

## Converting corn cobs into consumer products



### THE MIDWEST STANDS TO REAP SIGNIFICANT BENEFITS FROM THE BIOBASED PRODUCTS INDUSTRY; ONE MINNESOTA-BASED COMPANY IS AT THE FOREFRONT OF THAT INDUSTRY'S DEVELOPMENT.

Each year, approximately 5.7 billion barrels of oil go into the chemical compounds used to produce the synthetic raw materials for products as diverse as fabrics, plastic bottles, adhesives, cell phones and building materials. By contrast, the market for biobased products, made from chemical compounds produced from biomass such as corn cobs, wood fiber and soybeans instead of petroleum, is very small. Only 262,000 tons of bioplastics were produced globally in 2007, according to the trade organization European Bioplastics. If global production of bioplastics reaches 1.5 million tons by 2011, as predicted, that would represent only 1 percent of plastics in use today.

The management of one Minnesota-based green chemical company, Segetis Inc., thinks the market for biobased products is a lot bigger than that, and that up to a third of the petroleum-embedded chemical compounds that are currently used to make products can be replaced with biobased alternatives.

Currently the company, headquartered in Golden Valley, Minnesota, is concentrating on making novel biobased chemicals for use in plasticizers, solvents, polyurethane insulation and adhesives, which are used in a wide variety of durable and nondurable goods. In some cases these materials are replacing chemicals that are under considerable regulatory pressures, which has accelerated market interest.

Segetis does not expect to reach commercial capacity until 2012, but it already produces 250,000 pounds of sustainable chemicals a year at its semi-works production plant for potential customers to sample. Segetis started in rented lab space at the University of Minnesota just three years ago.

This rapid expansion is crucial because other start-up biochemical companies have struggled to expand quickly enough to get a commercial product to market. Part of the challenge stems from the difficulty in scaling up the fermentation of biomass from the lab to commercial levels while meeting industry specifications for chemical products.

Snehal Desai, business vice president at Segetis, credits the company's time-to-market advantage to the fact that it uses its patent-pending thermochemical conversion process instead of fermentation. This process uses high temperatures to reorganize the molecules in the feedstocks produced from biomass such as wood fiber or corncobs, forming new chemical entities. "We are using well established techniques from the chemical industry which deliver predictable, scalable results," Desai says. "The conditions under which fermentation succeeds can change each time that you expand the process, which can slow down commercialization."

### ENVIRONMENTAL AND ECONOMIC BENEFIT

There is a strong environmental argument for the increased use of biobased products. Enabling the \$2 trillion global chemical industry and the manufacturers it supplies to reduce their carbon footprint by replacing the oil found in everyday items with a renewable source is a compelling motivation. Biobased products make even more sense economically because they are also cheaper to produce, as biomass is a much cheaper raw material than oil.

Even further, Segetis argues that its biobased compounds result in better end products. "We can actually improve functionality, producing foams that make bedding more durable or ingredients that make household cleaners better," he says.

The growth of the biobased products industry in the Midwest is particularly important, because it bolsters demand for agricultural commodities in the region. As Jeff Holden, director of South Dakota's Office of Procurement Management, puts it, "There's a significant opportunity for the region's corn producers and soybean producers, for example, to supply these sorts of manufacturers." The industry also has the potential to expand the region's industrial base through value-added agricultural processing and manufacturing and to enhance the profitability of the region's biorefineries.

States across the Midwest are encouraging the use of biobased products through their own procurement policies. For example, in July 2008, South Dakota revised an existing law to allow Holden's office to pay suppliers of biobased products 5 percent more than their non-biobased competitors. The largest biobased contract the state has is for cleaning products. It also has a pilot project running with one supplier that produces soy-based toner for use in laser printers instead of petroleum-based toner. "We'll look to launch a full contract if this works out," says Holden.

To support the region's bioeconomy, the Midwestern Governors Association has formed a Midwestern Biobased Product Procurement System, which is being implemented by a regional task force of state procurement officials. "We have monthly conference calls aimed at generating cooperative contracts with suppliers of biobased products," says Holden. "We are currently looking to secure contracts with biobased suppliers for cleaning products and disposable food-service items."

As for Segetis, Desai believes the company can grow to become a global business. "We are talking to over 20 different manufacturers in the U.S. as well as Europe and Asia," he says. "The feedback we're getting from those sampling our products has been very positive."

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