

Biobutanol steps out of the shade

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The shift towards bio-based molecules has moved along quietly for a number of years. But be it economic uncertainty or the desire for greener molecules, biobutanol has come out of the shade. Sean Sutcliffe, chief executive officer of Green Biologics, explains how the company is preparing for growing demand.

“The newly merged Green Biologics is now a global player and is well positioned to work with producers looking to shift from ethanol to biobutanol production. Our portfolio of proprietary and engineered Clostridia strains can be used in a wide range of starch, sugar and cellulosic feedstock,” says Sean Sutcliffe, ceo of Green Biologics.

Green Biologics was established in 2003. But as of early 2012 the Oxford, UK-based privately held company effectively became a new and bigger operation having merged with US business Butlyfuel, a renewable chemicals and biofuels company with experience in bioprocessing and commercial scale-up. Sutcliffe says that the equity merger gives the new business a global reach while putting it ahead of other biobutanol players such as Tetravitae Bioscience, which was acquired by Eastman during the final quarter of 2011, and Cobalt Technologies.

Green Biologics’ focus is on producing n-butanol for the high value added chemical production market, where the material can be directly substituted for petroleum-based equivalent. Butanol and its derivatives are key intermediates in the production of paints, coatings, adhesives and inks. “The global market for butanol derived products is \$85m, and the market for renewable molecules in the chemical sector is growing at 20% each year. There is demand for biobutanol as a ‘drop in’ fuel, but for us it makes sense to focus on meeting chemical sector demand rather than looking to sell our material as a biofuel. Why burn it when it can be used as a chemical intermediate?” said Sutcliffe. Demand for biobutanol is particularly strong in China, where Green Biologics is on course to bring on stream a 50 000 tonne/year biobutanol facility based on corn waste feedstock. “The Chinese actually have quite a lot of biobutanol production capacity in place, but much of this is based on processes using corn as a feedstock,” explains Sutcliffe. “Using corn in China is expensive, but with Green Biologic’s technology our Chinese partner is using corn waste. The 50 000tpa production plant is due to become operational during 2012 and will meet local demand.”

Green Biologics also has biobutanol projects in India and Brazil, and Sutcliffe says that its ‘capital light’ business model makes it easy for existing ethanol producers to switch production. “Producers are able to leverage existing production assets to reduce operating and capital expenses and enable rapid deployment,” says Sutcliffe. So the

company has good reason to be optimistic about growth following its tie-up with Butylfuel. "The US has a lot of corn-based ethanol production, and Butylfuel is a well known and respected company in the US. Our merger with Butylfuel gives the new business a very strong presence in a market that has huge growth potential."

As well as its 'capital light' business model Green Biologics believes that its process is among the leaders when it comes economics and biobutanol yield. "We have developed technology which yields 80% biobutanol. The key to getting the right economics has been the technology and we have engineered strains for producing butanol from C5 and C6 sugars. Municipal waste is another area where we have demonstrated, on a lab scale, that our biocatalysts can produce butanol. This could be an interesting proposition for a region such as Europe where municipal waste is in abundant supply."

It is the supply of waste materials and the lack of certainty in the petroleum-based sector that Sutcliffe believes will be one of the most significant drivers for increasing biobutanol demand.

"Of course we are competing with petroleum-based butanol producers. But even in the chemical sector, where change tends to be incremental, there is a shift as business looks to satisfy customer demand, meet their own green targets, and have some sort of economic certainty," Sutcliffe comments. Sutcliffe's thoughts prove to be timely as the International Monetary Fund indicated, at the end of January 2012, that sanctions on Iran could push oil prices up 20%-30%, taking the price of Brent crude to more than \$140 a barrel. In a note to G20 deputies, the IMF said "A halt of Iran's exports to OECD economies without offset from other sources would likely trigger an initial oil price increase of around 20%-30%, with other producers or emergency stock releases likely providing some offset over time."

Indeed chemical majors have indicated their desire to be part of the green revolution where bio butanol is concerned. Eastman's aforementioned acquisition and a tie-up between Rhodia and Cobalt Technologies represent recent developments. BP and DuPont have worked together for several years to develop their bio-based isobutanol, which the partners intend to begin producing on a commercial scale within the year.

Green Biologics has 40 staff working in the UK and US and the focus for the next 12 months will be to bring the 50 000 tonne/year plant in China on stream, sign up customers to retrofit its process technology and develop strategic partnerships with chemical industry end users. But keeping an eye firmly on biobutanol's superior qualities as a "drop in" biofuel when compared with ethanol, Sutcliffe adds; "The blendstock opportunity for butanol exceeds \$80 billion each year and there is also potential for it to be upgraded to aviation jet fuel, a £50 billion market."

Whether it is economic stability, or greener credentials that are the drivers, biobutanol looks set to become a key molecule in taking both the chemical industry and automotive fuel sector forward.

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