Biobutanol on the move: Green Biologics closes $25M series B funding round; demo funded; ready for first commercial in 2016

Jim Lane

N-butanol pioneer gains altitude in tough market; Sofinnova and Swire Group join investor group; company receives CMEC shareholder approval on purchase agreement of 23 Mgy ethanol plant

In the UK, Green Biologics announced the closing of a $25 million Series B round led by Sofinnova Partners with strategic participation by Swire Pacific Limited. Follow on investments were also made by Capricorn Venture Partners, Oxford Capital Partners, Morningside Ventures and ConvergInce Holdings LLC.

“This investment round underlines the strength of Green Biologics’ commercial and technical position, and will allow us to execute our plan to bring on stream our first commercial production facility in the U.S. in 2016, ” said Green Biologics CEO Sean Sutcliffe.

Green Biologics also noted that following on from the announcement on July 2nd, an asset purchase agreement has been executed and approved by Central MN Ethanol Co-op shareholders last week. The aim is to retrofit the 23 Mgy plant to produce renewable n-butanol and acetone in 2016.

“Sofinnova looked long and hard in the market,” noted Sutcliffe, “and Swire is very strong in Asia, and has the stake in Cathay who are looking for biofuels potentials for the long term. There are a lot of linkages – agribusiness, and major sugar – a range of interests there. Sofinnova and Swire have seen the progress, and we’re delighted that they like what they see. Obviously its a long-term partnership in the making and they share our vision in building this company and this market.”

Green Biologics and n-butanol, the back-story on the molecule and the Emmetsburg demonstration

Back in July, Green Biologics announced a collaboration and planned investment in facilities with Iowa’s Easy Energy Systems. The collaboration will result in the modification of Easy Energy’s ethanol demonstration plant in Emmetsburg, IA to produce renewable n-butanol and acetone. In mid-2012 GBL successfully produced butanol and acetone from corn mash at the Emmetsburg facility in Iowa at a 40,000 liter fermentation scale.

That breakthrough took the company well down the route to scale — at the 40,000 liter mark, aiming for 80,000. By contrast, Cobalt has been reporting that it has passed the 100,000 liter scale in producing down at the LS9 facility in Okeechobee, Florida.
Ultimately, companies that are successful, financially, will need to reach much later fermentation scale — anything between 500,000 liters and the million gallon scale that Gevo is now successfully operating at. So, there’s a step up of 12X-30X required here — and overall, a reference plant for Green Biologics, featuring multiple fermentation units, would involve a 50-100X scale-up from this level.

The demonstration plant, now

“We’ve done the engineering and Emmetsburg will be up and running at the end of next year,” said Sutcliffe. “That will prove out for our engineering. In the short -term, we’re designing to produce the same products and manner as we plan for the commercial CMEC facility. And that’s part of the marketing push, as we continue to sample, as we did in producing 50 tons of product out of China earlier, which we sold and sampled. So it’s – as part of the marketing push, and invaluable in the short term.”

“Long-term, there will be more based on that location,” said Stone. “It’s not just a short term play to demonstrate corn mash. Eventually, we’ll move from corn mash to add in sorghum syrup, energy beets, or truck in other energy crop feedstocks.”

The timing

“This fundraising is paying for the Emmetsburg demonstration and the early commitments we have with CMEC towards our first commercial,” said Sutcliffe. “We’ll have a year to demonstrate and then complete the engineering for the next fundraising. We’ll look at a follow-on round at the end of 2014, when we’re ready with specific costs on the first commercial.” 2014 is about putting together those funding plans.

The molecules

“There’s more here than just n-butanol,” commented North American president Joel Stone. “Further on downstream, there’s the opportunity to couple butanol and acetic acid for butyl acetate, or with acrylic acid for butyl acrylate, and there are Glycol ethers, as well.Those are some of the largest derivative platforms.

The players in that space? “For butyl acetate and butyl acrylate,” said Stone, “BASF and Dow have been the strongest. In glycol ethers, it’s been Lyondell Basell, they have a core process and dominance there.”

Interested in a go-it-alone against companies like BASF, Dow and Lyondell — or is there a possibility of a hook-up down the line? “We’ve come a long way in demonstrating the validity or the process,” said Stone. “At some stage as we develop, key companies who have been keeping abreast of our development may want to have a more substantive conversation, and we’ll welcome that when we’ve made more progress, and they’re ready.”

The feedstocks

At Emmetsburg, for the demonstration, think corn mash. Longer-term, especially for China as well as they US, think cobs and stover.

Now, technologies like cobs – uniform and relatively easy to work with. But what about the aggregation — haven’t companies like DuPont and POET-DSM concluded that, for now, the future in in stover?

“In China, we’ll focus on both corn cobs and stover,” said Sean Sutcliffe. “The situation is very different China vs the US. There, our partners will set up the aggregation and harvesting, and have the roots in Jilin province.”

Stone agrees. “The challenge in the US is the size of the farms, they’re so big everything is highly mechanized, and uses a single-pass route for the combine harvester. But the farming economics in china is based on much smaller farms, much more manual. So, the logistics are actually easier for us in terms of adding on cob harvesting. You see similar things in Brazil. There are regions where it is more manual with the smaller plantations. Elsewhere, it’s more of a problem because of going to mechanized. You’ve got to look at each region, and it’s going to be a moving target for a while.”

The CMEC deal as a platform for US expansion

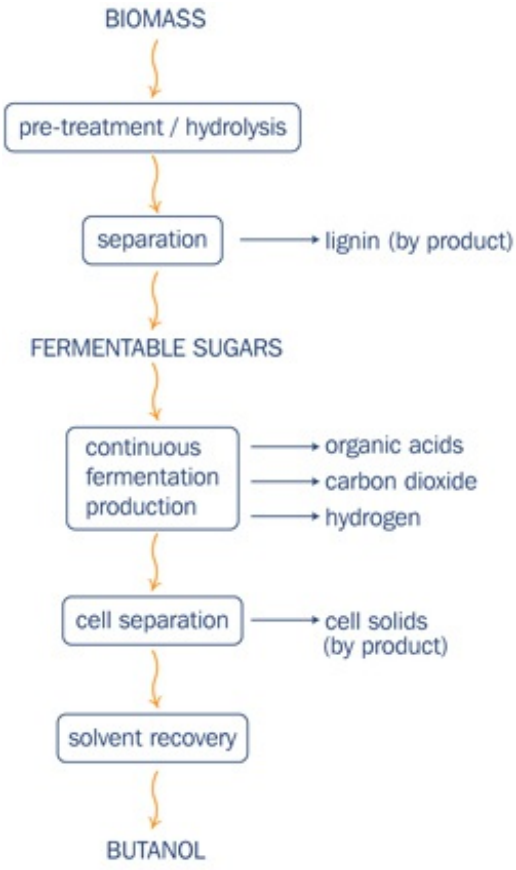
“With the CMEC deal,” said Stone, “the approval this week was the last piece of the puzzle. Being a co-op, it requires shareholder approval, and hit that on the 27th with overwhelming support. It allows us to move forward, and we plan to close in late 2014. That’s because we want to have the Emmetsburg demonstration plant that will give us the design basis, and that’s the next step in finalizing the retrofit.”

C4 molecules and the trend towards natural gas

The CMEC 23 million gallon per year ethanol plant in Little Falls, Minnesota.

Here in Digestville, we’ve been reporting much activity in the C4 platforms, as companies switch from naphtha to low-cost natgas, and there are shortages in the C4 feedstocks. Sutcliffe was having nothing of irrational exuberance. “Commodity cycles swing. Our job is improve the technology, and develop economic returns we can deliver throughout the cycle. We appreciate the trend but we’re not relying on it.”

For those less familiar…



For those less familiar with the 4-carbon butanol (as opposed to 2-carbon ethanol), it’s been widely tipped for years to ultimately be the molecule of choice for the US Corn Belt. It’s been a much tough technology puzzle — but the business case for producing fuels and chemicals using a four-carbon platform is solid. On the chemicals side, there are a range of $5 per gallon applications, or even higher prices.

On the fuels side, though the prices are lower, the blending rates are much higher for butanol with gasoline, the energy density is much higher than ethanol, and there’s no need for a flex-fuel vehicle to run, in terms of vehicle operation, a 50-50 blend of butanol and gasoline. So, lots of upside relative to ethanol.

The problems have been two-fold. First, a fermentation process with sufficient yield. Two, a process that can utilize cellulosic material.

Now, to complicate matters just a little, there’s isobutanol and n-butanol — the former is better for fuels, the latter is better for chemicals. Gevo and Butamax have been working on isobutanol, and have made substantial progress towards scale — especially Gevo, which is now operating at its first commercial facility in Luverne, Minnesota.

On the n-butanol front, there have been Cobalt Technologies and Green Biologics. Not only are both focused, primarily, on chemicals — they both are focused on cellulosic waste as a feedstock (Gevo and Butamax, for now, are producing from corn starch). Turns out that producing n-butanol from C5 sugars (found in cellulose and hemicellulose) is much easier than doing the same for isobutanol.

A differentiating point between Green Biologics and Cobalt has been the feedstock of focus. Though Cobalt is a US company, it has lately been focused on sugarcane bagasse and its ambitions are rightly pointed towards Brazil. By contrast, Green Biologics has been working on grain residues — corn stover, generally — and has been aimed at the US and China.

The bottom line

With the demo plant expected to be ready in the second-half of 2014 — we've still a ways to go towards a first commercial plant. With corn mash in focus for the US, keys from here will be the cost of the corn contracts and the nature of the offtake agreements.
Long-term, corn mash in not feasible on a cost basis in China — turning expectations into reality on that harvesting cobs and stover is one challenge. Finalizing that first commercial design and getting that next fundraising round done — these are the next milestones for the company after completing Emmetsburg.

Learn more about Green Biologics via this free, downloadable 2-page summary, here.

The company's website is here.