

DRAFT PHASE I
WORKPLAN of
PROPOSED NEW ANNEX on
PLUG-IN HYBRID ELECTRIC VEHICLES

Version 2
December 6-7, 2007

1. INTRODUCTION

1.1 International Energy Agency

The International Energy Agency (IEA), based in Paris, is an autonomous agency linked with the Organization for Economic Co-operation and Development (OECD). The IEA is the energy forum for 26 member countries. IEA member governments are committed to taking joint measures to meet oil supply emergencies. They have also agreed to share energy information, to co-ordinate their energy policies and to co-operate in the development of rational energy programs.

Objectives of the IEA:

- to maintain and improve systems for coping with oil supply disruptions;
- to promote rational energy policies in a global context through co-operative relations with non-member countries, industry and international organizations;
- to operate a permanent information system on the international oil market;
- to improve the world's energy supply and demand structure by developing alternative energy sources and increasing the efficiency of energy use;
- to assist in the integration of environmental and energy policies.

1.2 Implementing Agreement for Hybrid and Electric Vehicle Technologies and Programs

This proposed annex will be part of the IEA Hybrid and Electric Vehicle Technologies and Programs Implementing Agreement. This Agreement is an international collaboration program in which currently 10 countries participate in six annexes that each deal with different aspects related to electric and hybrid vehicles. The Chairman of this Implementing Agreement is Mr. Urs Muntwyler. The Secretary is Mr. Martijn van Walwijk. The Implementing Agreement started in 1994 and is scheduled to terminate its 3rd phase in November 2009

The participating countries in the Hybrid and Electric Vehicle Technologies and Programs (HEV) Implementing Agreement are: Austria, Belgium, Canada, France, Italy, The Netherlands, Sweden, Switzerland, Turkey and the United States.

The annexes in this Implementing Agreement are:

- Annex I: Information Exchange on HEV Technologies and Programs
 - the OA is Mr. C. Saricks from ANL, USA;
- Annex VII: Hybrid Vehicles
 - the OA is Mr. G. Passier from TNO Automotive, Netherlands;

- Annex VIII: Deployment Strategies
 - the OA is Ms. S. Kleindienst from Engineering Office Muntwyler, Switzerland;
- Annex IX: Clean City Vehicles
 - the OA is Mr. T. Mansson from EnEN AB, Sweden;
- Annex X: Electrochemical Power Sources and Energy Storage Systems for Electric and Hybrid Vehicles
 - the OA is the Department of Energy, USA;
- Annex XI: Electric Cycles
 - the OA is Mr. F. Vergels from AVERE, Belgium;
- Annex XII: Heavy-Duty Hybrid Vehicles
 - the OA is Mr. S. Smets from Vito, Flemish Institute for Technological Research, Belgium;
- Annex XIII: Fuel Cells for Vehicles
 - the OA is Mr. A. Dorda from A3PS - Austrian Agency for Alternative Propulsion Systems, Austria.
- Annex XIV: Market Deployment of Hybrid and Electric Vehicles: Lessons learned
 - the OA is Mr. T. Turrentine from University of California, Davis, USA.

2. STATUS OF SUGGESTED PHEV ANNEX

The reason for proposing this annex was the wish of some Annex VII participants to have a specific group focusing on plug-in hybrid electric vehicles (PHEVs). It was also understood, that since the completion of Annex VII was scheduled for November 2007 that the work initiated by its Subtask on PHEVs be continued and expanded upon. Certain analysis and more comprehensive investigations were not undertaken. Based on the knowledge and experience from Annex VII, this proposed annex, along with the same experts and newly identified ones, are well equipped to immediately tackle these and other identified issues during the first and subsequent evolutions of this proposed group.

This being said, it is also understood that the IEA/HEV Implementing Agreement is scheduled to complete its current chapter in November 2009. Despite this fact, Phase I of this suggested Annex Group will go beyond this date and operate for 3 years. It will also endeavor to identify new areas to be included if a Phase II is to be initiated.

Added to the identified items of Annex VII's Subtask on PHEVs are the recent developments with another proposed Annex Group on Renewable Energies. This group intends:

- to investigate the merits of using PHEVs as energy storage and source devices for renewable and other low-carbon energy sources,
- to study the impact (or cost) of using PHEVs as energy storage devices for renewable and other low-carbon energy sources, and
- to determine the benefits of using PHEVs as energy storage devices for grid management.

This Workplan idea and concept has been discussed at both Annex VII and Annex XII meetings, most recently in Istanbul, September 2007. It was at these meetings where participants showed an interest in combining the work of Annex VII, with the suggested items from the Renewable Energies Annex.

It is the Operating Agents' opinion that there remains a multitude of other issues needed to be addressed by an Expert Group on PHEVs and members of the IEA HEV Implementing Agreement as well as the IEA would be well served if it would continue after its initial proposed Phase I.

3. PROJECT FOCUS

3.1 Objectives

The Phase I Workplan of this proposed Annex Group will include issues identified by Subtask 2 on PHEVs of Annex VII's Final Report, and those related items identified in the proposed Annex Group on Renewable Energies. It will also endeavor to identify new areas to be included if a Phase II is to be initiated.

Along with information related to general descriptions of PHEV concepts, the Annex will collect, organize and report the information produced by its 5 identified Subtasks.

3.2 Subtask 1 – Advanced Battery Technologies & Components

Activities in Subtask 1 will focus on the investigation of existing and emerging energy storage technologies, particularly advanced battery technologies, which can lead to significant advances in the performance, safety and environmental impacts of PHEVs.

Related to Part 2 of Annex VII, Subtask 1 Activities will follow-up on and continue exploring issues related to:

- Battery life
- Battery power & energy density

Future iterations of this Annex Group may expand this subtask to include activities focusing on optimizing electric components and control systems such as motors and other key electric components reducing their size and weight and increasing efficiency and durability to meet automotive specifications, as well as other issues related to advanced battery technologies.

3.3 Subtask 2 – Merits and Policy Issues

Activities in Subtask 2 will focus on identifying policy issues which concern participating member governments, especially those related to greenhouse gas emissions (ie: CO, CH₄, N₂O, O₃), other criteria air contaminants (SO_x, NO_x, PM, VOC, CO, NH₃), and merits of using PHEVs as energy storage devices for renewable and other low-carbon energy sources.

Related to Part 2 of Annex VII, Subtask 2 activities will follow-up on and continue exploring issues related to:

- Potential reduction of greenhouse gas emissions
- Potential reduction of criteria air contaminant emissions

- Potential reduction of fuel consumption

Related to the proposed Renewable Energies Annex, Subtask 2 activities will explore issues related to:

- PHEVs as energy storage systems for the grid

3.4 Subtask 3 – Charging and Grid Issues

Activities in Subtask 3 will focus on the issues related to widespread connection of PHEVs to the electrical distribution grid.

Related to Part 2 of Annex VII, Subtask 3 Activities will follow-up on and continue exploring issues related to:

- Increase of electricity use
- Off-peak charging

Related to the proposed Renewable Energies Annex, Subtask 3 activities will explore issues related to:

- Value of PHEVs to utilities as controllable loads

Future iterations of this Annex Group may expand this subtask to include activities focusing on:

- Communication protocols and data requirements
- Time of day use, charging permissions and billing
- Charging stations
- Ability to use variable voltage levels
- Ability to deal with two way power flows

3.5 Subtask 4 – Marketability and Impacts

Activities in Subtask 4 will focus on identifying market barriers, issues related to cost, and other topics related to the use of the end product.

Related to Part 2 of Annex VII, Subtask 4 Activities will follow-up on and continue exploring issues related to:

- Cost effectiveness (what are consumers prepared to pay for a given range and other features like all-electric drive?)
- Cost for infrastructure (and chargers)
- Purchase and operating costs of PHEVs
- PHEV repair and maintenance infrastructure
- Use in cold (or extreme) climates
- Secondary value of batteries

Related to the proposed Renewable Energies Annex, Subtask 4 activities will explore issues related to:

- Impact of PHEVs on different power generation sources (renewable, others...)

3.6 *Subtask 5 – Group Administration and Communication*

Activities in Subtask 5 will focus on outreach and education activities, administrative requirements for the group, and communications.

More specifically, Subtask 5 Activities could include:

- Information exchange among members
- Establish a website to distribute all the necessary information to the participants.
- Collect information from Subtask Leaders regarding their respective tasks, reports, documents, upcoming presentations, conferences, etc.
- Prepare material for papers and presentations dealing with the contents and the results from this Annex to be presented at relevant venues.

3.7 *Other Possible Topics:*

Depending in the interest of candidate members, the identified subtask may be expanded to include other issues. These issues may also be retained for examination during a subsequent phase of this group.

3.8 *Deliverables*

Each subtask will result each year in a report internal to the identified projects. The subtask reports as well as other documents will be accessible for the members through the annex website. By using a document management system, the exchange of working documents, final reports and other information will be enhanced.

The preparation of papers summarizing the whole topic or highlighting certain aspects is on a voluntary basis, but to be encouraged. By publication in international journals and presentation at conferences, the annex as well as the Implementing Agreement gains exposure to a wider professional public.

4. OPERATIONAL APPROACH

4.1 Operating Agent

The Canadian Federal Government through its Department of Natural Resources (NRCan) will act as operating agent (OA) of this annex.

The OA organizes two expert meetings per year in participating countries in turn and makes the practical arrangements in co-operation with the host organization for each meeting. Each meeting may include a technical visit to the participant's facilities and/or other interesting projects or events. This allows the local participant to illustrate his capabilities and infrastructure in the field of plug-in hybrid electric vehicles and related technologies.

The OA chairs the meetings, prepares agendas and minutes, and reports to the Executive Committee of the Implementing Agreement. He/she provides project management and coordination, to ensure that activities are implemented and objectives are achieved.

4.2 Subtask Leaders

A Subtask Leader will be designated for each of the five main objectives. The OA is best placed for leading the topic of Group Administration and Communication, i.e. subtask V. The Subtask Leaders for the other four topics will be assigned once the tasks are fully defined. Their tasks are to prepare a working plan for each topic and report annually to the OA on their findings. This will allow distribution of efforts to all participants. The Subtask Leader coordinates the progress for his/her subtask and completes the report.

4.3 All Participants

All participants in the annex take part in the Information Exchange, i.e. subtask 5. Concerning the other objectives and subject areas, participation and contribution is on a voluntary basis. The amount of quality work will rely on the expertise of participating organizations/members, their time, and available resources. For the total task force the participating organizations are expected to set aside at least one man-month of professional service time per year.

4.4 Dissemination of Results

It is expected that the results of this annex will consist of at least four reports (1 for each of the first four Subtasks), an Annual Annex Report, as well as several papers and presentations. These documents will be made available on the OA's website.

The papers and presentations are public matter once published in proceedings and presented at conferences. From that moment, members can make them publicly available. The reports have a more proprietary nature. Therefore they will initially only be made available to member countries. A timing as well an approval system to make these reports publicly available still needs to be established in this working plan.

The organization of workshops linked to large conferences allows disseminating the results of the annex in a more structured manner. It also draws more attention to the annex's activities. Therefore, it is suggested that this possibility be pursued.

5. FINANCIAL ARRANGEMENTS

Work under this Annex Group will be carried out on a task sharing basis.

5.1 Operating Agents' Contribution

The Operating Agent for this group will provide in-kind support which will cover the management responsibilities.

These management costs include:

- general co-ordination of the activities of this annex;
- organization of two expert meetings per year of operation;
- participation and reporting in HEV ExCo meetings;
- work to increase participation in this annex; and
- hosting a secure website for the members of the annex.

5.2 Task-Sharing Work

Participating organizations will be expected to set aside a certain amount of professional service time to participate in the technical work and the meetings of this annex. This amount of time required, is estimated to be at least one man-month per year.

In addition, participants will be expected to finance their own travel and accommodation cost for the expert meetings.

Finally, each participant will be expected to host an expert meeting in turn. This cost collectively is known as task-sharing cost.

5.3 Sponsors

A Sponsor can be either a vehicle or component manufacturer or supplier, or a representative of a users group.

Sponsors will be able to participate during meetings and also contribute to tasks only if approved by their respective member representative. They will have no voting rights. Their contribution to this Annex will be managed by their respective member representative or other members of this Annex directly.

6. BENEFITS FOR PARTICIPATING COUNTRIES AND ORGANIZATIONS

6.1 Benefits for Countries

Oil security has become a major concern in recent years. Nations around the world are concerned with issues surrounding the consumption, availability, transportation, dependency, cost, environmental effects, etc. of oil extraction and use. To combat these issues and the harmful emissions associated with the consumption of oil in our respective transportation systems, consideration of more secure and environmentally friendly forms of transportation are being pursued.

Advanced technology options such as vehicles equipped with varying degrees of hybrid powertrain systems is growing and seems to be the advanced vehicle technology of choice by many as evidenced by consumer demand and their recent popularity.

Automotive manufacturers around the world are also showing a rising interest in pursuing related technologies, such as plug-in hybrid electric vehicles. Furthermore, Government RD&D funds are increasingly dedicating their efforts towards these and other related technologies.

If consumer acceptance and product availability of these technologies continues to expand over time as is expected, these technologies will undoubtedly make significant contributions in diminishing carbon dioxide levels and possibly extend our dependence on petroleum with a much more sustainable approach.

This annex will provide essential information for member countries to better understand the current situation related to PHEVs and their related prospects.

6.2 Benefits for Organizations

The automotive research organizations participating in this work are among the most prestigious in the world. Participation in this Annex will broaden and deepen their own expertise in PHEVs and related technologies and will help strengthen working relationships and international collaborations. This will also give them access to research that they have not done themselves and keep them informed of recent developments in other countries and of the state of the art of the technology.

7. SCHEDULE

If approved by the HEV Executive Committee during their meeting in Anaheim, California in December 2007, this Annex Group can begin its first session, a Workshop, in conjunction with the Annex XII meeting scheduled to take place in Canada in February 2008.

Experience from other annexes has shown that a period of three years is required to gain sufficient momentum. Despite the fact that the HEV Implementing Agreement is scheduled to terminate its current Phase in November 2009, it is recommended that Phase I of this group operate for 3 years and go beyond the termination date of phase 3 of the HEV Implementing Agreement.

The Phase I Workplan of this proposed Annex Group will only include issues identified by Subtask 2 on PHEVs of Annex VII's Final Report, those related items identified in the proposed Annex Group on Renewable Energies, and also identify new issues to be pursued in a subsequent phase.

Suggested Timeline:

- December 2007 – IEA/HEV Executive Committee presentation
- February 2008 – Kick-off Meeting and Workshop
- August 2008 – 1st Meeting (Tentative)
- February 2009 – 2nd Meeting (Tentative)
- August 2009 – 3rd Meeting (Tentative)
- February 2010 – 4th Meeting (Tentative)
- August 2010 – 5th Meeting (Tentative)
- February 2011 – 6th and Last Meeting of Phase I (Tentative)

It is also suggested that, if required, conference calls be organized by the operating agent between the proposed meeting schedule.

8. CONTACT INFORMATION

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