EEVC NEWSLETTER

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SO WHAT'S REALLY BEEN GOING ON?
"Jiminy Peak!"
Oliver Perry

The spectacular "blade lift" in the $3.9 million, 1.5 megawatt Jiminy Peak, Vermont wind turbine, finally took place Thursday afternoon, July 12th. The wind turbine, called "Zephyr," is the biggest construction project at the mountain since it was opened as a resort in 1948 and is the only wind generator in North America built by a ski resort to produce its own power. It is also the first wind turbine in the megawatt class to be purchased in the U.S. by a private company. The turbine is predicted to produce 33% of the energy needed by the ski resort.

Zephyr has three blades each 122 feet long, as long as a 12 story building is high. Each blade has GE's patented adjusting technology to maximize electrical output. The tower supporting the blades is 260 feet tall. Raising the blades, connected at the common hub, to the top of the tower was no easy task. Special boom crane configurations were needed.

Meanwhile in Senator Kennedy's Backyard, "Environmental Phoniness?"

Massachusetts Senator Ted Kennedy's family compound gazes out over the pristine waters around Cape Cod. Two summers ago Greenpeace activists cruised around a sailing yacht carrying wind-farm critic Robert Kennedy Jr. displaying a sign that read, "Bobby you are on the wrong boat." Greenpeace activists advocate "The Cape Wind Project" that wants to place 130 wind generators on Horseshoe Shoal in Nantucket Sound to "gracefully harness the wind." According to an editorial in the *Wall Street Journal for* Aug 8, 07, the well to do residents around Cape Cod are again facing off against Greenpeace over the purposed wind farm to be placed in the middle of their privileged view.

The *WSJ* article stated that although costs for wind energy electricity have come down to 4.5 cents per kilowatt hour from 6.1 cents in 1999, the technology is still not cost effective for some areas. Recent wind projects in Long Island and in Texas have been scrapped over cost considerations. Wind energy, according to the article will never be a large player in the overall energy equation, but it does serve to offer a "virtuous" solution to global warming, unless, that is, it spoils somebody's view.

How about those gas prices?

Last Spring, April 21st, when everyone was predicting gas prices to approach $4.00 a gallon by mid summer, I read a prediction by

Russell Gold in the *Wall Street Journal* that gasoline prices, at that point $2.88 a gallon, would drop and average $2.81 a gallon for the summer season. Not too many people at the time of the article were expecting the gas prices to go down.

Labor Day has come and gone. Prices at the pump on route 206 a few miles from my house are $2.45 for regular. Gold's prediction was based upon knowledge of what really sets the price at the pump, not on speculative (unfounded but loved) conspiracy theory. Some people have access to real data and understand the economic factors at play in the energy business. I suggest we lean more on their expertise when it comes to predicting the future cost of energy than our limited understanding, which often better suits our philosophy than reality.

David Bird, writing a recent article for a *Wall Street Journal* commodities report, states, "Retail gasoline prices, on average are slightly below year ago levels for the first time since 2001." However, he reports that in North Dakota gas prices average over $3.12 per gallon because mid west gasoline supplies have been shorter than usual. North Dakota Governor John Hoeven last week asked the US EPA for an exemption from pollution rules to allow the state to use winter-grade gasoline from Canada rather than to find summer grade gasoline.

Gas prices, CAFE, GM, and alternative fuel?

Several bills are working their way through Congress that would increase the corporate average fuel economy standard (CAFE) for cars and light trucks by 4% per year, reaching a target of 35 mpg by 2018. According to Robert W. Crandall and Hal J. Singer, writing for the *WSJ*, Sept 6, 07, to bolster support for these new rules CAFE proponents have issued two studies that purport to show that by increasing the CAFE standard to 35 mpg car owners would reap savings in excess of the increased cost of the more fuel efficient and technically advanced vehicle. The studies indicate that car manufacturers would also reap increased profits. But in their article Crandall and Singer state that unfortunately elementary economic principles require one to conclude that both carmakers and consumers will lose, not save, contrary to the study put forth by CAFE proponents.

"Ask any economist and he'll tell you that estimating the private costs and private benefits of increasing fuel economy is a fool's errand!" If there was a fuel savings technology out there that cost $1000 but generated $2500 in fuel savings over the life of the vehicle carmakers would surely embrace that technology without CAFE standards being imposed. Both consumer and manufacturer could split the savings. According to the estimates of Crandall and Singer, every new GM customer would incur a net loss of several hundred dollars under the newly proposed CAFE standard. Their analysis indicates that the cost of meeting the new standards will outweigh the savings in fuel. And they add that no country can expand its wealth by employing people in activities that entail more costs than benefits.

Crandall and Singer argue that the free market should dictate mpg standards not the government. News from another *WSJ* article titled "GM Crossover Trio Lures Drivers Away From Asian-Brand Vehicles" supports their position. "General Motors Corp is struggling to halt declining U.S. sales, but it has a bright spot in the three large crossover vehicles it launched in the past year." "The Buick Enclave, GMC Acadia and Saturn Outlook each have three rows of seats and look like big SUVs but are lighter, have a smoother ride, and get better gas mileage than SUVs." "More importantly, the trio is doing something that few other Detroit vehicles can achieve these days — they are pulling drivers from import brands."

"Dealers say they can't get enough Acadias and Enclaves." "We're selling them as soon as they come off the truck."

Those in the battery and alternative fuel business of course know that the bottom line in sales is cost effectiveness. We still cannot offer cost savings to purchasers of electric and hybrid cars. If my purpose is to save money, not the environment, then I can still save more cash by purchasing a conventional economy car. Have the increased CAFE standards really helped advance alternative fuel cars? (CAFE should not be confused with CARB standards which deal with emissions.)

Oil, no end to new discoveries!

The moment we run out of oil alternative energy transportation schemes will really be big. But it still appears as if we are not going to run out of oil in the near future. The latest interesting discovery that I happened upon in the August 28th edition of the *WSJ* pertains to activities in the Caspian Sea region, "hub of the world's largest oil development project."

The rewards of conquering the Kashagan, in Kazakhstan's sector of the Caspian Sea, are potentially huge. The discovery in 2000 was, according to the article, the world's largest oil find in thirty years. Production from this new field is expected to produce 1.5 million barrels of crude per day by 2019.

However, oil in the Kashagan field is potentially lethal, with high concentrations of hydrogen sulfide gas. Workers in the exploration process carry oxygen tanks and have regular evacuation drills. High tech boats stand ready to whisk them to safety. "One breath will kill you!"

The oil is 2.5 miles beneath the seabed under pressures 500 times that at sea level. The sea is frozen over five months of the year. Winds cause ice floes to crush oil rigs. To successfully tap the oil will require tremendous costs and futuristic technology. Already tons of money has been spent building an island to support the oil rigs, surrounded with a protective reef.

Companies involved in procuring the oil made bids for the drilling rights with the understanding that the host country will receive royalties after initial recovery costs are repaid. The tremendous price predicted to develop the technology needed to tap this reserve is constantly rising as more and more problems surface. Engineers and contractors are exploring the hitherto unknown and untried methods of obtaining their prize. They can't keep on schedule nor stay within their budgets. As a result the paybacks to local government will be significantly delayed. The delays have spawned serious political opposition from the host country which is further delaying advancements. Patience, perseverance, and the involvement of major league oil companies capable of operating large technically complex fields will be required to bring this oil to the world market.

But, as prices of oil continue to slowly rise, eventually this "hard to reach" oil will pay for the investment. Right now, one theory goes, some energy investors are not too anxious to see Caspian Sea petroleum on the market just yet. They want to continue to profit from tighter supplies and higher prices.

Global Warming: anything new?

Our September 6th local newspaper featured an interesting letter to the editor written by a Leon Czartoryski, from Florence, New Jersey, entitled "Assigning blame for global warming." According to Leon the major causes of global warming are biomass burning and atmospheric brown clouds, both of which are not man made. He then goes on to state that coal mine fires from all over the world (that cannot be quenched) are the number one single cause. (I personally do not see how Leon concludes that such fires are unrelated to man's activity.)

Then, I have been recently informed by several knowledgeable friends, there have been numerous reports of people who believe that extending daylight savings time has contributed to global warming. (One of my pet peeves regards our country's failure to invest in better elementary science education.)

From the standpoint of hard truth, as opposed to the growing consensus that everyone should take measures to curb CO_2 production, I am not sure we are any further along in the global warming debate then we were last spring. There is a newly released book written by Chris Horner entitled *The Politically Incorrect Guide to Global Warming and Environmentalism* now available to those interested in balancing Al Gore's arguments. Horner indicates that the latest survey of scientific literature finds no consensus on global warming. (I am too cheap to buy the book, but I suppose I still ought to try to read it.)

Discover magazine recently featured an interview with Henrik Svensmark, the 49 year old director of the Center for the Sun-Climate Research at the Danish National Space Center in Copenhagen. His studies show that cosmic rays are instrumental in determining the warming (and cooling) of Earth. His research theorizes that cosmic rays trigger cloud formation, suggesting that a high level of solar activity, which suppresses the level of cosmic rays striking the atmosphere, could result in fewer

clouds and a warmer planet. This, Svensmark concludes, could account for most of the warming during the last century.

Does this mean that CO_2 is less important that we have been lead to believe? Yes, Svensmark says, but how much less is impossible to know because climate models are so limited.

There was a recent discovery by a retired businessman and climate hobbyist Stephen McIntyre, (*WSJ* 8/28) that 1934 and not 1998 was the hottest year on record in the U.S. What does that finding have to do with Al Gore's statements regarding global warming? Maybe not a whole lot, other than to indicate that our so-called experts don't always have all of their facts in command and that there still is a lot of uncertainty regarding the issue. Global warming may be more alarmist than alarming! (*WSJ* Opinion 8/28/07)

Bret Stephens, writing for the *WSJ* in Opinion 8/28/07, concludes his article with a most important observation and plea in regard to the global warming debacle. Knowing that it's easy for us to remain indifferent to far-off and diffuse threats, have manipulators for financial reasons tried to make the issue an immediate threat? Captions that show polar bears floating alone on little ice patches under the caption "Bear's at Risk" do not tell us that the bear population has risen 5-fold since the 1960s. And why don't they more frequently mention that temperatures at the South Pole have been going down for 50 years even though an ice shelf quickly disintegrated in 2002? Is somebody trying to convince us of something to enhance their financial investments or personal influence? Does it help their cause if we can be led to believe that we are at serious risk?

It seems that everyone who wants to make a fortune or further their cause ties their wagon to a solution for global warming or blames the problem they want to conquer on fossil fuels. *WSJ* Sept 8, 07, page 2, "Consensus on Emission Cuts Take Shape, but Debate Turns to Who Will Pay?" The article explains that world wide everyone seems to agree that we must cut carbon dioxide emissions in order to save the planet. (Whether it is true or not, it is politically correct to believe it.) Now a multi-billion-dollar trade in carbon credits among the corporations and nations of the earth has been spawned. The terms of the Kyoto treaty basically requires the industrialized nations of the world to bankroll cheaper emissions-reducing projects in the developing world, including China, where carbon dioxide emissions are increasing the fastest. But what if all of the billions of dollars spent makes no significant impact one way or the other on global warming? What if our understanding of the real causes of global warming is flawed, or it turns out that irreversible global warming is not really happening?

(CO_2 emissions are not the same as toxic life threatening harmful emissions. CO_2 gives life to plants and provides zing to carbonated beverages. Sequestering CO_2 does not automatically eliminate the remaining air pollutants which are seriously harmful to our health.)

Stephens ends his article thus, "I do not wish the civilization boundaries built up over two centuries by an industrial, inventive, adaptive, globalized, and energy hungry society to be squandered chasing comparatively small environmental benefits at gigantic economic costs." Neither do you nor I.

Let's not be roped into believing that the global warming scare is going to advance electric car development. It won't. Adding electric cars will not make a significant reduction in the amount of CO_2 man puts into the air. The argument that every little bit we do to reduce CO_2 emissions has merit but in reality switching to more EVs would be like patching a pin hole in a tire while neglecting a large rip in the sidewall. Meanwhile fossil fuel advocates are going to take the global warming issue and spin it to further their interests. The big companies (and/or the government) will convince (scare) us into taking the CO2 (that they put into the air) out of the atmosphere at our expense while they negotiate ways to make money sequestering CO2. The fossil fuel industry will attempt to turn itself from a monster image to that of a great savior. And, I predict, Florida and New York City are not going to be under water any time soon any more than Martians are going to take over the Empire State Building. Such predictions serve those who make money off of them. I don't want to be a part of offering electric cars as a preventative for floods in Manhattan. I have a degree from an Ivy League school and I want to live up to the respect it represents. Tesla was a respected scientist and engineer, but he suc-

ceeded in tarnishing his image with questionable science before he said good bye. Refrain from forming premature conclusions in the climate debate. Let us not be manipulated into believing something that is not true just because it sounds like it could be.

I would like to close with an applicable account of an incident that occurred in my youth.

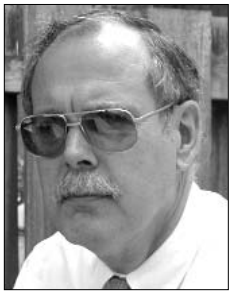
For some reason — I am not sure exactly what it was — I sincerely believed that one should not wastefully chop down trees. When I received permission to carry my first hatchet, my father stressed to me that I was not to start chopping down trees. Trees were valuable to our future.

My respect for trees soon led to conflict. To put me in my place, some of my friends (turned enemies) began cutting down trees near my woodland fort. I began to have arguments with everyone over not cutting down trees. I clearly remember one heated debate with one of my cousins on neutral property. He and I were behind his house one mid-summer day with a hatchet, playing "army." Suddenly he decided we should chop down a little defenseless tree. From my perspective chopping down that tree served no purpose other than to give him some kind of thrill. I really got angry at him for destroying the environment and a valuable future piece of lumber. I defended that tree like it was the only one on earth. And he argued that there were so many other trees around that chopping this one down wouldn't make any difference in the future price of lumber. Besides, this tree was neither a pine nor a lumber making hardwood. It was a wild bush ready to be chopped! I remember lying to him, trying to say it would make good lumber when in fact I knew it wouldn't (Sound familiar?). I felt he was wrong and the tree should not be wasted even if I had to lie to convince him of the truth. I was pretty mad when he went ahead and chopped it down just to spite me.

Last spring, over 50 years later, I drove by the old house and looked up at the hill behind it. All I could think of, as I gazed upon the hillside's present use, was why I so concerned over (and agitated about) chopping down one little bush. As my father would say in the over-all scheme of things, "That tree didn't amount to a tinker's dam!" "Just look the other way and see the Albany skyline." Rockefeller really made a difference on his hill!" All I succeeded in doing that day was making my cousin angry at my obstinance. The tree was not a pristine tree in somebody's front lawn. It was a bush in a clump of bushes on a "wild" side hill, destined to be cleared and turned into building lots.

It is good to stand up for the things that are right, but let's not become overzealous to the point of being foolish.

SIGNS OF THE SEASON
By California Pete



Fire season is upon us again (the other seasons here are rain, mud slide and earthquake — which actually lasts all year), and here in the Bay Area we've had at least one day with that odd look to the sky that means the smoke has reached us from a 31,294-acre blaze in the northern Sierra Nevadas.

Last week we drove up I-5 from Los Angeles. The hills around Tejon Pass at the southern part of the trip were covered with dried grass on the right side of the highway and were bare and blackened on the left side due to last year's fires, but as we went north through the Central Valley things looked pretty normal, with just the occasional burnt patch.

But as we approached the midpoint of our trip we saw what looked like a cloud bank ahead. When we reached it the sunlight had turned amber, and the air smelled funny — sure enough, it was smoke from a 15,000-acre fire in a remote part of the Plumas National Forest. And we have about two months to go.

The Zenn makes it to market

The Canadian-built Zenn NEV (neighborhood electric vehicle) has gone on sale here at Green Motors of the East Bay in Berkeley. The car starts at $12,750 and has a range of up to 35 miles. Claimed recharge time is as little as few as four hours, and the manufacturer claims the car will exceed the federally-mandated 25 mph top speed for an NEV by 10 mph. Just don't get caught, I guess.

Charge your Tesla at the Hyatt

Hyatt Hotels, which caters to a generally upscale clientele, has made a deal with Tesla Motors and will install Tesla recharging stations at three hotels: Fisherman's Wharf in San Francisco, Sacramento and Incline Village on the north shore of Lake Tahoe, according to the *San Francisco Chronicle*.

A Tesla can charge from an ordinary outlet, but it takes six to seven hours; a Tesla charger takes three or four hours.

And on an alternate-energy note: During that trip up I-5 we noticed that there's an awful lot of land on the side of that road that's not being used for anything much except perhaps grazing a few cows. There's room for many megawatts of solar panels, and even has a power line running through it to carry off the output.

NEWS UPDATE

Ultracapacitor back in the news

An Austin, TX-based company named EESTOR has shown up in the news again with an AP story about its claims that its ultracapacitor would be able to power an EV for 500 miles. Now, it seems, Zenn Motor Co. has bought a license for the device and expects to begin receiving shipments later this year. EEStor has also received a $3 million investment from the venture capital group Kleiner Perkins Caufield & Byers.

We first covered this in October of 2006, in which we reported that, according to the Sept. 3, 2005 issue of *Business Week* it's run by Richard D. Weir, Carl Nelson, and Richard S. Weir, previously managers in disk-storage technology. *Business Week* says that the May 2004 issue of *Utility Federal Technology Opportunities*, "an obscure trade newsletter," reported a claim by EEStor that it would "make a battery at half the cost per kilowatt-hour and one-tenth the weight of lead-acid batteries. Specifically, the product weighs 400 pounds and delivers 52 kilowatt-hours. (For battery geeks: 'The technology is basically a parallel plate capacitor with barium titanate as the dielectric,' UFTO says.)"

A January 22 article in MIT's *Technology Review* by Tyler Hamilton, based on a rare interview with Weir, reports that the company has found a way to "modify the composition of the barium-titanate powders to allow for a thousandfold increase in ultracapacitor voltage — in the range of 1,200 to 3,500 volts, and possibly much higher." The article further reports that "EEStor claims that, using an automated production line and existing power electronics, it will initially build a 15-kilowatt-hour energy-storage system for a small electric car weighing less than 100 pounds, and with a 200-mile driving range. The vehicle, the company says, will be able to recharge in less than 10 minutes."

Other people in the business have expressed considerable skepticism as to the practicality of the company's production methods, among other things.

We'll keep our eyes open and let you know if we find out any more.

New boron-based hydrogen storage

There has been considerable research over the years on chemical storage of hydrogen for transportation; much of it centering on boron compounds, specifically sodium borohydride. Pacific Northwest National Laboratory, located in Richmond, WA and operated by Battelle, reports on work done at DOE's Chemical Hydrogen Storage Center of Excellence, of which the center is a part, using another boron compound. PNNL scientists are using solid ammonia borane, or AB, compressed into small pellets to serve as a hydrogen storage material. Each milliliter of AB weighs about three-quarters of a gram and holds up to 1.8 liters of hydrogen. Researchers expect that a fuel system using small AB pellets will occupy less space and be lighter in weight than systems using pressurized hydrogen gas. Spent pellets are broken down and "recharged" chemically. How energy-efficient this process might be is not mentioned.

PNNL is one of DOE's ten national labora-

tories, managed by DOE's Office of Science. PNNL also performs research for other DOE offices as well as government agencies, universities, and industry. For more information go to www.pnl.gov.

Wave power attracts investors

A *Business Week* story by Vaughn Skelly dated August 27 reports that wave power is beginning to attract the attention of large electric utilities. California's PG&E announced in February that it planned to investigate several types of wave power systems. as we reported in March of this year. The *BW* story also mentions that Ocean Power Technology, inventor of a device called the PowerBuoy, has been hired to build and operate an installation off the Spanish coast, "and is talking with French oil major Total about another wave energy project off the French coast. It is also working on projects in England, Scotland, Hawaii, and Oregon." Other companies that are investing in wave power research include General Electric, Norsk Hydro, the Spanish utility Endesa, Chevron, Siemens Hydro Power Generation and more. Perhaps we'll see something happen yet; it would be about time.

New electric motorcycle

On July 10 Brammo Motorsports (Ashland, OR) announced a new electric motorcycle called the Enertia, which claims a 45-mile range, 3-hour recharge time, and a top speed over 50 mph. It uses a permanent-magnet pancake motor chain-driving the rear wheel with a 5:1 reduction and a 3.1 kWh, 76.8 V lithium phosphate battery from Valence Technologies (six modules with a battery management system). Carbon fiber construction gives it a weight of 275 lb.

Gizmag calls it the perfect commuter machine, citing its fine handling and acceleration ("harder than any car"); it does zero to 30 mph in 3.8 seconds.

The bike isn't cheap, with a price of $15,000 for the limited production carbon-fiber bike; a non-carbon one will go for $12,000; shipping is estimated at 2008. For more information go to www.enertiabike.com.

Bolt-on hybrid conversion

On August 22 Westart/Calstart reported that Wales, UK-based Connaught Motor Company had "delivered its first Hybrid+ "bolt-on" auxiliary mild-hybrid systems to vans retrofitted for Tesco markets in the UK, according to the Society for Automotive Engineers. "Connaught Chief Designer Geoff Matthews said that the system could be fitted to 'any vehicle where there is sufficient space.' He explained that the system uses a secondary, brushed, 48-V motor/alternator driven off the lower pulley drive on the front of the engine. 'The unique bit is the constantly variable transmission (CVT) drive between the engine and motor/alternator. Even if the diesel engine is turning at 800 rpm, the CVT drive will ensure that the motor/alternator is spinning at its optimum 3000 rpm,' he continued. SAE also reports that 'On an urban delivery route, Matthews expects a reduction in fuel consumption and carbon dioxide emissions of between 15% and 20%-and possibly 25%-depending on the cycle, traffic conditions, and driver.'"

A hybrid Vespa?

On July 25 Piaggio & C.s.p.a., manufacturer of Vespa motor scooters, Gilera motor cycles and several other brands, announced that it was developing a parallel hybrid scooter called the HyS, which uses an electric motor as an acceleration booster for its gasoline engine and for regenerative braking. The company claims that the motor gives an 85% performance boost and helps reduce fuel consumption up to 60 km/l. The scooter also has an electric-only mode with a range up to 20 km, and the battery can be charged from the wall, making this probably the only PHEV scooter around.

Maglev wind turbines?

A July 31 article in *Gizmag* reports that the

Chinese have developed a wind turbine that uses magnetic levitation to remove all bearing friction; the article implies that friction is a big factor limiting the efficiency of conventional wind turbines, but goes on to explain what may be the system's major advantage: reduced maintenance. Other reports say that the maglev principle might boost wind turbine capacity by as much as 20% over conventional units, and cut operational expenses by half, to about $0.05 per kWh

New photovoltaic system on line in CA

On August 23 Alcoa announced the startup of a 588,000 W roof-mounted photovoltaic power system at its manufacturing facility in Visalia, California. Alcoa worked with solar power project developer DEERS, which constructed and will own and operate the system. Alcoa will host the system and purchase the electricity generated.

The power generated will provide approximately 80% of the 200,000-square-foot facility's electricity needs during peak times. In addition to the solar panels, more than 200 solar light tubes were installed to supplement the artificial lighting in the facility with day lighting.

Construction to start on clean coal plant

On Sept. 7 Officials representing Southern Company, DOE, the Orlando Utilities Commission and KBR Inc., announced a Sept. 10 groundbreaking on an advanced 285 MW integrated gasification combined cycle facility near Orlando, FL.

More nuclear plants coming?

An AP story by Duncan Mansfield dated September 7 reports that the Nuclear Regulatory Commission (NRC) anticipates a flood of license applications for new reactors. The story quotes NRC as saying the agency is "weeks away from an anticipated flood of license applications for new reactors not seen since the 1970s" — as many as 29 reactors at 20 sites, most in the South, over the next three years.

This is not surprising, considering that the Southern Co, the big power utility serving much of the Southeast, has reported a string of record demand days in the past few weeks.

COMING EVENTS

Panasonic World Solar Challenge
October 21-28, Australia. Call 61 8 8463 4500 or go to www.wsc.org.au

Michelin Challenge Bibendum 2007
Shanghai, Nov 14-17. Contact mail.challenge-bibendum@fr.michelin.com, www.challenge-bibendum.com

EVS 23: Sustainability: The Future of Transportation
Dec 2nd - 5th, Anaheim, CA. For information go to www.electricdrive.org/evs23.

2008 Hybrid Vehicle Technologies Symposium
February 13-14, 2008, San Diego, CA. Go to www.sae.org/events/training/symposia/hybrid/ or call 202-463-7319.

2008 Clean Heavy Duty Vehicle Conference
February 20-22, 2008, San Diego, CA. Go to www.calstart.org/programs/chdvc/ or call 626-744-5600.

2008 SAE World Congress
April 14-17, Detroit, MI. Go to www.sae.org/congress/ or call 626-744-5600.

Convergence 2008
October 20-22, 2008, Detroit, MI. Go to www.sae.org/events/convergence/ or call 626-744-5600.

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.

October 10

November 14

December 12

January 9

February 13