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How shall we choose? Making useful comparisons between petroleum alternatives

Bruce E. Dale

Professor Bruce E. Dale

Professor Dale is Professor of Chemical Engineering and former Chair of the Department of Chemical Engineering at Michigan State University. In 1996 he won the Charles D. Scott Award for contributions to the use of biotechnology to produce fuels, chemical and other industrial products from renewable plant resources. In 2007 he won the Sterling Hendricks award for contributions to the chemical science of agriculture. He is interested in the environmentally sustainable conversion of plant matter to industrial products — fuels, chemicals and materials — while still meeting human and animal needs for food and feed. He occupies a leadership role in the recently established DOE Great Lakes Bioenergy Research Center (GLBRC). The GLBRC will receive $145 million in Federal funding over 5 years to develop cellulosic ethanol and other bioenergy sources.

Tuesday, May 4, 2010

Lecture: 4:15 PM
Room 66-110, Landau Building
Reception to follow

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Abstract

The world is beginning a long, and certainly painful, transition between the fossil energy sources, particularly petroleum, that have powered our economic growth over the last couple of centuries, and whatever energy carriers will come next. If we are to make sound choices between our petroleum alternatives, we will need to agree on metrics to guide our choices and then make sure we implement those metrics on a fair, consistent basis. Dale speaks from the battlefield of biofuels, perhaps the most visible near term alternative to petroleum. As such, biofuels are becoming a test case for the metrics we will use to choose between petroleum alternatives and how we will employ those metrics to make good choices. So far, we are not making very rational, fair comparisons.

Key metrics for choosing between petroleum alternatives should include at a minimum: potential scale, likely environmental impacts (including greenhouse gases), ultimate cost and energy return on investment (EROI). (The EROI metric is particularly important and therefore, it is particularly important to implement it correctly.) These metrics are analyzed for several petroleum alternatives, including different biofuels. Cellulosic biofuels show great promise when evaluated using these criteria.

Given the perceived land use issues and potential conflict with food production that accompany all discussions of biofuels, the analysis is broadened to determine how cellulosic biofuels might be gracefully integrated with existing agricultural systems to provide large net benefits. The results are frankly startling. If we redesign a relatively small fraction of our agricultural system to coproduce food and fuel, we can produce enough biofuel to replace about 70 billion gallons of gasoline per year while still generating all the food and feed currently produced from that land and reducing total US greenhouse gas production by 10%.

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