



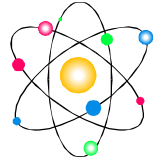
A word from the Chair

Urs Muntwyler

Chairman

The third week of October was the culmination of a fruitful year for our Implementing Agreement. Annex 10 on Electrochemical Systems was officially entered into force. Congratulations to Mr. Nils Stelzer, who has been promoted from interim to official Operating Agent. Congratulations are also due to the Operating Agent and all the participants in Annex 7 – Hybrid Vehicles, which produced a comprehensive and impressive report in June 2001 entitled: “Overview Report 2000 – Worldwide developments and activities in the field of hybrid road-vehicle technology”. The joint Annex on Deployment Strategies (Annex 8) reported on the successful workshop that had been held in Kyoto on June 6 on “Market Deployment Strategies for Clean Vehicles”. Annex 1 continued its important information exchange. The current Operating Agent, NEDO of Japan, will hand over its responsibilities in April 2002, and a successor is being elected by fax vote. We would like to thank the Government of Japan, NEDO, and CRIEPI for having generously supported this Annex for the past 8.5 years. The planned Annex 9 is organizing a workshop on Clean City Vehicles in Developing Countries on September 24,25 at IEA headquarters in Paris. More information is on page .. of this newsletter, please assist Mr. Mansson when the invitations are issued.

Strong coordination among fuel cells, hybrid vehicles, and electrochemical systems annexes.



Nils STELZER

Operating Agent, Annex 10

ECHEM – Wiener Neustadt, Austria

Serendipitously, there is an excellent fit both technically and in participation among the annexes dealing with fuel cells (Annex 15 of the Advanced Fuel Cell I/A), with hybrid vehicles (Annex 7 of the H&EV I/A), and with electrochemical systems (Annex 10 of the H&EV I/A). I have participated in the Experts' meetings of all three, and have found that they are very complementary to each other. It is likely that fuel cell vehicles will in fact be hybrid vehicles because a traction battery or supercapacitor would allow a lower power level and lower costs for the fuel cell stack, its ancillaries, and the on-board reformer (if used). Of course, the fuel cell vehicle would already have an electric traction motor and power electronics, and the only thing that would be added would be the battery or supercapacitor. This creates the link both with the

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Steering market introduction programmes

Sigrid Kleindienst

Operating Agent, Annex 8 – Zollikofen, Switzerland

An important conclusion that emerged from the workshop held in Kyoto on June 6, 2001 was that market introduction programmes operate in a rapidly changing environment, and need to continuously adapt to new situations and to lessons learned from previous experience. The emphasis of deployment strategies is often on a particular technology, such as electric

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Steering market introduction programmes

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vehicles or hybrid vehicles, but in fact success depends very strongly on social change and on behavioural change. Technology deployment programmes seek to change consumer behaviour when they are buying a vehicle or choosing transportation mode and these are often affected by social trends and attitudes toward the environment, energy, security, etc. Therefore, a well rounded market introduction strategy should include technical and infrastructure issues as well as social and behavioural issues. The obvious difficulty to do so results in the phenomenon that most of the programmes labeled as “market introduction strategy” (e.g. “demonstration programme”) in fact are technically oriented fleet tests (evaluating functions, reliability, energy consumption etc. and not addressing the user behaviour). Governments have the know-how, money and legal authority to steer the actions of all groups affected by the market introduction of clean vehicle technologies: the vehicle industry, the retailers, the users etc. However, it seems that the Government’s steering role in the transportation market is either not strong enough or overestimated. A networking approach seems to be more promising, and it is important to get existing networks (like the car industry network including dealers, garages, services, fuelling stations etc.) “into the boat” . These analyses, and many other conclusions emerging from our work, will be discussed in our final report, which we aim to complete by the end of this year. The report of the workshop is available on the IEA impag web-site (www.iea.org/impag user name: impag password: brandy) on the main impag page under the date August 20, 2001. ♦♦

Strong coordination among fuel cells, hybrid vehicles, and electrochemical systems annexes

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hybrid vehicle annex, and with the testing methods of supercapacitors and batteries that we are studying in Annex 10. In the area of participation, there is also a good fit in that different countries participate in each of these three annexes and we can all obtain information on recent developments by combining our information exchanges. In addition, there is strong industry participation in the fuel cell annex. Establishing personal contacts among the participants in all three annexes has already yielded high dividends in networking, and will continue to do so in the coming years. . ♦♦

Workshop on Clean Energy Vehicles in Developing Countries.

by Tommy Mansson

Interim Operating Agent, Annex 9
EnEN AB, Sweden

In New Delhi, the Supreme Court has ordered the conversion of commuter buses and older taxis to natural gas. In Beijing, a large conversion program is under way for the upcoming Olympics. These are just two examples of cities in developing countries giving a high priority to clean air. Our plans for an Annex on Clean Energy Vehicles have taken one step forward with the setting of a date and place for a workshop. It will be on September 24 and 25 in Paris at the IEA headquarters. IEA staff have given us their enthusiastic support, and the Swedish International Development Agency (SIDA) have agreed to finance the participation of delegates from developing countries, as well as sharing their own knowledge and experience in this area at the workshop. We are planning on 40 to 60 participants from IEA Implementing Agreements, industry, environmental organizations, and aid organizations. The topics to be discussed are:

- What is the potential for cleaning the air and reducing oil imports by new transport technology?

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Workshop on Clean Energy Vehicles in Developing Countries

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- What lessons can be learned from successes and failures?
- What is the role of developing countries, the donor community, and multi-nationals?
- An action program for clean city vehicles.

For more information - please contact tommy.mansson@enen.se ♦♦

Are Hybrid Trucks more fuel efficient?

Robert Winkel

Operating Agent Annex 7 – TNO Automotive, Delft, The Netherlands

At TNO we studied the fuel efficiency of charge sustaining hybrid trucks under various driving conditions. We found that under some driving cycles and driving conditions, the standard diesel truck was more fuel efficient than a hybrid one. At our recent experts' meeting in Ann Arbor we discussed this somewhat surprising result, and decided that we should do some further study to either confirm it or modify it. The advantages of a hybrid drive train are its greater energy efficiency during acceleration, braking, and idling, and in re-couping some energy if the internal combustion engine is "over-powered". These advantages are important for city buses, which make a lot of stops and starts during their drive cycle. However, for trucks with a drive cycle involving relatively few stops and starts, and which are not as over-powered as conventional passenger cars, a charge sustaining hybrid drive train might have fewer advantages. ♦♦

Where is the border between hybrid and ICE vehicles?

David Bauner

MTC AB – Stockholm Sweden

Legislators and policy makers are facing an increasingly knotty problem in defining the border line between hybrid and ICE vehicles. There are fuel

Where is the border between hybrid and ICE vehicles (cont'd)

efficient ICE vehicles on the market which stop the engine when the vehicle stops, and start it instantly when needed. In some cases they have been called "mild" hybrid vehicles, but a question could be raised whether this term is appropriate, because electric energy is not used to drive the vehicle. If electric energy is used for driving the vehicle, the term "hybrid" should be used, but even then there are degrees of "hybridization", and there are important differences between charge sustaining and charge depleting ("plug-in") hybrid vehicles. Another important consideration for urban air quality is whether the vehicle has a certain "zero emission range" or not. Finally, there is the question of hybrid Sport Utility Vehicles, they will be more fuel efficient than other SUV's, but might still have a high fuel consumption and high emission levels. In all, different definitions, or types of definitions, may be needed depending on how it is to be used. We shall grapple with all these problems in a "special topic" study in Annex 7 on hybrid vehicles. ♦♦

Transportation Renewable Energy – Photoelectrolytic and Biophotolysis Hydrogen Production

Carolyn Elam

Secretary, Hydrogen Implementing Agreement

National Renewable Energy Laboratory – Golden, CO, USA

The advances in fuel cell technology have made it more important than ever to also find ways to produce hydrogen sustainably. In the Hydrogen Implementing Agreement, Annex 14 is studying the photoelectrolytic production of hydrogen, and Annex 15 is studying the photobiological production of hydrogen.

Photoelectrolysis of water is the process whereby sunlight is used to split water into hydrogen and oxygen. This can be achieved by illuminating a photocatalytic semi-conductor device or system either directly or via dye sensitization. Such systems eliminate the need for separate power generation (i.e. via photovoltaic solar cells or solar thermal power station) and electrolysis, and, hence, offer great potential for cost reduction of electrolytically produced hydrogen using solar energy. In addition to the splitting of water, hydrogen can also be

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Transportation Renewable Energy – Photoelectrolytic and Biophotolysis Hydrogen Production

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photoelectrolytically produced by using organic matter as the electron donor. The aim of Annex 14 is to reach a stabilized sunlight-to-hydrogen conversion efficiency of 10 %. This would mean that 50 square meters of rooftop could produce about 5 kW of “hydrogen energy”, and six hours of sunshine would produce enough hydrogen to drive a small fuel cell car about 100 km.

Photobiological hydrogen production, the production of hydrogen by microorganisms, has been an active field of basic and applied research for over two decades. Development of practical processes will require significant scientific and technological advances and long term (more than 10 years) research and development. Annex 15 deals specifically with “biophotolysis”, the biological production of hydrogen from water and sunlight using microalgal photosynthesis. The process uses green algae or cyanobacteria to fix CO₂ into carbohydrates that are used by the algae to generate hydrogen gas, first in the dark by fermentations and then in the light through photosynthesis-coupled reactions. The goal is to achieve a light conversion of 3 % into hydrogen gas.

Although many years of research are still required, we may see a time when a bright sunny day will not only cheer people up, but will also produce fuel for our cars. ♦♦

How much do hybrid cars use their batteries?

Terry Penney

National Renewable Energy Laboratory – Golden, CO, USA

The two hybrid vehicles now available on the market, the Toyota Prius and the Honda Insight, use very different battery control strategies. At the National Renewable Energy Laboratory, we measured the discharging and recharging of the batteries in these two cars during actual driving. We found that the Toyota Prius limits its useful battery capacity to only 40% of the battery pack's

6.5 Ah rating (about 1.78 W-hr at nominal voltage of 274 V). During various chassis dynamometer driving cycles (city, highway, and aggressive US06) the Prius typically maintained a state of charge (SOC) around 56%, while only using 10% to 15% of its battery capacity over the cycle. The Insight's useful capacity is limited to 60% of the rated 6.5 Ah (about 1.08 W-hr at nominal voltage of 144 V). NREL did not observe a target SOC during its testing of the Insight, but over the same driving cycles the Insight only utilized between 4% and 13% of its battery capacity. We also looked at the amount of energy that was supplied by the pack for propulsion. Our testing showed that the Prius derived between 3% (highway cycle) and 10% (city and US06) of its propulsion energy from the battery pack (the remainder is supplied by the gasoline internal combustion engine). The Insight derived between 1% (highway cycle) and 3% (US06) of its propulsion energy from the pack.

We believe the control strategies were influenced by regulations and test procedures that require the vehicles to be charge sustaining over the city and highway driving cycles, and also by the 8 year warranty on the battery, which makes it necessary to minimize stress on the battery in order to prolong battery life. Understandably, a cautious approach has been taken during the first two or three years of hybrid technology on the market. It appears that there is potential for greater utilization of the battery pack capacity and perhaps fuel efficiency improvements once more experience is acquired with the batteries and the regulations and test procedures catch up with the technology. Detailed results of NREL work can be found on a NREL web site <http://www.ctts.nrel.gov/BTM/> under Papers and Presentations. ♦♦

Annual Report

Frans Koch

Secretary

The Annual Report for the year 2000 was distributed during the second week of January. It was entitled “Progress Towards Sustainable Transportation” and used a new format to describe the state of the art of

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hybrid and electric vehicles in our participating countries. Extra copies are available if anyone would like some more.

This year, we would like to publish the report for 2001 in a more timely fashion. The Secretary will make a special effort to complete the editing and printing during the next few months. Executive Committee members are requested to ensure that the articles for their countries are sent in as soon as possible. ♦♦

Web-site – www.ieahev.org

Frans Koch

Secretary

David Timm has been working on the revised web-site during the past month, and it should be ready within a few days. We shall notify you as soon as it becomes operational, and look forward to your views and comments on how to improve it even further and make it even more useful and attractive. ♦♦

CALENDAR OF EVENTS:

ANNEX 1 – INFORMATION EXCHANGE - EXPERTS MEETING:

MARCH 7-8, 2002 – VALBONNE, FRANCE

ANNEX 7 – HYBRID VEHICLES – EXPERTS MEETING

APRIL 22,23,2002 IN DELFT, THE NETHERLANDS

ANNEX 8 – DEPLOYMENT STRATEGIES – EXPERTS

MEETING: JUNE 10-12, 2002 – VANCOUVER, CANADA

WORKSHOP ON CLEAN CITY VEHICLES IN DEVELOPING

COUNTRIES: SEPTEMBER 24,25 – IEA HEADQUARTERS, PARIS, FRANCE.

HYBRID AND ELECTRIC VEHICLE EXECUTIVE COMMITTEE MEETING

OCTOBER 25,26, 2002 – BUSAN, KOREA

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Personal News



➤ *Implementing a Romantic Agreement.* Mayumi Kinoshita and Osamu Notoya were married in Tokyo on February 11, 2002. Mayumi has been

active in LEVO for several implementing agreements, and organized the workshop on Clean Energy Vehicles in Kyoto on June 6. Osamu has also worked for several Implementing Agreements while he was seconded to NEDO. The small wedding ceremony was at the Miyako Hotel where they met each other for the first time during the 23rd Advanced Motor Fuels I/A ExCo meeting. The parents and close relatives were present, and the happy couple intends to have their honeymoon in May. All the participants in the AMF and H&EV Implementing Agreements congratulate Mayumi and Osamu on this happy occasion, and wish them the very best for their future.

➤ *It was on the isle of Ischia that I met her* The isle of Ischia (close to Capri) is the site for great romances. This is where Mario Conte and Maria Balestriere were married on September 20 in a small church in the village where both Mario and Maria were born. Maria arrived at the church in a stately black car, but Mario walked from his home which was only 100 m away. Over 220 guests crowded into the small church and attended the reception on a terrace of the Continental Hotel. The fabulous food was followed by music and dance, and sufficient quantities of good wine ensured that no one was bothered by the evening chill. The happy couple honeymooned in Bangkok, Singapore, and the Maldiv Islands. All of Mario's many colleagues and friends wish him and Maria a happy future. ♦♦



February 2002

Annex I Expert Meeting in Valbonne

by Toru Nakatsu
Operating Agent – NEDO – Tokyo, Japan

The next Experts' meeting of Annex I will be in Valbonne, France on March 7 and 8, 2002. Mr. Coroller of ADEME has kindly agreed to host this meeting and Katia Soleil of ADEME is helping with the practical arrangements. We would like to ask all participants to confirm their arrangements with Katia Soleil (Katia.Soleil@Ademe.fr) as quickly as possible, if they have not already done so. Valbonne is about half an hour's driving North of Nice, and the ADEME offices are in Sophia Antipolis, a research park close to Valbonne. The word Sophia comes from the Greek for wisdom, and the word Antipolis means "not a city". The research park itself consists of a number of modern office buildings and research facilities in a park setting, and the residential area consists of modern houses grouped together in a village. The street plan for the village was copied from an old medieval French village.

During our meeting, we shall discuss progress of the work and have the mini-presentations, and we shall also make arrangements for a smooth hand-over on April 1 to the new Operating Agent. NEDO has participated in the work of Annex 1 since its first meeting on June 8,9, 1993 in La Rochelle, France, and somehow it is appropriate that our last meeting as Operating Agent, almost 9 years later, will also be in France. Throughout this whole period, Mr. Tomohiko Ikeya of CRIEPI has done an excellent job of the data collection, technical analysis, and production of the reports. My predecessors, Jun Shonaka, Masanobu Suga, and Iwane Shiozaki, and myself, have enjoyed working with our colleagues from many countries. We were pleased to learn that six organizations are interested in taking over the leadership of the Annex, and we wish the new Operating Agent success in the coming years. ♦♦

Supercapacitor and battery testing methods

Tien Q. Duong
U.S. Dept. of Energy

Testing and measurement is the very essence of technology development, and new technologies require new testing methods. At the DoE we work with many organizations that are developing improved batteries and supercapacitors. Sound testing methods to measure progress and achievements, and to compare different technology approaches, are of key importance. We have shared our battery testing methods with our colleagues in Annex 10, and we are now working on supercapacitor testing methods. We shall survey the various methods in use in our participating countries, and then refine the current ones. International cooperation in this area has strong advantages in avoiding doing the same work in many different countries at the same time, and especially in achieving international comparability. In this way, tests done in one country can be used in other countries and do not need to be duplicated. In addition, the Experts' meetings establish personal contacts with colleagues from other countries working in the same field, and invariably result in useful exchanges of ideas and information. ♦♦

Kyoto Workshop Report available on IEA web-site.

by Frans Koch - Secretary

The Government of Japan, and more specifically LEVO and NEDO, hosted a productive workshop on "Market Deployment Strategies for Clean Energy Vehicles" on June 6, 2001 in Kyoto, Japan. The participants included invited experts and members of the joint Annex on Market Deployment Strategies. The report is available on the IEA ImpAg web-site, www.iea.org/impag, user name impag password brandy, go down the page as far as 20 August 2001, and then click on the report. We shall post the report on our own web-site as well, as soon as the revised version comes on-line. ♦♦