American producer of green jetfuel looking towards Danish technology

A 400 liter reactor in the process of converting shavings of corn stover.(Photo: Mercurius Biorefining)

A new patented process can convert all kinds of biomass material to green jet fuel and chemicals, and Denmark may be the location for the European headquarters of the American effort.

By Bjorn Godske August 25, 2014 at 06:23

Backed with a new process, an American start-up company focused on second-generation biofuels is already looking out into the big world. They caught sight of Denmark as an area where there are both technological skills and a general understanding of liquid biofuels.

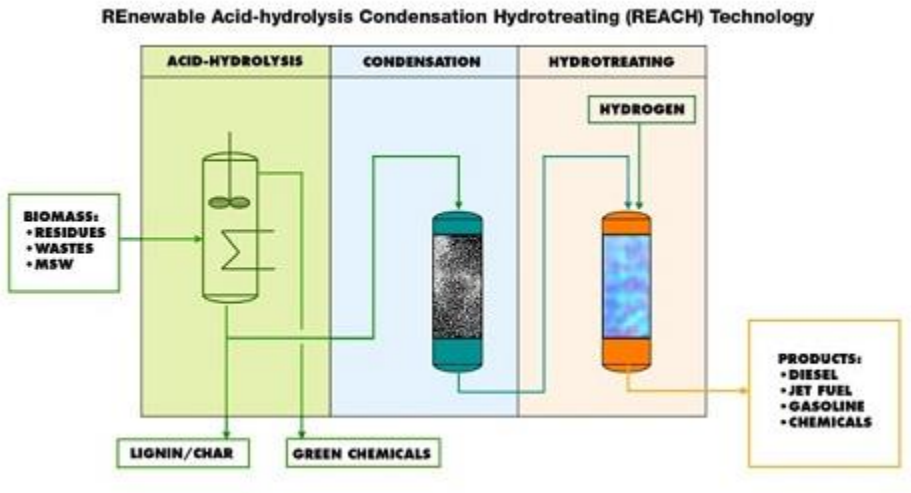
Karl Seck, Executive Director of Mercurius Biorefining, visited Denmark early this summer, meeting at both Symbiosis Centre, Kalundborg and Haldor Topsoe, which produces the catalysts used in the process. He explains:

"Our production will be bigger than just in The United States. Some areas of Europe, particularly the Nordics, are well advanced in the understanding of the significance of global warming. As a company, we need some partners who are advanced in their knowledge of these issues."

Northern Europe also has the advantage that there is a large availability of biomass residues, particularly in the Nordic and Baltic countries, says Karl Seck.

Known techniques put together in a new way

Although Mercurius Biorefining has patented the process, they actually just put techniques together in a new way. Basic elements of this three-step process:
1. Hydrolysis: where the acid partially breaks down the cellulose in the biomass.
2. Condensation: where hydrocarbon precursors build up into the desired carbon chain-lengths.
3. Hydro-treating: where the hydrocarbon precursors have oxygen removed to become drop-in diesel and jet fuel blends. The techniques are known in the paper and petroleum industries.



Different illustration used in original article for translation purposes.

According to Karl Seck the process is substantially faster than the traditional production of biofuels, where enzymes first break down the biomass in order to be fermented into ethanol.

One of the challenges of biofuels is the transportation of biomass itself. The volumes are big, whether it is straw, wood chip or other agricultural residues. One solution would be to establish production facilities where the biomass is located. However, this makes the plants small and thus uneconomical.

Mercurius Biorefining has attempted to solve this by first converting the biomass to a liquid with high energy content near the biomass source. This makes transportation to a central production facility easier as the fluid has a higher energy content both in terms of volume and weight than the pure biomass.

The whole process has been developed in collaboration with Purdue University in Indiana and the University of California, Davis.

Airlines are pushing the development

The finished product will among other things be used as jet fuel, explains Karl Seck:
"The airlines are interested in jet fuel from biomass, because they do not have many other alternatives to reduce CO2 emissions," he said.

Preliminary tests show that Mercurius Biorefining's process is able to convert a ton of biomass to about 300 liters of drop-in hydrocarbon jet and diesel fuel. Residues are few, since all carbon is converted, unlike during fermentation, where a third of the carbon is lost in the process as CO2. However, in addition to a green biofuel, it is also possible to produce green chemicals and a lignin based a bio-char material, which can be used for soil improvement.

The US Department of Energy has awarded 4.6 million dollars to the construction of a pilot plant in Indiana, where residues from corn fields will be used as feedstock. The pilot plant has a capacity of 10 tons of biomass per day. The company expects the price of the finished product can compete with traditional diesel.

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Translated by KB/LHB. Illustration created by Ingeniøren. Original URL:
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