

PolicyPennings by Dr. Daryll E. Ray

Importance of farm-based energy production has come full circle

We grew up just after the end of an era when biofuels—though we did not call them that—were the basic means of getting farm work done. Farm houses were heated with wood from the woodlot and the horsepower that plowed the fields and harvested the crops was fed by grass, hay and oats that were grown on the farm. In some places a DELCO or Windcharger system powered by a windmill provided rudimentary electric lighting for the farm. In addition, windmills were universally used to pump water for livestock and household use.

With the advent of gasoline and diesel tractors and rural electrification, the energy we used on farms came from somewhere else. It was refined from crude oil or generated from coal and much of the pasture and oat fields were converted to crops like corn and later soybeans. The bulk truck and the on-farm fuel tank became the source of energy that was used to power the agricultural work of the farm. In time, the idea of biofuels began to sound strange.

Later on, low corn and soybean prices sent farmers looking for some way to get more dollars out of the raw products they were producing. Ethanol and biodiesel seemed like logical products, after all Rudolf Diesel used peanut oil to fuel his early engines and farmers have been converting corn into alcohol for a long time. It was a struggle to develop the budding biofuels industry in the late 90s. The idea of biofuels sounded farfetched.

Then along came Katrina, political instability in the Middle East, and crude oil above \$60 a barrel and suddenly everyone was talking about biofuels and energy independence. Though commodity prices have risen in response to the additional demand for corn to be converted to ethanol, oil prices have continued to rise as well and suddenly it seems that everyone is in the biofuel business.

At the opening of the North American International Auto Show in Detroit, General Motors announced that it had bought a stake in Coskata, a start-up company. They plan to make ethanol by using inputs—wood chip and industrial and municipal waste—other than corn. When it is in full production, Coskata expects to be able to produce ethanol for less than \$1 a gallon. They claim their process gets more energy per ton of input than other processes and uses less than a gallon of water for each gallon of ethanol produced.

A recent article in the proceedings of the National Academy of Sciences of the United States (PNAS), <http://www.pnas.org/cgi/print/0704767105v1>, reported that "switchgrass

produced 540% more renewable energy than non-renewable energy consumed....[and] estimated average greenhouse (GHG) emissions from cellulosic ethanol derived from switchgrass were 94% lower than estimated GHG from gasoline."

Diversified Energy Corporation http://www.soyatech.com/news_story.php?id=6331, recently demonstrated a process that takes renewable oil—both plant and animal—and converts it directly into a "biogasoline fuel very similar to traditional unleaded gasoline." The process they used was developed by scientists at North Carolina State University (NCSU). Dr. Henry Lamb, NCSU Professor of Chemical and Biomolecular Engineering and lead investigator on the bio-gasoline work, remarked, "With over 243 million vehicles on U.S. roads (with a majority using gasoline), finding an affordable renewable drop-in replacement would be a major achievement."

At one time people were talking about 5 to 7 to 10 years before biofuels other than corn-based ethanol would be available commercially. Today the press releases are talking about having plants online by 2011, three years from now.

It should be noted that this type of research is not limited to the US. The Japanese have adopted a biomass policy that will convert rice straw and other cellulosic waste products into liquid fuels.

At this point it is unclear which technology will become the standard of the future. Likewise it is unclear what impact all of this research work will have on agriculture and how much and what kind of land will be involved. What we do know is that people need to eat and corn may not be the primary feedstock for the production of biofuels in the not too distant future.

With so much money being poured into cellulosic research by so many, technology advances that make cellulosic-based fuel a competitive reality seem like a very good bet indeed. Farms will again play a central role in energy as well as food production, except most of the energy will be used off the farm this time around.

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