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Thursday, March 18, 2004

## **Detroit Should Plug In to Future**

**By Alan Zelicoff**

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It's time to stop kidding ourselves about cheap oil. Prices are going up — in international markets and at the pump— and aren't likely to come down.

As reported in the New York Times a few weeks ago, even the prodigious petroleum reserves of Saudi Arabia— long a moderating influence on prices so long as the prickly royal family is in a good mood — may no longer be sufficient.

Driving accelerating demand are the rapidly growing economies of China and India where new wealth means many more automobiles on the road. Last year China increased its oil exports by 30 percent and it is set to do so again this year. Only second behind the United States in imports, it now leads Japan as an oil buyer.

None of this is to say that oil will run out. But the costs of recovering it, protecting the sea lanes where it is shipped, and propping up governments that we'd otherwise wish away but for their fossil fuel resources are rising quickly.

Because just about all U.S. transportation is propelled by oil— with almost two-thirds of the supply provided by imports— the prospects for severe economic impacts are higher than at anytime since the oil crisis of 1973.

But there may be an answer to a big part of our energy worries: advanced "heavy" hybrid vehicles. These are an extension of the already successful "light" hybrids that have been running around highways in Japan and the United States for six years, but with a twist. A new class of batteries results in much more energy storage and no compromise in performance, while providing reductions of 75 percent or more in gasoline consumption. The energy replacing inefficiently burned gasoline comes from the electric grid.

Professor Andy Frank of the Mechanical Engineering Department at the University of California-Davis has been building hybrids for 30 years. But over the past 10 years, he and his students have turned out heavy hybrids in the styles and sizes that most Americans insist on: large

sedans and SUVs.

Frank's Mercury Sable, Ford Explorer and Chevrolet Suburban all go 60 miles— and at highway speeds— on electricity alone before needing a recharge from a typical 110 volt outlet (the batteries charge fully overnight). That's more "electric-only" range than the daily commutes of 80 percent of U.S. drivers.

When the batteries go low, a small gas engine keeps them at about 20 percent of peak charge. And, when combined with the mechanical, continuously variable transmission that Frank has perfected, the gas engine maintains cruising speeds of up to 80 mph while the batteries provide an additional 200 horsepower for the brief times needed for passing or hill-climbing.

To the driver, aside from the noise reduction in the passenger compartment, there is no perceptible difference in handling or acceleration. Even energy that is normally lost as heat during braking is recaptured in the battery packs.

It takes about 15 kilowatt-hours to charge the batteries (about a dollar's worth of electricity), and electric motors are six or seven times as efficient as internal combustion engines. Thus, the fuel costs are about 1.6 cents per mile (as compared to 7 cents per mile with gasoline prices at \$2.00 in a sedan, and 10 cents per mile for an SUV).

Don't worry too much about where the electricity will come from. Even if tomorrow 10 percent of all cars were plug-in hybrids, only about 1 percent of U.S. electricity generation would be needed to power them.

Multiple surveys have shown that most (though not all) Americans would love to have such a car, if only for the added benefit of being able to avoid going to the gas station every week. So why can't you go out and buy one now?

American car companies don't want to take the short-term risk. Professor Frank and many economists note that because consumers would be willing to pay a few thousand extra dollars for a heavy hybrid, manufacturers could make a profit on these vehicles, but not as much profit as making the same product that they always have.

Battery costs are still high, but will come down quickly if hundreds of thousands of packs are made a year, allowing car manufacturers to recover their investment.

Perhaps this is the perfect situation for a temporary federal subsidy: a two or three year \$2,000 tax credit for purchasing a hybrid (of any body size and style) that gets at least 60 miles on a single electric charge before the gas engine kicks in.

This should be sufficient incentive for car companies to get over their risk-aversion and for battery-makers to compete for the large, new market. It will also stimulate research into yet better (and cheaper)

batteries, making possible plug-in hybrids with ranges of several hundred miles, eventually eliminating the need for the fossil-fuel burning engines altogether.

The money to pay for it can come from scaling-back the fed's oversold hydrogen fuel-cell initiative or adding a few pennies to the tax on gasoline.

Or, we can engage in business-as-usual and just wait for the Japanese to do it, watching as they capture another lucrative market— the one made a sure bet by several hundred million Chinese and Indians who— like us— want to drive cars, too.

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