

# Genomatica gaining commercial traction despite low oil

## Technology investments pay off with expanded target list, shorter development time lines

Genomatica, a developer of manufacturing processes that enable the production of intermediate and basic chemicals from renewable feedstocks, continues to build momentum behind its first product—biobased 1,4-butanediol (bioBDO)—as well as leverage its fermentation-based technology platform to advance into renewable butadiene and key nylon intermediates.

Renewables have been challenged by cheap oil, technology hurdles, and investor fatigue, but Genomatica's founder and CEO Christophe Schilling says that the company is gaining commercial traction thanks to solid technology and a business plan that positions the company as a technology partner—not a large-scale producer of chemicals.

"We've had a series of announcements the past couple of months starting with a major partnership with [agribusiness giant] Cargill, an expansion of our agreement with BASF, and the expansion of Novamont's bioBDO plant," Schilling says.

Under the agreement with Cargill, signed in July, the two companies will comarket Cargill's feedstock and production services to Genomatica licensees. The collaboration will give third-party licensors of Genomatica's process technology access to a source of carbohydrate feedstocks. "This is a high-impact partnership for us," Schilling says. "There

is no bigger producer of fermentation-based products in the world. Cargill is interested in finding additional outlets for their feedstocks, and Genomatica's technologies can drive that demand. And, with its global footprint of feedstocks, Cargill is a perfect partner."

The agreement could facilitate an over-the-fence solution for downstream producers to site a commercial plant at one of Cargill's wet-mill corn refineries, he adds. "Cargill is ready to put up the capital to build and operate plants on behalf of a company interested in securing the offtake... making it much easier for small, medium and large firms across the value chain to accelerate introduction of more sustainable, cost-competitive materials," Schilling says.

In addition to the Cargill announce-



**SCHILLING:** *Playing the long game in biotech.*

» Genomatica is a technology provider, not a producer of large-volume chemicals. «

ment, BASF announced in October that it had expanded its bioBDO partnership with Genomatica. The licensing deal expands the amount of bioBDO BASF can produce annually—from 50,000 to 75,000 m.t.—and the regions in which BASF is permitted to build a plant to Southeast Asia. BASF first produced commercial volumes of renewable butanediol

(BDO) in 2013 and offered it to customers for testing and commercial use. The quality of this BDO is comparable to petrochemical-based BDO, BASF says. It also expanded its portfolio by producing and offering polytetrahydrofuran (polyTHF) made from renewable BDO.

Meanwhile, the first commercial-scale plant using Genomatica's bioBDO technology is slated to come online in 2016. Novamont is building a €85-million (\$90.5 million); 30,000-m.t./year unit at Adria, Italy. The plant's offtake will replace petroleum-based BDO used to produce polyesters, Novamont says.

### Beyond bioBDO

Genomatica is translating its success in bioBDO into biobased butadiene and intermediates for nylon-6 and nylon-6,6. "Our technology tool kit is driving more rapid innovation," Schilling says. "We've got biobutadiene partnerships with Braskem and Versalis and are getting ready to share details on our progress."

Braskem—the world's third-largest producer of butadiene—agreed to provide "significant" funding for Genomatica's development work and received exclusive license rights to use the resulting process technology in the Americas. The supply of butadiene from North America has been decreasing because of the shift to lighter feedstocks at olefin plants. A biobutadiene plant using Genomatica's technology is also being studied for a Porto Torres, Italy, biorefinery complex Novamont is building in partnership with Versalis.

In August 2014, Genomatica announced that biobased caprolactam, hexamethylenediamine, and adipic acid, all key nylon intermediates, would be its next commercial targets. These products are especially attractive given the sustainability challenges associated with their production—a commonly used petroleum-based route to adipic acid, for example, emits the greenhouse gas nitrous oxide—and the fact that Genomatica's core technology will enable the company to relatively quickly develop and scale up the process technology. Market size for the targeted intermediates, which Schilling estimates to \$18 billion/year combined, is another draw. "With a relatively incremental R&D investment, we can enter three large markets," Schilling adds. The end markets are also distinct from BDO and butadiene, providing further downstream diversification.

"We're also excited that some of the pathways we are looking at could have higher-value specialty chemical opportuni-

### Key partnerships

BASF	Licensing agreement allowing BASF to build up to 75,000 m.t. of BDO/year.
Novamont	Novamont is converting a plant at Adria, Italy, to produce 30,000 m.t./year BDO. Commissioning expected in 2016.
Cargill	Comarketing agreement for feedstock/BDO licensing package.
DuPont Tate & Lyle	Successful, large-scale BDO production campaign in 2012.
Lanxess, DSM, and Toray	Companies demonstrated polybutylene terephthalate production using Genomatica BDO.
Versalis	Biobased butadiene partnership.
Braskem	Joint development agreement for biobased butadiene.

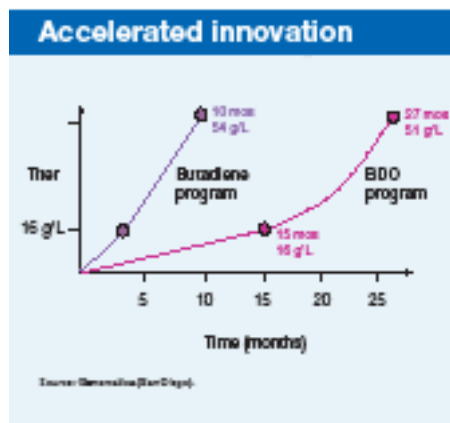
Source: Genomatica.

ties, which would be very attractive for our growth,” Schilling adds. “Our platform allows us to economically address these and other molecules where biology can do a better job than conventional chemistry.”

Schilling credits the company’s technology and licensing business model—which shielded the company from high capital-cost requirements faced by other industrial biotech companies—for Genomatica’s success. “There’s a multiplier effect from [Genomatica’s proprietary] technologies,” he says. “In addition to R&D investments from Genomatica, you have multiple firms investing to build plants or secure early license rights and to use their market knowledge and distribution strengths to drive sustainability into the mainstream. We view ourselves as the biotechnology partner to the chemical industry. We are a technology enabler, not a producer of large-volume chemicals. And as a technology enabler, it’s very important to us to demonstrate continued innovation. And that means that as the trusted partner, major companies will come to us to help them

bioengineer better products and market solutions.”

Picking the right opportunities has also been important. “I think we are being very thoughtful about how we put together our product portfolio,” Schilling says. “There’s



been a lot of question marks in [industrial biotechnology] lately, be it the drop in oil prices or the slow starts of some companies, which can make things a bit challenging. We

feel that biotechnology will have a big influence on industry. But, any time you impact an industry as broad as the chemical industry, it’s going to take some patience.”

Investments the company made in its platform technology are paying off in shorter development time lines for its next targets, enabling the company to drive innovation more efficiently and navigate the challenging financial climate that has impacted industrial biotechnology space in recent years.

“I think some people would have liked to have seen [industrial biotechnology] develop much faster, but we’re talking about plants that take years to get built and a transformation that takes a long time,” Schilling says. “You have to be ready to play that long game. Some companies are ready and prepared and have taken the right measures to do that. And others have struggled. We’ve benefited from the ability to show that we have a platform that can impact a range of products, so it’s not a one-trick pony—even at a time when oil is cheap you’re seeing companies doubling down on Genomatica.”

—REBECCA COONS



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