

# Technological responses to the Automotive Industry to the concerns of society in Europe

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## ABSTRACT

The automotive industry is dedicated to respond to the mobility needs of the European citizens and those of the society as a whole. This paper will illustrate the technological contribution of the industry to ensure the safety of all road users, to maintain the sustainability of road transportation and mobility while simultaneously strengthening European innovation, competitiveness and employment. In conclusion, the industry recognizes that responding to these challenges requires an integrated approach involving all stakeholders in the road transportation system.

**Key-words:** Technology, Automotive Industry, Society, Europe

## INTRODUCTION

The automotive industry is often depicted as "the engine of Europe" because of its economic and social importance and the historical role it has played in the development of our continent.

The European automotive industry is the key player in the European Union of the 21st century. It provides direct employment to more than 1.1 million people and supports, directly or indirectly, another 11 to 12 million jobs. It is an essential part of the economic backbone of Europe through its contribution to fiscal revenue and external trade. In addition, it generates significant activity for other industries, such as components, electronics, information telecommunication and logistics systems as well as production and manufacturing technologies.

The automotive industry is the innovation leader in the enlarged Europe. It contributes to the strength and competitiveness of Europe through significant investment in research and the development of novel products and services. With an investment of around 20 Bn € in research and development, the automotive sector is the largest R&D investor in Europe. This investment provides the continued basis for employment, innovation, growth and competitiveness of the European OEMs in the global market.

Motor vehicles are an indispensable part of every day life of most Europeans and the economy as a whole. In the European context the industry recognizes and acts on its responsibilities with regard to society. This responsibility can only be taken collectively by working in partnership with all stakeholders in the road transportation system.

The automotive industry is dedicated to respond to the mobility needs of the European citizens and those of the society as a whole.

In addition, the industry will contribute to ensuring the safety of all road users, to further minimize the environmental impact of our products while simultaneously maintaining European innovation, competitiveness and employment.

## THE MAJOR CHALLENGES

The automotive industry is often the focus of negative attention, with regard to issues such as for instance safety, the environment and congestion. Inevitably, this has created the incorrect and unacceptable impression that the products of the industry constitute a problem to our society.

The fact is that the industry is of major economic and social importance to our continent providing the essential mobility of people and goods that is a prerequisite for growth and development. Furthermore the industry is the major European R&D investor focusing its attention on issues of foremost social concern.

The technological achievements of the industry will be discussed under the following headings:

- ❑ Sustainability of Road Transportation
- ❑ Safety for all Road Users
- ❑ Mobility, Transport and Infrastructure

**Sustainability of Road Transportation** - The concept of sustainability refers to the balance of the environmental, economic and social aspects of the transportation system.

Technological developments have drastically reduced the impact of motor vehicles on the environment while maintaining the competitiveness of the industry and increasing the level of comfort in the vehicles.

Today 100 cars produce the same amount of pollutants of an average car built in the 1970s. In a way, it can be said that the problem of pollution in modern vehicles has been tackled, but this will be even more visible in 7, 8 or 10 years when the various generations of older vehicles will have disappeared from our roads.

Noise levels of motor vehicles have been reduced by 90 % since 1970, thanks to constant progress made to powertrains, suspension and aerodynamics of all vehicles. Further noise reduction potentials are only realizable in a systems approach involving the interaction of the vehicle and the infrastructure and road furniture.

CO<sub>2</sub> emissions from cars remain a challenge, but significant progress has been made through new engine technologies, cleaner fuels and better fuel efficiency. The average level of CO<sub>2</sub> emissions from new cars has been lowered by around 12 % since 1995, based on a commitment the automobile industry has signed with the EU Commission in July 1998.

Further contributions could be made not only by more fuel-efficient engines, but also by the use of cleaner renewable fuels, improving traffic management, infrastructure and driving behavior. The CO<sub>2</sub> reduction challenge can only be addressed by a collective effort by all road transportation stakeholders.

The automobile industry is the only transport industry that has engaged in a voluntary CO<sub>2</sub> reduction scheme. If overall CO<sub>2</sub> emissions from transport have increased in the last 13 years, as pointed out recently by the EU Commission, this is also due to other sectors, like aviation and navigation, and to the fact that transport of people and goods by road has increased by 40 and 18 % respectively.

In addition to the technological advances there are many other, simple things that can be done and can make a difference in this field, like removing known bottlenecks in routes, better synchronization of traffic lights, better and quicker information on traffic situation and leaflets for drivers with energy-saving driving tips.

There has also been tremendous progress in the recyclability of automobile products and the industry is approaching the 95 % recyclability target set out by the EU. Incidentally, the stringent recyclability target set

by legislation precludes the implementation of innovative material solutions leading to lighter cars. The industry has also significantly modernized and improved all industrial processes, in terms of waste management and savings of water and energy.

Future research activities in the field of **Sustainability of Road Transportation** will need to focus on optimizing the energy conversion efficiency of the system - fuel/vehicle/infrastructure - while simultaneously addressing the needs of the customer and the environment.

Contributions towards this objective should result from an integrated research approach linking the following areas:

- ❑ Energy sources for transportation (Fuels)
  - Synthesis, storage and distribution of fuels
  - Conventional fossil fuels to renewables and H<sub>2</sub>
- ❑ Vehicle design
  - Weight and aerodynamics
  - Internal Combustion Engine Technology
  - Hybrid Technology
  - Fuel Cell Electric Vehicles Drivetrains
  - Noise abatement systems
  - Exhaust gas after treatment systems
  - Adaptive, cooperative powertrain control and optimisation strategies
- ❑ Road and ICT infrastructure
  - Avoiding congestion and encouraging smooth traffic flow by relevant information and dynamic routing
  - Abating system noise emissions by appropriate road furniture
  - Information exchange between vehicle and infrastructure will enable mission specific, intelligent, adaptive powertrain control strategies

In the area of **Safety for all Road Users**, the number of road casualties has been halved in the last two decades, while traffic has tripled. This is mainly due to the dramatic progress made in safety of vehicles. For instance, the introduction of seatbelts, airbags and ABS alone has reduced by 80 % the number of fatal or serious injuries to vehicle passengers.

All these technological advances, and many others, like ESP to name just one of the more recent safety features, have been put on the market with no need of legislation. Clearly, better road safety is a never-ending battle, and has now taken a global dimension. The situation in Europe may compare well with other regions in the world (40,000 casualties a year out of a total of 1.5 million occur on European roads), but this is still an unbearable toll to our societies. Road safety is a global, not only European, issue.

As in the case of CO2 reduction, the automotive industry cannot be held as the only one player responsible in this area. Addressing the challenge requires an integrated approach involving the vehicle, the infrastructure and the driver.

The ITS technologies, the so-called e-Safety, offer many possibilities, but here too the active involvement of all stakeholders, including public authorities and other concerned industries is required.

Better safety for the more vulnerable road users, like pedestrians and cyclists, is an area where a lot of efforts are currently being made. The EU has recently adopted a package of measures to increase pedestrian safety, which are based on a voluntary commitment made by the industry two years ago. The package combines passive and active safety features, some of which have significant implications for the industry in terms of design of the car front ends. This redesign has an impact on cost and aerodynamics of the vehicles.

Technical changes and new technology has little impact if there are no measures taken on the infrastructure, by better protecting crossing points, or on behaviour, by applying sanctions to pedestrians.

Future research activities in the field of Safety for all Road users should focus on achieving the following goal:

An integrated cooperative road system – involving the users, the vehicle, the road, the ICT infrastructure and the rescue services –contributing to the prevention of accidents and mitigation of their impacts.

Contributions towards this objective should result from an integrated research approach in the following areas:

- Information
  - An agreed European methodology for gathering and analysing accident causation and consequences data should be established. (Accidentology) The data will be available for necessary in-depth accident investigation.
  - European models for evaluating the efficacy and cost-effectiveness of road safety measures should be established.
- Vehicle
  - On the basis of a standard open architecture components and systems could be compatible for improved integrated safety systems and services.
  - Integrated vehicle safety systems should be further developed to prevent accidents and mitigate their effects. The driver should be optimally supported in controlling the vehicle.
- Human/Vehicle/Infrastructure Interactions

- All users should easily understand the road infrastructure. The human interaction to the road information system should be investigated and systematized.
- Recommendations for the minimisation of user mistakes and the limiting of the consequences of driver errors should be established.
- An open architecture should be established for vehicle to vehicle and vehicle to infrastructure communication.
- Systems to provide guidance, warn of danger and further improve safe, congestion free driving should be established. This should be based on the interaction between the driver, intelligent roads and intelligent vehicles.
- Emergency management
  - Scenarios for emergency rescues and evacuations, as well as post-accident treatments should be designed. In addition, countermeasures against illegal operations, for example hijackings and vandalism, should be established. Optimised cooperation and performance between the police, authorities, fire brigades and rescue teams should support this task.

New technologies have also contributed to the area of concern - **Mobility, Transport and Infrastructure**. Navigation systems are now increasingly available. In the future, real-time traffic information, electronic emergency call systems and other devices will help improve traffic management, and will also contribute to better safety and fuel savings.

Here too, it is not an area where the automotive industry alone can carry the burden. The industry needs public authorities, other stakeholders and other industries to contribute in the areas of their competence: removing regulatory barriers, investing in infrastructure improvements, developing the technologies needed to bring to the consumer all the possible advantages offered by the new “intelligent” systems.

The free movement of people, goods and ideas is an essential facilitator of economic and social development and a basic human need. Mobility means access to employment, education, healthcare, leisure and cultural activities, and indispensable supplies of goods and services. European automotive manufacturers are committed to making mobility affordable to most people and make it more sustainable not only in terms of the environment, safety and occupation of space, but also from an economic and social point of view.

Forecasts for 2010 expect a 26% increase in terms of vehicle-kilometres and a 24% increase in terms of passenger-kilometres for EU15 compared to the year 1998. With respect to goods transport, the trend provides an even bigger challenge as forecasts expect an increase by 38% for 2010. About half of this growth is expected to be within the new EU member states. The development of decentralized economic activities will require additional investment in an efficient and flexible transport system.

Demographic trends of an increasingly ageing population will create new mobility patterns and needs, as well as a strong demand for a flexible, attractive and user-friendly mobility system. This will be achieved through better information and integration between all modes of collective and individual private transport as well as through better land use planning.

Future research activities in the field of Mobility, **Transport and Infrastructure** should focus on achieving the following goals:

- ❑ Providing ready access to convenient transportation for people of all ages and physical abilities, thanks to a combination of private vehicles and collective transport within an integrated framework.
- ❑ Support the development of the infrastructure by effective research in new materials and technologies to contribute to the goals of increased safety, noise abatement and improved fuel consumption. Goods transport and logistics use the infrastructure efficiently for urban deliveries and long-distance hauling.
- ❑ Providing real time traffic and road data in an integrated interoperable European information infrastructure. The system is based on an agreed vehicle to vehicle and vehicle to infrastructure communication protocol and results in improved network management, safety and resource use.

## CONCLUSION

The industry is faced with a challenging task. We have to reconcile - in a single affordable and attractive product - the contradictory demands of environmental compatibility, safety and comfort. At the same time the industry must operate in an increasingly competitive global market.

The industry has responded coherently to the societal concerns and will continue to do so through investment in joint research and development.