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CAN THE CHEAP, CONVENIENT, READILY AVAILABLE ENERGY PARTY CONTINUE?

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If a path to the better there be, it begins with a full look at the worst. Thomas Hardy

Throughout most of my life (I am 83), the United States has been the world's largest consumer of resources, such as grain, meat, steel, coal, and oil. At present, China leads in consumption of all these resources except oil, but China's economic growth rate of 8% is already a significant factor in global oil markets. Persuasive evidence indicates that oil supplies are peaking, so alternative fuels have a major role to play in the future energy market. The Energy Future Coalition is funding a 25 x 25 campaign — 25% of energy used in the United States in 25 years should come from biofuels produced on agricultural lands.

However, the few companies that focus primarily on ethanol are typically unprofitable. For example, Pacific Ethanol has not yet had a profitable quarter. In addition, ethanol has been touted as a "green" fuel; however, some producers have now switched their energy source for processing ethanol from relatively clean natural gas to coal, which exacerbates the global warming problem. Nevertheless, alternatives for oil must be found – and soon – that do not exacerbate global warming.

Biofuels are nothing new. Pioneers of the American West used buffalo "chips" for their cooking fires, and many Americans have fond memories of sitting around wood campfires. However, the recent rise in gasoline prices and the increasingly precarious supply of petroleum-based fuel have resulted in enormous interest in converting sugar, corn, soybeans, and sunflowers into a fuel that can be used in automobiles (typically when mixed with a petroleum product). Suddenly, the threats to the American way of life seem less than they appeared to be before modern biofuels appeared on the scene. Even with these new possibilities, I remember being told as a child that, if something appears too good to be true, it probably is. Biofuels are still in the experimental stage. Other alternatives are possible for this energy crisis, but they all appear likely to have a greater impact on the personal lifestyle of individuals than the biofuel alternative. The lure of less disruption to lifestyles is certainly one of the major attractions of the biofuel alternative, but is this alternative justified?

In the mid-1960s, I taught at the University of Kansas and saw the enormous fields of grain tended by farmers who used huge machines run by oil. Not only was it necessary to prepare the soil and harvest the crop but also to apply fertilizers and pesticides, etc. Clearly, a substantial amount of energy was invested even then; now the harvested material (e.g., corn) must be processed so that it is suitable for the internal combustion engine and then transported to urbanized areas for use. If all these activities, in the aggregate, require more energy than the resulting ethanol or biodiesel generates, then this strategy is not viable and sustainable. Studies of ecologist David Pimentel (Cornell University) and engineer Tad W. Patzek (University of California Berkeley) have revealed that turning plants such as corn, soybeans, and sunflowers into fuel uses much more energy than the resulting ethanol or biodiesel generates (Pimentel and Patzek 2005). Fortunately, data are available that bear directly on this issue, in terms of energy output compared with energy input for ethanol production: corn requires 29% more fossil energy than the fuel produced contains, switch grass requires 45% more fossil energy than the fuel produced contains, and wood biomass requires 57% more fossil energy than the fuel produced contains. In terms of energy output compared with energy input for biodiesel production, the study found that soybean plants require 27% more fossil energy than the fuel produced contains and sunflower plants require 118% more fossil energy than the fuel produced contains.

However, sugar cane provides a much more attractive alternative. Brazil expects to be energy self-sufficient in 2006 by increasing production of both ethanol from sugar cane and petroleum (Rohter 2006). The use of ethanol in Brazil is already so common that some gas stations have two sets of pumps, marked A for alcohol (ethanol) and G for gas. Brazil has experienced 30 years of trials to reach this stage, along with the inevitable mistakes en route. In addition, the use of alternative fuels in Brazil has been accelerated by the introduction of "flex fuel" engines designed to run on ethanol, gasoline, or any mixture of the two. At present, over 70% of the automobiles sold in Brazil have flex fuel engines. Brazilian executives feel that the US tax of 54¢ on all imports of Brazilian sugar cane-based ethanol has slowed the development of this alternative fuel, which began in 1975 after the first global energy crisis. The most impressive advantage of sugar-cane based ethanol is that, for each unit of energy expended to turn sugar cane into ethanol, 8.3 times as much energy is

made available, a figure supported by scientific evidence. Furthermore, fossil fuels are not used in the processing. Instead, cane residue, after the sugar has been squeezed out, is used as fuel.

The numbers for fossil fuels used to generate alternative energy sources (other than the ones for sugar cane) are depressing enough on their own, but as Professor Pimentel notes, "The government spends more than $3 billion a year to subsidize ethanol production when it does not provide a net energy balance or gain, is not a renewable energy source or an economical fuel." This spending is a perverse subsidy since it does not provide energy security. Worse yet, this subsidy gives the illusion that American energy security is improved. Once the general public realizes that present ethanol production in the United States does not benefit the nation's energy security, more attention will be given to alternative energy sources such as photovoltaic cells and wind power and producing fuel from hydrogen conversion. More energy efficient appliances and automobiles, together with convenient and attractive public transportation systems, which already exist in some other parts of the world, would buy the time needed to develop a substantial long-term energy policy, as would more frugal energy consumption by individuals.

Supporters of ethanol-blended fuel state that byproducts of ethanol production, such as distiller grains and corn oil, have not been factored into the input/output equations (Environmental News Network 2006). Since the Pimental and Patzek study indicates that corn requires 29% more fossil energy than the fuel produced contains, these byproducts would have to make a major contribution just to break even.

The United States already has a substantial ethanol industry with 33 new plants under construction (Foss 2006). The banning of additive MTBE (in some states, but not Virginia) will cause some problems, as will transport and distribution since ethanol tends to corrode pipelines. These pipelines need to function properly to provide the badly needed data on energy input/output ratios discussed earlier. At the same time, supply and demand issues can be clarified. Energy policy for both the United States and Virginia must be based on solid economic evidence. Bob Slaughter, president of the National Petrochemical and Refiners Association, stated that Congress is guilty of more irrational exuberance on ethanol than on any other issue.

Basically, all energy options must be compared on a level playing field in a fair and equitable fashion. Energy security is too important to be dominated by pork barrel politics or special interest groups. The markedly different energy balance of Jon Van Gerpen and Dev Shrestha (Biodiesel Energy Balance 2006) notes that the detailed study carried out by the USDA and USDOE claimed that the energy in a gallon of biodiesel was 3.2 times greater than the energy required to produce it. As already noted, the Pimental and Patzek analysis shows that biodiesel production actually requires 27% more fossil energy than is present in the biodiesel. A sound energy policy demands more robust evidence than this discrepancy. Is the input greater or less than the output?

In contrast, wind energy demand is booming because the cost is dropping below conventional sources (Brown 2006) and the public can easily confirm this savings in a variety of locations. "Clean" coal is also an alternative energy possibility, although more evidence is needed that coal's environmental impact has been reduced (Deyetter and Frease 2006).

The era of cheap, abundant, convenient energy is over and delaying action will surely make the problem more difficult and expensive to address. Major development of alternatives with minimal environmental impact will lessen the aggravations of the transition period.

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