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AUSTIN POWER

In Quest for Cleaner Energy, Texas City Touts Plug-In Car

Mayor's Unusual Plan Links Wind, Batteries; Pitching Auto Makers

By JOHN J. FIALKA
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AUSTIN, Texas -- Of all the plans cooked up by cities to combat pollution and global warming, the one hatched here is among the most ambitious -- and, some say, one of the more quixotic.

Mayor Will Wynn is pushing a new version of the electric car called the plug-in, which runs almost entirely on electricity and has a big rechargeable battery. But that's not all. Mayor Wynn envisions the parked electric cars plugging into a network operated by the city's utility, which would then use the powerful car batteries as a big storage system from which to draw power during peak demand.

Roger Duncan, deputy manager of Austin Energy, the city-owned electric utility, dreamed up the scheme three years ago after the mayor ordered him to get more electricity from "green" sources, especially from wind. Austin Energy already got 6% of its power from wind, but wind production peaked at night, when electricity demand was low. Mr. Duncan needed more clean power during hot days, when demand was high.

If there were enough plug-ins around Austin, Mr. Duncan figured, he could buy more wind-generated electricity, sell it to plug-in owners at night, then buy some of it back during the day from cars sitting in parking lots equipped with special sockets.

With concern about climate change on the rise, interest in renewable energy sources is moving from the fringe to the mainstream. Some utilities will buy extra power that their customers produce by home solar panels. These days, seemingly far-fetched plans like Austin's are drawing a level of support that would have been unlikely just a few years ago.

Austin, a city of 719,000 and the capital of Texas, is becoming one of the nation's biggest promoters of plug-ins. To give the market a push, it has launched a campaign -- called Plug-In Partners -- to line up people to buy the cars when they reach the market. Organizers say they've secured 8,000 pledges from individuals and organizations around the country to buy one when they're introduced.

The mayors of 50 major cities, several environmental groups and hundreds of utilities have endorsed the campaign, and many are intrigued by the power-storing concept. In California, the Bay Area Rapid Transit System, or BART, is looking into setting up a similar system for tapping into electric-car batteries in commuter parking lots, and several large utilities are studying the concept.

Although Mr. Duncan's 8,000 pledges are dwarfed by the 16 million vehicles sold annually in the U.S., both **General Motors** Corp. and **Toyota Motor** Corp. have said in recent months that they plan to develop plug-ins and bring them to market. Their intention is to try to tap growing consumer demand for nongasoline-powered vehicles -- not to provide power storage for utilities. Other car makers also have expressed interest. GM spokesman Greg Martin says Mr. Duncan's effort played a part in the decision.

President Bush, in his last two State of the Union addresses, has cited plug-in cars as a promising alternative to gas-powered ones. Legislation has been introduced in Congress that would provide a tax credit to partially offset the cost of buying the vehicles when they become available.

Big hurdles remain. The cars require expensive lithium-ion batteries that haven't been perfected. Production of plug-ins is at least three to five years off, and experts say the cars could cost $50,000.

"Plug-ins will have a niche market," says Red Cavaney, president of the American Petroleum Institute, which represents the oil industry. "They're certainly not going to replace the family car."

Austin's plan to use the plug-in batteries as a power-storage network also requires additional work. Mr. Duncan will have to devise financial incentives, such as cheaper parking or discounted power, to induce car owners to allow Austin Energy to buy back extra power from their batteries. The city will have to install a computer-monitoring system to make sure the utility doesn't leave car owners without enough battery juice.

Mr. Duncan has found his most enthusiastic backers in the electric-utility business. Shifting some of the nation's vehicles from gasoline to electricity, these people say, would curb pollution and reduce reliance on imported oil -- and would make utilities more profitable and efficient. The Electric Power Research Institute, an industry group, has spent years researching and touting plug-ins, and supports efforts to use their batteries to store extra power. Utilities, which use thousands of vehicles, would likely be the first big buyers of the vehicles, the group says.

The idea of tapping the electricity stored in car batteries -- called vehicle-to-grid power, or V2G -- originated with Willett Kempton, an electrical engineer and associate professor at the University of Delaware. He came up with the idea in the late 1990s after he learned that electric cars require large batteries and that most cars sit parked most of the day.

"I said to myself, 'Wait a minute, this is a big storage system,' " Dr. Kempton recalls. In a 1997 paper, he and economist Steven Letendre detailed how electric cars, using computer-controlled connections, could draw power from the electric grid at times and pump it back into the grid at other times. Much of

the software and hardware needed to do this, Dr. Kempton discovered, already existed. But car makers thought the idea was crazy, he says.

In 2001, Dr. Kempton went to San Dimas, Calif., where AC Propulsion was developing one-of-a-kind prototypes for electric cars, including a roadster called the Tzero. He and Alan Cocconi, the founder of the company, conducted an experiment using a two-way charging system that Mr. Cocconi had developed. The car's special lithium-ion battery was drawing power from a wall socket. With a laptop computer, the two men directed the electricity to move the other way -- from the car into the power line. The car's powerful battery generated more than enough electricity to temporarily meet the modest needs of the small company.

Electric cars first appeared in the 1890s. But they were overshadowed within 20 years by gasoline-powered cars, which were cheaper and had unlimited range. In the 1990s, concerns about reliance on imported oil and about climate change rekindled interest. Hybrids such as the Toyota Prius, which married electric drive systems with small gasoline engines -- but don't have to be plugged in -- have come to market and proven popular. But GM canceled its $1 billion drive to market an electric car, the EV1, in 2003 after California dropped a regulation requiring auto makers to sell some.

Austin takes pride in both its environmental record and its quirkiness. Austin Energy's Mr. Duncan, 59 years old, once raised money for local antinuclear campaigns by producing concerts starring Willie Nelson and other local musicians. These days, Austin Energy is part owner of a nuclear plant, and Mr. Duncan considers such plants part of the solution to global warming because they don't generate the pollutants that coal-burning ones do. The utility already uses more wind-generated power than any other major utility does, according to the U.S. Department of Energy. "This global-warming problem is so severe that we've got to use everything we have to fight it," he says.

Mr. Duncan concluded that plug-in vehicles would be especially useful in Texas, where wind-turbine "farms" in the western part of the state now supply the cheapest electricity. He figured he could sell the wind energy to plug-in owners at night, and during the day buy back extra power to help cool homes and office buildings.

To make the plan work, electric cars would have to plug in during the day at parking lots equipped with computer-monitored plugs. Dr. Kempton and other V2G devotees have written about existing technology that can track how much power utilities drain from each battery, so that too much isn't removed and car owners can be credited.

As Mr. Duncan saw it, the battery power could supplant dirtier energy generated by coal-fired plants and more expensive power from natural-gas-fueled facilities. The bottom line, he concluded, would be cleaner air for Austin and, assuming several thousand plug-in customers, $27 million more in annual electricity sales for Austin Energy.

But Mayor Wynn and Mr. Duncan quickly discovered that pushing plug-ins wasn't easy. Hardly anyone knew what they were talking about. At the moment, only a few hundred plug-in vehicles exist. Some are custom-made experimental cars; others are conventional hybrids like the Toyota Prius and Honda Civic Hybrid that have been converted using kits, a process that car makers discourage.

Conventional hybrids, which average 40 to 60 miles a gallon, are propelled by both electric motors and small gasoline engines, which also keep the batteries charged. Plug-ins have much bigger batteries and

are propelled solely by electric motors, with their smaller gasoline engines serving only to recharge batteries that run down on the road. Because they can run most or all of the day on electric power, they can travel more than 100 miles per gallon of gasoline.

In 2005, Austin's city council launched a public-awareness campaign about plug-ins. More than 11,000 residents signed petitions calling on auto makers to produce them, and local government agencies and businesses signed pledges to buy as many as 600.

Early on, Mr. Duncan met with some car-company officials in Washington to urge them to make plug-ins. "I didn't get a no, or anything. There was just plain silence," he recalls. "Finally, one of them asked me why was Austin doing this. I explained, and there was more silence."

In 2006, Austin's city council ponied up $1 million to mount a national campaign to drum up support. Mr. Duncan hit the road with a PowerPoint presentation, telling audiences that the cost of driving a plug-in car was comparable to paying 56 cents a gallon for gasoline.

Mayor Wynn, who headed the energy committee of the U.S. Conference of Mayors, rounded up endorsements from fellow mayors in Baltimore, Boston, Chicago, Minneapolis, Dallas, Los Angeles and San Francisco. He lobbied the U.S. head of Toyota during a meeting in New York City. Mr. Duncan pitched farm groups, emphasizing that the plug-in's auxiliary motor could be made to run mainly on ethanol or biodiesel fuel.

Some environmental groups have been leery of the campaign, worried that utilities would want to use coal-fired plants, rather than clean energy sources, to power plug-ins.

Technical challenges need to be overcome. Developing the plug-in battery "is the biggest show stopper, if you want to call it that," says Ahmad Pesaran, a battery expert at the Energy Department's National Renewable Energy Laboratory. Plug-ins need big lithium-ion batteries, 200- to 300-pound versions of the ones used in many laptop computers. The batteries have to store 100 times as much power as conventional car batteries and at least five times as much as batteries in current hybrids. Batteries for prototype plug-ins, Mr. Pesaran says, run $15,000 to $20,000 apiece. Plug-ins won't be commercially viable, he says, until the battery costs are cut by 75%.

A joint government-industry research program could help reduce the cost, as could economies of scale from mass production, he says. While plug-ins might reduce dependence on imported oil, they'd require imported copper, nickel and cobalt, and lithium-ion technology currently dominated by Japan, South Korea and China.

Optimists predict that plug-ins will be in showrooms within three to five years. It's likely to take longer for utilities to be able to tap the extra power stored in plug-in batteries.

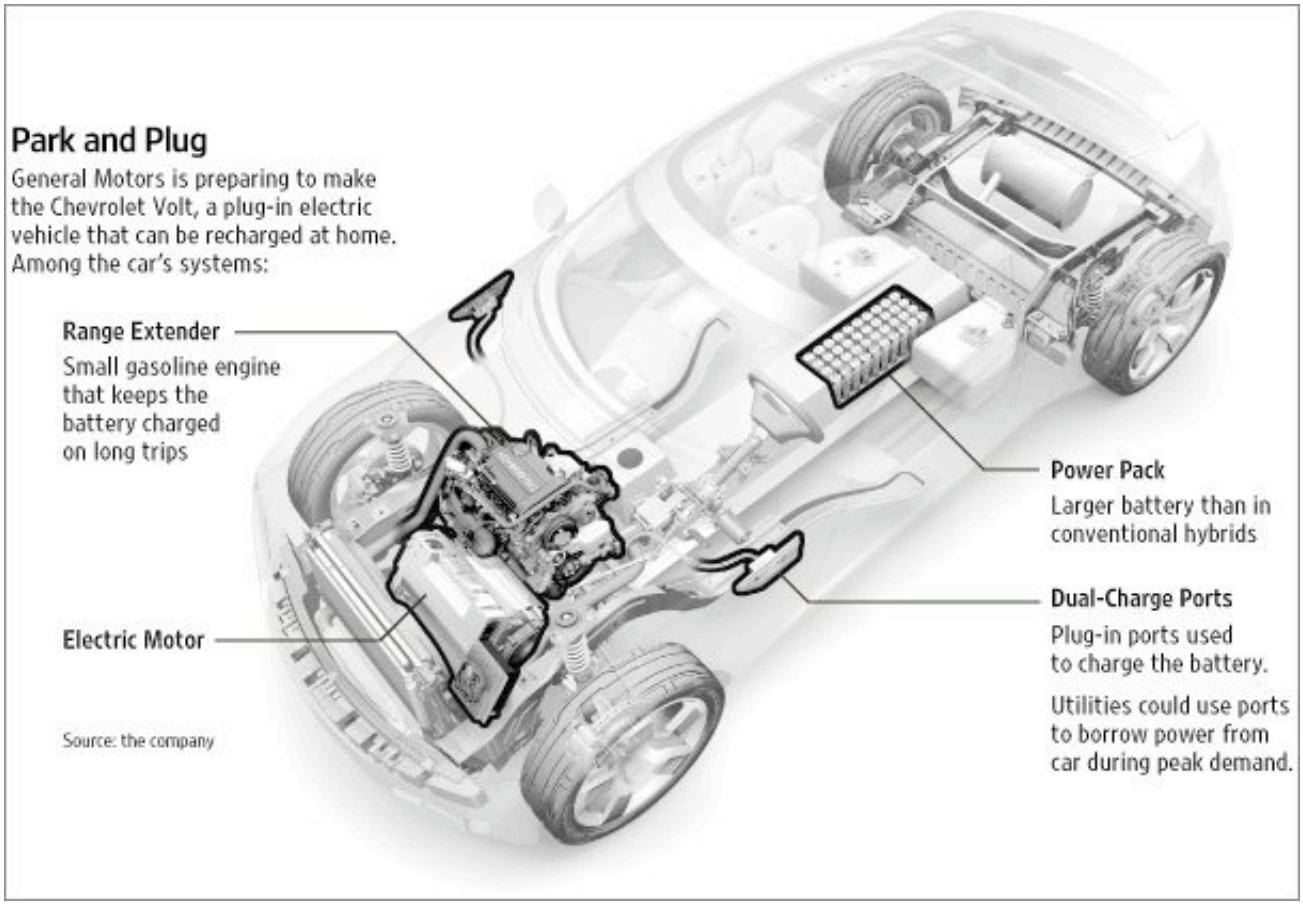
Mr. Duncan says he's willing to wait. During a four-year stint on Austin's city council, he sometimes practiced a Tibetan form of Buddhism during fights between pro-environment and pro-business members. "He meditates a lot and remains a completely calm person," says Jim Marston, director of the Texas office of Environmental Defense, a New York-based nonprofit group. "I don't think I've ever seen him raise his voice."

The vehicle-to-grid technology that utilities would need is slowly taking shape. In California, utilities

are introducing computer-driven "smart meters" that can be set to run appliances, such as washing machines, at night, when rates are lower. A plug-in family car sitting in the garage could be one of those appliances, says Sven Thesen, an engineer who is exploring electric-drive systems for PG&E Corp. in San Francisco.

This two-way process could be used on the nation's electric-power grid, according to a study released in January by the Department of Energy's Pacific Northwest National Laboratory. The national grid has enough spare capacity at night to fuel as many as 180 million electric cars, which is equivalent to 84% of the nation's current automobile fleet, the study says. Fuel for cars powered by electricity would cost customers only about 30% as much as fuel for gasoline-powered cars, the study estimates.

Auto makers haven't said when plug-ins will reach market, but Mayor Wynn says Austin's City Council has already set aside $1 million to fund rebates for the first 1,000 residents to buy plug-ins. The city intends to change building codes to require plugs in municipal parking lots, with Internet connections to Austin Energy. After that, the mayor explains, "we'll be able to start harvesting parking garages."



-- Mike Spector contributed to this article.

Write to John J. Fialka at john.fialka@wsj.com[1]

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