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## Introduction

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**Biographical notes:** Benoît Maisseu is Dipl. Eng. in Electrical Engineering of the Ecole Supérieure d'Electricité (Supélec, Paris, 1996). He has previously worked for Matra and EADS and been in charge of several European research projects in telematics. He is currently project manager for the electricity and electronics of electrical and hybrid vehicles for the LCV division of Renault. He has published several papers and has been assistant professor at the University of Versailles-Saint-Quentin, teaching fuzzy logics.

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With the increasing availability of hybrid electric cars in all markets, while fuel cell vehicle prototypes are multiplying, at a time when a new generation of electrical drive technologies is in preparation, and in an era in which environmental mobilisation is spreading, the numerous engineers, scientists and economists seeking openings for innovative technology in all domains could not long remain deprived of a link enabling them to share their advances in the face of the challenges represented by the electrification of vehicle engines. The absence of a journal dedicated to this new technical horizon had to be remedied; it is the objective of the *International Journal of Electric and Hybrid Vehicles* to gather together responses to these issues which affect most areas of industrial and scientific activity.

This journal will publish articles referring to the domain of electric and hybrid vehicles, including onboard electrical energy production systems such as, for example, the fuel cell, and will propose innovative solutions for overcoming the technical and economic obstacles lining the route that has yet to be travelled before these systems become standard. These articles will represent the original work of researchers intervening in the domain of these new motor systems, which are changing the physical and electrical architecture of present-day automobiles, or in directly linked sectors playing a determining role in the development of the industry. They will make it possible to build conduits for communication between key players for the purpose of accelerating progress in strategic technologies, and also to better understand and coordinate the evolution of industrial policies.

The production of electricity within vehicles will occupy an important position amongst the issues that we will find frequently in the pages of the IJEHV. Be it with the aid of hydrogen and oxygen by water synthesis, perhaps thanks to the sun, or simply with a heat engine, the production of electricity directly alongside the engine consuming it raises an infinite number of technical questions. The resolution of these difficulties is progressing fast and daily towards improving the energy efficiency of vehicles, bringing their cost down to acceptable levels, and making them safe and lastingly reliable.

The natural alternative to this onboard production of electricity consists of stocking electricity on board. This solution is motivating a large body of arduous research in an industrial universe where the number of players capable of offering large capacities is dwindling. Indeed, despite the multitude of nomadic applications that enjoy energetic autonomy, the automobile is tackling the challenge of tens of kWh almost alone. The high cost of batteries is a major obstacle to plug-in vehicles becoming commonplace. A substantial part of the future of these new vehicles concerns the improvement of the kWh/kg and kWh/\$ ratios, which constitute a real new technological frontier.

The challenge of new components, entire families of which must be developed, is monumental. The costs attained by the automobile industry are low and quality levels are ever higher, thanks to the deployment of tried and tested technologies, but this state of affairs is being upset by the arrival of these new types of engine. Customers, however, expect the availability of their automobiles and the quality of the packages on offer to remain unaffected. When all the electrical components are subjected to as yet non-standardised voltage levels, engines and electrical cables, connectors or again relays have to be developed on a virtually case-by-case basis. When high levels of electrical power are deployed right next to signals driving security systems, electromagnetic compatibility becomes a thorny problem. Thus, the sharing of certain developments will probably prove obligatory.

Beyond the physical components, a new algorithmic intelligence must be developed, the better to promote the techniques used, to gain the few fractions of a percentage point of performance that make it possible to cross the boundary of profitability. Apart from the optimisation of the distribution of engine power, power electronics, battery charge and performance of fuel cells, new applications include, for example, the recuperation of energy from braking, or the improved mastery of consumption by accessories such as air conditioning and heating.

Admittedly, the scale of the task facing engineers should not conceal the first of the keys to the conquest of the new world of hybrid and electrical vehicles. The economic equation is in fact complex and possesses a multitude of pitfalls, each more treacherous than the last, as demonstrated by certain commercial failures in the past. Conversely, successes regarding image must not obscure the real roads to progress. Because, all in all, one of the most insurmountable tests facing the innovations that the IJEHV will deal with, and which constitutes practically a sort of first in the history of the industrial era, consists in achieving the orchestration of the succession of probably the biggest star begotten by technology, the combustion engine.

Nevertheless, the technological and economic difficulties are not limited to vehicles. Success involves a much broader mutation. How does one fill up with hydrogen? How does one recharge an electric vehicle when one lives in an apartment? How can vehicles unfamiliar to after-sales service networks be serviced? How should vehicles characterised by levels of voltage sufficiently high to be dangerous be approached when they are involved in accidents? How should a hydrogen tank or a high capacity battery be stored and made safe? The energy distribution networks will also have to adapt, and these developments will be difficult to finance.

It remains to me to wish the IJEHV a safe journey, as it goes to work in the service of these issues thanks to you all, authors and readers, actors in this technical revolution.