EEVC NEWSLETTER

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Now affiliated with EAA

THE HOPEWELL PROJECT
EEVC President Oliver H. Perry

On October 20, 2006, selected visitors were invited to attend an opening day dedication of what has been billed as "America's first residence fully powered by 100% clean and renewable solar/hydrogen energy."

Mike Strizki speaks at the dedication ceremony for his off-grid solar home, located in a wooded area outside of Hopewell, New Jersey

Paul Kydd and I were invited to attend this unique occasion at the site of the residence of Mike Strizki in the rocky backwoods of a beautiful section of Hopewell Township, New Jersey.

Mike has been working very hard for the last few years to make his dream a reality. His home is now totally free from the grid and fossil fuels. The funding for this project has come from The Hopewell Project, a non-profit New Jersey Corporation that Mike has materialized through countless hours of lobbying and sleepless nights. For more information check out www.hopewellproject.org.

The following statements are taken from one of the Hopewell Project's brochures.

"Energy independence, environmental preservation, and economic sustainability represent critical global challenges. The Hopewell Project is aptly named; both a beacon of hope and a well of scientific and technological prowess. Hopewell, NJ is also the location of our signature project, the Solar-Hydrogen Residence. Without creating emissions, this

Viola Thomas-Hughes, running on the Democratic ticket for US congress representing section 2 in New Jersey. in front of portable solar collector

home's energy system covers all of a typical families needs without relying on any outside fuel source-fossil or otherwise, foreign or domestic."

"The Hopewell Project seeks to marshal the combined energies of government, businesses, philanthropies, and concerned individuals. Collectively, we can create a proud legacy as a generation possessing the courage and vision to move into a new energy paradigm, thus securing the future for all those who follow."

One might argue that Vince Delguercio's home (see associated article) is also totally free from outside dependence. But in Vince's case he is tied to the grid. If the grid has problems so does Vince. In theory Vince could operate without the grid but he would need some type of storage system for night time use. Vince does not have such a system. The Hopewell Project home produces hydrogen by breaking down water (electrolysis) into its components hydrogen and oxygen.

Hydrogen is stored in low pressure tanks and used to operate a fuel cell during darkness and winter.

Battery pack to store energy from solar panels.

The Hydrogen is stored in low pressure tanks (see picture). Because of the low pressure of the hydrogen, Mike's residence needs a considerable number of storage tanks. The hydrogen is used to operate a fuel cell (which creates the electricity) during darkness and winter months. Mike also has a storage bank of batteries (see picture) to assist in the overall operation of the system.

The most difficult aspect of converting Mike's home to the solar/hydrogen fuel cell residence involved changing local and state ordinances as well as changing (and passing) local, county, and state building codes. This project goes where present day ordinances, building and fire codes have yet to go. Mike had the assistance of key government officials and agencies to combat equally opposing government officials and agencies.

When analyzing the day by day process in completing a solar/hydrogen home, which Mike Strizki has endured, one realizes success would not have been achieved by an average, ordinary, typical person. If you are envious of Mike's successful venture, a brief review of the mountainous process of Mike's adventure will cure you. Mike's wife told me she only asked for one thing during the ordeal. She wanted time by herself in a motel. In Mike's own words, "This was the toughest challenge I have ever faced!"

EEVC CLUB MEMBER VINCENT DELGUERCIO'S "INDIRECT SOLAR RANGER"

Oliver H Perry

Vince Delguercio represents the EEVC in the maximization of our slogan "Independent

Photovoltaic panels cover the roof of Vince Delguercio's house near Hammonton, New Jersey.

A solar heating panel feeds this heat exchanger to warm the basement.

Motoring," (independent from fossil fuels). True and real independent motoring is taking place on his parcel of land relatively unnoticed among the garden farms and orchards in the vicinity of Hammonton, New Jersey

On a hot dry day in August, or a colder overcast day in November, few would pick this farming region as a place to live. No hills, lush forests, lakes, streams, nor modern landscaped developments meet the eye for miles around. Strips of exposed sandy soil between rows of traditional crops, old low-lying farm outbuildings, rusty irrigation pumps, and dying crops mingle with fields of newer stock, sprinkled with old trucks and farm machinery, appear in every direction. It is flatland suitable for irrigated garden farming and still untouched by the approaching suburban sprawl.

Thousands of motorists pass a few miles from Vince's home each summer en route to the shore. Many of them stop to buy fresh farm produce at one of the many farm stands among the billboards along Route 30. If you like blueberries and peaches, the Hammonton area has an abundance to purchase.

However, Vince and his brothers grew up in this area as a part of the truck farming economy. To them this place is home sweet home. They know that there is life in the soil as long as there is water for them to irrigate. They have placed their roots where you don't have to experience smog, breathe pollution, nor listen to the noise of the city. The same hot son that beats down on the heads of the migrant workers and makes the fields, roads, and driveways dusty, also grows sweet corn, tomatoes, lettuce, and cabbage. It also has been harnessed by Vince to power his newly acquired used Ford Ranger.

Vince designed his home to be passive solar. He constructed a roof line that provides a perfect southern exposure for solar panels, both water heating and electric. Taking advantage of the generous rebate program of the state of New Jersey, Vince just recently maximized the number of photovoltaic solar panels, installing them himself. (See photograph) He kept one hot water panel on the upper left side and uses a ceiling heat exchanger to heat his basement. (See photograph of me holding my hand in front of it.) The remaining panels provide electricity for his home energy uses.

The home has an electric driven geothermal heating and cooling system operating from two deep wells that Vince had drilled on his property. Vince's photovoltaic system is hooked up to send the excess electrical output into the local grid (Atlantic Electric). (See photographs) During the daylight hours, especially during the summer months, the system produces enough electricity to run the meter backwards, thus lowering Vince's energy bill and even at times providing him an actual rebate from Atlantic Electric for the excess. In other words, Vince gets paid by the utility for providing Atlantic Electric electricity. He is his own energy provider with excess to sell.

You may be interested in learning that the payback (with a 60% rebate from the state of NJ) for the installation of the photovoltaic system is between five and eight years. Vince is very happy with his present returns and claims that he may break even sooner than expected.

With excess electrical energy Vince felt it would be expedient for him to use this energy to charge an electric vehicle. So he recently purchased a used Ford Ranger, which he located on eBay, for that purpose. The Ford

A look under the hood of the electric Ford Ranger can be a little intimidating for the uninitiated.

Ranger is a professionally converted truck produced by Ford Motor Company as Ford's answer to the CARB (California Air Regulatory Board) mandate in the late nineties. Unlike GM, which crushed its EV-1s, Ford allowed the public to eventually purchase and keep some of their Ford Rangers.

The Ford Ranger is a rather complex and highly advanced technological machine. Vince has yet to figure out what every component under the hood does. (See picture) The vehicle has an AC drive; therefore it has the appropriate inverter system. The voltage of the system is over 300 volts.

Vince expects to drive his Ranger to and from work daily, a commute of around 50 miles. However, his battery pack, when the used vehicle was purchased, needed replacing. The original batteries (lead acid) were 8 volts apiece. Vince replaced them with advanced 12 volt sealed lead acid batteries.

The electrical system for discharging and charging the batteries utilized individual battery sensors. All of those sensors create quite a tangle of wiring that Vince had to cope with when switching his system to a lesser number of twelve volt batteries. Vince is an electronics engineer (Drexel) and is able to tinker with complicated electrical systems. (Note the pictures of Vince's experimental robots.)

Vince also experiments with robots.

After replacing the battery pack, Vince was disappointed that the range of the Ranger was still significantly less

Using hydraulic jacks Vince dropped the battery pack onto a low slung creeper with castors and then hoisted the front of the truck up using the pictured bumper attachment. The truck raised from the front providing clearance to roll the pack out to the side.

than predicted (only about twenty-five miles). He had to take the battery pack out a second time and inspect each battery to locate any weak or poorly performing one. As you can see from the pictures, inspecting a single battery is a major operation. Having to take out the huge battery box (with a sealed top, see picture) from underneath the truck several times, Vince has practiced it enough to get his time down to just one hour. Vince discovered two batteries that, although new, were not holding as much charge as their mates. He hopes that replacing them will solve the problem.

Other possibilities for the "less than expected range" might be that the charging system is incorrectly sensing the state of charge of the pack and is shutting down prematurely or there might be an undiscovered excess drain on the battery pack. Sometimes these problems are difficult to pinpoint. From my first discussions with Vince, it seemed as if the Ranger's charging system might not be putting in enough kilowatt hours for a full charge.

Recording the daily input energy readings from the watt-hr meter can be of great help in finding the source of the trouble. From my experience, I have found that a good battery pack always accepts a consistent number of kilowatt hours every time you charge it from its lowest 80% depth of discharge to its full state of charge. If the number of kilowatt-hours put into the pack at the end of a typical day's driving is lower than normal, something is wrong with either the battery pack or the charger.

If one knows for certain that the batteries are all good, a less then normal charge will

shorten the next day's range simply because the batteries are not completely charged. The problem then will be finding out the reason for the charger shutting down prematurely.

If you kept a record of the number of gallons of gas you used at each fill you would be warned of a problem the first time you saw that you had not put in enough gas for your gauge to read full. If your gas tank is nearly empty every time you fill up and you only replace ¾ of the required fuel to fill it, you expect to run out of gas before the expected range is reached. In this case you suspect a faulty gas gauge.

But if one's battery pack is not accepting the full number of kilowatt-hours on charge and the charging system is operating correctly, there is the possibility that a battery or two are filling up to maximum charge prematurely. The charger will sense the correct voltage for a full state of charge and will shut down as it is programmed to do. In this case these batteries are reaching a false full state of charge. The battery is the problem.

When you put in the normal amount of fuel and you don't reach the expected range, suspect a leak in the fuel tank, or in the case of a battery powered car, an electrical drain or bad battery. Driving the same route ever y day and recording the number of kilowatt-hours of input at the end of the run, one soon learns how many kilowatt hours are needed for that particular drive. One should always get the same number of miles range over the same course with a full charge. One or more poor batteries will reduce the number of drivable miles and can change the number of kilowatt-hours of charge needed for a full recharge either up or down. (Usually it is up, due to a battery's failure to reach its full state of charge in a timely manner.)

One more point for Vince to consider for the Ranger's poor range: If the batteries are found to be in excellent condition and the input energy required for a complete charge is proper (as observed from input meter recordings) but the range of the vehicle still falls short, then Vince might suspect an unwanted electric drain (similar to a gas tank leak) or some large added frictional gain (such as a stuck emergency brake or 150 mph head wind).

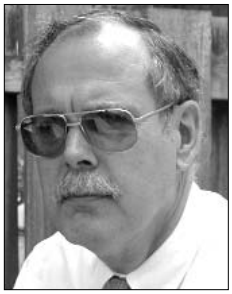
By our next meeting, Vince may have experimentally calculated the number of kilowatt hours his battery pack can hold and the number of kilowatt hours it takes to travel one mile. That figure will indicate whether or not he has a problem in the battery pack, charger, or truck electrical and power train. It could be that his new battery pack is too small an energy tank. (That is, the batteries don't actually hold the amount of energy that the company claims they should. The batteries could be good but just rated higher than they really are.)

Regardless of the length of time it takes to find the problem, Vince is not wasting fossil fuel while trying to solve it. Even in an inefficient vehicle he is taking the energy from the sun and putting it into his truck battery pack. Hopefully that pack will efficiently hold sufficient energy to give Vince the transportation range he needs to commute to and from work. But in the meantime, he can care less as to the availability of gasoline, or its price, in this project. Even if higher crude prices raise Atlantic Electric's electric rates, Vince will not be affected. He will just get a larger rebate for the electricity his panels provide the grid, and "keep on trucking"!

EEVC members interested in chatting with Vince about his project can reach him via e-mail at coyote1b@comcast.net

ARGUING OVER ALTERNATE ENERGY

California Pete



This is being written prior to the election, so I don't know how things will turn out, but we do have some quintessentially California things on the ballot. One is Proposition 87, a ballot initiative that calls for a tax on all petroleum pumped in the state, with the proceeds — estimated at $4 billion over ten years — to go to alternate energy research & development, production and distribution. As can be imagined, the oil companies have spent tens of millions running ads against it, and proponents, using mostly money from Hollywood producer Stephen Bing, have run as many ads in favor of it, many featuring Al Gore or (more recently) Bill Clinton.

The problem, as the *San Francisco Chronicle* and the opposing ads bring out, is that the money would first fund an entirely new bureaucracy that would be allowed to dole out the money as it saw fit — even to companies in which board members held stock, as long as it wasn't a controlling interest.

Another danger is that companies would, as they did in the 70s and 80s, farm the program without producing results. Already there has been an upsurge of venture capital investments into alternate energy firms, and one wonders how much of it would be there without Prop 87.

Even without the promise of government money there's quite a lot going on. On the solar front, for example, Fedex Express has installed an 81,000 square foot solar array that can put out 904 kW on the roof of its hub at Oakland Airport *(left)*. Google announced in October that it was installing a 1.6 MW system on the rooftops and parking lot shade structures of its Mountain View, CA headquarters. The system is scheduled for completion in the spring and is expected to generate 2,611,719 kWh per year, enough to meet 30 percent of the facility's power needs and save $393,000+ per year in the process, for a payback of about 7.5 years

In 2003 UPS installed a 100 kW system that provides 70 percent of the power needs at its Palm Springs, CA sorting facility. Since its deployment, the company says, the system has produced more than 523,000 kWh and reduced CO_2 output by a million pounds.

And, ever-trendy, UC Davis is installing a digester that will be fed food scraps from fancy restaurants and produce a methane-hydrogen mix that will, at least initially, be used in municipal garbage trucks (perhaps upscale garbage produces better methane). Plans are for the facility to be expanded to 8 tons per week. It would appear that California is a bit behind the times on this; along Route 5, running through the Central Valley to Los Angeles, is Coalinga, site of (among other things) a huge stockyard, with vast piles of manure steaming in the sun and letting drivers know where they are even in the middle of the night: "Eww, this must be Coalinga. Roll up the windows." Biogas production from manure is an old story, especially in Pennsylvania, so why not in Coalinga?

DOE PLEDGES GREENBACKS FOR GREEN ENERGY

On October 25 Department of Energy (DOE) Secretary Samuel W. Bodman announced $8.6 million for 16 projects to expand the use of alternative transportation fuels. Combined with funding from the participants, more than $25 million will be invested in the nation's alternative fuel infrastructure. The grants are part of the Clean Cities program and were selected under three topic areas including Refueling Infrastructure for E85 and Alternative Fuels; Incremental Cost for Alternative Fuel Vehicles; and Idle Reduction Training and Awareness for School Districts.

On October 23 DOE also announced the selection of nine projects totaling nearly $24 million aimed at developing novel and cost-effective technologies to capture and sequester the carbon dioxide produced in coal-fired power plants.

On October 24 DOE announced $100 million to fund 25 hydrogen research and development projects. These projects seek to overcome cost and durability barriers associated with hydrogen fuel cell research, and will specifically focus on fuel cell membranes, water transport within the stack, advanced cathode catalysts and supports, cell hardware, innovative fuel cell concepts, and effects of impurities on fuel cell performance and durability. Awards also include stationary fuel cell demonstration projects to help foster international and intergovernmental partnerships.

MITSUBISHI BUILDS RESEARCH EV

Mitsubishi Motors Corp. has built a new research vehicle called the Mitsubishi innovative Electric Vehicle (MiEV) for a next-generation EV development project. The vehicle will be used for joint research programs with power companies that have been working on the promotion of EVs. The power companies

will conduct field tests, gather data and evaluate the commercial viability of the vehicle. Mitsubishi will provide the EVs and analyze field test data collected by them.

The EV, based on Mitsubishi's "i" mini-car and powered by lithium-ion batteries, was displayed at EVS-22 in Yokohama on October 23 - 28. Unlike earlier versions, this one has a single motor driving the rear wheels.

MiEV specifications
Base vehicle: "i" mini-car
Dimensions (L x W x H): 3395 x 1475 x 1600 mm
Vehicle weight 1080 kg
Seating capacity: 4
Maximum speed: 130 km/h (81 mph)
Cruising distance with a single charge (Driving pattern: 10-15 mode): 130 km/160 km
Charging time (80% capacity)

15 Amp/200 V (on-board charger) 5 hrs / 7 hrs

15 Amp/100 V (on-board charger) 11 hrs / 13 hrs

3-phase 50 kW/200 V (Quick charger) 20 min / 25 min
Motor Type: Permanent magnet synchronous
Max. output: 47 kW
Max. torque: 180 N-m
Max. speed: 8500 rpm
Battery Type: Lithium-ion
Total voltage: 330 V
Total energy: 16 kWh / 20 kWh*
Controller: Inverter
Drive: Rear wheel drive

NEWS UPDATE

AutoNation CEO says "Raise gas tax"

An article by Alex Taylor III in *FORTUNE* online for June 19 reports that Mike Jackson, CEO of mega-dealer AutoNation, feels that the solution to many of our energy woes would be to increase the gasoline tax by about ten cents every year. Only that, he says, will drive people to more efficient vehicles.

Utilities call for sustainable development

On October 24 the World Business Council for Sustainable Development (WBCSD), along with eight of the world's leading electric utility companies, released "Powering a Sustainable Future," a report that contains an "agenda for concerted action" to secure future electricity generation, to bring more power to more people and to decrease the industry's greenhouse gas emissions. The eight companies warn that unless there is a marked shift in the way electricity is generated and regulated worldwide, increased energy production will have serious environmental impacts.

"With explosive population growth and development, economies are growing ever more dependent on electricity," said WBCSD President Bjorn Stigson. "That should be good news for the head of an electric power company, but the CEOs who have signed this new report are getting very concerned. Today, the power sector generates 40 percent of all carbon dioxide emissions from fuel combustion, and these emissions are rising quickly."

"Powering a Sustainable Future" is a collaborative effort driven by the eight international companies that comprise the WBCSD Electricity Utilities Sector Project. These companies represent around a tenth of the planet's generating capacity and reach all five continents. The group is chaired by ABB Ltd. (Switzerland), EDF Group (France), and Eskom Holdings Limited (South Africa), and also includes CLP Holdings (Hong Kong), Entergy Corporation from the US, Kansai Electric Power Company and Tokyo Electric Power Company from Japan, and Suez from France.

The report highlights the huge potential for end-use energy efficiency, which can provide more energy, more securely and sustainably, and at a lower price. Utilities need to work with governments and citizens' groups to find ways to make it a higher priority, and make sure it is understood and used as a resource option and investment alternative.

The report recognizes that energy security concerns are currently favoring the use of coal, the most carbon-intensive fuel. It argues

that "to significantly curb the growth in GHG emissions from the power sector in the next 20 to 30 years, we must find ways to finance the incremental cost of available lower-carbon technologies. Ideally developers should have a clear incentive to use such technologies whenever a new project is considered."

The group further urged governments to consult all stakeholders on the criteria for the acceptability of nuclear energy as a climate mitigation measure. Business and government alike need to reverse the trend of declining resources for energy research and development, to make sure that carbon capture and storage, fourth generation nuclear plants, solar technologies and new storage systems for electricity, will be ready for deployment in time.

The second phase of the WBCSD Sector Project on Electricity Utilities was formed in 2005 to identify the key sustainability challenges for the power sector, and communicate a global industry perspective on technology options and policy solutions.

GE invests in hybrid fuel cell bus

GE has announced a $13 million research partnership with the Federal Transit Administration, Ballard Power Systems and A123 Systems to develop a lightweight, battery dominant zero emissions hybrid fuel cell bus.

The research will be led by GE's Global Research Center in Niskayuna.

"Advancements in hybrid propulsion systems and battery chemistry offer tremendous promise for enabling cleaner, more affordable transportation alternatives that will reduce reliance on fossil fuels and promote a cleaner, healthier environment," said Mark Little, Senior Vice President and Director of GE Global Research. "At Global Research, we will be leveraging nearly three decades of experience in hybrid systems and battery chemistry research to help pave the way to commercialization.

It is expected that the hybrid fuel cell bus being designed and built will be completely emissions free, have a range of 200 miles with accessories operating, and an improved fuel cell life and cost. The focus of the research partnership will be to reduce fuel cell power requirements and improve energy storage technologies, which would help to increase the commercial viability of the technology.

COMING EVENTS

Vehicle Energy short course training program

Dec 6-8, University of Michigan, College of Engineering, Center for Professional Development, Ann Arbor, MI. For information go to http://cpd.engin.umich.edu/fmi/xsl/programs/details-short.xsl?-db=offering&-lay=web&-recid=2462&-find=

6th EVer Electric Auto Association Chapters Conference, in conjunction with 2007 Battery Beach Burnout.

Weekend of Jan 26-28, 2007, West Palm Beach, FL. Go to www.eaaev.org and www.FloridaEAA.org

Hybrid Vehicle Technologies Symposium — 2007

Feb. 7-8, 2007, San Diego. Check SAE at www.sae.org.

2007 motors & drive systems conference

Feb. 7-8, Dallas, TX. Go to http://www.e-driveonline.com/motors_conf_index.htm or e-mail jeremym@infowebcom.com.

Battery Council International 119th Convention and Power Mart

April 22-25, 2007, Myrtle Beach, SC. Phone: 312/644-6610, Fax: 312/527-6640, info@batterycouncil.org.

Fuel Cell 2007

June 14th - 15th, Rochester NY. Contact Marsha Hanrahan, marshah@infoweb-com.com or go to www.fuelcell-magazine.com/fc_2007 conf_index.htm

MEETING SCHEDULE

Meetings are held in Room 49, Plymouth-Whitemarsh High School, 201 East Germantown Pike in Plymouth Meeting, PA, and begin at 7:00 p.m.

December 13

January 10

February 14

March 7