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## Editorial

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**Biographical notes:** Giuseppe Calabrese is a Senior Researcher at Ceris-CNR (Institute for Economic Research on Firms and Growth – Italian National Research Council) of Turin, which he joined in 1988. He is the co-editor of the *International Journal of Automotive Technology and Management*. His main areas of research are focused on industrial organisation, technological innovation and the car industry. His latest work in the field of the automotive industry concerns new product development and production networks in Fiat Auto, the role of small-medium firms in the reorganisation of the car supply base and R&D organisation, and the prospective of alternative fuel vehicle. He currently teaches business managerial economics at University of Turin.

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## 1 Introduction

The papers included in this special issue have been selected from the contributions presented at the 18th GERPISA International Colloquium: The Greening of the Global Auto Industry in a Period of Crisis. The conference was held in Berlin, Germany, and hosted by WZB in June 2010.

The conference was structured in five plenary sessions and 25 parallel sessions. In the whole, 72 contributions were presented. Most of the slides and papers can be downloaded from <http://www.gerpisa.org>.

The conference can be considered the third step of the GERPISA's Fifth International Research Program for the period 2008–2011. As Jullien (2008) affirmed, the research is moving the international network into new territory but it should mobilise the competencies built up over the past 25 years. The question of how the automobile industry is integrating the demands of sustainable development is fundamentally tied to the question of how this activity is positioned in societies that produce and/or use automobiles. In particular, the scale on which the position of the automobile is currently being renegotiated in society requires us to return to the question of politics, states and the importance of regulation and taxation as these issues are likely to play a major role in determining outcomes for automobile firms and regions. This can be summarised in three major areas:

- The automobile industry presents a level of unity and continuity that reflects a sectoral community made up of competition and imitation. This lends credibility to the sectoral approach to research in order to identify key trends that concern all firms in the sector. Sustainable development has become one of these trends.

- Trade-offs need to be made and – because firms have specific historical trajectories are not occupying the same competitive space – they will make different trade-offs and the members of the community thus co-exist with a large diversity in its practices in relation to production and production policies. There are many reasons to consider that this principle also applies to the forms of interpretation by firms of the requirements of sustainable development.
- The strategies adopted by firms need to be interpreted more broadly than in terms of competitive analysis. In addition to evaluating their sustainability in terms of performance, we must add an analysis of their capacity to gain a long-term position in an increasingly global social, political and economic landscape. The sustainable development strategies that are being developed in automobile firms today clearly need to be evaluated on this dimension.

## **2 The contents of this special issue**

The papers presented in this special issue are dedicated to the innovation design and sustainable development in the automobile industry.

The five papers presented in this third special issue related to the research programme are dedicated to the innovation design and sustainable development in the automobile industry are mostly focused on policy issues.

Thanks to scrapping incentives, the percentage of sales in Europe of low-emission cars is increasing and not only concentrated, as in the past, mainly on natural gas and liquefied petroleum gas cars. The USA and Japan have a similar pattern of sales but the cars are more differentiated (ethanol, methanol and hybrid cars).

The production panorama is rapidly changed in few years. At the beginning of the decade France and Great Britain each played a major role in building alternative cars, but the remaining countries in Europe contributed practically nothing. Now all the brands are involved in at least one alternative fuel technology.

It is also important to note that countries have focused their efforts on completely different technologies in accordance with their own specific needs and energy structures. Italy has chosen to specialise mainly on the methane car (Nadin et al., 2009), France is focusing on the electric car, whereas Germany has opted for the liquefied petroleum gas car.

As for the European Union, steps towards finding alternative methods of propulsion have taken the usual path, with the institution of regulatory requirements that increasingly restrict the sale of polluting vehicles, the placing of specific limits on emissions (the next deadlines are 2009–2010 with the Euro 5 standards and 2014–2015 with Euro 6) and the provision of direct support for basic research – thus focusing on fuel cells (Dijk and Montalvo, 2009). The commitment of member countries in this area has thus far been disorganised, limited and fragmented. It is estimated that the public funding allocated to these programmes amounts to 50–60 million euros per year, approximately one-third of US funding and a quarter of Japanese funding.

Even if the long-term objective is to build a hydrogen auto with fuel cell technology, this option should not detract attention from the other types of alternative propulsion because the timeline for introducing fuel cell technology is still largely undefined and its success still very uncertain (the launch date has been postponed every year; 20 years ago

we had the same hopes for electric cars), and also because some of the components needed to develop fuel cells are also used in compressed natural gas cars, especially the hybrid ones.

It is not by chance that the Americans have decided not to focus solely on fuel cell technology. Since 1993, projects have been developed specifically for hybrid cars, co-financed equally by the US government and separately by the three national manufacturers. These support programmes were unified in 2000, so Ford, General Motors and Chrysler have started to develop projects together. In the last years, US manufacturers have launched a few hybrid models, but with smaller commercial success than current market leaders Toyota and Honda (Berggren et al., 2009).

Even though European manufacturers have developed prototypes with hybrid methods of propulsion, in some cases with national public support only, they are not inclined to produce these vehicles at the moment (with the exception of commercial niche vehicles). The main obstacle is the additional costs and the unwillingness to sell at a loss, unlike their US and Japanese counterparts. The European Union may intervene by instituting regulatory requirements (in some countries hybrid cars are comparable to traditional cars and subject to circulation restrictions), by means of technology (improving the cost and efficiency of some parts), or by supporting demand in order to reduce the price differential with traditional cars.

They can similarly intervene for compressed natural gas technology, again by instituting regulations (exploiting the environmental and safety benefits as opposed to traditional vehicles), through technology (improving the energy performance, and incorporating compressed natural gas into hybrid cars) and by supporting demand (by not adjusting excises in particular and by promoting the conversion of cars already in circulation). The fundamental issue mainly involves increasing the distribution network, which is scarce in Italy and almost non-existent in other European countries. This will break the vicious circle between methane distributors, who do not want to increase the network due to the lack of demand, and the consumers, who are not willing to buy methane cars due to the lack of supply points. In addition, the methane distribution network can easily be converted to supply hydrogen, which is one of the further main factors that could slow down the widespread diffusion of fuel cell cars.

In the medium and long term, the automotive industry worldwide is expected to undergo radical discontinuous changes which will shake up a previously more or less stable industry. All serious automotive industry forecasts now anticipate that electric mobility will become established – in the industrialized countries at least – with fundamentally new vehicle concepts.

According to Freyssenet, the quivering observed towards the alternative motorisations could be the starter of at least three scenarios. In the scenario of diversity, each automobile producer will be able to find its regional niche. In the scenario of progressiveness, only most powerful carmakers will survive. In the scenario of rupture, the newcomers and the innovating enterprises will have the possibility to engage a true ‘second automobile revolution’. The winning scenario will prevail not because of its technical superiority or of its best environmental performances, but initially because of energy geopolitics and of firm profit strategies. For these reasons, the third scenario, which appears today most random, could impose, as the improbable petrol car scenario imposed one century ago.

Wang and Kimble move our attention to China and to the concept of leapfrogging, where a newly industrialising nation moves directly to the use of advanced technologies without needing to follow the trajectory of its predecessors, is an attractive one, particularly for the automobile industry where there is an urgent need to develop more sustainable technologies. China now has the highest level of automobile production and sales in the world; thus, the question they address in the paper is, can China ‘leapfrog’ to the development clean and economically viable electric vehicles? The existing literature on leapfrogging is ambiguous and ill defined; we review the literature and identify four generic patterns for leapfrogging. They then present some empirical data on the factors that might influence China’s ability to leapfrog to electric vehicles. They conclude with an evaluation of the likelihood of it actually being able to do so and propose three leapfrogging scenarios that it might follow.

Many authors and managers tend to view in electric cars an increasingly sustainable solution for the future of the global automobile industry. Encouraged by many states in Europe and across the world, this niche market is slowly taking shape and has some chances of achieving future growth for the first time in its history. The paper of Villareal tries to identify operational factors in the construction of the market for electric cars in France, highlighting the crucial role played by the state and public policy in the emergence of the new branch and in the construction of its demand. It also shows the definitional and symbolical conflicts which have structured debates on the future of the electric car and its commercial implications. Grasping these processes is decisive to understanding the current situation and the importance of representations on market building.

The paper by Begley and Donnelly examines the priorities for small open economies (SOEs) using the examples of Israel, Denmark and in particular that of Ireland. It considers the potential role that EV networks could have in developing the renewable energy sector and how car neutral economies such as the three under examination aim to utilise EV networks as part of a wider scheme to break their dependency on oil imports. To achieve this, these nation states have reached agreements with companies such as Renault and Better Place to put in place the structures and equipment necessary for the development of these networks.

Due to the long transition phase especially in the emerging markets, management of the ‘ambidexterity’ of optimising the existing technology and developing radically new ones is required. The article of Proff specifically examines the Brazilian automotive industry in the transition to electric mobility, i.e., the research question of what will happen to the Brazilian subsidiaries of international automotive companies after their parent companies make the transition to electric mobility.

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