MAY 1989

MEETING NOTICE

The next meeting will be **May 19th**, at *CRAGIN FEDERAL SAVINGS & LOAN* 333 W. Wesley St. Wheaton, Ill. -Time - 7:30 P.M. *sharp.* Guests are welcome and need not be members to attend the meeting.

THE PRES SAYS

I felt the May 6th Rally at Triton was better than last year's event at Argonne. A lot of credit goes to Co-Chairmen Woods and Ovyach. Ray certainly provided us with excellent facilities, including the indoor garage for display and charging. Thanks also to members who had their cars at the Rally.

Member Vana is making arrangements for us to participate in the La Grange Pet Parade on Saturday, June ~~3rd~~ 10th. Not only are our electric cars a hobby, they can (in some cases) be considered pets. I hope several members will join Vana and fellow townsman Ralph Johnson in the parade which usually receives radio and TV coverage.

Donation of the Club Car will be formally presented to the Triton College Board at their May 23'd meeting at 7:30 PM.

This next meeting will be devoted to an "OPEN-LINE" to discuss items that members wish to bring up. Further progress on the hybrid study will be deferred pending completion of member Newton's analysis.

Bill

F. V. E. A. A.

FOX VALLEY ELECTRIC
AUTO ASSOCIATION
624 Pershing St. Wheaton, Il 60187

FIRST CLASS

ADDRESS CORRECTION
REQUESTED

Minutes of the FVEAA of April 21, 1989

The meeting was called to order by Pres. Shafer at 7:29 P.M. There were 19 members present. Treasurer V. Vana gave the following report....savings..$844.45....Now account $1046.96 for a grand total of $1891.41.
Pres. Shafer announced that we have finally gotten our FEIN number of 36-3633099 from the U.S. Government. The next step is to get our non profit status officially recognized by the State of Illinois.
During Consumers week which falls next week two of our members will be featured speakers at events during the week. Pres. Shafer will speak at the State of Illinois building on April 27, 1989 and Ken Woods will speak on the same date and time, but at a different location...Morraine Valley college.
There will also be an open house at Morraine Valley College on Sunday April 30, 1989 between 1 and 4:30 P.M. for the public to see the school and facilities.

Rally at Triton College; Chairman Ray Oviyach is getting everything ready for May 6, 1989 between 10:00 A.M. and 2:30 P.M. It will be at the industrial buikding right next to the driving range. Speakers will be featured from 10:00 A.M. to 12:00 P.M. and then everyone will be welcomed to our display of Electric vehicles in the front lot. we will probably have five or six cars from the club and Obha car also.

MidCon '89 is a three day program for electrical engineers from Sept. 12th thru Sept. 14th. It is design oriented in the Midwest. On Wed. Sept. 13th at the Hyatt Regency O'Hare, River Rd. and Expy..Pres Shafer to get together with Henry Setton to put on a program for the engineers.

V. Vana to talk to the LaGrange people to see if we might put on a display at the "Pet Parade"...as long as Electric cars are our "PETS".

Long awaited decision of the fate of the club car. A motion was made by Dick Ness and seconded by Jack Cahill to donate the 1975 Fiat 128 Electric Vehicle to Triton College to further their information about electric vehicle technology. Ray Oviyach to tow the car from Ken Woods' garage to the college. Pres Shafer is to send written offer to the president of the college and when we have a written response we will then make the transfer, which should take place on May 6, 1989.

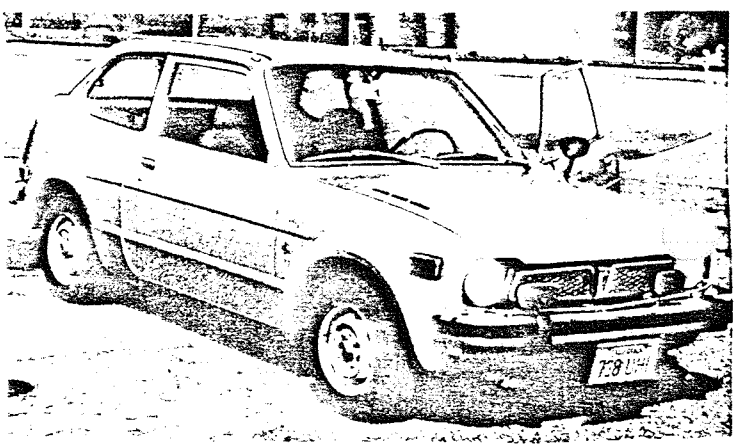
The California South Coast Air Quality District (Orange County) has 125 recommendations of which one is to phase out ICE vehicles by the year 2007....Wanna bet?...

A discussion was held on our hybrid project technology led by Pres Shafer re: the paper published in the April bulletin. John Newton is to do some calculations and send them to Bill to have for our next meeting and discussion and bulletin.

The meeting was adjourned at 9:18 P.M. by majority voice vote.

Respectfully submitted,

Paul P. Harris, Secretary



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FVEAA
fox valley electric auto association

WHY CONSUMERS EVENTUALLY WILL BECOME INTERESTED IN ELECTRIC CARS

William H Shafer, President
Kenneth R Woods, Vice President
FOX VALLEY ELECTRIC AUTO ASSOCIATION
24 April, 1989

National Consumer's Week is proclaimed each year and activities which relate to matters of interest to consumers are featured. As a part of the observance, the Chicago Commitee to Use Energy Wisely presents material relating to energy use and conservation. In this paper, the Fox Valley Electric Auto Association, represented by Ken Woods and me, will outline why The FVEAA believes consumers will become interested in electric cars.

Recent interest in electric cars can be traced to the 1973 oil embargo. The limited availability of gasoline at that time forced on consumers an awareness of the need for an alternative to their dependence on petroleum for personal transportation. The first meeting of the Fox Valley Electric Auto Association was held September 24, 1976 after 3 individuals converted conventional autos to electric cars in response to the gasoline crisis. Thirty seven current members of the FVEAA sustain that interest. We believe many more will join us in the future.

The reasons why we expect an increased future interest in electric cars are:

1. Their simplicity.
2. National and individual economics.
3. Environmental considerations.

This presentation addresses these three factors and is based on the 12-year experiece of FVEAA members building and operating over 20 electric cars.

SIMPLICITY

Compared to today's automobiles, electric cars are simple. Until about 1970 all cars were relatively uncomplicated. If they broke down there was someone who could get them running. A stock of essential repair parts was almost always immediately avilable. Anyone with a basic education could maintain his own car. Today's cars are better than those 30 years ago; they ride better, they handle better, they don't require as much periodic maintenance, they get better gas mileage, but they are also much more complex than a 1957 Chevy.

If an auto company executive's new 89 car stops running, he probably isn't even going to open the hood because of the control complexity. He knows that it will require a lot of specialized diagnostic equipment to find the trouble and that repair will be expensive. A replacement electronic ignition module for a 1989 BMW is priced at $ 1125. A replacement alternator for a Ford Taurus SHO will set the owner back $ 233. Electric cars are simpler

(Slide 1) The electric car drive train contains only four basic elements; the battery, the speed control mechanism, a direct-current motor, and a 3-speed manual transmission. There is nothing complicated about any of these components, and they have a history of reliable operation.

Batteries have been around a long time. (Slide 2) They have been improved over those available just 20 years ago; they are longer-lived, can deliver higher peak currents, require less maintenance, and energy-storage capability has been increased by 30%.

Today's speed controller has also been greatly improved over those produced two decades ago. Power transistors and other components are now available to handle the high peak currents experienced during acceleration. (Slide 3) These power components are rugged and reliable. The cost for a controller developed and used by FVEAA members is about $ 800. This is less than a BMW ignition module replacement.

The DC motor (Slide 4) is also a proven, well-developed, reliable product. The armature is the only moving element. With periodic cleaning and brush raplacements, it will last many years in transportation service. One enterprising electric auto commercial developer recognized that the controller and motor could be recycled in a new electric car chassis. He was prepared to offer a customer a 50% trade-in allowance applied toward purchase of a new electric car fro him. That is marketing savvy !

The drive system of an electric car is simple, reliable, and cost-effective when compared with today's trend toward turbocharged electronically-controlled complex cars. Within the next 10 years, it is estimated that 40% of new car cost will be for the electronics. We think consumers will readily come to recognize electric car virtues.

NATIONAL AND INDIVIDUAL ECONOMICS

Turning now to the cost factors. On the national scale, the cost of imported oil is a major contributor to the annual balance-of-payments deficit. In 1988, the bill for imported oil amounted to almost $ 50-billion and is expected to increase in the future as it has in the past. This slide shows imported oil costs. (Slide 5) The national economic cost for a disruption of the imported oil supply has not been estimated but it may produce military intervention.

Personal transportation is expensive for the individual . Hertz estimated in 1988 that the total owning and operating costs of a compact car amounted to 45.3 cents per mile. The annual fuel bill for a modern car is about $ 500. Since it comes in increments with each fill of the tank, most consumers are unaware of the total annual costs for fuel, or for maintenance, and for depreciation. It is only wher his car requires repair, maintenance, or replacement that the owner becomes aware of these.

We now will compare the relative economics of a conventional car and an electric alternative. Electric car operating costs include an amount for battery amortization. Although some FVEAA cars have achieved a 4-year life for the standard golf-cart type deep-discharge batteries we use, a 2-3 year replacement cycle is considered typical. At current prices, battery amortization for FVEAA cars has been found to be 5-10 cents per mile.

The energy cost for an electric car is dependent on electric rates. Commonwealth Edison's current marginal residential winter rate, including all charges for taxes, is 6.05 cents per kwh. FVEAA cars have metered AC energy input and found an average of 1/2 kwh is used per mile of travel. The electrical energy use amounts to 3.08 cents per mile. The total "fuel" charge including battery amortization is about 10 cents per mile. This is over double that for a conventional car.

The 1989 CAFE standard car achieves 27 miles per gallon and uses unleaded gasoline presently selling for about $ 1.20 per gallon, including all taxes. The fuel cost for a CAFE car is 4.4 cents per mile. Present fuel costs favor the petroleum car, but what will be future cost when the County, State, and Federal governments succeed in raising gasoline taxes for a variety of non-transportation purposes?

A major advantage of an electric over a petroleum vehicle is the electric's expected lower maintenance due to the electric's simplicity. I recently had a $ 200 maintenance "tuneup" on a 1987 Omni at 12000 miles, a cost equal to 1.6 cents/mile. Lombard Toyota recently offered a similar annual checkup on a Toyota for a reduced price of $ 156 which would reduce maintenance to about 1.5 cents/mile. The only similar costs for an electric consists of an insignificant cost to periodically add distilled water to the battery.

Another electric advantage is longer life. If a conventional car is replaced after 5 years while the mechanically simpler electric can last twice as long, the economics will then favor the electric.

ENVIRONMENTAL CONSIDERATIONS

In addition to simplicity and costs, environmental factors are also important in the future for electric cars. Urban smog such as experienced in many populated areas of the world is caused by a concentration of combustion products and the reaction of these gases with sunlight. A major contributor is the internal combustion engine of a conventional car.

Consumers today are becoming aware of the "greenhouse gases", principally carbon dioxide. These trap the sun's reflected radiation and cause a rise in global temparature. The delicate energy balance between the earth and the sun that provides the source of incident energy is threatened by man's activities and the increasing numbers of persons (now over 5 billion) that the planet must support. The current carbon dioxide level is higher than it has been for over one million years. Carbon dioxide in the atmosphere has increased by 25% since 1850, the beginning of the Industrial Revolution.

Many responsible investigators have confirmed that a global warming is underway. Revell and Seuss issued an early warning in 1957 about the profilgate consumption of fossil fuels. The latest warnings have been issued by Stephen Schneider, William Kellog, James Hansen, and Carl Sagan. Their findings have been extensively reported in many scientific journals.

Last year may have been a preview of future global warming. The six warmest years of this century thus far have been in 1980, 81, 83, 86, 87 and 88. Last year was the warmest of all.

A two-year study by the US EPA, authorized in 1986, recommended the following governmental actions in it's February, 1989 report:

1. Increase average fuel economy to 40 mpg by 2000.
2. Reduce energy consumption of <u>new</u> single family homes so they will use 50% less heating fuel than the 1980 average.
3. Impose carbon emission fees ranging from 7 to 20% of fuel cost.
4. Increase solar energy research.
5. Initiate a worldwide tree replacement program.
6. Eliminate CFC use by the year 2000.

Another recent action to halt environmental deterioration was taken with the adoption of 123 recommendations by California's South Coast Air Quality Management District (SCAQMD)) that will affect the Los Angeles area population of 12 million persons. One recommendation is to reduce hydrocarbon emissions from 0.39 to 0.25 gram per mile of travel; carbon monoxide from 7 to 3.7 grams, and nitrous oxide from 0.7 to 0.4 grams. Auto company spokesmen state they may not be able to reach the new limits by the 1993 effective date. Ultimately, the plan envisions an end to gasoline-powered cars by 2007. Electric cars have a prominent place in the future transportation plans of SCAQMD.

With all the advantages, why are electric cars such a rarity today? The answer is the limited distance an electric car can travel on a single charge.

Battery energy storage limitations place a severe restriction on electric car accceptability. The FVEAA cars can travel about 20-25 miles on a single charge. While this is sufficient for local trips, it is not enough for general purposes. Owning a FVEAA-type electric car is about the same as owning a conventional car with a 1-gallon gasoline tank. Our construction and operating experience with electric cars has led to our current design study now in-progress for a petro-electric transitional car in which a small engine-generator rated about 15 horsepower will be added to the electric drive and give the electric car additional range when required. Details of this study are beyond the scope of this presentation.

(Slides of FVEAA cars) While FVEAA cars have been individually constructed as a hobby, they point a way for future personal transportation. They are a wonderful insurance policy and will become a much desired object if (and when) there is another artifically contrived petroleum shortage. They will also become more desirable here as the Chicago area takes measures to solve it air quality problems. Illinois has the fifth-highest level of carbon emissions, surpassed only by Texas, Pennsylvania, Ohio, and California. Requests for Proposals were recently issued by the Illinois Department of Energy and Natural Resources for study of Chicago Area ozone reduction, sustainable agriculture, and addressing the greenouse effect. This is a harbinger of coming events. Although only one-half of adult Americans can presently identify the greenhouse effect, it is the opinion of the authors that in a few years, 100% will be aware as the measures to improve air quality and reduced oil supplies directly affect them. By the end of the next decade, Chicken Little may be right.

We believe the FVEAA is several years ahead of the public on the subject of electric cars. It is by sessions such as this that we hope to advise the public of the realistic application advantages of electric cars. If you would like to learn more about our activities, you are invited to attend the FVEAA electic car rally at Triton Community College on Saturday, May 6th where you can see the cars, ride in them, and listen to presentation of papers on their construction by the many talented Chicago area persons associated with electric car development.

"Fill it up, check the tires and water, wipe the windshield and clean up the seal in the back-seat."

U.S. help urged on electric car

Chicago Tribune Sunday, May 7, 1989

WASHINGTON (AP)—Ford Motor Co. unveiled an electric-powered mini-van in the capital with a suggestion that the nation's No. 2 automaker would welcome more government involvement to boost the fledgling technology.

"Joint government-industry initiatives are critical if any alternative fuel strategy is going to become a viable national option in the foreseeable future," John McTague, Ford's vice president for research, said here.

The Aerostar van showed by Ford at a hotel near the Transportation Department was powered by a sodium-sulfur battery, with the drive provided by a motor mounted on the rear axle. The inverter, which converts direct current from the battery to the alternating current needed to run the motor, was a new, lighter and smaller design, Ford said.

Company officials said the van has a 100-mile driving range and a maximum speed of 65 miles an hour, with acceleration from a standstill to 50 m.p.h. in less than 20 seconds. The battery takes eight hours to recharge, the company said.

The cost of operating the vehicle, both replacing the battery every three or four years and recharging it, is comparable with the cost of running a gasoline-powered vehicle at today's prices, Ford said.

Electric-powered vehicles have been put forward as a long-term solution to the problems of diminishing petroleum supplies and increasing air pollution.

The system was developed jointly by the Energy Department, Ford, General Electric Co. and several battery manufacturers.

McTague said bringing the vehicle from the prototype stage to commercial practicality would require government support of battery research aimed at bringing down recharge times and "substantial production to test out" the vehicles for durability, cost and acceptance.

Bill Day, Ford's chief of public relations in Washington, hinted broadly that the company would need government purchase of the electric vehicles to build momentum for their use.

"You've got to read between the lines," Days said, citing other instances of new technology, such as air bags, where government purchases created the momentum that led to commercial success.

Lawmakers here have been looking at legislation that would require conversion to cleaner-burning fuels, including electricity, of most vehicles operated by the Defense Department and civilian federal agencies.

The conversion would begin in 1993 at a rate of 10 percent of the federal fleet a year and would be finished in 2002.

With government support and the right market, electrical vehicles could reach the commercial stage within 10 years, McTague said.

The Energy Department has provided 95 percent of the $20 million spent on the electric vehicle program since 1982.

New batteries

Dropping acid

BATTERIES are bulky, heavy and full of unpleasant chemicals. It would be nice to have a compact, lightweight and rechargeable source of power that is in no danger of leaking acid. That, alas, has been an impossible dream of battery designers for the past 150 years.

Sir Humphrey Davy's first batteries were more or less the same as today's. A century and a half of electrical evolution has failed to produce anything very different from his plates of metal dipped in acid. But consider an entirely new type of battery. It contains no liquid, and packs the same electrical punch as a kilogram of motorcycle battery in a package the size and weight of a large padded envelope. It is the product of a long industry-sponsored research programme at the United Kingdom Atomic Energy Authority's research centre at Harwell, and should make a sizeable dent in the growing market for portable power.

At their simplest, batteries have two solid electrodes dipped into a liquid electrolyte. Chemical reactions at the electrodes remove electrons from the atoms they belong to, creating atoms with too few electrons (ions) and free electrons. Connect something (a silicon chip or an electric motor) between the electrodes and you have a circuit through which these electrons can make their way. The spare electrons buzz around the outer circuit, powering the chip or turning the motor. The ions swim through the liquid electrolyte. Both routes end up at the other electrode, where electrons and ions are reunited.

So a battery-builder needs to do two things. One is to find a material from which to make the electrodes that will provide free electrons; the other is to produce an electrolyte that will allow the ions to make their way from one electrode to the other as easily as possible. Liquids do this well; on the whole, solids do not. Furthermore, to compete on equal terms with a lead-acid device, a battery has to be rechargeable. The chemical reactions that allow the battery to pour forth electrons must happen in reverse when electrons are pushed into the terminals of the battery in the kitchen overnight.

The Harwell battery does all this and more. Instead of having electrodes dipped in an electrolyte, the new battery consists of three extremely thin layers, one on top of the other. It is made in the same way as the foil-coated plastic packets that keep potato crisps crisper. The whole battery is less than a quarter of a millimetre thick. The bulk of the device, such as it is, consists of the insulation needed to keep the highly reactive electrode from immolating itself in the surrounding air.

The electrolyte was the problem. The first work on solid-state batteries focused on using lithium electrodes and various solid compounds made of lithium ions for the electrolyte. But these did not give the ions sufficient passage and they tended to crumble as the battery was used. The answer was to use a plastic film with a lithium compound dissolved in it. The film was good at carrying ions—but not good enough. Making the film thinner helps, since it makes the ions' journey shorter. But the most [illegible] new development is an improvement in the mobility of the ions.

Plastics contain some areas in which all their molecules are in serried ranks. In other places they are tangled and overlapping. In these "amorphous" areas ions can move freely. The Harwell team's biggest step forward came when they found how to ensure that more and more of the plastic film was in this amorphous form.

Because the battery is just a thin film, it can be rolled, folded and cut up like any piece of paper. The battery designer has a free choice about the size, shape, weight and power capacity of his battery. The film can be pasted around the inside of the case of a portable computer, or folded to fit inside the handset of a portable telephone. Then cellular telephones could be as handy as the handset of an ordinary telephone. Because the new batteries are much more powerful than lead-acid batteries, weight for weight, they may eventually make electrical vehicles more powerful. Indeed, the ecology-conscious yuppies of the future may use the same batteries for their cars as for their carphones.

THE ECONOMIST APRIL 29 1989