

Questions, Responses and Discussion: Cellulose to Ethanol Technologies (Presentations by Tom Richard and Paul Grabowski)

Question: Is there a difference between corn-based ethanol and cellulose-based ethanol?

Response from Richard: There is no difference between the ethanol produced by either type of feedstock.

Question: Tom Richard recommended increasing the productivity of abandoned and marginal land with perennials. Where is the marginal farm land located?

Response from Richard: In the Northeast, the South, Appalachia, and the arid West. In addition to farming marginal land, existing cropland can be farmed more intensively to enhance production of food and fuel.

Question: If a facility is built to use corn as the feedstock for ethanol production, can this facility use other feedstocks as well?

Response from Richard: Facilities built for corn conversion can process other starches including wheat and rye. The pre-treatment processes for extracting the sugars differ with different feedstocks, however, and we need a greater understanding of how the pre-treatment process works.

Question: Would you comment on the use of water in the conversion process?

Responses from Richard and Grabowski: There are various bioconversion strategies. The thermochemical conversion process does not require much water. Generally, 3 ½ gallons of water are required to produce 3 gallons of ethanol. However, the biochemical process is effective when recycled waste water from the conversion facility is used. Additionally, different separation technologies requiring differing amounts of water can be used.

Question: Can switchgrass be used as a nutrient sink and to protect water?

Response from Richard: Yes. One of the benefits of switchgrass and other grasses is that they use nutrients from manure.

Question: Can we expect significant yields of switchgrass without the use of fertilizers?

Response from Richard: There are wide ranges of yields, but it is assumed that significant yields can be achieved using modest amounts of fertilizer and good farming techniques.

Question: Is there a federal policy to remove biomass from federal lands?

Response from Grabowski: DOE does support the removal of biomass and the thinning of national forests.

Question: Is there a commercial cellulose-to-ethanol plant operating now?

Response from Richard: Facilities are in operation but we do not yet have a commercially viable one. To be financially successful, the facility would need to be quite large.

Question: There is a perception that the process of producing ethanol by thermochemical conversion is closer to commercialization than the biological processes. Is this true?

Response from Grabowski: Yes.

Question: There is also a perception that the biological conversion process is less expensive and produces greater output in relation to the inputs. Is this true?

Response from Grabowski: The biochemical industry is well established and is close to reaching the commercialization stage. However, there is no advantage of one source over another.

Question: What is the basis for the prediction that feedstock prices will decline as the conversion technology matures?

Response from Richard: Feedstock costs will decrease as conversion technologies become more efficient. And, as the price of oil increases, the cost of feedstocks, in comparison, decreases.

Question: There is not much emphasis on the ratio of cellulose input to ethanol output. Why?

Response from Grabowski: The current yield from thermochemical conversion is from 70 to 80 gallons/ton of input. The amount of the input depends on the source of heat for the conversion process. The ratio of input to yield is more favorable for the pyrolysis method.

Response from Richard: When discussing energy ratios, remember we have fossil as an input and biofuel as the output. Fossil fuel must be burned to convert biomass to ethanol. No conversion process will generate more energy as an output than is used as an input. The biochemical process depends on how one uses lignin. Lignin as energy yields good output numbers. In the biomass ratio, solar energy is inherent and a cost is not attached to it. A good summary chart of the energy input to output ratios can be found at www.nrbp.org.

Question: What about carbon emissions from biomass fuels?

Response: Emissions are lower from biomass fuels than from gasoline.

Question: Can we blend ethanol with gasoline to make E85 in the distribution chain?

Response from Grabowski: it can be blended at a tank farm.

Question: EISA caps the ethanol portion of the renewable fuel mix to 15 billion gallons. Does the production of bio-oil take the pressure off the production of ethanol?

Response from Grabowski: There is no federal effort to reduce the pressure to produce ethanol.

Question: What recommendations do you have for State action?

Responses from Richard and Grabowski:

- Work with the industry to foster the commercialization of facilities. Assist in the financing of facilities.
- Conduct research to determine appropriate feedstocks for each region of the country, because feedstocks differ by region.
- Invest in the logistics of moving ethanol to market.