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LEASING

## The Top 8 Clean Car Technologies Most Likely to Take Over for Gas

### Meet the Best Contenders for the Next Mode of Transportation

When the automobile was new in 1900, there was no clear consensus which technology would triumph. Would it be gasoline, steam or electricity? The smart money was on electricity, which shows that the smart money can be wrong.

We're in a similar period now, trying to find what comes after the straightforward, gas-burning internal-combustion engine. There's still a lot of fog, and it's unlikely to clear soon. But from where we sit today, here are eight leading technologies, listed in priority order from most-likely to could-be-a-contender:

1. Plug-In Hybrids. There's no question that plug-in hybrids, with 40-mile all-electric range and the ability to recharge from standard house current, will be on the market in the next two or three years. The leading (and only) mainstream players are General Motors (which plans on introducing a Saturn Vue plug-in hybrid) and Toyota (with an adapted Prius). Ambitious startups (Fisker, BYD) are also planning to field plug-in hybrids. The big challenge for all of them is developing a lithium-ion battery pack that can stand up to repeated discharge and recharge cycles and still demonstrate the longevity that today's nickel-metal-hydrate hybrid battery packs have had. GM and Toyota talk about 2010 introductions, but battery development headaches could delay that.

2. Battery Electrics. Again, it's all about the batteries. Lithium-ion is the current leader, but is it ready to carry four passengers in a fully featured, crashworthy sedan more than 200 miles? It's time to be cautiously optimistic. Nissan has plans to bring an electric car to the U.S. by 2010. Chrysler, which has been lagging in green technology, surprised the world by suddenly announcing a concept car known as the Dodge EV, a sports car with a lithium-ion battery pack. It claimed 150-mile range and blistering acceleration of zero to 60 in less than five seconds. Some Chrysler electric is to be on the market by 2010. The sports car was clearly aimed at the Tesla Roadster, a California-built \$100,000 exotic which (like the Chrysler) sports a Lotus-designed body.

3. Range Extenders. General Motors is making a big, bold step forward by building the Chevrolet Volt, with production slated for the end of 2010 (as a 2011 model). The Volt is something new: an electric car with a gas motor whose only function (it's not connected to the wheels) is to keep the electric motor spinning after the batteries are depleted. GM had this field (also known as "series hybrids") to itself, but Chrysler has jumped into the fray with range-extender versions of the Town and Country minivan and Jeep Wrangler. As with plug-in hybrids, 40 miles can be enjoyed in battery-only mode, but the gas engine extends that to 400 miles or more.

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4. Very Small Cars. It doesn't have to be a hybrid; in fact, some of our current hybrids, based on SUVs, are actually gas guzzlers. High fuel prices have created a strong American market for very small cars, and carmakers such as Ford have been emboldened to start selling in the U.S. tiny, fuel- and space-efficient cars once relegated only to Europe or Asia. Consider the Toyota iQ. The minuscule car is just 118 inches long, but can carry three adults (plus a child)! It reportedly achieves 60/51 mpg fuel economy. The Toyota of 10 years ago would never have contemplated selling iQs in the U.S., but now it is definitely being considered.

5. Fuel Cells. The joke is that the hydrogen revolution is always at least 10 years away. And, well, it's still at least that far in the future. But the possibilities are endless, since hydrogen is the most abundant element in the universe. Big drawbacks now are the cost of the fuel and, of course, the cars themselves. Hand assembled by Ph.Ds, fuel-cell cars are way too expensive to be ready for showrooms before 2020. The leading players are General Motors (which has the cutting-edge Sequel and a fleet of Equinox SUVs under test) and Honda (the ready-for-the-road FCX Clarity).

6. Salad Oil. Americans love the idea of running their cars on used fryer drippings. And the technology totally works. Companies such as Massachusetts-based Greasecar have found a niche converting diesels to run on 100 percent biofuel. The problem is standardizing and ramping up the technology so we could seriously make a dent in gasoline power. We simply don't have enough available farmland to run our transportation fleet on soybean-derived oil, and there aren't enough fryers to greatly expand what is now a small cottage industry.

7. Liquid Hydrogen. BMW's Hydrogen 7 is a very impressive car, quiet and powerful. Its 12-cylinder engine will burn gasoline all day, but push a button and it switches without a hitch to a tankful of energy-

dense liquid hydrogen. You can drive it anywhere. But things get complicated after that. Hydrogen is expensive to begin with, and it liquefies at -423 degrees Fahrenheit, meaning a super-cooled cryogenic tank is obligatory. Leave the car alone for too long (parked for a week at an airport, say) and much of the hydrogen will return to a gaseous state and vent out. The big challenges: affordable hydrogen production and liquification; easy refueling; and answering safety questions.

8. Ethanol. GM and Ford are world leaders in producing "flex-fuel" vehicles that can run on ethanol or gasoline. Millions have been produced, but most run on gasoline most of the time because of a still-embryonic ethanol station network. Cornell professor David Pimentel claims that ethanol has a net negative energy balance, which the industry heatedly denies. And there's the ramp-up question, too. According to Pimentel, if we converted 100 percent of the U.S. corn crop to ethanol, it would only replace six percent of current fossil fuel use. Because corn is in high demand, prices for it are escalating, creating a "food vs. fuel" controversy. Cellulosic ethanol, produced from plant fiber, has a much higher energy potential, but research is still embryonic.

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#### MUNICIPAL LEASE/PURCHASE

Due to the current economic climate, many municipalities are looking for alternate ways to procure their vehicles. As budgets are being cut and services are required to remain the at the same level, many agencies are turning to leasing their equipment. If your budget is forcing you to look for just a few new cars each year, we can show you how the same budget dollars can add four or five new vehicles for ever one vehicle you would have added if purchased. This can allow you to add vehicles each year, and set up a cycling program that will also reduce your maintenance costs for the life of the vehicles.

With a lease/purchase program, we will finance 100% of the vehicle with no money down. Leases can include many related expenses such as light bars, cages, radios, custom paint, decals, and shipping. We allow our customers to utilize the upfitter of their choice, or work through our network of national upfitters. As an independent Fleet Management company, we will purchase from any dealer or under any state or federal contract.

Union Leasing also holds vehicle leasing contracts with GSA and several States and Municipalities for closed end leasing of new and used vehicles.

If you would like additional information on our lease/purchase or other programs, contact our government team today to discuss how Union Leasing can help you manage your fleet at [government@unionleasing.com](mailto:government@unionleasing.com)



#### COMPRESSED NATURAL GAS IN THE U.S.

In the US, federal tax credits are available for buying a new CNG vehicle. Use of CNG varies from state to state. In California, CNG is used extensively in local city and county fleets, as well as public transportation (city/school buses), and there are 90 public fueling stations in Southern California alone. Although natural gas prices are rising, compressed natural gas is available at 30-60% less than the cost of gasoline, as a rule of thumb, in much of California. Personal use of CNG is a small niche market currently, though with current tax incentives and a growing number of public fueling stations available, it is experiencing unprecedented growth. The state of Utah offers a subsidised statewide network of CNG filling stations at a rate of \$0.85/gge[9], while gasoline is above \$4.00/gal. Elsewhere in the nation, retail prices average around \$2.50/gge, with home refueling units compressing gas from residential gas lines for approx \$1.50/gge. Other than aftermarket conversions, and government used vehicle auctions, the only currently produced CNG vehicle in the US is the Honda Civic GX sedan, which is made in limited numbers and available only in a few states.

An initiative, known as Pickens Plan, calls for the expansion of the use of CNG as a standard fuel for cars has been recently started by oilman and entrepreneur T. Boone Pickens. California voters defeated Proposition 10 in the 2008 General Election by a significant (59.8% to 40.2%) margin. Proposition 10 was a \$5 Billion bond measure that, among other things, would have given rebates to state residents that purchase CNG vehicles. Congress has encouraged conversion of cars to CNG with a tax credits of up to 50% of the auto conversion cost and the CNG home filling station cost. However, while CNG is much cleaner fuel, the conversion requires a type certificate from the EPA. Meeting the requirements of a type certificate can cost up to \$50,000.

#### GREEN YOUR WORKPLACE IN FIVE EASY STEPS

Transform your workplace into a greener environment with these top tips.

1. Make sure your PC and monitor are off when you leave work
2. Reuse or recycle your waste paper
3. Switch unnecessary lights off and use the natural daylight more
4. Encourage your workplace to buy more recycled products
5. Take part in an energy examination



## CAN OBAMA SAVE THE U.S. AUTO INDUSTRY BY GREENING IT ON DAY ONE?

### Can Detroit Retool with Plug-in Hybrids, Higher Gas Mileage Cars and Other Innovations?

President-elect Barack Obama went into the Motor City's lion's den last year, speaking before a sold-out audience convened by the Detroit Economic Club. He told the assembled business and political leaders not what they wanted to hear, but what they needed to hear.

"For years," he said, "while foreign competitors were investing in more fuel-efficient technology for their vehicles, American automakers were spending their time investing in bigger, faster cars....Here in Detroit, three giants of American industry are hemorrhaging jobs and profits as foreign competitors answer the rising global demand for fuel-efficient cars....The need to drastically change our energy policy is no longer a debatable proposition. It is not a question of whether, but how; not a question of if, but when. For the sake of our security, our economy, our jobs and our planet, the age of oil must end in our time."

Obama then described a plan to subsidize 10 percent of the Big Three's retiree health care costs (as much as \$7 billion) if the companies would invest half of that savings in fuel-efficiency research. His alternative idea was \$3 billion over 10 years to remake auto plants for a new generation of clean cars.

Obama wants a million plug-in hybrids on the road by 2015, a plan that could be derailed by insufficient lithium-ion battery capacity by then. He has a 10-year, \$150 billion renewable energy plan.

Felix Kramer of CalCars.org, an early and consistent voice for plug-in hybrids, thinks the Obama plan is achievable. "Scaling up to produce a million plug-in vehicles in six years is far less challenging than what auto industry achieved after

Pearl Harbor, switching in a year from cars and trucks to tanks and planes," he said. "And supplying batteries for those vehicles is attainable, especially since we have good enough technology to get started now."

Kramer also likes Obama's plan to have half of all new federal new car purchases by 2012 all-electric or plug-in. "That firm commitment to purchase 30,000 or more vehicles annually will be welcome to carmakers gearing up to produce plug-ins. It won't be hard to deliver," he said.

All well and good. But none of the proposals Obama has put on the table so far, by themselves, will turn around the increasingly dire situation for American automakers, which have indeed let foreign companies take the lead in fuel efficiency. The automakers need immediate and concentrated help, and they need clear direction. It's hard to see how a GM/Chrysler merger--bringing together two companies with SUV-heavy product lines--is a clear answer.

It's a cliché to say that Obama has a lot on his plate. But he can't defer action on the auto industry for long. He clearly understands the issues, and the imperatives of a quick turnaround. The Senator from Illinois is proving adept at getting his transition team in place. Let's hope that putting the ailing automakers on a green path is a day one priority.

Barack Obama: The auto industry needs to go green.



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