

## Hybrid-Car Tinkerers Scoff at No-Plug-In Rule

By [DANNY HAKIM](#)

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**D**ETROIT, April 1 - Ron Gremban and Felix Kramer have modified a Toyota Prius so it can be plugged into a wall outlet.

This does not make [Toyota](#) happy. The company has spent millions of dollars persuading people that hybrid electric cars like the Prius never need to be plugged in and work just like normal cars. So has [Honda](#), which even ran a commercial that showed a guy wandering around his Civic hybrid fruitlessly searching for a plug.

But the idea of making hybrid cars that have the option of being plugged in is supported by a diverse group of interests, from neoconservatives who support greater fuel efficiency to utilities salivating at the chance to supplant oil with electricity. If you were able to plug a hybrid in overnight, you could potentially use a lot less gas by cruising for long stretches on battery power only. But unlike purely electric cars, which take hours to charge and need frequent recharging, you would not have to plug in if you did not want to.

"I've gotten anywhere from 65 to over 100 miles per gallon," said Mr. Gremban, an engineer at CalCars, a small nonprofit group based in Palo Alto, Calif. He gets 40 to 45 miles per gallon driving his normal Prius. And EnergyCS, a small company that has collaborated with CalCars, has modified another Prius with more sophisticated batteries; they claim their Prius gets up to 180 m.p.g. and can travel more than 30 miles on battery power.

"If you cover people's daily commute, maybe they'll go to the gas station once a month," said Mr. Kramer, the founder of CalCars. "That's the whole idea."

Conventional hybrid electric cars already save gas. But if one looks at growth projections for oil consumption, hybrids will slow the growth rate of oil imports only marginally, at best, with the amount depending on how many hybrids are sold. To actually stop the growth of oil imports and potentially even reduce consumption, automakers have focused on developing cars powered by hydrogen fuel cells.

But fuel cells would require a complete reinvention of the automobile, not to mention the nation's gas stations, and the technology to put them on the road is still a long way from fruition. Advocates of plug-in hybrids say the technology for these vehicles is available now to the point that people are building them in garages.

"All of the relevant technology is at hand," said Frank Gaffney, founder of the Center for Security Policy and an assistant defense secretary in the Reagan administration. His group was among a coalition of right-leaning organizations that released an energy plan this year promoting plug-ins as one way to increase fuel efficiency in light of the instability of the Middle East.



Andrew Sacks for The New York Times  
Ron Gremban modified a Toyota Prius by installing auxiliary batteries.

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"If you're thinking about this as an environmental issue first and foremost, you're missing the point," Mr. Gaffney said. Curbing dependence on foreign oil, he added, "is a national security emergency."

Toyota, however, says the plug-in is not ready for prime time.

"They say this is the next great thing, but it just isn't," said David Hermance, an executive engineer at Toyota. "The electric utilities really want to sell electricity and they want to sell it to the transportation sector because that expands their market. They have an agenda."

But the plug-in hybrid is not just coming out of the garages of enthusiasts in California. [DaimlerChrysler](#) has developed several dozen plug-in hybrid vans in cooperation with the Electric Power Research Institute, a group financed by more than 300 utilities, including the New York Power Authority and [Southern California Edison](#). Testing of the vans will start this year, and one will be used by The [New York Times](#) on a newspaper delivery route in Manhattan. Several small companies are also developing or have developed plug-in hybrid prototypes.

"We think it's the only way to rekindle interest in electric transportation," said Robert Graham, who manages research into electric vehicles for the Research Institute. "There are no technology hurdles at all. It's simply a matter of getting the vehicle built out on the street and getting people to recognize its value."

For power companies, the notion of people plugging in cars overnight represents not only a new way to make money, but the vehicles would also draw power mostly during off hours which would improve efficiency, because power plants cannot simply shut down at night as demand diminishes.

As it stands, though, modifying a hybrid like the Prius to enable it to plug in would add perhaps \$2,000 to \$3,000 to the cost of a car that is already roughly \$3,000 more expensive than conventional gas cars. Advocates say the costs would be much lower if such cars were mass-produced by a major automaker.

Felix Kramer, left, and Ron Gremban in Ann Arbor, Mich., with an auxiliary battery charger for a converted Prius. Toyota has spent millions persuading people that the car does not need to be plugged in.

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But Nick Cappa, a spokesman for DaimlerChrysler, was cautious, calling the technology one of many the company was exploring. Among its current drawbacks is that the added batteries take up space and make the company's Sprinter van several hundred pounds heavier.

"This is part of a small program investigating these technologies," Mr. Cappa said.

And Mr. Hermance of Toyota said that batteries today were not durable enough to handle the wide range of charging up and charging down that a plug-in hybrid would need, calling that the most damaging thing you can do to a battery.

Edward Furia, the chief executive of AFS Trinity Power, a privately held company in Bellevue, Wash., that develops mechanical batteries called flywheels, agreed with Mr. Hermance, but said that a secondary energy storage technology like a flywheel could solve the problem.

"If you've got a flywheel with your chemical battery, you can draw down the chemical battery, but when it's time to do a heavy lift, to accelerate or absorb energy, the flywheel is doing the acceleration or the absorption, not the chemical battery," said Mr. Furia, whose company is developing its own plug-in hybrid that it says will get several hundred miles per gallon.

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While many environmentalists support the technology, some say in terms of emissions, electric cars would only be as good as the power plants that produce electricity.

"The concern on plug-in hybrids is that we not substitute addiction to one polluting fuel for addiction to a more polluting fuel," said Dan Becker, the head of the Sierra Club's global warming and energy program. "Coal is more polluting than gasoline, and nearly 60 percent of U.S. electricity is generated by burning coal."

Roger Duncan, a deputy general manager of Austin Energy, a utility owned by the City of Austin, Tex., said that "it's hard to say what impact it will have on the nation as a whole," but that in regions that use cleaner-than-average power sources, like Austin or California, it would provide a clear emissions benefit. Mr. Duncan even imagines a day when drivers could be paid to return energy to the grid during times of excessive demand.

Plug-in hybrid prototypes have been around for several years, but the idea of modifying a Prius stemmed from the curiosity of some Prius owners in the United States, Mr. Kramer said. They were aroused by a mysterious unmarked button on their Prius and discovered that in Priuses sold in Europe and Japan, the button allows the car to drive for a mile in electric-only mode. Mr. Hermance said the feature was disabled in the United States because of complications it would have created in emissions-testing rules.

Mr. Kramer said "a bunch of engineers reverse-engineered it in the United States and figured out how to hack it."

But they soon wanted to travel on batteries for more than a mile and began to collaborate through CalCars on adding batteries to the Prius that would allow for longer pure electric travel. With the help of dozens of volunteer engineers collaborating online, the group retrofitted a Prius in Mr. Gremban's garage to travel about 10 miles on nothing but battery power.

Mr. Duncan said the plug-in hybrid was "very realistic, because it's not that big a leap in technology."

"Look what Felix has done with Prius off the street," he added. "This isn't rocket science."



Andrew Sacks for The New York Times  
Ron Gremban modified a Toyota Prius by installing auxiliary batteries.

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