



GLASS FOR EUROPE
Building, Automotive, Solar-Energy Glass

Glass for Europe's answer to the consultation on reducing CO₂ emissions from road vehicles

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Glass for Europe is a registered organization on the European Commission's register of interest representatives under the ID number 15997912445-80.

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Glass for Europe is the trade association for Europe's manufacturers of flat glass. Flat glass is the material that goes into a variety of end-products and primarily in windows and façades for **buildings**, windscreens and windows for **automotive and transport** as well as glass covers, connectors and mirrors for **solar-energy** equipments. It is also used in smaller quantities for other applications such as furniture, appliances, electronics, etc.

Glass for Europe has four members: AGC Glass Europe, NSG-Group, Saint-Gobain Glass and Siseecam-Trakya Cam and works in association with Guardian. Altogether, these five companies represent 90% of Europe's flat glass production.

Glass products not only provide light, comfort, style, security and safety, they are also **essential to energy-efficient buildings, houses and transport**. Windows containing high-performance glass such as low-e insulating glass, which helps keep warmth in, and solar-control glass, which reflects unwanted heat away, help reduce energy consumption. Solar-energy glass helps enhance the production of a renewable sources of energy.



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Glass for Europe welcomes the Commission consultation on reducing CO₂ emissions from road vehicles. A significant CO₂ emission reduction potential lies in road transport sector as recognized by the Roadmap for moving to a competitive and low-carbon economy, which aims at cutting CO₂ emissions from transport by 50% to 70% by 2050.

In order to meet this ambitious goal, Glass for Europe feels that a broad and ambitious strategy to reduce CO₂ emissions from road vehicles is rapidly needed. In particular, such a strategy should look at all technologies that reduce CO₂ emissions, i.e. powering technologies, weight reduction and innovative solutions to indirectly improve fuel efficiency (or range in case of electric vehicles and hybrid electric vehicles).

This strategy should also aim at boosting the market uptake of innovative technologies that contribute to the overall decrease of road transport emissions. Solar control glazing which helps reducing the use of mobile air-conditioning unit is one of these innovative technologies.

Reducing emissions due to mobile air-conditioning units

Solar control is an innovative glazing solutions developed by the glass industry to reduce the amount of solar heat that passes through windows, facades and windscreens while still letting daylight in. As this technology is available today and is already equipping some road vehicles on the market, Glass for Europe feels that the energy saving potential of solar control glazing for automotive applications should be accounted for in any strategy on reducing CO₂ emissions from road vehicles.

Reducing air-conditioning need

A considerable amount of solar heat penetrates the interior of vehicles when a car is exposed to solar radiation. For instance, without solar control glazing technology, solar radiation generates a greenhouse effect heating up a vehicle's interiors to temperatures above 60°C when the outside temperature is 27°C¹.

Until now, the solution to reduce internal heat and provide comfort to occupants has been to use air-conditioning, which results in an increase in fuel consumption and more CO₂ emissions. The individual fuel use for vehicle air conditioning depends on a variety of factors such as glazing surface, outside temperature, exposure to solar radiation, efficiency of the MAC unit, etc. and can therefore vary a lot. Studies nevertheless found that fuel use for air-conditioning is between 5% and 15% of the annual fuel use for a standard car². Another study carried by the German Automobile Club ADAC demonstrates that for some popular European vehicles, air-conditioning use when temperatures are above 22°C can generate up to 20% additional fuel consumption.

Solar control glazing's contribution to reducing CO₂ emissions from road vehicles

Solar-control glazing for windscreens, back and rear side glazing is a high-performance technology that provide not only good visibility and durability but also attenuate solar heat gain. Glazing with advanced solar control properties substantially reduces heat build-up inside vehicles and therefore either reduces the need to air-condition the vehicle or helps considerably lower the load on the unit.

Studies have shown that reducing a standard vehicle's thermal load by 5% reduces energy consumption of the MAC unit by 10%. Considering that solar control glass can contribute to reducing inside cabin temperatures by more than 10°C, it has the potential to improve overall fuel

¹ In fact, temperatures up to 65°C were found during real tests performed in the Paris region. Findings confirmed also in National Renewable Energy Laboratory, Dr. Robert Farrington – Stay Cool with Advanced Automotive Glazing – 2003.

² National Renewable Energy Laboratory, Dr. Robert Farrington – Stay Cool with Advanced Automotive Glazing – 2003.

consumption efficiency by 2% and up to 4% in some cases³. Bearing in mind the thousands of new cars sold annually in the EU and overall CO₂ emissions generated by road transport, such an energy-saving potential should not be ignored.

As such it can contribute to reducing the need to use air-conditioning and thus offer an effective way to reduce CO₂ emissions from road vehicles.

Increasing the range of electric vehicles and hybrid electric vehicles

In the specific case of electric vehicle (EV) and hybrid electric vehicle (HEV), the use of solar control glass contributes to increasing the range in summer conditions, as the use of air-conditioning reduces the autonomy of an EV by up to 30%. Similarly, in winter, the range can be cut up to 50%⁴ due to high heating needs and poor performance of the battery under extremely cold conditions. As such, cabin's thermal comfort needs constitute the second source of energy consumption of an electric vehicle after driving power. Therefore, increasing the range of EV/HEV requires cutting drastically cabin's thermal needs.

The use of solar control glazing can contribute to increasing EVs' range as it already reduces fuel consumption of Internal Combustion Engine vehicles. Similarly, based on energy saving glazing technologies already used in buildings, the glass industry is currently developing solutions to reduce heat losses in cabin and heating needs in order to increase the range of EVs and HEVs under winter conditions.

What a strategy on reducing CO₂ emissions from road-vehicles can do?

Glass for Europe feels that any strategy, regulation or amendment to existing legislation to reduce CO₂ emissions from road vehicles should aim at cutting emissions from MAC unit to grasp this particular untapped saving potential of road vehicles. This requires:

- The development of a specific test procedure to calculate MAC emissions (1)
 - A mechanism to account for the added-value of using energy efficient glazing in the overall fuel efficiency of vehicles (2)
 - Setting maximum emissions values for MAC systems (3)
 - Provide information on MAC energy consumption when a vehicle is put on the market (4)
 - Reflect on a holistic approach to all operating conditions (5)
 - Promote market deployment of electric vehicles (6)
1. The Commission (DG Enterprise) is working on the development of a test procedure to measure CO₂ emissions from mobile air-conditioning systems equipping road vehicles. Once the pilot test phase is finalized, this procedure should be included in legislation on CO₂ emissions from road vehicles. To this end, **Glass for Europe feels that an amendment to annex II of regulation 2008/692/EC on type-approval of motor vehicles is needed to fully grasp the energy saving potential of advanced automotive glazing solutions.**
 2. Given the energy saving potential lying in reducing use of mobile air-conditioning units, their fuel consumption should be taken into account in the overall fuel efficiency of vehicles. This would allow benchmarking overall vehicle efficiency against the EU target of an average 120 CO₂/km for new cars in 2012.

³ Source: B. Taxis-Reischl & Fa. Behr - Energieverbrauch Klimaanlagen und Wege zur Verbrauchsreduzierung - 1997.

⁴ Source: Valeo – Impact of Thermal Comfort on Electric Vehicle Autonomy – Presentation by D. Neveu at the conference Thermal Management for EV/HEV, Darmstadt 27 June 2011.

3. Glass for Europe also believes that maximum emissions limits for MAC should be set to incentivize vehicles manufacturers to use energy efficient technologies that reduce and sometimes even eliminate the need to use air-conditioning.
4. Information on the energy consumption and associated emissions of the MAC unit should be made available to customer before purchase. Customers need to be truly aware of all parameters affecting the overall fuel consumption of a vehicle. In a context of increasing oil prices providing such information will incentivize consumers (households, businesses) to opt for the most energy efficient vehicles to reduce their transport costs, thus contributing to the overall CO₂ emissions reduction of transport sector.
5. Besides, in the wider context of the future revision of European Drive Cycles (NDEC), a holistic approach to all operating conditions should be reflected. Support for the most energy-efficient ways of heating vehicles in cold conditions, cooling in hot conditions, ice removal and condensation removal may also need to be envisaged.
6. Measures to promote the market deployment of electric vehicle (EV), such as harmonised standards for the measurement of vehicle range, should constitute a substantive part of the strategy. However, these standards should not only be limited to battery range but rather encompass all the operating conditions having an influence on the overall range of EV such as heating and cooling of the cabin as well as defrosting and condensation removal.
