

IEA INTERNATIONAL ENERGY AGENCY



*Annex VII: Hybrid Vehicles
Overview Report 2000*

List of Participants

*Worldwide developments and activities
in the field of hybrid
road-vehicle technology*

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This report

This Overview Report on the status of Hybrid Vehicle Technologies and Programmes is the result of collaborative work carried out in phase I of Annex VII between June 1998 and June 2000. It incorporates the results of both Subtask VII/1 and Subtask VII/2 over this period. The main text is based on the information collected by the participants on the status of hybrid vehicle technology and the R&D and implementation projects and programmes in various countries. As the Topics that have been studied in Subtask VII/2 closely relate to the aspects that are analyzed in the Overview Report resulting from Subtask VII/1, the Topic Reports have been integrated into this report at the appropriate places. Whenever this is the case, authors of the Topic Report are clearly mentioned.

At the end of phase II an updated version of this Overview Report will be published, incorporating the Topic Reports on subjects studied in phase II.

The structure of the report is as follows:

Chapter 2 introduces the various hybrid drivetrain configurations which are being developed and studied by the light duty and heavy duty vehicle manufacturers in the world. Roughly spoken, one can divide hybrid drivetrain configurations using electrical storage devices into series-, parallel and combined hybrids. Furthermore, hybrids making use of a mechanical energy storage device are briefly discussed.

Chapter 3 takes a closer look at some concrete examples of hybrid vehicles that have been developed for different applications (two-wheelers, passenger cars, vans, buses and trucks) and discusses some trends. Different vehicle applications demand different hybrid configurations. On the basis of existing examples the choices made by the R&D community and automotive industry are illustrated.

Subsequently, Chapter 4 deals with the two main components that are specifically developed for hybrid vehicle applications: thermal energy sources and energy storage devices (i.e. batteries, supercapacitors and flywheels). An overview and analysis of the state-of-the-art of these components is presented and some general reflections on the latest developments are given. In a future version of this report more components for hybrid powertrains will be discussed.

Chapter 5 describes large programmes and projects on hybrid vehicles that are being carried out worldwide. These are on the one hand divided into governmental and industrial programmes and on the other hand split up for the three regions Europe, USA and Asia.

Based on the vast amount of data collected in Annex VII Chapter 6 analyses worldwide trends within the field of hybrid vehicle technology in a more statistical manner. Trends in R&D (for instance status of hybrid vehicles, components used within several hybrid vehicle configurations), market introduction and mass production are visualized. Furthermore time paths for the development and introduction of hybrid electric vehicles and fuel cell vehicles are discussed.

Chapter 7 is focused on energy and emission aspects of hybrid vehicles. This chapter is composed of various Topic Reports written by the Annex VII participants. Attention is paid to test methods for HEVs, energy consumption and emissions of hybrids and the perspectives for using alternative motor fuels in hybrid vehicles. As part of the discussion on energy aspects a comparative assessment is presented of different HEV configurations using the simulation tool ADVISOR.

The next chapter (Chapter 8) presents a study of the cost aspects of hybrids, fully based on a Topic Report devoted to this subject.

Chapter 9 concludes the report with some final remarks. A summary of the conclusions from the various chapters of this report can be found in the executive summary.

Finally in Chapter 10 a general overview is given of the information collected on hybrid vehicles (from human powered hybrid two-wheelers up to heavy duty vehicles) which are currently in the R&D or early commercial stage (prototypes, testing vehicles, concept cars). The overview is of course not complete. A selection is made of those vehicles that are attractive or illustrative by virtue of their technical innovation, or that are already in the (pre-) commercial stage. Apart from general vehicle data, some technical information of the driveline configuration is given (whenever available).

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