

The Wall Street Journal Online

December 30, 2006

Gentlemen, Start Your Plug-Ins

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An oil and security task force of the Council on Foreign Relations recently opined that "[t]he voices that espouse 'energy independence' are doing the nation a disservice by focusing on a goal that is unachievable over the foreseeable future . . ." Others have also said, essentially, that other nations will control our transportation fuel -- get used to it. Yet House Democrats have announced a push for "energy independence in 10 years," and last month General Motors joined Toyota and perhaps other auto makers in a race to produce plug-in hybrid vehicles, hugely reducing the demand for oil. Who's right -- those who drive toward independence or those who shrug?

Bet on major progress toward independence, spurred by market forces and a portfolio of rapidly developing oil-replacing technologies.

In recent years a number of alternatives to conventional oil have come to the fore -- oil sands, oil shale, coal-to-diesel and coal-to-methanol technologies. But their acceptability to a new Congress, quite possibly the next president, and a public increasingly concerned about global warming will depend on their demonstrating affordable and effective methods of sequestering the carbon they produce or otherwise avoiding carbon emissions.

Ethanol's appeal rose a few years ago when it became clear that genetically modified biocatalysts could break down the cellulose in biomass and thus enable ethanol's production from a wide range of plant life. This means that, compared with corn, little fossil fuel is needed during biomass cultivation and land use presents much less of a problem. Indeed two years ago the National Energy Policy Commission (NEPC), making reasonable assumptions about improved vehicle efficiency and biomass yields over the next 20 years, estimated that just 7% of U.S. farmland (the amount now in the Soil Bank) could produce enough biomass to provide half the fuel needed by U.S. passenger vehicles, and that production costs for cellulosic ethanol were headed downward toward around 70 cents per gallon. Further, conversion of only a portion of industrial, municipal and animal wastes -- using thermal processes now coming into commercial operation -- appears to be able to yield an additional several million barrels a day of diesel or, with some processes, methanol.

But in spite of the technological promise of alternative liquid fuels, skeptics rightly point out that it will take time to build production facilities and learn the practicalities of operating biorefineries and shifting industry from hydrocarbons to carbohydrates. Most of all there is a sense of investor caution, driven by memories of the mid-'80s and the late '90s when sharp drops in oil prices, driven in part by increased production from Saudi reserves, bankrupted such undertakings as the Synfuels Corporation. Also, industry

support for moving away from oil dependence has long been weak outside agribusiness, and consumers see little immediate savings from using alternative liquid fuels.

All this is likely to change decisively, because electricity is about to become a major partner with alternative liquid fuels in replacing oil.

The change is being driven by innovations in the batteries that now power modern electronics. If hybrid gasoline-electric cars are provided with advanced batteries (GM's announcement said its choice would be lithium-ion) having improved energy and power density -- variants of the ones in our computers and cell phones -- dozens of vehicle prototypes are now demonstrating that these "plug-in hybrids" can more than double hybrids' overall (gasoline) mileage. With a plug-in, charging your car overnight from an ordinary 110-volt socket in your garage lets you drive 20 miles or more on the electricity stored in the topped-up battery before the car lapses into its normal hybrid mode. If you forget to charge or exceed 20 miles, no problem, you then just have a regular hybrid with the insurance of liquid fuel in the tank. And during those 20 all-electric miles you will be driving at a cost of between a penny and three cents a mile instead of the current 10-cent-a-mile cost of gasoline.

Utilities are rapidly becoming quite interested in plug-ins because of the substantial benefit to them of being able to sell off-peak power at night. Because off-peak nighttime charging uses unutilized capacity, DOE's Pacific Northwest National Laboratory estimates that adopting plug-ins will not create a need for new base load electricity generation plants until plug-ins constitute over 84% of the country's 220 million passenger vehicles. Further, those plug-ins that are left connected to an electrical socket after being fully charged (most U.S. cars are parked over 20 hours a day) can substitute for expensive natural gas by providing electricity from their batteries back to the grid: "spinning" reserves to help deal with power outages and regulation of the grid's voltage and amperage.

Once plug-ins start appearing in showrooms it is not only consumers and utility shareholders who will be smiling. If cheap off-peak electricity supplies a portion of our transportation needs, this will help insulate alternative liquid fuels from OPEC market manipulation designed to cripple oil's competitors. Indian and Chinese demand and peaking oil production may make it much harder for OPEC today to use any excess production capacity to drive prices down and destroy competitive technology. But as plug-ins come into the fleet low electricity costs will stand as a substantial further barrier to such market manipulation. Since OPEC cannot drive oil prices low enough to undermine our use of off-peak electricity, it is unlikely to embark on a course of radical price cuts at all because such cuts are painful for its oil-exporter members. Plug-ins thus may well give investors enough confidence to back alternative liquid fuels without any need for new taxes on oil or subsidies to protect them.

Environmentalists should join this march with enthusiasm. Replacing hydrocarbons with fuels derived from biomass and waste reduces vehicles' carbon emissions very substantially. And replacing gasoline with electricity further brightens the environmental

picture. The Environmental and Energy Study Institute has shown that, with today's electricity grid, there would be a national average reduction in carbon emissions by about 60% per vehicle when a plug-in hybrid with 20-mile all-electric range replaces a conventional car.

Subsidizing expensive substitutes for petroleum, ignoring the massive infrastructure costs needed to fuel family cars with hydrogen, searching for a single elegant solution -- none of this has worked, nor will it. Instead we should encourage a portfolio of inexpensive fuels, including electricity, that requires very little infrastructure change and let its components work together: A 50 mpg hybrid, once it becomes a plug-in, will likely get solidly over 100 mpg of gasoline (call it "mpgg"); if it is also a flexible fuel vehicle using 85% ethanol, E-85, its mpgg rises to around 500.

The market will likely operate to expand sharply the use of these technologies that are already in pilot plants and prototypes and heavily reduce oil use in the foreseeable future. And given the array of Wahhabis, terrorists and Ahmadinejad-like fanatics who sit atop the Persian Gulf's two-thirds of the world's conventional oil, such reduction will not be a disservice to the nation.

Mr. Woolsey, co-chair of the Committee on the Present Danger, was Director of Central Intelligence from 1993 to 1995