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Biofuel Conference Call Including a New Biodiesel from Algae

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A few days ago I participated in a conference call (recording available here) about biofuels with an organization called Biotechnology Industry Organization (BIO). In this article, I will discuss some things I found interesting, including a new technique for making biodiesel that involves feeding biomass to algae.

The call had three speakers. The first, Jim McMillan of the National Renewable Energy Laboratory gave an overview of the current US biofuel situation. According to him, a lot of current interest is in cellulosic ethanol, since corn ethanol doesn't scale up very well. At this point, the cost of cellulosic ethanol seems to be double or more that of corn ethanol. The economics are still being clarified by demonstration projects. Until there is some sort of climate legislation that raises the price of carbon, it will be difficult to overcome the price gap.

The second speaker was Reid Detchon of Energy Future Coalition, who spoke about political factors affecting biofuels. The big legislation they are looking forward to is the climate-change legislation that would raise the price of carbon, because they believe either McCain or Obama would support such legislation. Such legislation would make biofuels more cost-competitive. This fall, the EPA is scheduled to examine the carbon impact of various biofuels over their life cycles. This could have an impact on how corn ethanol is viewed relative to other biofuels.

The third speaker was Jonathan Wolfson of Solazyme. I found this the most interesting of the three presentations. Solazyme has a process for making biodiesel using algae. Instead of growing algae outside, Solazyme grows micro-algae in tanks in the dark inside, and feeds the micro-algae biomass, such as processed switchgrass. They believe they have developed a technique that is not far from commercial development.

Observations

Biotechnology Industry Organization (BIO) is an industry trade organization, located in Washington D. C.. In many ways it is not too different the from American Petroleum Institute (API), except operating in a different industry. As such, it shouldn't be too surprising if the material they present casts the biotechnology industry in as favorable a light as possible. This is a bias you may want to keep in mind, if you read their materials or listen to the conference call.

The first two speakers on the conference call expect that some sort of climate change legislation will be passed, once a new administration is in place. I am skeptical that that will actually happen. Once people look at the costs involved, I expect that very little will legislation will be passed that

raises the price of carbon. Also, a lot of things could change between now and 2009. I expect the US financial situation will be significantly worse by the end of the year, because of the continued high price of oil. If we have a cold winter as well, I expect support for the legislation will be pretty low.

The conference call was an hour long, so there is quite a bit more on the tape than what I discuss here. If the topics are of interest, you may want to listen to the recording.

Solazyme Technology

As indicated above, I found Jonathan Wolfson's presentation on their new algae technology interesting. According to Wolfson, when the usual approach of growing algae with sunlight is used, the algae have to be efficient on two different processes: (1) transforming light into chemical energy and (2) transforming the chemical energy into oils. In Solazyme's approach, they only have to be efficient at the second half of this process--turning the chemical energy into oils.

With this approach, a variety of different feedstocks can be used. The process basically turns carbohydrates into oils. The oils that are produced can be used in various ways--as a food, as a fuel, or as a chemical feedstock. According to one video I watched from their website, the oil is somewhat similar to olive oil.

In some ways, the Solazyme approach is not too different from an ethanol approach. With ethanol, yeast often acts on corn or biomass feedstock to provide alcohol as an output. With this approach, it is algae that acts on biomass, to provide an oil as an output.

Solazyme claims that it has been able to produce biodiesel fuel that meets the standards for Number 2 diesel fuel. They claim that the fuel they produce can be used at 100% concentration, year around, without problems. I believe that the tests they have run were in only one vehicle, for one year. It seems to me that more tests would be needed to show the limitations of the fuel. For example, do microorganisms grow in the fuel, and cause the problems in the tank after a couple of years?

Solazyme claims that the process they have developed can be scaled up fairly quickly. They have tried to make the process as compatible with existing equipment as possible. The oils they have made to date have been made on large scale equipment owned by someone else, using short production runs. If they leased the equipment full time, or built their own facility, they claim they could make the oil in quantity. Whether or not this can be done needs to be proven, because collecting and processing adequate biomass for any biofuel operation is challenging.

If I understand correctly, Solazyme's goal is to produce biofuel that is competitive with diesel, without subsidies, in a fairly short time. They believe that they can scale up the process (probably to the size of a demonstration plant) in 24 to 36 months.

If you are interested in learning more about this, you will want to listen to the last third of the conference call tape. You may also want to look at the Solazyme website. There are several videos about the process available on that website.

Could this be a panacea?

Regarding whether this could be a panacea, there are still a lot of obstacles in the way. The process is only at a developmental stage, and hasn't been tested at scale. Also, the total amount of biomass available in the US isn't necessarily all that great, if one starts burning it for fuel in

vehicles. We are basically using the same biomass to replenish our soil; to provide wood for heating homes; to provide biomass for fueling electric power plants; to provide feedstock for cellulosic ethanol and now to provide feedstock for algal diesel as well. There is clearly not enough biomass to do all of these things at the scale some might like, simultaneously.

Exactly how much biomass might be available is a subject for another post. A first pass estimate based on the Billion Ton Study is that there is enough biomass to replace about 20% of the US petroleum usage, if biomass is not used for other purposes, such as heating houses. This could be helpful, if we are short of petroleum products, but it isn't a complete solution.

Why haven't we heard about this before?

Solazyne is a privately held company. It is not trying to hype the stock.