

PLUG-IN HYBRID ELECTRIC VEHICLES: Electricity in the Driver's Seat

By Kurt Yeager

Electric utilities and municipalities have a great deal to gain from plug-in hybrids in terms of consumer satisfaction, economic savings, and environmental stewardship, but they must modernize the electricity grid so that consumers can easily and reliably charge their cars.

With gasoline costing nearly \$4 per gallon, plug-in hybrid electric vehicles (PHEVs) offer consumers a way to reduce overall travel costs while reducing their carbon footprint. Unlike today's hybrids and traditional cars, the primary source of power for plug-in hybrids will be electricity, with gasoline only used for long trips. The benefits of this new vehicle design are staggering: The fuel cost for a plug-in hybrid car running on a battery will be the equivalent of 65 cents per gallon at 8.5 cents per kilowatt hour. PHEVs also represent a potentially valuable electricity supply source for states, particularly during peak power demand periods. Indeed, utilities would pay PHEV owners to use some of the cars' stored power and, as a result, drivers could actually make money with their cars. Furthermore, because these vehicles are much more efficient than standard cars, they will emit fewer greenhouse gases—such as carbon dioxide (CO₂)—even when the electricity they use is generated by coal.

Recognizing the growing demand for cars that use electricity, General Motors and Toyota will begin selling PEHVs by 2010, with Ford models coming to showrooms shortly thereafter. This new generation of automobile will plug in to a standard home electricity outlet, use only as much power as a dishwasher, and can be fully charged in less than six hours. Because of the relatively small amount of electricity needed to charge the car, more than a million cars in a state could be charged each night, without requiring new electricity generation or delivery infrastructure. Furthermore, in an emergency, such as a natural disaster, these cars could be made to feed power back into the grid, making it possible for the same million cars to provide as much as 2,000 megawatts of power to the state.

Despite the potential that plug-in hybrids hold, a major obstacle to reaping maximum benefit from them is the obsolete utility power grid. Today's grid—the network of power stations, transmission lines, substations, etc., that ultimately deliver power to consumers—is based on 1950s technology that is long overdue for an upgrade. One such upgrade, new “smart meters” that will allow consumers to purchase and sell power real-time, is critical for people to maximize cost-savings from their PHEVs. As a result, a significant portion of the commercial success of plug-in hybrids does not rest in the hands of automakers, but rather in the hands of utility companies that need to adapt their antiquated infrastructures to meet the energy needs of the 21st century.

Federal and local governments have already recognized that this “vehicle to grid” strategy could significantly improve the reliability of electricity to homes and business while reducing transportation costs to consumers. To encourage the adoption of these vehicles by consumers and the manufacturing of them by automakers, the U.S. House of Representatives introduced an amendment

to the Internal Revenue Code in 2007 providing tax credits for plug-in hybrids. Locally, more and more cities are following the federal government's lead by providing additional incentives. For example, the city of Austin, Texas, is setting aside \$1 million in rebates to help consumers and businesses purchase PEHVs as soon as they are available. The local electric utility, Austin Energy, is also moving to create a citywide smart grid to not only enable it to handle the increased demand for power that these vehicles will create over time, but also to allow these vehicles to feed power back into the grid, if and when the need arises.

Electric utilities and municipalities have a great deal to gain from PHEVs, but they must first proactively modernize the grid, and make it both attractive and convenient for consumers to plug in their hybrid vehicles.