

Fox Valley Electric Auto Association
1522 Clinton Place
River Forest, IL 60305-1208

Address Correction Requested

**NEXT MEETING: Friday, October 16 at 7:30PM in Room K-161 at
The College of Dupage SW Corner of 22nd Street & Lambert Road in Glen Ellen.**

**DISCUSSION TOPICS - 1. An "Ask The Fox" discussion of hybrid cars.
2. The economics of electric cars led by member Bill Shafer.**

MEMBERSHIP INFORMATION

Any person interested in electric cars is welcome to join the FVEAA. The cost for a full year's dues is \$20 which will entitle the member to receive our monthly Newsletter that contains useful information about electric car components, construction, policies and events. Dues for new members joining in October will be \$ 2.

To obtain information about the FVEAA, you may contact either President Woods or Vice President Shafer:

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OCTOBER, 1998 PRESSEZ

Fred Kitch is in good company. William Ford Jr., the new head of the auto company and great grandson of founder Henry Ford plans to drive a RANGER EV pick up truck every day.

Our first agenda item is an "Ask the Fox" a discussion of Hybrid Electric vehicles. This appears to be the immediate direction of the auto industry with the Toyota Prius leading the way. Even some of our most critical auto writers have warmed up to the Prius.

Bill Shafer will lead a discussion of EV economics. This is featured in this month's newsletter. Included will be costs for conversion, energy, annual, and special metering.

KEN

MINUTES OF SEPTEMBER MEETING

The meeting at the College of DuPage was called to order by president Woods at 7:43. Twelve members and one guest attended.

Treasurer Corell's report that there is \$ 2322.42 in the Savings account and \$ 786.12 in checking was approved.

Member Ken Meyers discussed his approach to battery charging. It has two similar circuits on a printed circuit board. One provides dc voltage control for the power circuit and the other for a dc-dc converter for the 12-volt system. For his Festiva project he may try toroid transformers to provide both the required secondary voltage and to isolate the charger from the ac supply.

Member Shafer reported problems with Version 8 of Ed Meyer's Triac charger. The harmonics generated by current-chopping caused heating in the iron of the ac meter on the charger circuit, in both conduit and wire. They also caused the 400-volt Peak Inverse Rating of the Triac to be exceeded and fail. Ed redesigned and rebuilt the charger, designated it Version 9. Added were an 84 millihenry linear choke in each leg, a soft-turn-on control, and a freewheeling diode to eliminate sparking if the energized attachment plug is pulled. Version 9 has eliminated the heating and performed well.

Former member Johanna Helenowska, now Mrs. Gittler, reported on her participation in the Edgebrook (Chicago) neighborhood festival. She exhibited her Jet Industries Van. She recognized the assistance she received from Member Forest Claypool, who has a similar vehicle in his 'VAIR shop, to get the van operating properly.

Member Kitch updated his experiences with his RANGER purchase and use. He now has Illinois EV License A 85 EV. He drives the pickup about 15 miles a day for work and also has used it for other driving. His main comment "You really notice the tire pressure". He also brought up the subject of off-peak metering for battery charging. (Editor's note - See discussion of this topic in the October Newsletter issue.)

The subject of rebates for conversions was discussed. The details were published in the September Newsletter. Fred said the program had many unanswered questions including the maximum rebate available, program funding sources, and applicability. New Member Rich Gloff, who is deciding on conversion of his 89 Ford Ranger pickup, agreed to investigate the program and report at the next meeting.

Member Jim Hendrickson reports that his rebuilding of John Emde's Suburu for a 72-volt system is progressing well. He hopes to have it on the road in a couple of months.

VP Shafer reported he received an e-mail inquiry from Daniel Giddings in Holland Michigan about a 1990 Dodge Colt that has 54 miles on the odometer. Dan bought the car specifically for conversion. He also has a Prestolite motor, Curtis controller, and other equipment for conversion, but never got around to the work. Including the car, Dan estimates he has about \$ 10k invested in the project. He is interested in selling the equipment. Bill replied that Dan probably would have to swallow the Colt car cost and place a reasonable price on the components. Anyone interested should contact Bill.

The meeting was adjourned at 10:35 P.M.

Submitted by Secretary Dave Aarvold

FROM OTHER EV NEWSLETTERS

Current Events, the publication of the Electric Auto Association, had a description of the uses of GM's EV-1 in the Bay area of California in their May/June issue. There was also an article on a converted Porche 914 from Shadow Mountain High School in Phoenix. The car participated in the 1998 Tour de Sol and racked up some impressive statistics: It had an Advanced DC motor and Curtis controller, two-year + old Trojan batteries and a Lester charger. The first day the car went 76.9 miles @ 164 wh/mile; the second was 110.5 miles @ 153.3 wh/m; the third was 137.6 miles @ 159 wh/m; the fourth was 722.7 miles @ 160wh/m; the final day (5) it went 72.8 miles @ 174 wh/m. Overall the car was driven 446 miles @ 160 wh/mile, and an equivalent miles per gallon of 59.2.

The issue featured profiled ten of the thirty six participants. The most unique was the "Ovionic Electric Scooter" entered by Ovonics Battery Co. The scooter built from a Taiwanese product featured a 2kw permanent magnet motor (5kw peak) and a Curtis controller. The 240 pound scooter can carry two persons with a total weight of 250 pounds, a maximum speed of 40 mpg, and a 100 mile range.

The Eastern Electric Vehicle Club (EEVC) September Newsletter lead article offered data favoring the paralleling of batteries to reduce peak currents. They also had an engaging article, Part 3 of the Cinnamonson High School vehicle and the Tour de Sol event.

EV Circuit, the Newsletter from the Ottawa Group (EVCO) in their July/August edition described Earl Wallingford's converted 1997 Geo Metro. It has an 8" Advanced DC motor, Curtis 1231 controller, twelve batteries making up a 144-volt system, A Zivan charger, weighs 2340 pounds and has a 75 mph top speed. He also has a 3-page article comparing ac and dc drive systems. They also report that Ontario has initiated a "smog patrol" that can cost the driver of a smoky vehicle a \$ 500 fine. Visibly smoky vehicles constitute about 3 % of Ottawa traffic but emit 30% of the pollutants. They also note that the National Hot Rod Association has adopted racing rules that allow electric vehicles to compete with petroleum fuelled cars.

EV NEWS, the Global Electric Auto publication in the August issue described Solectria's new offering, the FLASH. It is a light duty pickup based on an Asian utility vehicle. It uses GP sealed batteries, a 20 kw induction motor, a 1.6 kw charger, and has a load capacity of 1100 lbs. It is intended for off-road applications such as airports, parks, and campuses. It has a 45 mile range and 25 mph top speed. The FLASH will sell for about \$ 17,000. Solectria may develop a neighborhood vehicle based on the pickup.

In an article about pollution from power plants, they note that TVA's Cumberland coal-fired plant emits more NOx than all the utility generators in the East. The estimated cost of reducing NOx emissions ranges from \$ 700-1031. Total cost for the control requirement will be about \$ 3.9 billion for the Northeastern states. (Editor's note) Congress has yet to agree to the terms of the Kyoto agreement to reduce global warming. The Administration is attempting to implement provisions through a series of EPA regulations. Look for a future fight over this.

FROM OTHER EV NEWSLETTERS - Concluded

The September issue of EV News reports that Federal funding in the coming year recommended to be (in millions of dollars): \$ 25 for hybrid development, \$ 6-7 for the battery consortium, about \$ 3 for vehicle field testing and evaluation, and \$ 2 for infrastructure and systems.

The issues reports that a panel of experts has produced a report on fuel cells for the California Air Resources Board. The 130-page document rejects hydrogen as a fuel because of handling and storage difficulties. Complete success by automakers with their current research programs could allow commercial vehicles in about 2005.

The issue says a small company in Manassas VA is offering to "hybridize" Honda Civics and other small vehicles by installing an electric assist. The package includes a 12 kw Unique Mobility dc motor coupled to the crankshaft and controller. Eight Genesis 12 volt batteries weighing 120 pounds provide a 96-volt system. The total package weighs about 150 pounds. For additional information, e-mail the company at tecinfo@electromotive-inc.com.

The SEVA September newsletter from Sacramento contained a report on drag racing in Woodburn Oregon last August. There will be another drag event in Alameda CA in October.

Argonne Lab's summer edition for Future Drive gave a brief discussion of two similar approaches to correct the cold starting problems that high ethanol fuel engines have. Ethanol has a low vapor pressure and high heat of vaporization. E 85 fuel consists of 85 % denatured ethanol and 15% of gasoline-like hydrocarbon primer. By using rejected engine heat in a distillation process the 15% component can be concentrated and used for starting until the engine warms up. Fourteen US and Canadian universities participated in the first Ethanol Vehicle Challenge that was won by Michigan's Wayne State University.

The issue also reports results of the 1998 Future Car competition with Virginia Tech taking first place. In this program universities are challenged to produce a mid-sized American car that gets 80 mpg. Most use hybrids and some a trying direct-injection diesels.

The Vancouver group, VEVA, in their September newsletter gave results of the Woodburn, OR drag race in which the electrics beat the Vipers by a wide margin. The winning time for the 1/4 mile dash was 10.673 seconds; best time for a Viper was 12.489 seconds.

RECENT ARTICLES ABOUT ELECTRIC VEHICLES

Japans first electric car rental business starts in Kobe. Chicago Sun-Times 7/19/98. The Kobe Eco Car Co in Kobe offers 24 electric cars and 4 hybrid vehicles for rent. The company expects the venture will be good for the local environment and Kobe tourists. Average rental cost is \$ 50 for six hours. The business is backed by Toyota and 34 other corporate sponsors.

Is it a car or cart? GEM votes for both. Chicago Sun-Times 9/9/98. Global Electric Motors is assembling neighborhood vehicles in Fargo North Dakota where their facility is located. These 950 pound, 2-passenger vehicles (similar to Citicars) are street legal in Florida and Arizona. They are intended for use on the fairways and in retirement communities. They have a 48-volt system.

Power Struggle. The Hartford Courant 8/24/98. A tiny yellow, German-built delivery van is endlessly circling a closed runway at the Danbury Airport to test the range of this vehicle. The Nickel-zinc batteries deliver 106 miles. Seventy five miles away in South Windsor a full-sized transit bus powered by fuel cells is being developed.

Small companies, funded by federal grants and investors, are searching for automobile new power sources for specialized applications. Energy Research, the company running the Danbury test, started out 30 years ago making batteries for NASA and the Navy. It has 150 employees. International Fuel Cells, 89% owned by United Technologies and 11% by Toyota, employs 200 workers. It is estimated that nine companies working on fuel cells spend \$ 60 million annually. The best known is Canada's Ballard Power Systems.

Out of juice! Nation's charge toward electric cars stalls. Design News October 5, 1998. After an eight-month investigation Senior Regional Editor Charles J. Murray wrote this excellent analysis of the progress toward commercial electric cars. He notes that Big 3 executives publicly express optimism but many engineers admit privately that development work has subtly shifted toward hybrid vehicles.

The reason for this shift is the limitation of energy storage by electrochemical means. Another factor is overcoming government ignorance of technology and lack of commitment to programs. These are reflected in an Argonne Labs report that concludes only modest increases in energy storage capability in the next 20 years. Another study by the University of Michigan predicts battery powered vehicles will increase from essentially 0% today to only 2% by 2007.

Exotic batteries cost a lot of money. The NiMH batteries in a Ford RANGER go for \$ 30,000. The battery pack for a GM EV-1 costs \$ 45,000. The reported lithium-ion battery cost for a Nissan Altra was \$ 600,000 although the company will only admit a cost "over \$ 100,000". Exotic cell cost is not likely to drop with mass production because they require expensive materials and processes to build. Exotic batteries used for laptop computers and cell phones cost \$ 5-10,000 per kwhr for these devices. Price objective for auto use batteries is \$ 100/kwhr. Lead-acid batteries can be purchased for about \$ 60/kwhr. Battery cost is a major barrier to commercial EV development.

RECENT ARTICLES ABOUT ELECTRIC VEHICLES - Concluded

Recent battery development began in the mid-70's as a response to the oil crisis. There has been only small progress since then. Battery makers keep issuing projections that automakers question. Firms working on exotic batteries have to be optimistic to obtain federal research grant funding. Automakers realize you can't just wish these batteries into existence.

The Hybrid vehicle appears to be the like bridge. It uses gasoline that stores 12,722 Watt-hours per kilogram of mass. Only about a quarter of this energy is available to power a car but this is ten times the energy storage for the best battery available today.

This article is available on the Web at <http://www.manufacturing.net/news/reg/headline/ev.htm>

ECONOMICS OF CONVERTING AND USING A CONVENTIONAL CAR

PROJECT COST

Recycling a conventional car and converting it to electric power will cost about \$ 7,000 if you do the work and start with a recent model small car with little rust and a blown engine. These can be obtained locally for \$ 3-500. A conversion kit for vehicles weighing up to 4000 lbs is available from KTA Services for \$ 5000. The local selling price for 12 Trojan T-125, 6-volt batteries for a 96-volt system is about \$ 720. Battery racks, welding costs, miscellaneous material and contract services will add about \$ 300.

ENERGY USE

The car's weight determines its energy economy. Based on data collected by FVEAA members, who have submetering to measure the ac energy supplied for charging, electricity consumption has been found to range from 300 Watthours/mile for a Citicar to 700 for a 5500 lb vehicle. These are real-world figures for urban driving in the Chicago area. It is dependent on charger efficiency, how each person drives, and traffic conditions. It involves no Expressway driving on a regular basis.

ENERGY COST

FVEAA cars use the standard residential rate for charging. In Chicago the cost is 8.92 cents/kwh. Taxes add about 6% making the total 9.46 cents/kwh. The energy cost for typical car using 1/2 kwh/mile is therefore 4.73 cents/mile. A car driven 30 miles per day would use \$ 14.19 per month of electricity at the standard residential rate. There is a monthly customer service charge of \$ 8.20 that is not included because adding an electric car does not change this item.

ECONOMICS OF CONVERTING AND USING AN ELECTRIC CAR - CONTINUED

SPECIAL RATES

An electric car can be recharged at a time favorable to the supplying utility company. The energy charge for off-peak consumption is less than the general residential rate. In Chicago, Rate 1 DR is available for residential service off-peak rates. It requires a service independent of other loads. There is an additional monthly service charge of \$ 14.08 applicable to the off-peak service. Energy charges for this Rate are shown by the following Table:

Off-Peak Time 9PM-7AM	Summer (Cents/Kwh)	Winter (Cents/Kwh)
First 350 Kwh	6.589	6.589
Over 350 Kwh	3.868	3.868
Other Times	22.348	11.48

The monthly additional service charge for special metering makes a time-of-day rate more expensive than the standard rate for a converted vehicle that has a 30-mile range.

ANNUAL COST

A neglected area of electric cars is its economic value to the owner. I presented the following data on converted electric car costs to a graduate student seminar at the Illinois Institute of Technology (Chicago) last year.

The following table is an annual cost data for conventional cars. It was published in a 1996 AAA survey conducted by Runzheimer Associates. They assumed 10,000 miles of driving. Insurance cost was based on personal use, driven less than 10 miles/day, with no youthful driver. Gasoline cost was \$ 1.20 per gallon. Operating costs include gasoline, oil, maintenance and tires. Fixed costs include insurance, license, registration fees, depreciation, and finance charges.

Car Type	Annual Cost For 10,000 miles	Annual Operating Costs	Annual Fixed Costs
Escort Subcompact	\$ 4380	\$ 800	\$ 3580
Taurus Midsize	5133	1000	4133
Caprice Full-sized	6720	1080	5189
Caravan Minivan	5250	1020	4230

ECONOMICS OF CONVERTING AND USING AN ELECTRIC CAR - Concluded

The following lists similar items for my 1980 Mazda RX-7 converted in 1991:

Conversion Cost	Annual Cost	Battery Amortization @ 11 cents/mile	Electricity 767 kwh @ 10 cents/kwh	Maintenance Costs	Operating Costs (Col 3+4+5)	Annual Fixed Costs See Note A
\$ 5624	\$ 1286	\$ 121	\$ 77	\$ 4	\$ 202	\$ 1084

Note A - \$ 375 of annual fixed costs include depreciation = project cost/ 15 years expected life, \$ 450 annual finance charge = 8% of project cost, \$ 210 liability insurance, and \$ 49 license and local vehicle taxes. Driven 1100 miles in 1995.

The comparison must be adjusted for the difference in driving mileage in the AAA analysis and Mazda use. Using the AAA insurance assumption for personal use that daily driving is limited to 10 miles, the electric could be substituted for 3300 of the 10,000 annual mileage. This is three times my Mazda use and well within the car's 25-mile range capability. The following table shows the adjusted annual cost comparison:

Car Type	Operating Cost for 10 k miles	Operating Cost for 3.3 k miles	Fixed Costs	Annual Cost for 10 k miles	Annual Cost for 3.3 k miles
Mazda	-	\$ 606	\$ 1084	-	\$ 1690
Escort	\$ 800	264	3580	\$ 4480	3844
Taurus	1000	300	4133	5133	4163

Multiplying the Mazda annual operating cost of \$ 202 by three yields an adjusted annual operating cost of \$ 606 for 3300 miles (5.5 cents/mile). The adjusted total annual cost for the Mazda becomes \$ 1690. This is 44% of the Escort figure.

The electric car's long life contributes to its economic advantage. An electric motor does not experience the wear that an internal combustion engine experiences during short trip driving. The motor, controller and other electrical components of my first conversion (A DAF in service for 15 years from 1976-1991) were recycled for conversion of a Ford Escort by another FVEAA member after I retired the DAF due to body terminal rust.

The life of my other car (IC engine) has been extended by Mazda use. My new car purchases were reduced by the substitution of the electric for short trips. This may be a factor in car manufacturer's skepticism about electric cars. They seem to envision a 7-year replacement cycle and/or a 3-4 year lease.