

EEVC NEWSLETTER

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HONDA SHOWS THREE ALTERNATE-ENERGY TWO-WHEELERS



Honda recently showed three innovative two-wheel vehicle prototypes: an all-electric moped, a hybrid scooter, and a fuel-cell scooter. No production plans have been announced, but it's nice to see what a market and engineering leader can do when it sets its mind to it.

Electric moped

The Moped EV is 1290 mm (50 3/4 inches) long, weighs 44 kg (97 lb) and uses a

(top left): Honda's prototype electric moped;
(above) hybrid scooter;
(left) Fuel cell scooter

360 W-hr nickel hydrogen battery located inside its aluminum frame. It claims performance comparable to that of an internal combustion engine bike of the same class.

Instead of a conventional twist-grip throttle, the moped uses a two-stage lever throttle located beneath the right handlebar and

operated by the thumb. Honda claims this is easier for inexperienced riders to use.

The motor and controller are integrated into the rear swing arm.

This isn't Honda's first electric scooter; in 1994 the company developed the CUV ES, an electric scooter leased to government institutions.

Hybrid scooter

The hybrid scooter uses a 50 cc engine and an electric motor, and features an alternating current generator with an idle stop function and electronic fuel injection. In addition to an electronically controlled belt converter and a range of Honda environmental technologies, the new scooter features a dual series and parallel hybrid powertrain with a direct rear-wheel drive electric motor. Thanks to a compact power system and a rechargeable nickel hydrogen battery located under the front cowl, the hybrid scooter is about the same size as the Dio Z4, a standard-size 50cc scooter, and is only 10 kg (22 lb) heavier.

The hybrid scooter's internal combustion engine and direct rear-wheel-drive electric motor function in two modes. In series mode, when riding on flat ground and when high output is not required, the engine alone powers the electric motor. In parallel mode, used during acceleration and when high output is required, the electric motor assists the engine. In parallel mode, an electronically controlled belt converter automatically selects the optimum assist ratio.

The hybrid system charges the battery during deceleration and whenever possible and uses this power when higher output is required. In addition, the scooter enters idle stop mode at rest and during deceleration. These allow 1.6 times the fuel economy of the Dio Z4 (when riding on flat ground at 30 km/h) and 37% less carbon dioxide.

Fuel cell scooter

The third two-wheel prototype is a scooter powered by the Honda FC Stack fuel cell system, which is capable of starting at sub-freezing temperatures.

It's based on a 125 cc scooter of the kind popular with commuters worldwide. Space has been conserved by placing the electric drive system on the rear-wheel swing arm,

and by placing the Honda FC Stack fuel cell in the center of the vehicle, with auxiliary systems arranged around it. The result is a scooter comparable in size to an internal combustion engine vehicle of the same class.

Honda plans to continue refining the new vehicle's design to make it even more light and compact, so that the fuel cell scooter achieves the same range and offers storage space comparable to internal combustion engine vehicles of its class.

DOE HYDROGEN PLANS: KEEPING THE WORLD SAFE FOR CO₂

The U.S. Department of Energy says that, in accordance with the president's announced initiative for hydrogen vehicles, it is exploring paths to a hydrogen economy, but all of them are based on fossil fuels. Step 1 involves uses natural gas, while Step 2 uses coal—which is supposed to produce hydrogen without emitting any carbon dioxide. Since the reactions that produce the hydrogen have carbon dioxide as one of the end products, this is a challenge, and one gets the impression that DOE has no real answer. The agency is funding research into so-called carbon sequestration, but one wonders how successful they will be. The technology just doesn't exist.

In any case they *sound* attractive, and any measurable results are far enough in the future that political benefit can be gained from them without actually accomplishing anything but spending money.

As for delivering the hydrogen, DOE says it's working on that too—but we have explored the problems with hydrogen delivery in these pages in the past.

FORD SHOWS ITS TRUE COLORS

Several years ago Ford Motor Co. chairman Bill Ford said that the era of the internal combustion engine was nearing its end. Perhaps some people actually believed him at the time, but in the words of Ron Ziegler (Richard Nixon's press secretary), that statement is no longer operative. Ford seems fully committed to IC engines, hydrocarbon fuels, and heavy vehicles. Not that you can blame them—SUVs are where the money is, after

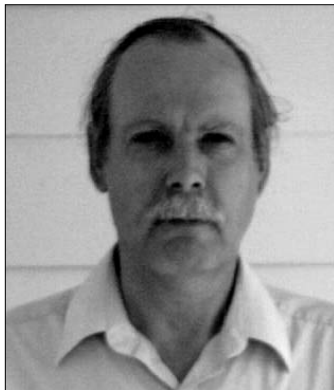
all. But in the past few months Ford has shown where it stands in no uncertain terms.

The first happened a few months ago, when the company announced that it would crush all the Th!nk electric vehicles coming off lease, rather than sell them to users or to the Norwegian firm Th!nk Nordic.

Now Ford is lobbying heavily against a measure designed to encourage fuel-efficient vehicles. The *Sacramento Bee* for August 24 reports that Ford has launched a crusade against Assembly Bill 2628, which would set aside 75,000 permits to let owners of hybrids that average 45 mpg or more and meet near-zero-emission standards drive with just one occupant in highway car-pool lanes (which normally require three occupants per vehicle). The bill is favored by the governor, but Ford calls it a “Buy Japanese” measure. Why? Because it applies only to vehicles that get more than 45 mpg. The new Ford hybrid escape SUV gets 36 mpg city/31 mpg highway.

WHERE HAVE ALL THE TROLLEYS GONE? By “California Pete”

San Francisco, perhaps even more than the rest of California, is a hotbed of environmental activism. It also depends on tourism for much of its business, and the city has found a way to combine the two.



Long famous for its quaint and environmentally benign cable cars (originally powered by steam, now run by large electric motors), San Francisco has a working trolley line consisting of more than 30 vintage streetcars, trams, and trolleys from around the world in daily operation around the city.

The F-Line, established in 1995, brought electric streetcars back to a city that had not seen them since 1982. The line covers many of the city's popular tourist areas (the Embar-



The F-Line's Car #1, originally used on the San Francisco Municipal Railway in 1912.

cadero, Fisherman's Wharf, multiple cable car stops, and through the downtown area). It is both the world's longest publicly-operated heritage streetcar line in daily service (six



Car #1055, a PCC car built in 1948 and originally operated by the PTC in Philadelphia.

miles one-way), and—along with New Orleans' St. Charles line—the most popular, carrying more than 20,000 tourists and commuters every day.



Car #1007 is from the Philadelphia Suburban Transit Co. (Red Arrow).



Car #578 (S), built in 1895, was used by San Francisco's Market Street Railway Co. and is brought out on special occasions.

The F-Line belongs to the San Francisco Municipal Railway (Muni) and is supported in its daily operation by the Market Street Railway (www.streetcar.org), a 1200-member non-profit organization that since 1984 has been helping find and restore vintage streetcars and works closely with leaders from neighborhoods, business, Muni, and City Hall. Aside from its work with the trolleys, the group educates the public on the historic importance of mass transportation toward maintaining a high quality of urban life in San Francisco.

The group is also working to begin a second historic streetcar line, the E-line, which will tie together all the historic and modern attractions of San Francisco's waterfront. Plans call for initial operation from the Wharf to the Giants' ballpark and the Caltrain depot, with a later extension farther west to the San Francisco Maritime National Historical Park, Ghirardelli Square, and the arts center at Fort Mason. An extension even farther west is being discussed to serve the Marina District and The Presidio.

In addition to its support for the historic streetcars, Market Street Railway helps preserve and interpret the history of the San Francisco cable cars.

Historic rolling stock

The F-Line includes a fleet of 15 historic trolleys (1895 to 1954) including an 1895 model from the old San Francisco Market St. Railway plus cars from other cities in the U.S.; Osaka and Kobe/Hiroshima, Japan; Melbourne, Australia; Hamburg, Germany;

Porto, Portugal; Blackpool, England; and Moscow. On top of that is a group of eleven trolleys from Milan, Italy built in 1928.

This is augmented by 17 streamlined PCC cars from around the country (designed in 1935), including 1940s and 1950s cars from Philadelphia and one from the old Philadelphia Suburban Transportation Co.

The streetcars are painted in the colors of their original cities, and San Francisco Municipal Railway publishes a handy guide to help identify them.

What about Philadelphia?

Long-time EEVC members remember our excursion down Delaware Avenue on a vintage trolley belonging to the Buckingham Valley Trolley Association. We also remember that shortly thereafter SEPTA managed to get that operation shut down. Buckingham Valley Trolley Association and East Penn Valley Traction eventually gave most of the trolleys and artifacts in their collection to the Electric City Trolley Museum in Scranton, which is supported by the nonprofit Electric City Trolley Museum Association, www.ectma.org.

There is an organization in Philadelphia trying to emulate the San Francisco's success. It's called Friends of Philadelphia Trolleys (<http://users.snip.net/~trolleydriver/FPT.htm>). There have been proposals to establish a historic streetcar loop around University City, and there are occasional excursion runs, and SEPTA has said it would run some more modern trolleys made to look like the old PCC cars on Route 10 and 15, but that apparently hasn't happened. SEPTA does make some PCC cars available for charter, but Philadelphia has nothing even remotely resembling the F-Line.

What I want to know is, how come San Francisco gets it, and Philadelphia so plainly doesn't?

(Pictures from Market Street Railway)

GUY DAVIS: STILL IN THE BATTERY BUSINESS Oliver Perry

Guy Davis, first president of the EEVC, is still active in the lead-acid battery business. In a recent phone conversation, Guy told me

that he is still at work developing a better lead acid battery. I thought that our battery consortiums had just about developed the best efficiencies available in lead acid configurations, but Guy feels differently. He has reason to believe that much more can be done to improve the present lead acid battery and he is still making a strong effort to bring to market an even more advanced lead acid battery.

The EEVC wishes Guy well in his "never say die" attempts to keep making advancements. We look forward to learning more about his battery improvements at a later time. Guy is putting effort where effort belongs, putting his many years of experience in battery manufacturing to use.

I have learned that it is best to allow entrepreneurs time to "do their thing" before exposing them to the world at large. Not that there is any "cover to blow" in Guy's case, but in a competitive business one never knows what problems can occur in a premature announcement of an improved product. Regardless, I still think we may soon learn from Guy how a better lead acid battery can be produced.

Some argue that the lead acid battery has seen its day, and that as the horse gave way to the tractor and automobile, so the lead acid business will give way to something superior. But others such as Guy hope to get more out of the traditional lead acid battery before it goes the way of the horse and buggy.

Stay tuned.

NEWS UPDATE

UPS launches hydrogen-powered delivery vehicles



UPS will use this fuel cell-powered Dodge Sprinter in delivery service in Los Angeles.

UPS has announced the U.S. deployment of its first three large package delivery vehicles using hydrogen fuel cells for power. The vehicle, the Dodge Sprinter, will be used first in Los Angeles; two more will be used in Sacramento and Ann Arbor, MI.

This announcement grows out of a 2003 collaborative project by UPS, EPA and DaimlerChrysler. Starting in March 2004, DaimlerChrysler provided an "F-Cell," a fuel cell-powered Mercedes-Benz A-Class car, which UPS modified for early-morning package deliveries in southeastern Michigan. The car is fueled daily at the EPA's hydrogen fueling station at its National Emissions Testing Laboratory in Ann Arbor. DaimlerChrysler and UPS concurrently began testing a medium-duty vehicle in Germany. The new Dodge Sprinters were built in part on information gathered during these road tests.

According to DaimlerChrysler, compared to the first Sprinter the new fuel cell Sprinters feature a 20% increase in powertrain efficiency; a 40% increase in range to 155 miles, and a 45% increase in peak engine power. They now have acceleration similar to a gas- or diesel-powered UPS vehicle. They also have 10% more cargo capacity than the diesel-powered Sprinters now in use by UPS.

CA solar project reaches 3.2 MW

California's Sacramento Municipal Utility District (SMUD) dedicated new solar power arrays on August 24th at the site of one of its first major solar installations, located about 25 miles southeast of Sacramento, near the now-closed Rancho Seco nuclear power plant. The new arrays increase the solar power capacity at the site to 3.2 MW. The site's first solar project—a 1 MW system called PV1—was installed 20 years ago, and those solar arrays are still operating at about 80 percent of their original performance.

Including the solar panels that SMUD has installed on parking structures, homes, and other buildings, the utility now has a total installed solar power capacity of 8.3 megawatts. In the past year, the utility has drawn on renewable energy sources for 9 percent of its electricity supply, and the utility has committed to increase that percentage to 20 percent by 2011.

ZAP unveils fuel cell drive system

ZAP recently announced an electric propulsion system that uses a new hydrogen fuel cell and lead-cobalt battery design developed by Apollo Energy Systems. ZAP and Apollo intend to develop a new breed of automobile that would be manufactured and marketed by ZAP using new technology from Apollo. The first step would be to develop a prototype fuel cell car using the Smart city coupe, a direct-import car from Europe that ZAP has upgraded to U.S. Department of Transportation standards

Apollo has developed and patented an alkaline fuel cell and a tri-polar lead-cobalt battery to be used with it. The battery is made with lead-foam electrodes making it lighter than ordinary lead-acid batteries with a higher voltage as well as greater energy and power density. Apollo says it would replace such advanced battery technologies as nickel-metal-hydride and lithium-ion in many applications for about 20 percent of the cost.

COMING EVENTS

Cruisin' Southern Cal: 2004 Fuel Cell Vehicle Road Rally

Sept. 17-19, Los Angeles to San Diego, CA. Contact The California Fuel Cell Partnership, 916-371 2870, or go to www.fuelcellpartnership.org.

AltWheels Alternative Transportation Festival

Sept. 17-19, Brookline, MA. Contact Alison Sander, 202-824-7362, or go to www.altwheels.org/index.html.

22nd National NGV Conference and Exhibition

Sept. 19-22, San Antonio, TX. Contact Steph Yborra, 202-824-7362, or go to www.ngvc.org/

Electric Drive Transportation Association Conference

Sept 21-23, Orlando, FL. Contact Pam Turner, EDTA Conference Manager, 408-741-5870, or go to www.edtaconference.com

Electric Transportation Industry Conference 2004

Sept 21-25, Kissimmee, FL. Call Kara Elden, 202-408-0774

Hydrogen and Fuel Cells 2004 Confer-

ence and Trade Show

Sept. 25-28, Toronto. Contact Advance Group, 800-555-1099 x2, or go to www.ngvc.org/

ITSC 2004, 7th International IEEE Conference on Intelligent Transportation Systems

Oct 3-6, Washington, DC. Contact ITSC 2004, 732-562 3870, or go to www.itsc2004.org/registration.html.

Alternative & Advanced Energy Technologies: Manufacturing Challenges & Opportunities

October 12-13, Dearborn, MI. Contact Irene Spanos, SME Communications, 313-425-3155, communications@sme.org.

Michelin Challenge Bibendum 2004

Oct. 12-14, Shanghai, China. Contact Nathalie Zhang, 86-21-5835-6012, or go to www.challengebibendum-registration.com/Default.asp?language=EN

The 2004 Fuel Cell Seminar

Nov. 1-5, San Antonio, TX. Contact Courtesy Associates, Inc., 847-768-0816, or go to www.fuelcellseminar.com.

SAE seminar: Hybrid Vehicle Technologies—Today & Tomorrow

February 9-10, 2005, Costa Mesa, CA. Contact Nancy Eiben, 724-772-8525.

POWER-GEN Renewable Energy

March 1-3, 2005, Las Vegas, NV. Contact Donna Welch, 918-835-3161, <http://pgre05.events.pennnet.com>.

EVS-21: The 21st Worldwide Battery, Hybrid and Fuel Cell Electric Vehicle Symposium & Exhibition

April 2-6, 2005, Monte Carlo, Monaco. Contact the EVS-21 Monaco Organization, +377 97 77 54 21/+377 97 77 54 22.

MEETING SCHEDULE

Meetings are held in Room 215, Plymouth-Whitemarsh High School, 201 East Germantown Pike in Plymouth Meeting, PA, and begin at 7:00 p.m.

October 13

November 10

December 8