INSIGHT: US Genomatica brings second renewable chem to market

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HOUSTON (ICIS)--US-based Genomatica has brought a second chemical to market, butylene glycol (BG), a product that serves a vastly different end market from its first product to be commercialised, 1,4 butanediol (BDO).

The development marks a milestone for the company, which is engineering microorganisms that ferment sugars to produce chemicals. It has now brought two process technologies from concept to market.

Biotechnology holds much promise. The petrochemical industry is limited to seven basic building blocks, methanol, ethylene, propylene, butadiene (BD), benzene, toluene and xylenes.

Biotechnology companies could potentially develop many more or directly produce target chemicals by tinkering with the DNA of microorganisms.

These new building blocks could open up lower cost processes to produce existing chemicals. They could even lead to new materials that have never been commercialised.

Genomatica's first two products, BG and BDO, illustrate the potential of the technology. The company's microorganisms make each of these chemicals directly from sugars without relying on any intermediary steps.

A traditional petrochemical process cannot produce these chemicals directly from a feedstock.

Genomatica's BG and BDO are also purer and their production has a smaller environmental footprint.

"This is a story you'll see across many chemicals that are produced with biotechnologies," said Genomatica CEO Christophe Schilling. "The processes can lend themselves to higher quality."

For many customers, purity is critical – especially for a product like BG, which often ends up in personal-care products. For BDO, higher purity allows it to be used for making polymers.

"The purity provides a functional benefit that is more advantageous for a range of applications," he said. "Customers are responding well to the value of our performance benefits."

Although BG and BDO are very similar – the two molecules are isomers – their markets and end uses are vastly different.

BDO is an industrial chemical that can be used as a solvent in its own right or as an intermediate to produce polyurethanes and elastane fibres like *Spandex*.

By contrast, BG is used in cosmetics and other personal care products. The size of its market is also much smaller than BDO's.

These differences are one of the reasons why Genomatica adopted a branded ingredient strategy for its BG versus the licensing strategy it is using for BDO, Schilling said. It is marketing BG as *Brontide*, and using Azelis as a distributor in Europe and Daicel as a marketing partner in Asia Pacific.

With BG, Genomatica can prove it can commercialise products that are used in very different markets, while also offering further proof of the viability of its technology.

Genomatica's renewable production of BG and BDO is an industry first, since both are produced directly from fermentation with no intermediate steps.

Myriant and BioAmber have stated their interest in developing renewable BDO, but these processes would rely on succinic acid as an intermediate.

Succinic acid had promised to be a lower-cost BDO feedstock than maleic anhydride (MA), the most common raw material for making the product, but, so far, the succinic acid route has not really caught on.

Myriant started up one 30m lb/year (14,000 tonnes/year) bio-succinic acid plant in Louisiana back in 2013. And BioAmber began producing succinic acid in late 2015 at its 30m lb/year plant in Sarnia, Ontario province in Canada. It had expected to reach full capacity at the end of this year.

Meanwhile, other companies continue to start up BDO plants that rely on traditional petrochemicals for feedstock, mainly in China.

Still, Schilling said Genomatica's process can compete on cost. "We believe firmly that the technologies for BG and BDO have excellent production-cost profiles. That is a key part of the story for us."

Novamont confirmed that Genomatica’s BDO technology met all technical and economic performance guarantees just eight months after the grand opening of its 30,000 tonne/year plant.

Other trends are also moving in favour of Genomatica.

In Europe, interest is rising for renewable materials and in developing a circular economy, in which products and raw materials are reused and waste from one process is used as an input for another.

This year, the European Parliament backed plans to raise the EU’s target for the recycling of municipal waste by 2025 to 55%. The EU wants all plastic packaging to be recyclable by 2030.

This sentiment bodes well for Genomatica's chemicals, which are made from sugars.

One of the uses for BDO is to make single-use compostable bags.

"You can feel the momentum in Europe," Schilling said. "I think there is more effort that you see on the regulatory side as well to promote the adoption of renewables and innovation."

Such sentiment is not as strong in the US, where the focus on renewables has been concentrated on fuels, Schilling said.

Still, one of the promises of biotechnology is that it could open up the US markets regardless of renewable standards.

The industry is still young, so it is just at the beginning of finding ways to reduce costs and become more efficient.

"We're just at the very beginning of the cost improvement curve for these technologies," Schilling said. "We know these things can get so much better."

Additional reporting by Niall Swan

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