15 Burning Questions (Answers) for Biofuels in 2013, Part 2

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This is part two of a two-part piece. Part one can be found here *[1].* [1]

Midstream Technologies

1. What technical breakthroughs that are feasible in the next two to three years would have the biggest impact on the industry? What could turn this space upside down?

The *Digest*'s take: Without a doubt, drop-in fuels and low-cost cellulosic sugars. Only drop-ins serve new markets like aviation, work their way around the ethanol blend wall and overcome the shortage of flexible-fuel vehicles (FFVs) — and, in particular, biomass-based intermediates receive much warmer support from refiners because they don't cut into refinery business.

Potential game-changers in the next two to three years: Will Joule's technology deliver on the numbers at scale, will KiOR be able to scale up to where its costs are competitive with incumbent fuels?

On the sugars side: There's BlueFire, Blue Sugars, Renmatix, Proterro, Comet and Sweetwater already in the mix — and more to come. Regardless, 15-cent sugars would be a game-changing event — especially for financiers and companies like LS9, Solazyme and Amyris, which depend on them.

Downstream Markets

1. In addition to the obvious "flight to higher margin" in the fuels vs. products debate, which makes perfect business sense, are there other benefits people are experiencing — perhaps unexpectedly — from this shift?

The *Digest*'s take: The shift from fuels to chemicals and other higher-value products has the added benefit of removing some infrastructure concerns in deploying volumes at scale. Moreover, as it is a market currently unsupported by subsidies or mandates, it is inherently less controversial.

An interesting phenomenon seen not only with biomass, but also with natural gas — changing the source mix changes the desired location for manufacturing industries. Expect that lower energy costs and more abundant energy will power a renaissance in manufacturing jobs.

2. What's up with renewable jet fuel (RJF) and the Department of Defense (DoD)?

The *Digest*'s take: It should be expected that, should the U.S. reasonably negotiate its fiscal cliff — the Obama administration's $510 million commercialization program for aviation biofuels, centered around the Navy, will finally get funded and underway. Its goal of financing technology at sufficient scale to be cost-competitive is generally well-known. Its goal of buying down the cost of the feedstock to ensure that the fuels are competitive — that's the United States Department of Agriculture's (USDA's) role in the project and perhaps the most important one.

3. What are the implication of the Canadian RFS and U.S. RFS2 for Canadian cellulosic ethanol exported to the U.S.?

The *Digest*'s take: Canada's the land of milk and honey. With massive quantities of wood and ag residues, a society that well understands the importance of a healthy forest products industry and available government support, our expectation is that Canada will focus more on energy exporting with its cellulosic production, rather than imposing a large mandate on itself, which could expose itself to financial uncertainties that have bedeviled even the rich coffers of the American financial markets.

4. What are the market trends and growth perspectives for platform chemicals and biofuel markets outside the U.S.? Where are the big opportunities?

The *Digest*'s take: In a word, Asia. The story in Brazil and the U.S. is fairly well-understood, and the European Union is increasingly likely to be an importer. The wildcard is Asia. With looming shortages in raw energy in many parts of the continent, abundant bio-resources replete with capital in many cases and fast-

growing economies much in need of affordable energy, if Asia isn't doubling its bio-based energy and product production every couple of years through the 2010s and 2020s, we'd be mighty surprised.

Downstream Routes to Market

1. How do the routes to RFS compliance differ between E15 and E85? What's in the future for FFVs?

The *Digest*'s take: E85 is dead. E15 is years away and controversial. E30 is a more friendly option on some levels, yet it requires a flex-fuel vehicle. It is a sweet spot for engines and may become important in the context of meeting corporate average fuel economy (CAFÉ) targets later on.

Here't the big however, however. E85 was killed by not pricing it rationally vis-à-vis gasoline and not concentrating demand. If a cluster approach to FFVs is not employed, and E30 is not priced at an appropriate (10 percent) discount to gasoline (as it is in Brazil), you can forget this market opportunity, too.

2. Hybrids or electric/fuel vehicles are here. Can they run on pure biofuels?

The *Digest*'s take: Hybrids are here and run on biofuels just fine. One of these days someone is going to get the weight right on a renewable diesel-electric hybrid — and that will be a monster in fuel efficiency. Plug-in electrics? Not going to be around in meaningful numbers for a long, long time.

Financing

1. What is the estimated value of a future cellulosic renewable identification number system (RINS) as it relates to financing?

The *Digest*'s take: If we could predict RIN values, we'd probably close down the *Digest*, buy a seat on a trading floor, trade RINs and buy a Caribbean nation within the year. Same goes for share prices, weather, oil prices and so forth.

Here's what we can say for sure. RINs are useless in financing advanced biofuels because no debt guys we know do anything except zero them out, regarding that as a speculative upside for equity rather than a fully hedged means of producing revenue to support project debt payments. In fact, all the venture capitalists (VCs) we know zero them out, too.

2. How are the leading advanced biofuels companies obtaining funding in spite of headwinds from CAFE (which translates into a reduced fuel demand), the boom in compressed natural gas (CNG) and opposition to the RFS?

The *Digest*'s take: Well, here's the pathway. You start with fuel cost. If you are at $85 oil parity or better, good. Short of that, it's time for a flight-to-margin shift to

chemicals. Offtake? A commitment (or commitments) to buy the first five years of production, good. Or 10 years, better. Short of that, you'll be an all-equity financing play. Feedstock? You need contracts that support your costs — how long term depends on the feedstock.

From there, you need mountains of data supporting your supply chain. How do you aggregate feedstock, ship it, store it — and if your feedstock plans looks anything like "if you build it, they will come," you are definitely in the Hurt Room. Rate, titer, yield — for every process step.

And here's the really fun news. Do all that, you still will be all-equity for the first commercial, and probably the second, unless you have a loan guarantee from your friend in equity reserve, the USDA, which is getting out of that business excepting smaller business and industry-type loan guarantees in the $20 million range.

To read part one of this two-part series, please click here. *[1] What's your take? Please feel free to comment below! Copyright 2012;* Biofuels Digest [2]

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