

Interest in new types of energy heats up

Argonne National Laboratory fiddles – the real issue is to tie the production of fuel cells to the nuclear world.

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It's like a giant rolling Erector Set for engineers who really like to play around with automotive components.

Formally called the Mobile Automotive Technology Test bed, or MATT, the bare-bones chassis plays a vital part in the research at Argonne National Laboratory into new ways to power vehicles.

One day, the engineers can test how an electric motor performs with a gasoline-powered engine and a manual transmission. The next day they can substitute an engine fueled by hydrogen. Soon, they intend to place giant batteries on the MATT's rear platform, to research a plug-in hybrid vehicle that could increase fuel efficiency and reduce emissions.

Argonne, one of the U.S. Department of Energy's largest research centers, is just one of the dozens of national laboratories, private companies, universities and automakers' research facilities around the country working on such projects.

The building where MATT is housed illustrates the nation's changing priorities. The structure previously was used for research into magnets necessary for use in nuclear reactors. When that work ended in the 1970s, the building sat empty for years.

Now it's devoted to the lab's Center for Transportation Research, where among other projects the staff is working to develop, test or perfect vehicles that can run on everything from ethanol to hydrogen, methanol to wood chips.

"You can almost see the transition in the country's needs," says Don Hillebrand, the center's director.

Hillebrand says he's confident the nation can move away from its dependence on foreign oil, but he believes the solution lies in a combination of new options, not one single answer.

"We are the Saudi Arabia of coal, because we've got all the coal we want. We're the Saudi Arabia of shale oil, tar sands, biofuels . . . Solar, wind," Hillebrand says. "The U.S. has got substantial carriers of fuel and energy supplies. The problem the U.S. has is they're not oil, they're in different forms.

"So what our research is really focusing on is giving the U.S. alternatives to just using oil, and there are a lot of alternatives."

Hydrogen fuel cells are often mentioned as one of the most promising alternatives. The fuel cell would use hydrogen and oxygen to produce electricity, with water as the byproduct.

Although Argonne has done work on fuel cells and similar futuristic technologies, Hillebrand says he is most excited about its potential to play a lead role among the national labs in developing plug-in hybrids.

A standard hybrid such as the Toyota Prius uses an electric motor, a small battery and a gasoline motor. With a plug-in hybrid, the small battery is replaced by much bigger battery packs that can be recharged through a standard 120-volt outlet.

With such a car, a driver could travel the first 10, 20 or even 40 miles of a trip on battery power before the vehicle would switch to the gasoline engine, Hillebrand says.

"You've now just, for most people, eliminated . . . half of all the oil they use," he says.

Drawbacks remain. Owning a plug-in hybrid would be a challenge for anyone who does not live in a single-family home with a garage or carport and a readily available outlet.

Before the plug-in hybrid could hit the road in mass numbers, the batteries would likely have to become lighter, less expensive and longer lasting. And there is concern about the capability of the electrical grid to support a nationwide fleet of such vehicles – although supporters say most would be charged overnight, during off-peak hours for utilities.

With a concerted effort to solve the battery problems, Hillebrand says, plug-in hybrids could be feasible for mass production in 18 months.

Because the technology is still being perfected, it's unclear how long a battery would have to be charged to yield the optimum mileage. But supporters say they expect the electrical cost to amount to less than \$1 per gallon.

Plug-in hybrids are "inevitable," said Bradley Berman, editor of HybridCars.com, a Web site that provides consumer information about hybrid vehicles. He has particular hope for those fueled by biofuel, such as E85, the term for motor fuel blends of 15 percent gasoline and 85 percent ethanol. **(Remember 85% ethanol is 20% less efficient than gasoline so a mile already costs 20% more.)**

Argonne researchers expect to receive four plug-in batteries for MATT in June. But they couldn't wait to start doing some tests, so they took a Prius, disconnected its small battery and used a power processing system to simulate the larger battery involved in a plug-in hybrid.

The result?

A car that traveled 78 miles on one gallon of gas.