



# EEVC NEWSLETTER

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## SPONTANEOUS SUMMER EEVC MEETING



*The old timers enjoyed seeing the Lectric Leopard.*

The New Jersey Boys, Ken Barbour, Dan Monroe, and Al Arrison, arranged for a spontaneous Saturday evening EEVC tour of Don Auker's solar and geo-thermal powered home in Lebanon, PA this past July. Don and Angie provided us with a wonderful summer time buffet, complete with some great pies. It was



*A cool truck indeed!*

a very hot day and the air conditioning powered by a grid supplemented with Don's Solar Panels and geo thermal pump felt great.

Attendance was very good. In addition to Don Auker's professionally built electric motor cycle, electric lawn mower, and Tesla sports car one of our members brought his new Volt. Another member arrived in his Lectric Leopard. We also looked over a con-



*Brandon Hollinger drives his new conversion into Don's garage and into the light.*

verted electric pick up with lithium ion batteries and had a display of Brandon Hollinger's latest electric conversion, a sports car convertible. In addition to discussing and viewing electric vehicles Don provided us with a tour of his solar paneled and geo-thermal home, describing in detail the technical aspects of the systems.



*Under the Hood of Brandon's conversion*



*Inside the Letric Leopard*



*Don Auker provides a demonstration of how well his electric lawn mower cruises over short and dried out grass.*



*Don Auker reveals the battery pack in his electric lawn mower.*

## **THE CAR THAT COULD- PART V** **Before the EV-1: Came the Impact** **Oliver H. Perry**

Continued in-depth review of the book  
“The Car That Could” by Michel Shnayerson

### **Update**

“The Car That Could,” written by Michael Shnayerson, is an outstanding detailed account of the design and production of the EV-1 by General Motors. This is the fifth part of a detailed review of that book. The account is very relevant for better understanding the struggle for electric cars to enter today’s market.

### **Team USA**

Did you know that GM, Ford, and Chrysler considered a joint effort to build electric cars and that GM wanted help in producing the car that would eventually become the EV-1? The following is that part of that story.

At the end of part IV Ken Baker, the GM manager assigned to turn the prototype Impact car, (forerunner of the EV-1) into a full production electric vehicle, made a last ditch effort to save the Impact program in the General Motors building in New York City. Baker had taken a year to convert the AeroVironment concept prototype electric car into a production design with all of the perks of a GM luxury car. But in that year the fortunes of GM ran in reverse. In December of 1992 GM was expected to scale back their electric car program, which at that time consisted making 50 initial Impact cars followed by a significant production line. A shutdown of the whole Impact program was feared as GM attempted to turn the tide on months of financial losses.

Baker prepared hard and long to make a successful effort to persuade the GM board to continue to fund the Impact program by combining the forces of Chrysler and Ford, in what was referred to as TeamUSA.

Baker’s pitch was delivered on December 7th, Pearl Harbor Day. Baker argued that GM should share its technological lead in electric cars with Ford and Chrysler because GM could no longer afford to go it alone. Al Gore in his best seller wrote of a need to get

beyond the internal combustion engine. Team USA would be the new Washington administration's centerpiece for transportation, served up just as Bill Clinton and Al Gore took office.

Baker succeeded in getting the endorsement of the GM board to form TeamUSA. However with approval also came the ratification to remove the Impact from its production status. A pared-down Impact platform would remain to refine the design of a small "limited-production" fleet of fifty cars. Maybe thirty of these would be used as test cars around the country for several years to gather more information needed to advance the company further along the EV learning curve. But for the moment there would not be a production vehicle.

Although Baker felt relieved that the board had accepted TeamUSA he did not feel totally victorious. To the hundreds of people who had shared his dream of having GM seize the EV technology lead with a full production Impact, teaming up with Chrysler and Ford to produce 50 test cars seemed more like a defeat.

### **The Pearl Harbor Day Bomb**

As Baker left the boardroom on Pearl Harbor Day, feeling relieved that at least he had prevented the total loss of the Impact program. However the *Wall Street Journal* dropped a bomb on his hope for TeamUSA the same morning.

The *WSJ* speculated that GM would scale down the Impact program. This news was released before Chrysler had opportunity to sign the TeamUSA agreement. John Wallace, who had signed a mutual gentlemen's agreement for Ford, suddenly had doubts about his commitment when the news broke. After the article appeared, executives from Chrysler stated they would not sign.

Baker had previously convinced both Chrysler and Ford that GM's Impact program was such a solid sure go that it would succeed with or without outside help. He had made the representatives for Chrysler and GM feel convinced that they would be left out in the cold if they did not sign on. By signing on they could meet the California mandate with the aid of GM's advanced technology. Both representatives for Ford and

Chrysler were convinced that GM was so far ahead of them in EV development that they should sign on or lose the race. Baker had convinced them it was to their advantage to gain access to Impact intellectual property by joining TeamUSA.

Shnayerson writes in his book that later John Wallace, Ford's representative, would say that he knew in advance of the article that the Impact program was going to go down but that he had verbally agreed to go along with Baker as a friendly gesture to help Baker acquire a public relations gimmick.

Baker's TeamUSA proposal a few days before the GM board meeting, which at the time seemed genuine and transparent to both Chrysler and Ford, did appear to some executives to be a mere publicity stunt. Three days after the *WSJ* article appeared, lawyers from GM, Ford, and Chrysler were still trying to redraft a letter they all could sign. The final agreement among the Big Three resulted in forming a vague consortium that would mutually explore electric vehicle opportunities, making no mention of beating Japan in an EV race.

### **Shutting Down the Line**

The GM board agreement to shut down the Impact production line remained speculative *Wall Street Journal* rumor as far as the public was concerned. Reporters sought confirmation of the report but GM wisely withheld confirmation, still hoping for the best agreement with Ford and Chrysler regarding TeamUSA.

There was also the real issue of informing the Impact workers of the shutdown before the media informed them. Baker preferred that he be allowed to be the first to officially inform his staff that the Impact production line had been canceled.

It was a glum and somber group of assembly line union workers that walked into the empty GM Lansing plant for the announced meeting. Baker tried to convince the workers that the non-start up of the prepared Impact assembly line was as tough a blow to Baker himself (and everyone involved) as it was to the assembly line workers. He hoped they would all still have a Merry Christmas. 652 members of Local 1618 prepared for a bleak holiday. Later that month they each received Christmas cards signed by Baker. Each card

had a drawing of the Impact on the front of the card. Shnayerson wrote that dozens of them returned their cards to their shop steward on their way out the door.

### **Was the union part of GM's problem?**

Even with the shut down, each of the union workers was entitled to receive 85% pay without coming to work as part of the jobs bank deal that had doomed Bob Stempel's chairmanship. Twenty of the 652 workers decided to earn full pay by reporting to work even without their jobs. Their shop steward put them to work counting and recounting cafeteria tables. A company that has to pay salaries for non-producing workers must question how long they can remain competitive.

### **Ford places an ad for EV engineers**

The 100 contract engineers assigned to the Impact program responded to an ad placed in the newspapers by Ford and were working on the Ecostar program within days of their release from GM. Each company seemed to be still going their own way even before the ink was dry on an agreement to work together as a part of TeamUSA.

### **Reduction of the dedicated**

The 250 GM career engineers on the Impact engineering staff was reduced to about 70. Baker stressed to those who lost their jobs that they had succeeded in advancing the cause of electric vehicles. Their contributions would be used in other GM programs. Baker's voice cracked with emotion more than once as he personally addressed all Impact employees regarding the shutdown. The closing of the Impact assembly line was a dreary end to the most technically ambitious program in GM history.

### **Europe explores EVs**

As 1993 began, the TeamUSA vs Japan EV race disappeared. Japan didn't even claim to know there was a race with the US in regard to producing electric vehicles. In fact it seemed that maybe Europe was proving to be more of a threat to US electric vehicle advancement than Japan, with offerings from BMW (sodium sulfur battery) and Volvo (nickel cadmium). Both battery technologies

later proved to have insurmountable obstacles to practicality. Mercedes Benz, Peugeot, Citroen, Volkswagen, and Renault also had unique prototypes on their drawing boards and claimed breakthroughs.

### **The Big Three unveil their EVs to each other**

January 13, 1993 GM revealed their Impact to both Chrysler and Ford in an unheard of technical show and tell between competitors. A week later Chrysler revealed their TEVan, an electric Dodge Caravan conversion. With its General Electric DC motor, GE controller, nickel cadmium battery pack, and questionable 80 mile range, it was the most car for the least amount of R& D expenditure among the three. Two days later Ford revealed its sodium sulfur battery powered Ecostar. It had the most expensive battery pack of the three companies, which still was not ready for production.

With the CARB mandate still looming, which would force car manufacturers to provide a certain percentage of zero emission automobiles to the California market (possibly in other states as well), all three car companies were concerned about finding the most economical path to meeting their respective requirements. Times were hard and cost sharing for developing a production EV for a market that might not really exist appealed to all three. Baker and others in GM hoped that money from the government, Ford, and Chrysler would enable their Impact project to continue in a joint TeamUSA effort. (The team was also coined EV3.) GM hoped they could convince the other two companies that the Impact offered the best hope for meeting the mandate.

Each company tried to convince the others that their respective vehicle was the one to advance. But even if they picked one particular car there remained serious questions. When cars were built whose brand would they carry? How would they be sold? Who would service them? Would the Impact have an EV3 emblem representing all three motor companies?

In the meantime all of the companies were still trying to do away with the mandate even as they tried to work together for TeamUSA. The California recession had gone from bad

to worse. In five years California lost 700 companies and as many as 224,000 jobs, many in aerospace. This was not the time, the car companies argued, to try to develop electric cars that were far too expensive for most people to afford. However there were those in California who insisted that EV manufacturing could regain jobs. They were pressing for manufacturing bases to produce them. A New Deal type consortium of public and private interests called CALSTART was formed to foster EV technology. Groups like CALSTART tried to impress the California legislators that EVs were a now thing and very affordable.

### **But were EVs really affordable?**

When news of GM's Impact reached Disney, GM agreed to sell some of their 50 hand built Impacts to Disney for \$500,000 each, when they were completed, making the statement that if everyone in California was a multi-millionaire GM would have it made. Ken Baker had spent 200 million dollars on the Impact program, which, at that point, did not even have 50 cars to show for it. Of course there were those who felt that someone else other than a major car company could have achieved as much with fewer expenditures.

### **Ken Baker promoted to VP of R&D**

Conditions being as they were, Ken Baker realized that the 200 million dollars he had spent for GM on the Impact program most likely was going to be chalked up as a wasted venture, at best a research venture. His career at GM might be over. Therefore Baker decided to accept a new position suddenly offered to him within GM, Vice President of the GM Research and Development Labs. The complex was home to 750 GM scientists. The facility had lost its focus and status. Baker was challenged to revise its function and its image. Ken would still be involved in the hands on building of the 50 Impacts, but from a distant office. Jim Ellis would become the program's de facto manager.

### **Ellis Inspires**

In a quiet way, Ellis came into his own when Baker took over the R&D Labs. Ellis had arrived at GM in 1960 with a masters

degree in engineering from Michigan State. He came in fresh and identified problems quickly. He pushed his solutions along and then moved on. He whisked through twenty-two jobs in twenty years. Pinned on his desk was a quote from Brooks Atkinson. "This nation was built by people dedicated to taking risks." Another was a list of ten EV commandments:

1. Come to work each day willing to be fired.
2. Circumvent any orders aimed at stopping your dream.
3. Do any job needed to make your project work, regardless of job description.
4. Find people to help you.
5. Follow your intuition about the people you choose, and work only with the best.
6. Work underground as long as you can--- publicity triggers the corporate immune system.
7. Never bet on a race unless you are running in it.
8. Remember it is easier to ask for forgiveness than permission.
9. Be true to your goals, but be realistic about the ways to achieve them.
10. Honor your sponsors.

As 1993 progressed, the efforts to form a solid EV3 relationship between GM, Ford, and Chrysler went through ups and downs. Chrysler was first to pull out of the talks permanently. They had never really shown commitment in the first place. Chairman Eaton stated, "We never had any plans of joining despite the more than 70 hours of EV3 meetings." "There is absolutely no economic basis for electric vehicles in the world. Not even in Italy where gas is four times the price of gas in California."

### **First there were three, now there were two**

GM and Ford were left to come up with an EV2 partnership between themselves. Agreement on shared costs for a joint vehicle program was their first challenge.

Disputes over the Ecostar van and Impact ramped up. GM wanted to know how much R&D Ford had invested in EV research and whether or not they were working on a secret

car in addition to the Ecostar? Was the sodium sulfur battery really viable? How could each company make sure the other was putting in their fair share of investment costs?

There were also standoffs between GM and Ford over the type of charging system that should be used, conductive or inductive.

Eventually it was determined that each member had to bring 100 million dollars to the table. GM requested that Ford pay 50% of GM's 100 million dollars because Ford in comparison to GM didn't have enough EV technology to make their in-house contributions worthwhile. There was question in GM's mind as to how valuable Ford's intellectual property actually was.

Compromise began to emerge. Both companies agreed initially that there would be two cars produced for market, the Ecostar and the Impact. However, the thought eventually came to both parties that perhaps they should consider scrapping both cars and develop a third vehicle.

As the two parties came closer together, Ford finally admitted that they had a hidden EV project vehicle and agreed to allow GM to see it. Shnayerson writes that the visit to Ford to see the secret vehicle was to GM officials like a visit to the Kremlin. Ford's secret car turned out to be based upon the conversion of a four-seated micro-van, the Mitsubishi Expo LRV. It was designed to run on Ford's sodium sulfur battery pack. At this point Ford's sodium sulfur battery looked more convincing to GM. But GM EVers were equally taken back in discovering that Ford had used the same starting point as GM had for one of GM's own hidden EV projects, a Mitsubishi Expo LRV.

Both the Ecostar and the Impact were dropped from future production as GM and Ford found mutual ground for a third vehicle in their joint EV2 venture. Agreement was reached on all points of contention. They began to look for real estate to begin the EV2 venture. A press conference was scheduled for November 9, 1993 which read, "Ford and GM today signed a memorandum of understanding outlining their intention to ground develop and build electric vehicles and electric vehicle components jointly for the late nineties."

### **At the last minute the press conference was canceled. Why?**

The shotgun marriage between Ford and GM had been forced by the CARB mandate hanging over their heads. Shnayerson suggests that their mutual anger at the mandate got the best of them before they reached the altar. Crying, "WE NO CAN DO," seemed to be a more appropriate response to the mandate than trying to do the impossible. Killing the mandate would erase the need for either of them to make electric cars.

### **The Climate Change**

Carmakers in 1993 were coming to the conclusion that they were entering a period of a new and strange fast paced technology, which could forever change the entire auto industry. EVs, for example, might not replace cars but instead serve as a different kind of vehicle much like microwave ovens served in kitchens to offer a different kind of service than regular ovens. The battery, needed to replace gasoline cars, was not available at reasonable prices and might never be. And there was talk of future gasoline engines that could run almost as clean as electric cars. EVs might never succeed in the market place. Why bust your chops to meet a mandate when in the end something else equal to or better than an EV might appear in the marketplace?

The "Dream Car" partnership (PNGV) between Washington and Detroit also proved to be a good reason for GM, Ford, and Chrysler to hold back on EV production. In September of 93 Clinton and Gore evoked the goal of producing over the next decade a five passenger sedan capable of accelerating to 55 mph in less than 12 seconds and achieving three times the current average 27.5 mpg, possibly with something other than petroleum. Government and Industry would split the costs. "Clinton's comparison of the partnership to Star Wars and the Apollo moonshot program was reason to hope that the mandate, as a goal, might soon be supplanted." \* \* Page 164, *The Car That Could*.

(To be continued...)

## NEWS UPDATE

### Ford teams with SunPower

An August 11 story by David Baker in the *San Francisco Chronicle* reports that Ford Motor Co. and SunPower Corp. have formed an alliance for cross-selling of EVs and solar panels. “SunPower, based in San Jose, will offer discounted home solar systems to people who buy the all-electric Focus, which Ford plans to start selling in California late this year... Focus Electric buyers will be able to purchase a 2.5-kilowatt solar system for just under \$10,000, once a 30 percent federal tax credit is taken into account. Systems of that size typically sell for about \$17,000, with no incentives factored in.”

### First Fisker Karma EV Delivered

On July 26 Fisker Motors reported that Ray Lane, Managing Partner at Kleiner Perkins Caufield and Byers and Chairman of the Board of Fisker Automotive, Chairman of Carnegie Mellon University, took delivery of a 2012 Fisker Karma, one of the initial batch of production cars from the company.

### A123 to make GM EV batteries

An AP story reports that on August 11 General Motors announced that “battery maker A123 Systems Inc. will produce batteries to be used in future electric vehicles being sold in select global markets.”

### Nissan Leaf for energy storage

On August 2 Nissan Motor Co. unveiled a system that enables electricity to be supplied from the lithium-ion batteries installed in Nissan LEAF to ordinary households, as part of its comprehensive efforts toward the realization of a zero-emission society. The new system was unveiled at ‘Kan-kan-kyo’\*1, a house built in front of the Nissan Global Headquarters by Sekisui House Ltd. Nissan will continue development and study how it can be fully aligned and connected with current power systems.

### Getting a charge in Portland

An August 17 story by the AP’s Jonathan J. Cooper reported that a one-block stretch of street in Portland, OR will become a testing ground for EV chargers. “Seven electric

charging stations from six different manufacturers have been installed at Portland State University as part of a two-year study that will examine which chargers get the most use, who’s plugging in, and what they do while their car drinks up a charge.”

“Researchers also will survey users to collect other data, said George Beard, a Portland State instructor who is heavily involved in the project. Are they long-distance travellers pulling off of Interstate 5 for a quick fill up, or professors going to work? When the car charges, do they stand around and wait, or do they stop by the coffee shop across the street?”

### A MISAPPLICATION OF THE VOLT By California Pete



I had a chip in my windshield repaired the other day, and Safelite technician Sergio Ponce showed up to repair it in a Chevy Volt. I asked him how he liked the car, and he told me that it didn’t get as good mileage as the Prius it replaced — about 40 mpg, versus about 50 for the Prius. The problem, of course, is that it’s the wrong car for the application. As a mobile service vehicle it has to go a lot farther than the car’s 40 miles of all-electric range, which was not a consideration with the Prius.



He had a few other complaints about it, as well. When stopped on a steep hill, he said, it’s terribly slow to get going again, which can be a problem when there are impatient truck drivers behind you. And the valence under the nose of the car has only a few inches of ground clearance, causing it to scrape, although, he added, the dealer can provide a

replacement valence with greater clearance.

### **RAV 4 EV not to be built in CA**

On August 6 it was announced that, despite earlier suggestions, the Toyota Rav4 Electric being developed in collaboration with Tesla Motors will not be manufactured in Tesla's Fremont, CA plant (previously the Toyota-GM NUMMI), but at Toyota's Woodstock, Ontario plant where the other Rav4s are put together. Several things apparently swung the deal, according to the *San Francisco Chronicle*, but an important one was \$144 million from Ontario and the Canadian government to go towards upgrading the Woodstock plant and two others.

Tesla will, however, be making the Rav4 powertrain at its Palo Alto HQ.

### **NIMBY with a vengeance**

*Greentech Media* reports that someone in Southern California seems to have it in for wind energy: "Since November, at least eight incidents of vandalism at wind farms in Southern California have been confirmed by the Kern County Sheriff's Department." Meteorological towers have been knocked down, at a cost of hundreds of thousands of dollars. So far no turbines have been sabotaged, but who knows what may happen next? Surveillance cameras, anyone?

## **COMING EVENTS**

### **Training seminar: Electric Vehicles in the Smart Grid**

Sep 8, Palo Alto, CA. Go to <http://conta.cc/nP2Y5t>

### **AltWheels Fleet Day**

Sept 19, Norwood, MA. For information go to [www.AltWheels.org](http://www.AltWheels.org).

### **RETECH 2011: The Renewable Energy Technology Conference & Exhibition**

Sep 20-21, Washington. [www.retech2011.com](http://www.retech2011.com)

### **Battery Power 2011**

Sept 20-21, Nashville, TN. Go to [www.batteryeronline.com/bppt-conf11/bp11\\_index.php](http://www.batteryeronline.com/bppt-conf11/bp11_index.php)

### **DoE Solar Decathlon 2011**

Sept 23-Oct 2, Washington, DC. Go to [www.solardecathlon.gov/](http://www.solardecathlon.gov/)

### **EV Battery Tech USA**

Sept 27-28, Troy, MI. [\[tech.com/\]\(http://tech.com/\)](http://www.ev-battery-</a></p></div><div data-bbox=)

### **The Business of Plugging In**

Oct 11-13, Dearborn. Go to [www.bpiconference.com](http://www.bpiconference.com)

### **World Solar Challenge**

Oct 16-23, from Darwin to Adelaide, Australia. Go to [www.worldsolarchallenge.org/](http://www.worldsolarchallenge.org/)

### **The Networked EV: Smart Grids and Electric Vehicles**

Oct 20, San Francisco. [www.greentechmedia.com/events/live/the-networked-ev-2011/](http://www.greentechmedia.com/events/live/the-networked-ev-2011/)

### **U.S. National Electric Vehicles Safety Standards Summit**

Oct 21-22, Detroit. Go to [www.nfpa.org/newsReleaseDetails.asp?categoryid=488&itemId=46997](http://www.nfpa.org/newsReleaseDetails.asp?categoryid=488&itemId=46997)

### **The Battery Show**

Oct 25-27, Detroit [www.thebatteryshow.com/](http://www.thebatteryshow.com/)

### **European Electric Vehicle Congress**

Oct 26-28, Brussels. [www.eevc.eu](http://www.eevc.eu)

### **SAE International 2011 Vehicle Battery Summit**

Nov 14-15, Shanghai. Go to [www.sae.org/events/battery/?&PC=11VBSSDEML&PCN=6125556048](http://www.sae.org/events/battery/?&PC=11VBSSDEML&PCN=6125556048)

### **SAE 2011 Powertrain Electric Motors Symposium for Electric and Hybrid Electric Vehicles**

Nov 16, Shanghai. Go to [www.sae.org/events/training/symposia/emotor/?&PC=11EMOTSDEM&PCN=6125556048](http://www.sae.org/events/training/symposia/emotor/?&PC=11EMOTSDEM&PCN=6125556048)

### **Solar POWER-GEN Conf & Exhibition**

Feb 14-16, Long Beach, CA. Go to [www.solar-powergen.com/index.html](http://www.solar-powergen.com/index.html)

### **EVS26**

May 6-9, Los Angeles. [www.evs26.org/](http://www.evs26.org/)

## **MEETING SCHEDULE**

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

September 14

October 12

November 9

December 14

January 11