

# Getting Ready for Plug-in Hybrids

GREEN VEHICLE EVOLUTION

BY MICHAEL LAMB

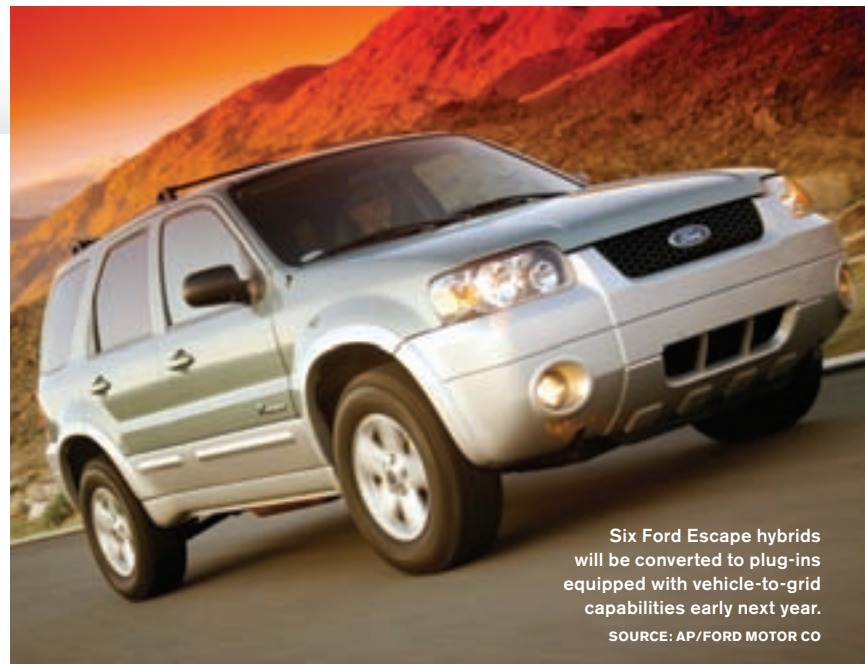
**✱ WITH GASOLINE PRICES CURRENTLY** averaging \$2.97 per gallon and the cost of a barrel of crude oil surpassing \$90, Americans can feel the results of this country's dependence on foreign oil in the transportation sector. Concerns about climate change, along with a renewed personal sense of responsibility for limiting our carbon footprint, are two additional reasons consumers are pushing for cleaner, more efficient transportation solutions.

These forces have converged to create a tipping point – what some have coined the hybrid phenomenon – characterized by thousands of automobile owners choosing hybrid vehicles over conventional, petroleum-fueled units and by their advocating for a greening of the auto industry. At Xcel Energy, we believe plug-in hybrid electric vehicles are the next logical step in the green vehicle revolution.

As plug-in hybrids are poised to enter the mainstream, Xcel Energy is taking steps to prepare for widespread penetration of cars equipped with vehicle-to-grid capabilities. Earlier this year, we announced the results of a six-month study related to plug-in hybrids and how an increase in their popularity may affect Colorado. The study found that the vehicles could reduce the overall expense of owning a vehicle, and with the help of smart-grid technologies, eliminate harmful vehicle emissions by nearly 50 percent.

Now we're taking the impact study a step further with our field test, which is expected to be one of the nation's largest demonstrations of vehicle-to-grid technology. The effort is a joint collaboration between Xcel Energy, Hybrids Plus, Inc. in Boulder, Colo., V2Green in Seattle, and the U.S. Department of Energy's National Renewable Energy Laboratory in Golden, Colo. Xcel Energy's test will examine exactly how drivers – and their vehicles – will react and perform in real-world settings. This is, quite literally, where the rubber will meet the road.

The project team will convert six Ford Escape Hybrids to plug-ins equipped with vehicle-to-grid capabilities. Each car will be equipped



Six Ford Escape hybrids will be converted to plug-ins equipped with vehicle-to-grid capabilities early next year.

SOURCE: AP/FORD MOTOR CO

with a cellular modem for remotely collecting data; a controller from V2Green; and a 6-kilowatt Inverger, an inverter and charger in a single unit, from Hybrids Plus. In addition, the car's nickel-metal hydride batteries will be replaced with a lithium-ion phosphate battery pack. By outfitting the vehicles with these components, Xcel Energy can remotely control each vehicle by requesting that it postpone charging or begin discharging energy back to the electricity grid.

The significance of this pilot is that it allows Xcel Energy to understand how the technology works not just on a drawing board but also in real, day-to-day operation. Plug-in hybrids hold the promise of shoring up grid reliability by providing another source of distributed generation. They offer a potential solution by relieving distribution peak load and flattening the highly variable nature of renewable energy supply curves.

The demonstration also will give us valuable insight into future consumer behaviors. With every home connected to the electricity grid, vehicle-to-grid technology could be key to meeting our growing energy needs. This project is another step toward further exploration of how plug-in hybrids can become an integrated part of a smart house and our vision of the smart grid energy system of the future. We're working toward a system that more easily allows customers and utilities to work together to balance the power grid and lower greenhouse gas emissions.

Xcel Energy's test drivers are its own employees, who are using the vehicles for both personal and commercial fleet use. Employees selected for the program will be asked to install chargers at their homes, and encouraged to plug in both at home and at their place of work. We expect the feedback they provide will help us devise incentives – either financial or otherwise – to help facilitate smart charging scenarios and motivate more people to consider plug-in hybrids as their primary source of transportation.

Plans are in motion for Xcel Energy to be ready once these vehicles reach a 10 to 20 percent market penetration. Given automakers' spikes in sales of hybrid electric vehicles and their recent announcements that they will begin to build production model plug-in hybrids, that day may come sooner rather than later.

*Michael Lamb is executive director of Utility Innovations at Xcel Energy*



Michael Lamb  
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## NewsFlash

### IGCC LAUNCHED

Construction has begun on a 285-megawatt integrated gasification combined cycle coal plant near Orlando, Fla.

It is expected to be one of the most efficient and cleanest coal-fired power plants in the world, according to backers. Southern Company will operate the unit.

The plant, part of a federal initiative, will turn coal into synthetic gas to generate electricity. It will reduce emissions of sulfur dioxide, nitrogen oxides and mercury, require less water and produce 20–25 percent less carbon dioxide than conventional coal-fired plants.

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