Ethanol, Missouri, and the Future

Most projections assume that the U.S. will switch from corn ethanol to cellulosic ethanol in the future. Cellulose is the starchy "skeleton" of a plant. It is converted into sugar by processing with enzymes or acid, and then the sugar is fermented into ethanol. There is more cellulose in most plants than there is sugar (the stalk, the woody part, etc.), hence cellulosic ethanol is potentially a larger source. In addition, cellulose can be obtained from sources that are otherwise considered weeds or waste: sawdust, cornstalks, wheat chaff, and grasses. Switchgrass, made famous by President Bush, is an example. A grass native to much of the U.S., it grows in poor soils, requires no fertilizer and little water, and produces large amounts of biomass. Thus, cellulosic ethanol is potentially a higher-yielding, more efficient process that diverts less land from food production and requires less water, herbicides, pesticides and energy to farm.[i] Some also estimate that it could become a very high profit product.[ii]

The downside is that it has not been economically feasible until recently. The process of converting cellulose to sugar is not efficient, and the use of acids is problematic in terms of pollution. Many experts feel that it is not a large technical challenge to discover new enzymes to make this process more efficient. However, as things stand now, there is controversy over whether cellulosic ethanol has a positive[ii] or negative net energy yield.[iii]

In the future, Missouri will need to find substitutes for gasoline that can be produced in large amounts—the equivalent of about 77 million barrels per year, assuming gasoline use does not increase from 2004. Replacement with corn ethanol would require conversion of food-producing cropland equivalent to roughly 1/6 of the state. While physically possible, it would have terrible consequences on the availability and cost of food. Replacement with cellulosic ethanol might potentially involve less land and marginal land, reducing the amount converted from food production. But it is an unproven technology. And unless technical improvements occur, both strategies would seem to have small net energy yields. That means that in production, either other sources of energy would have to be consumed—coal or natural gas—or the manufacturing plants would have to consume a large fraction of their own production to power themselves. "A recent study by the Organization for Economic Cooperation and Development concluded that biofuels 'offer a cure [for oil dependence] that is worse than the disease.'"[iv]

E10 is useful, perhaps even necessary, as a gasoline additive; in that role it makes a contribution to extending gasoline supplies, securing energy independence, and ameliorating CO_2 emissions. Ethanol may be an economic benefit for Missouri farmers, and we should encourage Missouri's participation in the E10 market. There may be a role for E85 going forward, but it is not yet proved, and hopes that it might substitute for gasoline seem unrealistic. We should be interested in research to improve the manufacture of ethanol, but skeptical about currently investing heavily in ethanol plants for the E85 market; they may be economically unfeasible and may be environmentally unsustainable.

[i] For an easy to read primer on cellulosic ethanol, see *Cellulosic ethanol,* Wikipedia, retrieved online 12/6/2007 at http://en.wikipedia.org/wiki/Cellulosic_ethanol.
[ii] Switch grass: Alternative energy source? *All things considered.* (2/1/2006). Audio file accessed 12/6/2007 at http://www.npr.org/templates/story/story.php?storyId=5183608.
[iii] Ethanol and biodiesel from crops not worth the energy. *Science daily,* (7/6/2005). Retrieved online 12/6/2007 from http://www.sciencedaily.com/releases/2005/07/050705231841.htm.
[iv] Etter, Lauren. (11/28/2007). *Ethanol craze cools as doubts multiply.* Wall Street Journal. Retrieved online 12/6/2007 at http://online.wsj.com/public/article/SB119621238761706021.html.