The Ultimate Automobile

By Louis P. Solomon with Dick Van Orden

These days, many of us are talking about the high price of gasoline and the implications for our next car. Will it be a hybrid? Will it be a smaller, more efficient car? Or will we just say, "Come what may I'll do what I want," and then buy an SUV, or a gas-guzzling luxury car, or a heavy and powerful pickup truck.

First, let's define the problem. As we see it, the United States is a huge country with inadequate public transportation to serve its vast spaces and its crowded cities. We have always relied upon automobiles for transportation. Gasoline was once very inexpensive, but no longer; this is making the cost of transportation of major economic importance to many citizens.

Do we have alternatives for personal transportation? Probably not. We still need an individual car, but what about alternative fuel from non-petroleum sources? Ethanol, which is made from replenishable fuel sources, is making a major move to help replace at least a part of our national gasoline needs. But there will be insufficient ethanol to satisfy the needs of our population—even if all of the farm lands available produce crops that could be turned into ethanol. Even now, we are importing ethanol from Brazil. Cost-wise, ethanol will give little or no improvement over today's prices of gasoline for our vehicles.

Biofuels are being discussed, but they are saddled with the high prices of infrastructure to produce and market them, plus the need for different engines (diesel) to use them. This is not a satisfactory method to replace a gasoline shortfall, or reduce the price.

Electric cars are a great idea, but they need large, heavy, expensive storage batteries to store the energy needed to go reasonable distances. Further, it takes a long time to recharge them, and the load on our aging electrical infrastructure would be immense.

That leaves our final—and best—alternative: hydrogen. We need a major economic and engineering effort, aided by our government, to develop hydrogen-powered automobiles and the needed facilities to equip stations to manufacture, package, and dispense hydrogen to provide the energy to drive our cars. The technology exists today, and would radically change the present fuel dispensing infrastructure. As we have shown in a previous column, hydrogen fuel could be manufactured at individual homes, apartment houses, and other traditionally non-fuel supply places, from all types of water, including salt water.

If we had sufficient hydrogen generating capability, what would our ultimate car for the future be like?

First, there must be a means of supplying the gaseous hydrogen under pressure in a sealed tank from our local hydrogen filling station. One way would be to "fill up" with one or more hydrogen tanks similar to the propane tanks we use to supply our outdoor grills. When one is empty, we turn it in for a full one, which we connect to a manifold that distributes the gas through a regulator valve to our automobile's equipment used to produce electricity.

Second, we must have a means of converting hydrogen to electricity to provide the propulsive power we need. One way would be to use the hydrogen to power a small internal combustion engine that drives a generator. A better one, however, would be to convert the hydrogen to electricity by using fuel cells. Fuel cells are devices that combine hydrogen with the oxygen in the air to produce electricity.

Third, there must be electric motors to drive the automobile, using the electricity produced by the fuel cells. Designs for the car vary; some may carry a small battery to store energy, much like our lead-acid

batteries in cars today. Others would have no battery, but would use only the fuel cells for all electrical needs. Also, there may be a single large electric motor to drive the wheels, using standard drive shaft and differential. A better design would be to use four small electric motors, one for each wheel, to provide the power, doing away with the drive shaft and differential.

Fourth, each car would have a computer to regulate and control all aspects of the functioning of hydrogen delivery to fuel cells and electrical flow from fuel cells to electric motors.

Two such automobiles have been designed, built, and used as demonstrators. One, built by General Motors, is said to have cost $5 million and is a normal-sized sedan with many unique features. It has shown the way for using hydrogen and fuel cells for automobile power. A second design was built by Nissan Motors. Several models have been leased to organizations in California for testing. Each Nissan car produced to date is reputed to cost $1 million. Reports on both designs have been enthusiastic.

There is no reason not to speed up production of the GM, Nissan, and similar models, and to offer them for sale to citizens. With further design improvements and cost reductions, they can be mass produced, thus reducing unit costs. These Ultimate Automobiles can bring relief from imported oil and from our balance of payments problems. They will also reduce the pollution of the atmosphere, since the fuel cells produce no combustion products, only water. And hydrogen is produced from water by electrolysis so no atmospheric pollution is encountered there as well.

The technology is known today for all of the elements of this hydrogen powered automobile. Additional development is needed to reduce costs and improve efficiency. Our government can help with a speeded-up development, but the major car companies should bear the major financial load. The time to move rapidly is now; the effects will be very important to the environment and ending our reliance on foreign oil.