

Introduction to Session 4

Process Economics and Commercialization

DONALD L. JOHNSON¹ AND LAWRENCE J. RUSSO, JR.²

*¹Grain Processing Corporation, Muscatine, IA;
and ²New Energy of Indiana, South Bend, IN*

The heart of commercialization is the process economics of any conversion of renewable resources to fuels and/or chemicals. Today, most commodity renewable resources—trees, grain crops, and sugar, for example—are less expensive than crude oil on a pound of feedstock per pound of petroleum basis. The cost on a dollar per “unit of usable carbon” may be a bit more difficult to compare, depending on who does the cost accounting.

The raw material cost, however, is merely the starting point, for if it cannot be converted economically, compared to the alternatives, then there will be no commercialization. In fact, it is extremely difficult to obtain capital if the venture only returns “as good as” or slightly better than the long-practiced alternative business, because the investors will demand a much higher return on their assets for a risky, i.e., new, process. And remember, even if our paper process appears better than a conventional petroleum-based one, there still must be large incentives to compete with an entrenched existing business, because the “initiation fee” can be high, as the existing business folks reduce their prices to stay in business with an already sunk investment.

This meeting has focused primarily on cellulose hydrolysis, with trees or waste paper as the source. Since I am associated with the corn refining industry, my industrial focus has of course been corn as the source of glucose. After all, corn is a steady, abundant source of carbohydrate whose price has been relatively stable, while petroleum fluctuates wildly. Moreover, the infrastructure for collecting, storing, and distributing it is in place. It is a good raw material, then, to convert to fuels and chemicals, with emphasis on higher valued chemicals, while the technology to convert cellulose to glucose is being developed. In this way, the commercial

venture can proceed with the "source" risk removed. After all, the downstream processes ought to work just as well whether corn starch or cellulose is the source of glucose.

In the first part of this session we begin with the methodologies for evaluating economics of some processes, then feature two cellulose hydrolysis, ethanol plant commercial designs emphasizing two different conversion philosophies for your comparison. Then, actual capital and operating costs for producing ethanol from molasses is featured.

In the second part of the session, ideas, economics, and commercial evaluation for producing chemicals is presented.