Who's Resurrecting the Electric Car?

Written by JUDITH LEWIS

Forget those poky little golf cars — the battery-powered muscle car is just around the corner

Low rider don't use no gas now: Tommy Chong's Olds, a.k.a. "Ace," gets electrified by Reverend Gadget (Photos by Kevin Scanlon)

The 1946 Oldsmobile that sits amid the old boat hulls and flywheels in the Reverend Gadget’s Culver City machine shop harks back to an era of voluptuous curves and radiant chrome; its owner, actor and comedian Tommy Chong, calls it “Ace,” and considers the car so exquisite that he lists it among his collection of sculptures. Open the door, however, and it looks like somebody doused Chong’s baby in gasoline and torched it: There’s no engine, no seats, no pedals — nothing, in fact, but a small white box bolted to the floor where the back seat should be, with two wires connecting the box to some contraption in the trunk.

“That’s for the air bags,” says Reverend Gadget, a.k.a. Greg Abbott, the craftsman, lay engineer and artist who’s restoring Chong’s Olds. A compact, muscular man, with a boyish grin and blue eyes that crinkle up when he laughs, he ushers me around the back of the car to see a little black machine branded “Praise the Lowered.” He flashes a smile and winks. “It’s a lowrider.”

When he finishes outfitting the Olds with a DC motor, enough serial-wired, nickel-metal hydride (NiMH) D-cell batteries to produce 340,000 watts of power, and a computerized controller to connect the two, Chong’s ride will be the first all-electric vehicle to bounce down San Fernando Road competing for glory with the ’60s-era Chevy Impalas of the Imperial Car Club. It will also do speed when necessary. “He’s getting a huge motor,” says Gadget of Chong. “He’ll be able to do burnouts in this car.”

And so what if the electric engine whines more than vrooms? “It’ll be my spaceship,” says Chong, who currently drives a Prius. “These cars glide. The only sound you’ll hear will be the sound system and the air bags.” Plus, he says, “by driving the ultimate electric stoner car, I can get off the titty. You know, the oil titty.”

There was a time not too long ago that Chong thought electric cars were only for “guys like Ed Begley
— you know, people who wear Birkenstocks and don’t eat meat.” Only a year ago, he was building Ace as a hot rod with a gasoline engine. Then he went to a party at Gadget’s place and, as he puts it, “got educated.”

“He had all his cars sitting out, and I saw the possibilities,” Chong says. “He showed me the benefits of it all and how perfect it is, and how fast can it go. Now I don’t want to put gasoline in anything.”

Despite the reputation electric vehicles have as poky little wagons for hippies and old people, the electric muscle car has been around for a while. There’s even a National Electric Drag-Racing Association (NEDRA) devoted to high-performance electrics. In 1998, San Dimas–based engineer Alan Cocconi of AC Propulsion introduced the first version of his sun-yellow tZero roadster, featured on the cover of this paper in 2002, which does 0 to 60 in 3.6 seconds, leaving Ferrari F355s in the smoke off its tires. Amateur race-car constructor Ian Wright took the tZero’s three-phase AC induction motor and fitted it to a British street-legal race car, the Ariel Atom, and managed to get all the way to 112 miles per hour in first gear. (Electric motors are renowned for their torque — Chong’s Olds won’t even need a transmission.) Wright has now joined a Silicon Valley team to produce the Tesla Roadster, a high-end all-electric sports car with a battery range of up to 250 miles.

All those cars are fine, says Gadget, who learned about fast electric cars by hanging around electric-car drag racers such as former NEDRA president Roderick Wilde, inventor of the electric Graumann postal-van drag racer, “Gone Postal,” and Palo Alto–based Otmar Ebenhoech, whose Zilla controllers dominate the EV racer market (and who races his own Porsche 914 from time to time). “But those are all quarter-of-a-million-dollar sports cars,” says Gadget. “Your market’s really small. I’m looking at it thinking, if electric cars are going to make a difference, a lot of people have to drive them. They have to be made affordable.”

So instead of building cars from the ground up, Gadget and his business partner, Roger Wilson, convert existing cars or shells of cars into electric vehicles by supplying or outfitting them with preconfigured kits loaded with everything an electric car needs except a new motor.

“Usually if you want to do a conversion from gas to electric, you have to think about all the different pieces,” says Wilson, a software designer who founded the Alternative Energy Zone Village at the annual Burning Man Festival. “You have to buy wires, cable fittings, relays, DC-to-DC converters, batteries, a motor and a special motor plate. Our idea is that if you have a kit with all the parts in it, you don’t have to think about it so much. You buy a motor, our controller module and batteries, and you put it together.”

Most of Gadget and Wilson’s cars won’t make use of AC drives like the one Cocconi developed for the tZero; part of the plan to keep EV conversion affordable is to use the simpler, high-performance DC motor.

“It’s been around for 100 years,” says Gadget, “but it’s still a good drive. It means we can’t do regenerative braking” — feeding the power from stopping the car back into the batteries, the way the Toyota Prius does. That’s because, he says, “high-performance DC motors make lousy generators.” Also, “we’re going to lose a couple of percent points in efficiency. But we have a system we can do for under $10,000. With the batteries, it’s 17 grand. For $30,000, we can do a Hummer.”

Even the idea of a conversion kit isn’t new: In Errington, British Columbia, Randy Holmquist, who started converting gas cars to electric vehicles in the 1990s because he wanted “a cheap way to get to work,” has been converting S-10 pickups for 16 years, at the rate of one to three a year. He sells kits for around $10,000 U.S., and installs them for another $4,000 (plus $2,000 for the batteries). “The Chevy
S-10 is the best conversion on the market,” he says. “It’s designed so that it can hold the weight of the batteries. We put six batteries underneath the hood where the motor was and 18 in the truck bed. It’s real easy, and accessible.”

In the last five years, business had dropped so sharply that he let stock parts run out. But “in the last three months, we started getting orders again. In the last three months, we’ve sold five.”

He attributes the renewed interest not just to higher gas prices but to public exasperation with the oil business in general. “We used to get calls from people wanting a cheap way to get to work,” he says. “Now it’s ‘I’m tired of the oil companies making tons of money on me. I want out.’ It’s not ‘How do I save money?’ anymore. It’s ‘I don’t want to support the oil industry and I don’t care what it costs.’ ”

Not all cars made to run on gas convert easily to electric vehicles. “Some of them need so many batteries,” says Holmquist, “they exceed the legal weight limits for cars.” But for the vehicles that work, converting cars has both environmental and economic advantages over building new electric vehicles from the ground up. Twelve million automobiles pile into U.S. landfills every year, with just as many in Europe. Manufacturing a single car, says the Environmental Protection Agency, requires 40,000 gallons of water — nearly half the water the average family uses in a year. And as General Motors found out when it rolled out the fabled EV1, whose mysterious disappearance from the roadways is chronicled in Chris Paine’s new documentary, *Who Killed the Electric Car?*, developing a vehicle from scratch costs a billion dollars.

“And even after you spend that, you don’t have a car on the road for a decade,” says Gadget. “This way, if we do conversions, we’ve got them on the road right away.”

So far, Gadget and Wilson’s new company, Left Coast Conversions, has done four cars and a BMW motorcycle that was featured on Gadget’s short-lived Discovery Channel show, *Big*. MTV is following the progress of Chong’s ride. Gadget and Wilson have raised one-tenth of the half million they need to go into full production, advance-ordering bulk parts and motor plates. But for now, they tackle custom projects one by one. Two other cars are lined up alongside the Olds waiting for their electric guts: a 1971 Triumph Spitfire and a 1991 BMW 535. Missing from the lineup today is Gadget’s own 1962 Sunbeam, which has been sequestered at Earl Scheib’s Body Shop to get spruced up for its public debut at the Los Angeles Film Festival premiere of *Who Killed the Electric Car?* Gadget has a cameo in the movie about the death of the elegant little EV1, as does Cocconi, who designed the controller for the Impact, the 1990s-era concept car upon which the EV1 was based.

The point of their presence in the movie is simple: If the big car companies won’t make electric cars, somebody else will. “I didn’t want people to feel like we always have to wait for major automakers,” Paine told me over the phone. “From the beginning of the car industry, people have been converting cars on their own; lots of mechanics have been doing things independently. I wanted to give a voice to those people.”

It was more than 100 years ago that the famed physicist and engineer Nikola Tesla wrote enthusiastically of the application of electrical power to the propulsion of automobiles; even before that, he had advocated harnessing the current produced by the steam or gas propulsion of marine engines and locomotives to improve fuel efficiency. “A gain of 50 to 100 percent in the effective energy derived from the fuel could be secured in this manner,” he wrote in a
1904 letter to the Manufacturer’s Record. “It is difficult to understand why a fact so plain and obvious is not receiving more attention from engineers.”

More puzzling still, in 2006, nearly all of General Motors’ research and development goes toward cars and trucks with internal-combustion engines; GM no longer has any research arm dedicated to electric vehicles. Its only alternative-fuel venture at the moment promotes corn-based ethanol, a fuel that, due to modern agricultural practices, takes as much energy — in the form of petroleum — to produce as it yields. This remains true even after some reliable experts, such as former Shell Oil analyst and geology professor Kenneth Deffeyes, reported that world oil production has already passed the peak predicted by geologist M. King Hubbert. “It’s real and it’s here,” writes Deffeyes in his book Beyond Oil. “Business as usual is not an option.” Meanwhile, for the past two decades, the U.S. Congress has so stubbornly refused to raise the Corporate Average Fuel Economy (CAFE) standards for U.S. automakers’ fleets that, as Al Gore points out in his movie An Inconvenient Truth, the Chinese now require car companies doing business in their country to meet fleetwide efficiency standards one and a half times as stringent as our own.

Only California has managed to hold the auto industry to account for its profligacy, and then only in the name of clean air, not fuel efficiency. California alone of the 50 states has the authority under the Clean Air Act to set its own emissions standards. And when the state Legislature passed a 1990 law requiring that 2 percent of any single automaker’s fleet consist of zero-emissions vehicles, it was presented only as a matter of reducing smog. The standard was to take effect in 1998; consequently, in 1996, General Motors unveiled the EV1 electric vehicle, which had been a decade in the making. Only five years later, however, the auto industry vanquished California regulators in court, the California Air Resources Board backed off its idealism, and the motive for what the auto industry considered a costly experiment dried up. Shortly thereafter, GM began reclaiming and destroying every EV1 it had ever produced. Paine’s Who Killed the Electric Car? also tells the story of an earnest team of early adopters, the kind of people to whom 5,000 potential customers is a decent market share. Among them is Cocconi, who, in addition to designing the drive system for the Impact, worked with GM on its 1987 Sunraycer, which won an international race for all-solar vehicles in Australia that year.

Electric Car is no Fahrenheit 9/11; it spreads blame among both cultural and market forces, and, while it’s not the filmmaker’s intent to exonerate the car companies, it’s entirely possible to conclude at the end of the documentary that GM had little choice but to discontinue its overpriced niche-market cars. But even if you let the company off the hook, you still emerge with the feeling that if the big carmakers were about anything but short-term profit — if they had stuck with the technology until short-range lead-acid batteries, and later NiMH batteries, could be replaced with long-range lithium ions, for instance, Californians could by now be speeding down the 405 in tiny cars fueled by solar-powered charging stations. It is not, however, the kind of risk entrenched behemoth corporations take in the United States.

They do, however, take California laws to court, and as Paine’s film opens around the country, automobile manufacturers and petroleum consortia are currently engaged in beating back California’s new law requiring a 30 percent reduction in greenhouse-gas emissions in automakers’ fleets by 2016. It
was looking bad for the state until last month, when the Supreme Court decided to hear *Massachusetts v. EPA*, a case brought by environmentalists, states and local governments to force the EPA to regulate carbon dioxide from cars and trucks as a pollutant. But even in the unlikely event that air-pollution foes win both battles, Detroit may not ever be the place to look for fast, efficient, alternative-fuel vehicles. As S. David Freeman, former general manager of the Los Angeles Department of Water and Power and current president of the Harbor Commission, opines in the film, “Clean cars are too important to be left to the auto industry.”

It’s the truncated promise of the EV1 that Gadget and Wilson, Holmquist, Cocconi and Tesla Motors CEO Martin Eberhard seek to resurrect, not by mass-producing cars by the thousands but by tailoring automobiles to the needs of a dedicated few and hoping their spark lights a fire. Eberhard has $40 million in backing for his San Carlos–based company from the likes of PayPal co-founder Elon Musk, eBay’s Jeff Skoll and Google’s Sergey Brin; he even had Democratic gubernatorial candidate Steve Westly shilling for his car on the campaign trail. (Eberhard plans a public unveiling of the Tesla Roadster this week.) And Paine’s documentary stands to spread their influence even further — maybe even beyond the two coasts, where nearly all electric-vehicle drivers live.

“The idea is to get the neoconservatives involved,” Paine says. “Whatever you think about the war in Iraq, we can all agree there’s a Middle East oil component to it. And nobody wants to see our soldiers killed. Nobody’s happy about paying more than $2.50 a gallon, and everybody thinks it’s a dangerous policy to rely on foreign oil.” The big automobile manufacturers, he insists, will have to get back in the electric-car game. “It’s just the laws of physics saying more and more electric cars will get built. Unfortunately, it’s like turning around the Spanish Armada to get them to move.”

**The shop on Jefferson Boulevard** where Gadget has lived and worked for the last 13 years is a tangle of metal parts congregated for projects past and future: the old chassis of a Burning Man art car here, the shell of a boat that once roamed Black Rock City there. At the center hangs a trapezoidal object useful for pull-ups, and there are rows of metal boxes and batteries in various states of rehabilitation. Near the waiting vehicles is a neat little display of the insides that Left Coast Conversions drops into each of its autos — “remanufactured,” in California legal terms, as full-fledged battery-powered vehicles. Gadget opens a small aluminum box, about 2 feet square, to reveal a radiator loaded with pale-green antifreeze about one-twenty-fourth the size of the one in your internal-combustion-engine car’s, and a small green box labeled “Zilla” — one of Otmar Ebenhoech’s controllers, a small computer 10,000 times as juiced as the one that sits on your desktop. The whole contraption attaches by four cables to the car: two to the motor, two to the battery, plus two thin wires that run power to the vehicle’s auxiliary systems, like fans, lights and stereo.

“It’s simple,” Gadget assures me.

“Simple enough that I could do it?”

“You need to know how to do a little welding,” he advises, and promises to teach me the next time I come by.

Gadget prefers to work with what he calls “Arcane British Cars, or ABCs — Triumphs and MGs and...
Austin Healys.” He picks them up at auctions for $200 to $300. “We’ll be converting those, and we’ll sell them on the lot,” he says, for the price of a new Prius ($25,000 to $30,000). But Left Coast also has modularized kits ready to drop into Mazda Miatas and Chrysler PT Cruisers for the “build-it-yourself market.” With NiMH batteries, he can guarantee a range of 60 to 100 miles. And one day, he adds, “We’ll move on to lithium ions.”

Most electric-vehicle enthusiasts regard lithium batteries as the answer to the range issue that has burdened public perception of electric vehicles. Cocconi already uses them in the tZero.

“Lead acid sucks,” Wilson tells me. “They’re miserable.”

But lithium costs exponentially more. “With a lead-acid battery pack,” Wilson says, “if you spend $1,500, you get a range of 25 miles; with nickel-metal hydride, for $6,000 you get a range of 60 to 100. With lithium, you spend $20,000, but [get a] 200-mile range. Lithiums are bitchin’, but they’re just not really available yet. So everybody’s stuck with lead-acid batteries.”

The way Wilson sees it, the battery issue is something the original EV1 project could have addressed with the same resources GM put into fighting California law. “There was a point when they decided we can throw $6 million at lobbying against the zero-emission mandate and be able to say we no longer have this mandate, or we could spend $6 million at battery research and meet the standard. Which one do you think they picked?”

But battery development, although loaded with politics and undeserved patents — the Texaco-owned Ovonics once sued Toyota over its use of NiMH batteries in the Prius — still crawled forward.

“We have a lithium manufacturer, A123, who’s talking to us about how to make lithium batteries more affordable,” says Gadget. “But until they’re available, if you set your car up with NiMH batteries, we have a one-voltage-type system,” meaning you can upgrade to lithium whenever you — or they — are ready. “We aim to be as standardized as possible.”

And as efficient. “We need to do 40 cars a year,” Wilson says, “and we can make money happily. That’s not much demand. Forty cars a year is cruising along. In two or three years, we’re planning to franchise operations and have people in other cities doing cars as well.” He also plans to extend Left Coast’s services to people who don’t buy kits. “We always say, if you have a question, call us. If you buy an electric car from someone else, we’ll help you. I want to get so many electric vehicles on the road that no one can ever again say there’s no consumer demand.”

On the Saturday afternoon that Who Killed the Electric Car? played the Los Angeles Film Festival, the Broxton Avenue parking lot next to the theater was given over to green cars, green-building ideas and even green cleaning products. A gleaming tZero was on the lot, as was Roderick Wilde, a tattooed biker type in a red bandanna. He was on hand to show off his electrified Graumann racing vehicle, “Gone Postal,” and told me he’s about to relocate to Croatia, where he’ll set up shop manufacturing high-end sports cars. Joe Gershen of Green Depot had set up a booth to explain the merits of running refined vegetable oil, or biodiesel, in ordinary diesel engines; Doug Korthof was holding forth from his own booth on the politics of grid-tied solar systems. But Gadget and Wilson, in sneakers and black T-shirts,
Wilson’s mop of salt-and-pepper curls bouncing with his step, took up a significant chunk of space on the lot with their friends, selves and cars: Chong’s Ace, one step closer to completion, had a motor dropped in it, and the Sunbeam, well, it beamed — light glinting off its deep-grape polished exterior, its hood lifted to reveal a neat set of lead-acid batteries outfitted with circuit boards and connected with orange cables. People hovered around asking questions, and suddenly what once was a big idea seemed real. I asked Wilson if he was nervous. He said he wasn’t.

“We’re thinking small enough,” he said. “We’re not trying to be Starbucks and have a conversion on every corner. We’re not trying to take over the world. We’re just doing one car at a time.” He stopped to consider what he’d just said and made one adjustment: “We’re just saving the planet. One car at a time.”

Click here to find out where to fill up on biodiesel.

Click here to read about the Crisco Kid.

Last Updated ( Tuesday, 15 August 2006 )