

ENERGY

MORE IDEAS TO WATCH

BY CHRISTOPHER MIMS

THE GASOLINE GARDEN

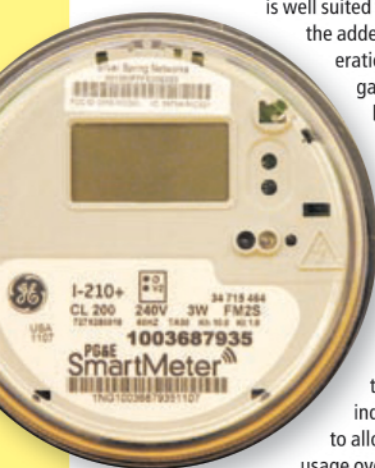
It is the next step for biofuels: genetically engineered plant life that produces hydrocarbons as a by-product of its normal metabolism. The result will be fuel—common gasoline, even—using nothing but sunlight and CO₂. In July, Exxon Mobil announced plans to spend more than \$600 million in pursuit of algae that can accomplish the task. Joule Biotechnologies claims to have already succeeded, although the company has yet to reveal any details of its proprietary system.

HOT NUKES

Uranium and plutonium are not the only fuels that can power a nuclear reactor. With an initial kick from more traditional fissile materials, thorium can set up a self-sustaining “breeder” reaction that produces uranium 233, which is well suited to nuclear power generation. The process has the added benefit of being resistant to nuclear proliferation, because its end products emit enough gamma rays to make the fuel dangerous to handle and easy to track.

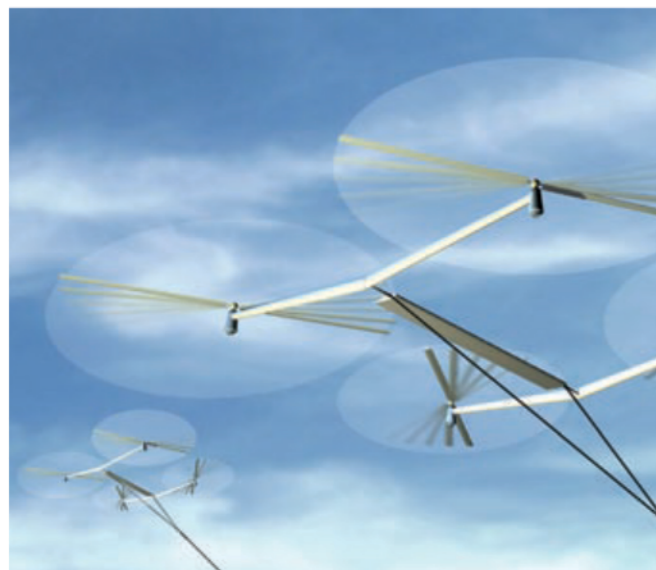
SAVE ENERGY WITH INFORMATION

Studies show that simply making customers aware of their energy use lowers it by 5 to 15 percent. Smart meters allow customers to track their energy consumption minute by minute and appliance by appliance. Countless start-ups are offering the devices, and Google and Microsoft are independently partnering with local utilities to allow individuals to monitor their power usage over the Web.



WIND POWER FROM THE STRATOSPHERE

According to a Stanford University study released in July, the high-altitude winds that constantly blow tens of thousands of feet above the earth hold enough energy to supply all of human civilization 100 times over. California's Sky WindPower has proposed harvesting this energy by building fleets of giant, airborne, ground-tethered windmills (below), while Italy's Kite Gen proposes to accomplish the same feat using kites.



TRANSPORTATION

Delivering the U.S. from Oil

Plug-in hybrid trucks are improving the long view of the short haul

BY AMANDA SCHUPAK

Cargo trucks gulp about 40 percent of the fuel pumped in the U.S. While most consumer attention focuses on improving the fuel economy of consumer vehicles, a major opportunity goes rumbling by. “Folks do not realize that the fuel use of even a small truck is equal to many, many cars,” says Bill Van Amburg, senior vice president of Calstart, a clean transportation technology nonprofit, and director of the Hybrid Truck Users Forum. “A utility truck as a hybrid would reduce more petroleum than nine Priuses.”

Some 1,300 commercial hybrids on the road today get up to twice the fuel efficiency of their conventional counterparts. But these traditional hybrids are inherently limited. They make more efficient use of petroleum-based fuel by capturing some of the energy lost during braking.

Plug-in hybrids, on the other hand, draw energy from the grid. They can drive for miles—in many cases, an entire day's route—without using any fossil fuel at all. This shifts energy demand away from petroleum and toward grid-based sources. (Last year zero-carbon renewables and nuclear supplied 30 percent of all electric power in the U.S.)

In many ways, plug-in hybrid technology makes more sense for delivery trucks than for consumer sedans. A cargo truck runs a short daily route that includes many stops to aid in regenerative braking. Most of the U.S. Postal Service's 200,000-plus mail trucks, for example, travel fewer than 20 miles a day. In addition, fleet vehicles return nightly to storage lots that have ready access to the 120- or 240-volt outlets required to charge them.

The Department of Energy recently launched the nation's largest commercial plug-in hybrid program, a \$45.4-million project to get 378 medium-duty vehicles on the road in early 2011. The trucks, which will go to 50 municipal and utility fleets, will feature a power system from Eaton, a large manufacturer of electrical components, on a Ford F-550 chassis. (For its part, Ford will wait for the market to prove itself before designing its own commercial plug-ins.) “These are going to start breaking free in 2011,” says Paul Scott, president of the Electric Vehicle Association of Southern California.

Start-up company Bright Automotive has a more ambitious plan. It aims to replace at least 50,000 trucks with plug-in hybrids by 2014. Bright's IDEA prototype (above right) travels 40 miles on battery power before switching to a four-cylinder engine that gets 40 miles to the gallon. The streamlined aluminum body has the payload of a postal truck yet is far more aerodynamic. The truck weighs as much as a midsize sedan.



BRIGHT'S
PLUG-IN HYBRID

John E. Waters, Bright Automotive's founder and the former developer of the battery system for General Motors's groundbreaking EV1 electric car, says that each IDEA would save 1,500 gallons of fuel and 16 tons of carbon dioxide emissions a year over a standard utility truck. Waters says he is ready to begin assembly in his U.S. plant once a pending \$450-million federal loan comes through.

Despite the appeal of the carbon savings, the fleet owners who are the trucks' primary customers have more practical considerations. Bright's executives are coy about the IDEA's eventual price tag but assert that a customer with 2,000 trucks driving 80 miles a day five days a week could save \$7.2 million a year. Right now that is probably not enough to justify large-

scale purchases without additional rebates—or a price on carbon. Van Amburg estimates that going hybrid currently adds \$30,000 to \$50,000 in upfront costs per vehicle, although that figure should come down as production volumes increase.

Improved battery technology will also help. Today the IDEA's 13-kilowatt-hour lithium-ion battery pack accounts for nearly a quarter of the vehicle's total cost. Much of the research being done for the batteries going into the Chevy Volt and other consumer plug-ins should also be applicable to commercial batteries. “For all the good we all want to do,” says David Lauzun, Bright's vice president of product development, “these vehicles will not take over the world until it becomes the economic choice—I have to have them because it saves me money.”

TRANSPORTATION

Bus Rapid Transit

Subwaylike bus lines mobilize the urban future BY MICHAEL MOYER

For the first time in human civilization, more people now live in urban areas than in the countryside. This shift creates a number of dilemmas, not least of which is how to move people within the world's rapidly growing metropolises. Pollution and traffic point away from car-based options, while light-rail systems are slow to construct and prohibitively expensive. One disarmingly simple—and cheap—possibility is Bus Rapid Transit, which is engineered to operate like a subway on wheels. In these systems, concrete dividers on existing roads separate high-capacity buses from the rest of traffic. Riders pay before boarding, then wait in enclosed stations. When a bus arrives, sliding partitions open to allow riders to board from a platform that is level with the bus floor. The traffic-free thoroughfares, quick boarding times, and modern, comfortable stations resemble light-rail systems more than the chaos of typical bus travel. In Bogotá, Colombia, which has had seven Bus Rapid Transit lines in operation since 2001 (right), the buses handle 1.6 million trips a day. Its success has allowed the city to remove 7,000 private buses from the city, reducing consumption of bus fuel and its associated pollution by more than 59 percent.



COURTESY OF PACIFIC GAS AND ELECTRIC COMPANY (SmartMeter); DON FOLEY; SOURCES: BBN SHEPARD SKY WIND POWER CORPORATION (tethered windmills)

COURTESY OF BRIGHT AUTOMOTIVE (van); SCOTT DALTON/Redux Pictures (bus lines)