**Original scientific article**

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**CO₂ impact on the environment and alternative for a decrease in the automotive industry****

**Summary:** Protecting the environment is becoming an increasingly high priority for business, and the legislation in this area is becoming ever more stringent. In order to survive and prosper, companies must anticipate future legislation by putting in place environmental management systems. Fuel efficiency improvements, alternative fuel technologies and environmental pressures are considered the three most influential trends, so „climate protection and the reduction of CO₂ emissions will be one of the, if not the biggest, challenge of the next decade“ because the reduction of CO₂ is absolutely and unequivocally the most crucial issue for the automotive industry.

**Keywords:** environment, emissions, automotive industry, solutions

**Rezime:** Zaštita okoline postaje prioritetni poslovni problem zbog zaoštravanje pravne regulative u ovoj oblasti. U cilju preživljavanja i rasta, preduzeća moraju predvidati buduće zakonske propise, a to je moguće uvođenjem sistema upravljanja okruženjem. Efikasnost goriva, tehnologija alternativnih goriva i zaštita okoline su tri najvažnija zadataka na globalnom nivou, što znači da će zaštita klime i smanjenje emisije CO₂ biti glavni zadatak industrije vozila u sledećoj dekadi.

**Ključne reči:** okruženje, emisija goriva, industrija vozila

1. **INTRODUCTION**

The scope of the article is to explore in greater detail environmental issues, including fuel-efficient and alternative-fuel vehicles. These additional areas of focus reflect changes in today's automotive landscape. The industry is...
clearly in transition, with static sales in almost all developed markets eroding customer loyalty; and increased emphasis on environmental and regulatory compliance.

The use of energy and other limited resources and the protection of the environment play an important role in Mobility and Transport. Whilst in the last decades the focus has been on reducing exhaust emissions and their impact on air quality (Figure 3), it is expected that in future, when 70 % of the world’s population will live in urban areas (Source: UN 2008, World Urbanisation Prospects – The 2007 Revision), R&D efforts will shift towards further reduction of CO₂ emissions, higher energy efficiency and lower noise pollution.

Moreover, the secure supply of sufficient quantity and quality of fuels and other energy carriers to meet the requirements of future powertrains in order to contribute to reduced CO₂ emission is of great importance and interest to society and the automotive industry as a whole.

**Figure 1.: Reduction of emissions (Source: The Automotive Industry R&D challenges of the future – EUCAR 2008, www.eucar.be )**

The issues of energy supply and protection of the environment can be addressed by a multi-level approach that includes:

- Further improvement of combustion engines for efficiency,
Diversification of energy sources (conventional fuels, biogas, hydro treated vegetable oil, biomass to liquid, biodiesel, hydrogen, electricity, etc.),

- Diversified infrastructure for fuels and energy supply with limited energy carriers,
- Optimisation of vehicles (improved energy management, energy recuperation, lightweight structures, new vehicle concepts), and
- Co-operative systems, improved infrastructure (e.g. traffic control systems) and eco-driving in an integrated approach with participation of all relevant stakeholders.

2. ENVIRONMENT A PRIORITY FOR VEHICLE MAKERS

On a company basis, the view of the relative importance of trends reveals important priority variations according to business segment. In particular, vehicle manufacturers are much more likely to see environmental issues as significant than are suppliers. This is confirmation of views expressed in KPMG firms’ interviews with auto companies over the last year. Suppliers typically say that environmental concerns are issues for their customers, and only indirectly issues for suppliers themselves; and vehicle manufacturers tend to say that environmental concerns are transmitted directly to them by customers and by regulators. However, suppliers are more concerned than auto-makers with reducing costs, as cost pressure is typically transmitted to suppliers by their customers. Cost concerns increase the lower down the value chain the company sits.

![Figure 2: The most important trends in automotive industry today (Source: KPMG Global Auto Executive Survey 2009)](image-url)
Climate change and the negative impact that various human activities can have on our ecosystem are among the inescapable challenges world leaders are facing. While the issue of global warming remains highly debated, there is evidence to support the environmental impact of carbon emissions.

The European Automobile Manufacturers Association (ACEA) estimates that the automotive industry is responsible for 15 percent of global carbon emissions, amounting to roughly 8 billion tons annually. Although environmental protection has been the primary driver for change, other factors such as the price volatility of fossil fuels and energy independence also have helped perpetuate a change to alternative and renewable energy sources. Accordingly, many governments have implemented a wide array of policies aimed at reducing carbon emissions, some of which specifically targeting the automotive industry.

![Figure 3: \( \text{CO}_2 \) - emissions in g/km – consumption target by major market US, Japan and EU (Source: PwC Automotive Institute Analysis)](image)

The European Union, widely seen as a leader in reducing automotive carbon emissions, has taken additional steps in setting a limit of 120g/km of carbon emissions by 2015, with 65 percent of new vehicles required to meet the standard by 2012. While other developed markets such as Japan are also enforcing tough emission standards, developing markets that have long lagged other regions in terms of enforcement are beginning to catch up and are adopting increasingly stringent emission regulations. Electric vehicles are seen as one possible solution automakers can focus on to meet increasingly stringent
emission regulations around the world, since electric vehicles release no carbon emissions while running on electric power.

Moreover, emissions regulations in the EU do not just cover CO\(_2\) for new vehicles. European emission standards define acceptable limits for exhaust emissions of new vehicles sold in EU member states. In the EU, standards are set for NOx, hydrocarbon (HC), CO and PM. Currently, different standards have to be achieved for each vehicle type. Limits for exhaust emissions are defined in a series of EU directives. Euro 1 to Euro 6. The last directives Euro 5 and 6 were adopted by the member states in May 2007 and cover new European on-board diagnostic systems too. Euro 5 will come into force for all new car models in September 2009 (Euro 6: September 2014) and for all new vehicles in January 2011 (Euro 6: September 2015).

Actual and protected GHG emission for new passanger vehicles:

![Figure 4. Actual and protected GHG emissions for new passenger vehicles](Source: The automotive industry and climate change – (ICCT) International Council on Clean Transportation)

In summary, the EU is working out specific regulations to achieve the objective of 120 g CO\(_2\)/km by 2012 through an integrated approach.; the US CAFE is still behind other industrialised countries; CARB standards are becoming more stringent annually; Japan improved its fuel economy standards to a respectively low level; and China, similar to Japan, has set weight-based fuel economy standards with a minimum level that must be achieved by every vehicle.

Even though the various standards will certainly contribute to the reduction of CO2 emissions, their variety represents an additional challenge for automotive manufacturers.
While it is difficult to precisely predict what the average new car emission would be in 2012 in the absence of additional measures, it is useful to establish some considerations for a baseline against which various options will be compared. Several influences need to be factored in.

- The recent trend may continue without additional measures, implying 1.5 gram reduction per year (average over the 2002-2006 period). The likely 2012 emission level would be 151 g CO₂/km based on a linear projection in the absence of additional measures.

- A less conservative approach would be to assume that in light of the revised CO₂ and cars strategy and the announcement of the upcoming legislative framework, car manufacturers will step up their efforts ahead of the actual entry into force of the legislation.

- Alternatively, an inverse trend may be observed, whereby in the absence of a dedicated instrument, especially after 2008-9 and the end of the voluntary agreements, average CO₂ emissions would in fact be reduced at a slower rate, and possibly increase due e.g. to a continued autonomous power and weight increase.

![Figure 5: Consumer Interest in „green” vehicles (Source: Capgemini - Cars Online 07/08 „Responding to Changing Consumer Trends and Buying Behaviour”, 2007)](image-url)

But the new trend in automotive industry is called „green vehicles”. A study realised by Cars Online 07/08 show that more than one-quarter of respondents
said they currently own or lease a fuel-efficient vehicle while almost half said they are planning to buy or thinking seriously about buying a fuel-efficient vehicle. Not surprisingly, the numbers for alternative-fuel vehicles were lower. Just 2% of respondents currently own an alternative-fuel vehicle and 11% are planning to buy or thinking seriously about buying one. The most common type of alternative-fuel vehicle represented in the survey were gas/electric hybrids, named by about half of current alternative-fuel car owners. Biodiesel vehicles were the second most common, named by 15%. The alternative-fuel market remains in transition and it’s still too early to tell how it will ultimately shake out, although sales are expected to continue to grow. For example, J.D. Power and Associates predicts that U.S. sales of hybrid vehicles will increase by 35% in 2007, compared with 2006.3 Current ownership of fuel-efficient and alternative-fuel vehicles tended to be quite consistent across gender and age groups, although the oldest consumers were somewhat more likely to be seriously thinking about buying an alternative-fuel car.

However, the Cars Online research uncovered some differences in the reasons behind consumer decisions about green vehicles. For example, European consumers were more likely to cite environmental impact as a primary factor, while more respondents in China and the U.S. pointed to fuel economy. Older consumers were somewhat more likely to identify fuel economy as a primary factor, compared with the youngest respondents (18-34). Men put more emphasis than did women on fuel economy, while a higher proportion of women identified environmental impact as the primary reason driving their decisions about green vehicles.

![Figure 6: Main reasons for choosing “green” cars (Source: Capgemini - Cars Online 07/08 „Responding to Changing Consumer Trends and Buying Behaviour”, 2007)](image-url)
3. **CONCLUSION**

- Fostering the competitiveness of the European automotive industry and encouraging research into fuel efficiency technologies.
- Reducing the climate change impacts and improving the fuel efficiency of passenger cars by reaching the objective of an average emission value of 130 g CO2/km for newly sold cars.
- Designing a legislative framework efficiently implementing the average new car fleet target ensuring competitively neutral and socially equitable and sustainable reduction targets which are equitable to the diversity of the European automobile manufacturers and avoid any unjustified distortion of competition between automobile manufacturers.
- Fuel efficiency and the environment are likely to remain with us in the coming years, keeping consumers focussed on green vehicles – although what constitutes green may evolve over time.

**BIBLIOGRAPHY**

3. Francois Jaumain, Pierre Bussy, Brandon Mason, Global Automotive Perspectives Issue 1 2009, - Capitalising on change
4. european automobile industry report european automobile manufacturers association, Carlos Ghosn, Ivan Hodac
5. climate change - the automotive industry’s – ernst & young
7. The automotive industry and climate change Framework and dynamics of the CO2 (r)evolution – PWC

www.eucar.be
www.pwc.com