

## Biofuels Won't Give No Satisfaction

Economics has only four basic principles: Marginality, elasticity, substitution and time preference. And as anyone whoever completed a basic course can attest, prices are set at the margin. It is the price offered for the last unit produced and the cost of producing that last unit that really matter.

These principles from the so-called Dismal Science paradoxically give us reason to be optimistic about the world's energy picture. As I never tire of pointing out, usually to the consternation of the hot commodities crowd, long-term constant-dollar prices for commodities must decline for reasons of substitution and the price elasticity of demand. As price rises, additional substitutes become economic and demand for the marginal unit declines.

Of course, we are dealing with a set of two-edged swords here. The very same roster of energy alternatives bandied about today were bandied about in the 1970s: Solar, wind, oil sands, oil shale, heavy oil, coal gasification and/or liquefaction, liquefied natural gas, coal seam gas, Devonian shale, tight sands gas, wind, solar, tidal, and so on. Why are these sources still called alternative? The marginal unit of conventional fossil fuels remained cheaper and more abundant than any of them and therefore the alternatives remained uneconomic.

Billions of dollars were wasted on those alternative energy projects by both private firms and governments until the 1985-1986 oil price collapse brought the farce to an end. As I emphasized last [March](#), everyone running an energy business today is a survivor of that collapse, and as Mark Twain observed, a cat who sits on a hot stove will not sit on a hot stove again. Or a cold one.

### Here Comes The Sun

I participated in a conference on alternative energy sources in 1981 where an investment banker was touting the use of wood as a renewable energy source. His marketing gimmick was ingenious; he kept referring to wood as "young coal," and the truth of that moniker was and is indisputable. With the sole and prominent exception of nuclear, all energy sources can be traced back to the sun, either in the form of current thermal gradients (wind, hydroelectric) or in the form of fossil fuels, solar energy captured by plants and converted chemically. A comedian with the marketing moxie of my friend above could call crude oil and natural gas biofuels and be perfectly within his rights.

But biofuels have come to mean one of two things, either a diesel fuel substitute derived from vegetable oils such as soybean oil or ethanol derived from sources such as corn and sugar. These two biofuels were the subject of an excellent presentation at a conference in London last week, the gist of which I will summarize below.

First, those hoping for free-market economics are advised to look elsewhere. Mandates abound, from the European Union's "soft" mandate for 5.75% biodiesel use by 2010, up from 2% today, and its tax credit of \$450 per metric ton to the U.S. exemption of ethanol from the federal gasoline tax to Brazil's mandated targets for ethanol use in motor fuels. The combination of agribusiness interests, farm state votes, green lobbies, petroleum displacement and industrial policy is irresistible to politicians.

Second, high petroleum product prices make production attractive. This is true for both European and American biodiesel derived from soybean oil and for American ethanol derived from corn. The recent jump in sugar prices, discussed here in [February](#), has pushed Brazilian ethanol derived from sugar right to its breakeven zone, however. This is a clear warning, one that we will return to below.

### Capacity

Many of us learned in our youth about the capacity issues associated with ethanol. They exist for biodiesel as well. Current world diesel and fuel oil consumption is more than 1,500 million metric tons (MMT) per year. We can compare that to world vegetable oil production of 115 MMT per year, of which 6 MMT go to biodiesel production. As the presenter noted, if we diverted 100% of world vegetable oil production to biodiesel, we would displace 27 days of current diesel and fuel oil consumption.

We could run through a similar exercise with ethanol. If we distilled the entire U.S. corn crop and used none of it for human or livestock consumption, we could displace 85 days of gasoline consumption. Global sugar cane production is the equivalent of 113 MMT of ethanol; this compares to global gasoline consumption of 982 MMT of gasoline.

Let's stipulate right now we are not going to divert 100% of the world's corn, sugar and vegetable oil crops to fuel production. As much as drivers everywhere want cheap fuel, most want to eat on occasion, too.

While commodity optimists such as myself point out, few endeavors are more suited to technological – read “genetic” – efficiency gains than the conversion of existing organic matter into either food or fuel, we are facing a situation where the energy business is exerting an increasing claim on certain of the world's foodstuffs. Even this year, U.S. ethanol production could grow to where it claims nearly all of our corn exports.

I might point out as an aside some major trans-Atlantic attitudinal differences. The Europeans at this particular conference, including a very well-versed representative of the International Energy Agency, kept returning to carbon dioxide and the global warming issue; the Americans generally shrugged. The Europeans have different attitudes on the genetic modification key to increased corn and sugar production as well: They fear it palpably while the Americans accept it. In sum, Europeans want all of the “green” benefits of biofuels and are not willing to accept at least one cost, genetic modification. In reality we no doubt need to both increase the use of genetic modification and reduce carbon emissions.

### **Filling The Gap**

If the world is going to need an additional 30 MMT of vegetable oil for biodiesel production by 2010, from whence will it come? In addition to soybean oil, palm oil from Malaysia and Indonesia, canola from Canada and Australia and sunseed oil from Argentina are likely sources. Each has a limited capacity and in the case of palm oil, up to five years is required for the trees to become productive. Soybean oil will remain the marginal supply source, and this will inject far greater price volatility into the soybean market than seen in the past. A similar analysis offered for ethanol indicates U.S. corn will be the marginal source of supply, with consequence for prices.

Where does that leave us? The combination of high conventional energy prices and government mandates are going to put fuel claims on what had been the sole province of food claims. This means energy prices will drive agricultural prices, and the energy market's impact on agricultural prices will be far stronger and more immediate than will the food market's impact. And as seen before, any downturn in the conventional fuel market will render biofuels uneconomic very quickly.

The prospect is unsatisfying. If high prices strengthen energy's claim on food supplies, governments everywhere will intervene on behalf of their hungry citizens. If low prices torpedo biofuels' economics, governments everywhere will respond with subsidies for these industries. Only an elimination of current mandates and subsidies today will avoid these problems tomorrow, but the likelihood of this happening is near zero. Somehow I think we will rue the day when we decided to make food and fuel substitutes at the margin.