising. Combined with investments from the companies receiving the grants, nearly \$1.3 billion will be spent.

Here's a look at a few of the 19 projects receiving funding:

- Algenol Biofuels was given \$25 million to build a biofuel plant in Freeport, Texas, that will use algae to produce 100,000 gallons of ethanol per year.

- American Biotechnologies Inc. received \$125 million for a pilot plant in Emeryville, Calif., that will produce a diesel substitute by fermenting sweet sorghum. The process is supposed to produce other products such as lubricants and petrochemical substitutes.

- Bluefire of Fulton, Miss., received \$81 million for a facility that will use wood scraps and municipal solid waste to produce 19 million gallons of ethanol per year.

- Enerkem Corp. of Pontotoc, Miss., received \$50 million for a plant at a municipal landfill that will use waste to produce ethanol and gasoline.

- Ineos New Planet BioEnergy of Vero Beach, Fla., received \$50 million for a facility using wood and leftover construction and demolition materials to produce ethanol and electricity.

- Haldor Topsoe Inc. received \$25 million for a pilot plant in Illinois that will convert wood to gasoline.

- Logos Technologies received \$20 million for a project in Visalia, Calif., that will convert wood and switchgrass into ethanol.

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