





# Pinching Pennies

A new yeast product promises to save producers pennies per gallon when pennies count the most.

BY KRIS BEVILL

**In a margin environment with high corn prices, relatively low oil prices and stagnant consumer demand for gasoline, the ethanol industry has borne witness to razor thin margins.** The crunch has caused everything from slowdowns to temporary full shutdowns as producers wait for prices to even out and attempt to pinpoint where they can squeeze even the smallest of profit increases out of each gallon of fuel they produce. It wasn't always that way for the ethanol industry. A decade ago, ethanol producers may not have considered that type of incremental changes, but these days, a boost of even half a cent per gallon could make the difference between an operational or idled ethanol plant.

Enter Mascoma Corp. While widely known for its proposed cellulosic ethanol production plans, Mascoma is a technology development firm with a few more tricks up its sleeve. Its specialty is a proprietary consolidated bioprocessing (CBP) platform. CBP is a conversion process in which microorganisms are used to hydrolyze and ferment sugars in one step, as opposed to traditional processes, which require enzymes to hydrolyze sugars and separate microorganisms to carry out fermentation. By definition, CBP requires the use of engineered microor-



ganisms because natural organisms are not capable of simultaneously performing both functions, according to Mascoma.

As Mascoma developed its CBP process, it engineered a yeast that can be applied in corn ethanol plants and has been proven to cut operating costs by reducing the plant's enzyme requirements. The Mascoma Grain Technology yeast product, commercially known as TransFerm, is the first commercial application of the company's CBP technol-

ogy and is a drop-in, bioengineered substitute for conventional yeasts used in ethanol fermentation. Because the yeast itself expresses glucoamylase enzymes, it significantly reduces the amount of enzymes that would otherwise need to be purchased for ethanol production, according to the company. The reduced need for enzymes translates to a gross savings of 1 to 2 cents per gallon, says David Arkowitz, chief financial officer at Mascoma. "We're replacing a significant amount of dollars that

it costs to produce ethanol because the yeast makes its own enzymes," he says.

TransFerm was introduced to the market during the first quarter of this year but the product has already been used in more than 1,000 fermentations to produce more than 90 million gallons of ethanol at 15 ethanol plants, according to Mascoma estimates. That total includes six commercial customers as well as additional potential customers who are conducting trial runs to test the product at their facilities. The yeast is manufactured and distributed by Lallemand Ethanol Technology, which entered into a multiyear partnership with Mascoma in December to commercialize the product. Mascoma and Lallemand jointly market and sell TransFerm. As part of the agreement, Lallemand pays Mascoma a technology license fee and receives a portion of the net sales based on the market price of conventional yeast, as well as ongoing incentive payments based on sales performance. This is the first bioengineered yeast Lallemand Ethanol Technology has marketed at a commercial level, according to Craig Pilgrim, Global Marketing and Product Development Manager. "We've been involved in a lot of small incremental changes in the past," he says. "You can only push biology so far and then you have to take the next step. For us, it's great to see this product out there. It really is quite a step-change from what it was before in terms of savings and performance, so it's very exciting for us to be involved, not only in partnership with Mascoma, but for the industry overall."

Arkowitz says the product is still in the early days of availability, so it's difficult to predict how many ethanol producers will be using the product by year's end. For now, the companies are content to grow sales in a manageable fashion and continue to optimize the product. ICM Inc. signed on as Mascoma's technology development partner in October and provided scale-up assistance and industry expertise to bring the product to market. Now that it has been introduced, the engineering firm is continuing to run lab tests and conduct other related work, Arkowitz says. The first few months of commercial operations have been positive, and the companies are very pleased with TransFerm's



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performance thus far. “We’ve seen significant interest in this product,” Pilgrim says. “Margins are very, very tight so any kind of savings—especially in the 1 to 2 cents per gallon range—is a pretty good deal for them.”

Valero Renewable Fuels Co. LLC, a Mascoma investor, was the first ethanol producer to sign up to use the engineered yeast product. The company signed a multiyear agreement with Mascoma in November that provides Valero with terms and pricing for TransFerm’s use at any or all of Valero’s 10 corn ethanol plants. Bill Day, Valero’s executive director of media relations, declined to elaborate on the specifics of the agreement but he confirmed that Valero has trialed the product at several of its facilities and will continue to work with Mascoma and others to optimize the results.

In March, Pacific Ethanol Inc. also signed an agreement to use TransFerm at its 40 MMgy Columbia plant in Boardman, Ore., with the option to extend that agreement to include the company’s three additional ethanol facilities. Paul Koehler, Pacific Ethanol vice president, says the Columbia plant has experienced positive operational and financial results in the months since incorporating the new yeast into its process. “It has lowered our ingredient costs for production and is consistent in its performance,” he says. “Pacific Ethanol is pleased with the product and with the team from Mascoma and Lallemand.” Koehler says Pacific Ethanol does indeed plan to use the product at all of its facilities, pending trials at each plant to confirm the expected benefits.

## Operational Considerations

Bioengineered yeasts require users to complete a bit more paperwork as compared to natural yeasts and Mascoma needed to garner a favorable review from the U.S. Food and Drug Administration before distillers grains produced at facilities using the yeast product could be used as animal feed, but the actual production process is unchanged. The FDA gave the product a favorable review in February. “For use in trials or commercial use, the facility itself doesn’t have to do anything differently,” Arkowitz says. “They don’t have to invest in any capital equipment or

change their processes. We mean it when we say ‘drop-in.’ They can just use it instead of using a conventional yeast.”

Mascoma intends to continue using its CBP technology platform to improve TransFerm as well as roll out additional products. The next step will be to introduce MGT 1.1, which is designed to express glucoamylase enzymes as TransFerm does but with the additional capability of generating additional yield for corn ethanol producers, according

to Arkowitz. Mascoma is awaiting regulatory approval for MGT 1.1 and anticipates launching the product in the not too distant future, he says. In the meantime, Pilgrim assures there’s no need for producers to wait for the new and improved version to become available. “You could wait,” he says, “but you’d be leaving money on the table.”

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