

Pulp Non-Fiction

JIM LANE, Biofuels Digest



In Florida, the affable Rod Young, perhaps the most pre-eminent analyst and forecaster in the pulp & paper industry (and chief economic adviser for RISI, and a pretty good vintner to boot) visited the winter meeting of the The Association of Suppliers to the Paper Industry in Palm Beach yesterday, to give one of the most unrelentingly gloomy mid-to-long term forecasts the Digest has ever heard.

The numbers in the entertainingly presented forecast got so bad that at any moment we expected the Dark Lords of the Sith to make an appearance and signal an end to the sunny days of the old Republic.

Packaging, modest growth. Writing paper, bad. Newsprint, awful. Direct mail, hanging on, "it will be the last thing to go". Magazines, down. Catalogues, unspeakable. Directories, crumbling. The internet has just hammered the sector. Out of respect, we took our meeting notes by hand on notepaper they had provided, and kept our trusty iPad safely tucked away in a briefcase.

Gesundheit!

You know the sector's in the toilet when the brightest sector in the current industry outlook is the demand for tissue paper, driven by the demographics of a rising world population.

After making a few remarks about biofuels and the pulp & paper opportunity, the nice people at ASPI gave us a nice thank-you gift, a memory stick encased in wood with the ASPI logo imprinted. "Made in China", it read.

Which reminded us, that of course, this was a look primarily at North America. In China, "there's this giant sucking sound, which is the Chinese demand for recycled fiber," Young noted, but his overall economic forecast called for rising Chinese interest rates, trouble in controlling the housing bubble across China, and overall, some clouds on the horizon with developing countries as the world economy

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Published on Chem.Info (<http://www.chem.info>)

recovers. “It’s not a black swan event we’re waiting for, but really a grey swan, you know it’s going to happen, just not where.”

But Russia and its rich forest reserves – wouldn’t that save the pulp & paper industry? “Who’s going to put a billion dollars of capital investment into Russia?” Young asked rhetorically. “Even the Chinese wouldn’t do it, unless the Chinese army surrounded the project.”

Pivoting to Biofuels

Which brings us to the options for biofuels to provide both a value-add for the virgin pulp and for waste streams, and utilizing pulp & paper facilities. Particularly closing plants like the Old Town project in Maine where Cobalt Technologies is working on scaling its biobutanol technology.

Though solutions on the kinds of scale that will strongly impact industry numbers are unlikely to come in the first half of the decade, the white knight for woody biomass might well be the biofuels industry. The CEO of Verso, a leading US producer of coated and uncoated papers, recently opined, “we ultimately see ourselves as an energy company with paper as a byproduct.”

Companies that are working the wood opportunities hard include ZeaChem and Mascoma, as well as the aforementioned Cobalt. Chemrec has been working with pulp mill black liquor to convert it into dimethyl ether (DME), which can be used as a biofuel.

Amyris, LS9, Virent and Who? Mercurius?

One of the more interesting early-stage projects in the biofuels industry is working in this sector, currently with sawdust, and that is Mercurius Biofuels. Broadly speaking, its a technology that has a path not entirely unlike the very hottest companies in biofuels such as Virent, LS9, and Amyris, in that it creates a renewable, drop-in diesel from biomass.

Those three are, via very different processes, utilizing sugar as a feedstock. All of them are in, or headed for, Brazil – where not too long ago we speculated about a battle for supremacy between the likes of Shell-Codexis-Virent and Total-Amyris for domination of Brazil, and the world. We wouldn’t die of surprise if Chevron-LS9 found a way into that mix at some stage, though Chevron is more active in Brazil in developing upstream oil & gas at its Frade field than in the downstream retail markets.

By contrast, the Mercurius process is one of the few that we know that generates a renewable diesel from woody biomass without utilizing a sugar – cane, cellulosic, or otherwise. They are an outlier in the argument that the control of low-cost cellulosic sugars is the control of the long-term biofuels industry.

In the case of Mercurius, based on technology originally licensed from the EERC at the University North Dakota and still in early development, the C6 sugars in woody

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biomass (currently, sawdust) are converted to a group of organic acids via an acid hydrolysis – levulinic acid, formic acid, and the C5 sugars are converted to an aromatic aldehyde, in this case furfural.

The Differentiation Point in Those Renewable Diesel Plays

Another point of differentiation from Amyris and LS9 at this point, though not so much with Virent or Avantium- instead of using a magic bug, Mercurius uses a catalytic conversion to transform the organic acids and aldehydes into diesel-range hydrocarbons with excellent cetane numbers in the 70-80 range (premium diesel has a cetane of 60, and standard diesel is in the 40-45 range). According to the company, the fuel has good flow properties and makes an excellent diesel blendstock, and they also have developed an approach for producing renewable gasoline and renewable jet fuel, and can also produce renewable chemicals such as ethyl formate and ethyl levulinate.

Where is the company in its development. Right now, the Ferndale, WA-based group is testing out 12 different catalysts and two feedstocks in a research partnership with PNNL. Following completion of testing and a \$600K micropilot for which it is fundraising with angels and venture capitalists, the company intends to raise \$5 million for its pilot next year based on 1-10 tons per day of biomass, and move towards a 500 ton per day commercial scale facility in 2015. The fuel is penciling out at bench scale at 90 cents per gallon in operating cost, with capex in the \$3-\$5 range, or \$60-\$100 million for a 20 million gallon execution.

Sugar – the New Oil?

Is sugar the new oil? Well, probably, but based on what Mercurius is developing not for absolutely darn certain. While in the obligatory Brazilian business visa waiting period, a visit to Ferndale, Washington might just be the best way to kill time. ZeaChem – developing its technology at semi-works scale in Boardman, Oregon – is on the way. Out of Sand Hill Road in Silicon Valley, head north on I-5, take the right fork at US 97 at Weed, and then mosey along the Columbia River eastbound along US 84 until Boardman, and look at all that lovely wood along the way.

If you notice the high unemployment and eager county development officers in places like Skamania County, Washington, that's good too. Then I-82/I-5 north to Seattle and Ferndale right before you reach the Canadian border.

Along the way, you'll see some of the most amazing sustainable forest resources – they've been a mainstay of pulp-and-paper for years. Now the old paper industry, while still huge, needs a new direction. They have permits, land, pipes, boilers, perhaps the best collection of pre-treatment experts collected on the planet. They sure do need a new set of technologies to tease out the new, higher values in wood. That's what you can supply.

Just don't bring a laptop-based presentation, or an iPad. An old-fashioned print out will do just fine.

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[More on Mercurius.](#) [1]

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[1] <http://www.mercuriusbiofuels.com/>