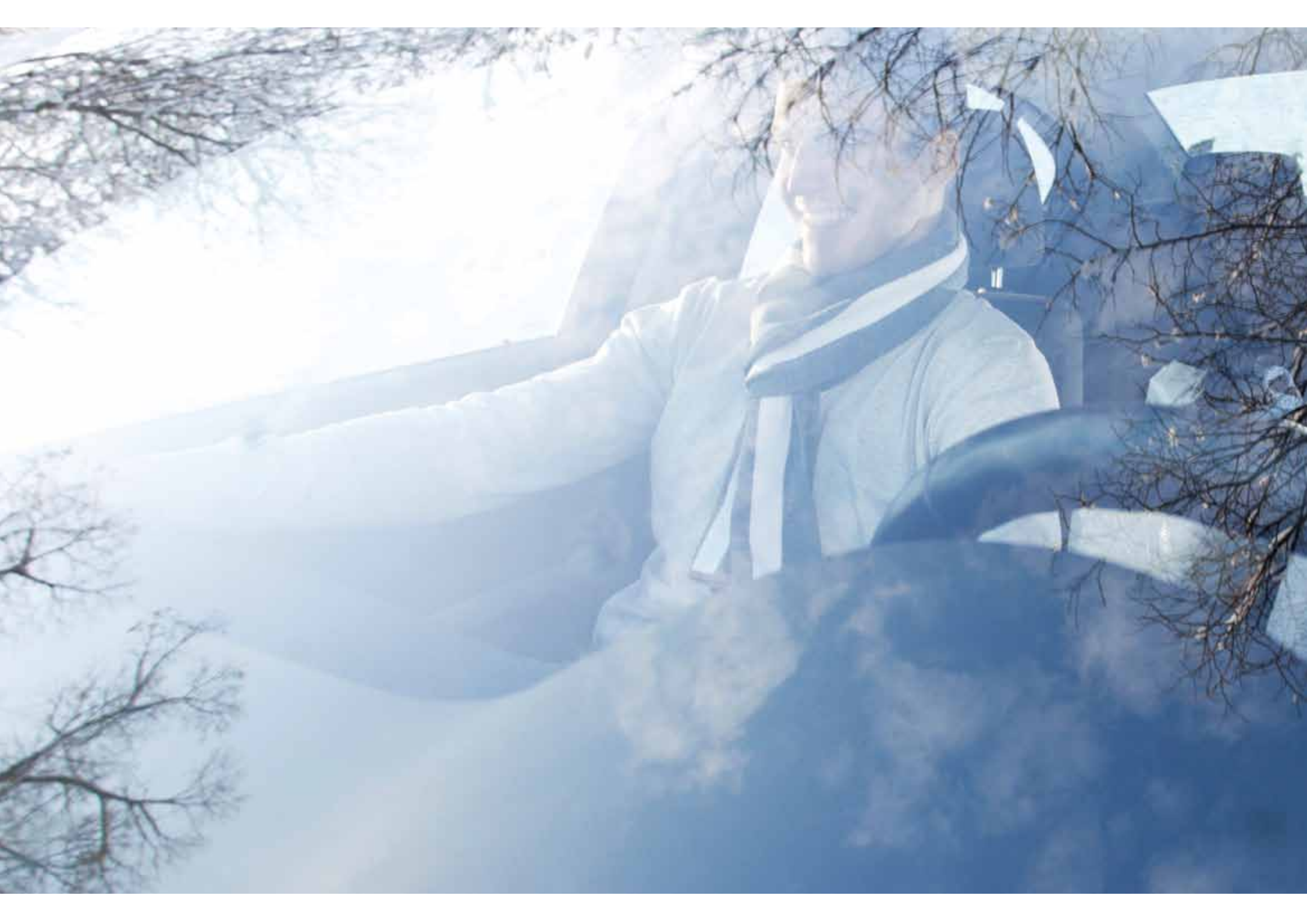




Glass - Contributing to innovative,
green and safe transport solutions
for Europe

GLASS
FOR • EUROPE





Introduction

Flat glass is an integral part of most automotive vehicles and is essential to Europe's transport industry. Flat glass is used to make windscreens, backlights, windows and sun roofs for a wide range of automobile and transport applications, from cars to cruise ships and buses. Europe's glazing manufacturers are constantly striving to deliver products that provide the best possible technological solutions to meet automobile manufacturers' and end-users' needs from a comfort, safety and security perspective, whilst at the same time helping the industry to meet its climate commitments.

Innovative high-tech glazing solutions have been developed to minimize heat gain in vehicles and offer thermal comfort all year around, to reduce vehicle weight through the use of lightweight glazing, to provide maximum visibility for optimum driving conditions, to integrate new features that enhance the driving experience and to safeguard the vehicle occupants in case of accident.

As a driver or as a passenger, you are seeing your environment through glass constantly without noticing it. Maybe, in future you will look at your windscreen and window in a different manner. In so doing, you will hopefully see vital **pieces of industrial engineering that are integral in providing performance and sustainability for Europe's green transport future.**

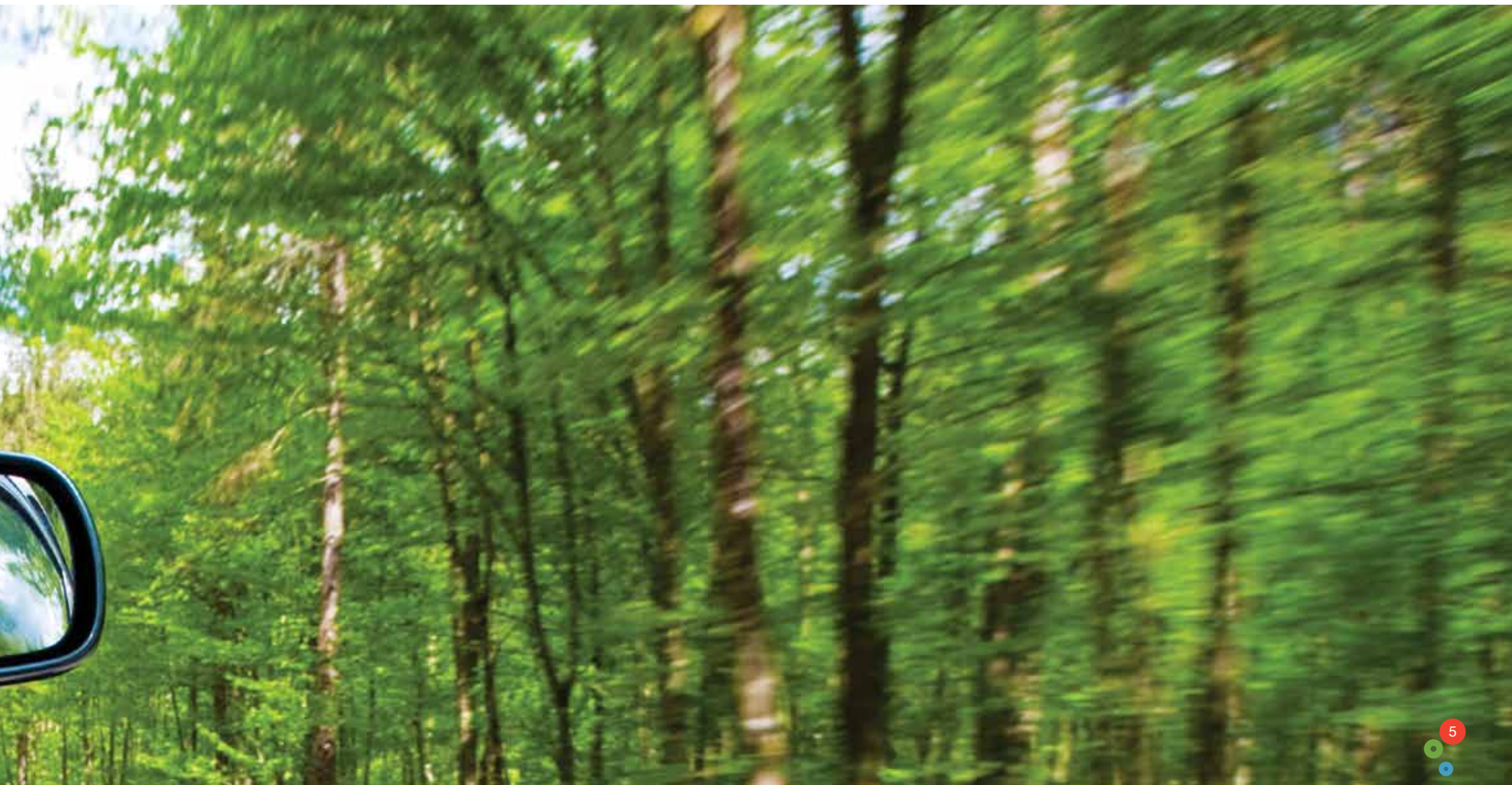
Bertrand Cazes
Secretary General of Glass for Europe

Greening the automotive sector, thanks to glass

Glazing solutions for the automotive industry need to offer the highest possible performance in terms of safety, security and durability, as well as style and comfort for vehicle manufacturers and for their passengers. However, our industry is increasingly going beyond this, to offer innovative products that make a **major contribution to reducing fuel consumption and CO₂ emissions from vehicles**, thus taking an active role in contributing to the EU's innovative and technological competitiveness as well as to the greening of the transport sector.



Contributing to a reduction of vehicles' energy needs is a priority for glass makers.
It is notably achieved by weight reduction, solar control glazing and the development of electric vehicle-specific glazing



Solar control glazing to curb air-conditioning emissions

In recent years, the industry has developed solar control glazing. This type of glass is specially engineered to reduce vehicle cabin temperature by up to 7 or 8°C, and reduce heat penetration in vehicles exposed to solar radiation by over 25%. In this way, **a significant amount of energy is saved from powering air-conditioning units while passengers' comfort is safeguarded.**

The simplest way to assess the solar control properties of automotive glazing is by its TTS value.

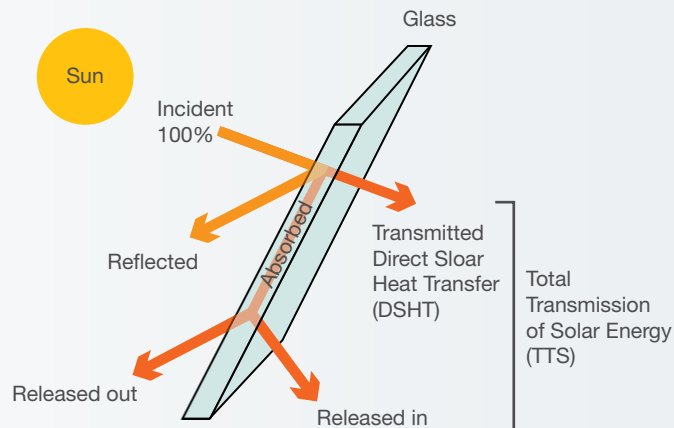
TTS stands for 'transmission of total solar energy' into a vehicle, and it is determined by the solar direct transmittance plus the secondary heat transfer of the glazing towards the interior of the vehicle's cabin. In theory, the lower the TTS value, the more energy-efficient the vehicle becomes, since less solar energy builds up inside the cabin. The TTS value, once processed with other data, can be used to determine the fuel efficiency gains from reduced recourse to air-conditioning, as is already the case in the United States.

Within the framework of the **'Mobile air-conditioning initiative' launched by the European Commission**, test procedures to quantify effectively the fuel consumption of MAC systems are under development. Because the reduction in the cabin temperature stemming from the use of solar control glazing results in reduced air-conditioning use and to lower loads on units, it contributes significantly to reducing the real-life energy use of units. As this is already well documented, the glazing type is likely to be integrated as a parameter in the test procedure.

Beyond test procedures, one should consider ways of ensuring that car buyers are properly informed about the performance of these systems. Considering that **thanks to advanced glazing, vehicle's overall efficiency can be improved by up to 2 to 4%**, one may wish to reflect about including emissions from vehicle air-conditioning into official fuel consumption data and the NDEC driving cycle.

As well as reducing heat levels, the inherent insulation properties of advanced glass also considerably reduce the effects of external cooling, as laminated glazing and low-emissivity coating glass have insulation properties that keep the car's cabin warm in winter. Thus, advanced glazing provides thermal comfort all year round.

Advanced glazing provides thermal comfort and efficiency all year round.



Technology Explained: Solar Control Glazing

As part of the heat-reflective technologies, solar control glazing has a coating that allows it to reduce the transmission of solar heat from the external environment while still permitting the optimal light transmission essential to ideal driving conditions. This type of glazing can reduce by over 25% the heat penetration in vehicles exposed to solar radiation, thus reducing the need for the use of fuel-hungry cooling systems.

Technology Explained: Dark tinted glazing

Another solar control solution, dark-tinted glass, **keeps vehicle interiors cool by absorbing solar energy, while at the same time providing privacy for passengers** in the back of the car (dark tinted glass is not permitted for the driver and forward-passenger windows, nor of course for the windscreen). Dark-tinted glass is available in several colours and each colour in several shades from lighter to very dark. This type of absorbing glazing can also reduce the transmitted heat to the interior.

Technology Explained: Switchable glazing

Switchable glazing can change colour from clear to dark, allowing the driver to control the amount of light, and indirectly heat, entering the car and regulating how the weather conditions affect the vehicle's cabin. By switching a typical switchable glazing into the dark state, the amount of energy entering the cabin can be reduced by an additional 40% compared to the bright state. Thanks to the possibility of adjusting the level of light transmittance in the interior of a car, the use of air conditioning units and the overall fuel consumption can be limited.



Lighter automotive components for energy-efficient transport

Other than significantly reducing the thermal load (leading to reductions in fuel consumption), the different types of advanced glazing are also designed to be lighter in weight; thus reducing the weight of the vehicle as a whole and generating further fuel savings.¹ Innovations in **thinner but stronger glass contribute to the target of reaching 90 gr/CO₂ emissions by 2020**. All glass manufacturers are constantly working on reducing weight wherever possible for all types of glazing, without jeopardizing safety in case of accidents.

In fact, the glass industry already has an impressive track record in reducing the weight of its glazing solutions. For instance, over the last 30 years, the weight of glass in vehicles has been reduced considerably while trends in design have led to larger glass surface, for instance with the integration of completely glazed roof tops. Nowadays, the average glass content in a vehicle represents only 3% by mass and **glass is integrated as a structural component of cars, thus limiting the need to resort to heavier materials**. Moreover, the use of acoustic windscreens allows car makers to reduce vehicle weight by using thinner glazing without sacrificing acoustic comfort.

Glazing in Electric Vehicles

Electromobility is seen as one of the greatest opportunities to radically improve the environmental footprint of Europe's transport sector. In this area as well, advanced glazing solutions have an important role to play.

Batteries in EV applications are a significant portion of the final vehicle mass and cost. Thus, the current research and development in technologies for electric vehicles (EVs) is seeking **ways to further reduce vehicle weight while limiting higher sound propagation, by looking at smart materials**. Innovative lighter glass materials are under development to support that trend.

In addition, just as the fuel economy of a petrol car can vary according to the temperature and weather conditions, the range of an electric car is affected by extreme weather conditions. For instance, TÜV SÜD found that in winter, the range of an EV can be reduced by as much as 50%² due to both the poorer performance of batteries under cold conditions and the need to heat the vehicle cabin. In hot summer days, the range can be cut by 30%, mostly due to the energy needed to air-condition the vehicle. Given the impact of glazing on limiting the need to heat or cool vehicle cabins, **the driving range of electric cars can be improved by way of advanced glazing solutions**. To further increase the driving range of EVs, the integration of photovoltaic cells into the glass components of cars may also be just a few steps away.

¹ It is commonly assumed that a lightening of 10kg of an average family car can reduce the vehicle's CO₂ emissions by 0.8 g/km.

² N. Kanari, J.L. Pineau and S. Shallari – End-of-Life vehicle recycling in the EU – 2003.

Recommendations

- Given the clear benefits of advanced glazing solutions, notably in terms of fuel consumption and extended range of electric vehicles, Glass for Europe believes that standards and norms on fuel consumption, CO₂ emissions and ranges of electric vehicles should consider all real-life conditions of vehicles and not only engine characteristics.
- Once test procedures are in place to quantify fuel consumption and CO₂ emissions generated by air-conditioning, mechanisms should be put in place so that car buyers are properly informed about the performance of these systems and how they affect the overall fuel and range performance of vehicles.
- Car manufacturers must be incentivized to equip their vehicles with advanced glazing solutions.

Glass providing safety and security to drivers and occupants

The glass industry invests heavily in developing products designed to improve road safety and to guarantee the security of the car and its passengers. Glass manufacturers need to ensure that the glass produced for the windscreens and side windows has the levels of strength required to resist non-optimal climatic and wear and tear conditions experienced by the car.

Automotive glass is designed to be able to last for the lifetime of car – enduring all weather conditions, wear and tear and wiper usage – and fulfilling all safety and quality requirements in case of accident or attack.

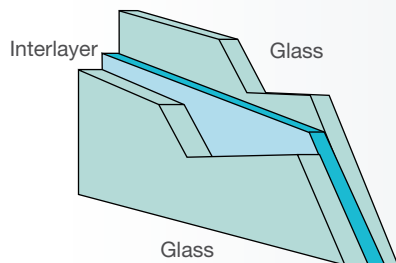


Security

Glass plays an important role in the car's ability to offer safety and security to its passengers. Generally, **safety is ensured by two types of glazing: toughened or laminated glass. Both toughened glass and laminated glass** can be used in particular in side windows of cars to provide increased levels of security and passenger comfort, by increasing impact resistance and defence against theft. With the use of laminated glass, in case of impact in an accident, the glass will crack, while absorbing a large part of the

energy from the impacting body. Since the glass remains adhered to the plastic interlayer, the window stays in the frame, acting as a safety net and keeping fragments away from the passengers, thus **further reducing the risks of fatal injuries in case of accidents.** Hence, this type of glass responds to the main safety concerns in modern cars and is considered a critical structural component of the car in terms of safety.

Currently, car manufacturers use laminated glazing for windcreens while sidelights and backlights are offered only as an option in laminated glass, with the majority of vehicles being equipped with tempered side- and backlights. **Laminated glazing is one of the safest solutions** on the market, and for this reason it should also be generalised in side panes and rear glass of a vehicle. It would provide car users with the highest levels of security and safety.



Technology explained: Laminated glazing

Laminated glazing is a sandwich comprising two glass sheets and a tough plastic interlayer, which are bonded to each other under controlled heat and pressure. While the glass panes may crack when struck, the glass remains adhered to the interlayer, which is more difficult to puncture or tear and hence structural integrity is maintained.

Laminated glazing provides the highest levels of security and safety.



Visibility

The driver's field of vision is influenced by the light the wind-screen allows into the cabin. For this reason, automotive glazing mounted in front of the B-pillar (pillar on both sides in front of the driver's seat) has to comply with minimum light transmittance requirements of 70% to ensure optimal visibility. Behind the B-pillar lower light transmission values are possible, which provides the freedom to develop even more efficient solar control glazing and to use dark-tinted glass for enhanced design.

Our cutting edge products help **to ensure optimal visibility, regardless of the climatic conditions, to prevent optical distortions and minimize the risk of accidents.** Examples of these innovative technologies include **hydrophobic glazing**, which is designed to increase driver visibility in rainy conditions by dispersing water more rapidly from the glass surface. **Heated glass systems** remove condensation from internal glass surfaces and ice from external surfaces for improved driver comfort and passenger safety.

Certification

As an integral and structural part of a car, glass needs to undergo multiple certification and homologation processes to ensure it complies with the safety requirements outlined at global (UNECE) and European level. The **testing regimes carried out on the light transmittance, durability, strength and optical qualities of glass are extremely rigorous** and paramount to ensure safety and comfort in a car. The testing is not only carried out during the development phase, but at each stage of manufacture to maintain the highest standards.

All types of glass are then type approved by an authorised agency.

Moreover, whether for the original or replacement market, **automotive glass always bears a marking** that allows the identification of the type of glass, the manufacturer, the series as well as the type approval by the competent authority. This ensures an extra protection against counterfeiting and guarantees traceability down to the automotive processing plant and glass-making plant. As such, it contributes to safeguarding the high safety standards for users.

Recommendations

- Car manufacturers should be encouraged to use products such as laminated glazing not only in windscreens but also in rear and side panes to ensure the highest level of protection to passengers.
- For the same reasons, all cars should be equipped with the most advanced and high quality glass, which must be UNECE and EC compliant and marked adequately.
- International standards on glass quality should remain strongly enforced and need to continue to cover all possible hazards that car glass may face during its life.

Combating noise pollution for better comfort

Passenger comfort has always been a high priority for car manufacturers. This is partly because, as part of the design of a car, glazed areas have grown in size to offer more light in the cabins and unobstructed views to the outside. Additionally, glass manufacturers have also developed solutions to address the issue of noise pollution within vehicles.

Noise reduction is only one of the many specific features provided by laminated glazing.

Acoustic laminated glass technologies have been developed to combat levels of noise penetration in vehicles, which can have an effect on people's health, causing disturbance and

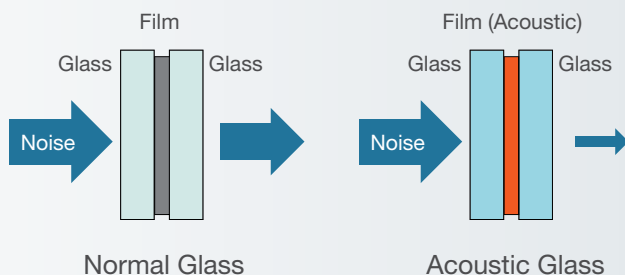
stress if an occupant is exposed over a prolonged period. Noise mainly comes from the sound of the car's engine, air and other environmental factors (e.g. other cars, roadworks, etc.).

When using specific acoustic laminated glass, **improvements of the order of 3-5 dB³ can be reached, which is quite noticeable to the ear.**

Lower noise levels mean that the driver will become less tired, and make communication inside the vehicle more comfortable, thus contributing to overall safety.

Technology explained: Acoustic glazing

Acoustic glazing consists of two or more sheets of glass, bonded together with one or more acoustic interlayers. The interlayers act as a noise-dampening core, weakening the sound as it travels through the glass. Acoustic laminated glass also benefits from all the safety and security properties of standard laminated glass. Moreover, acoustic windscreens reduce the need for heavier glazing, which allows car manufacturers to reduce vehicle weight.



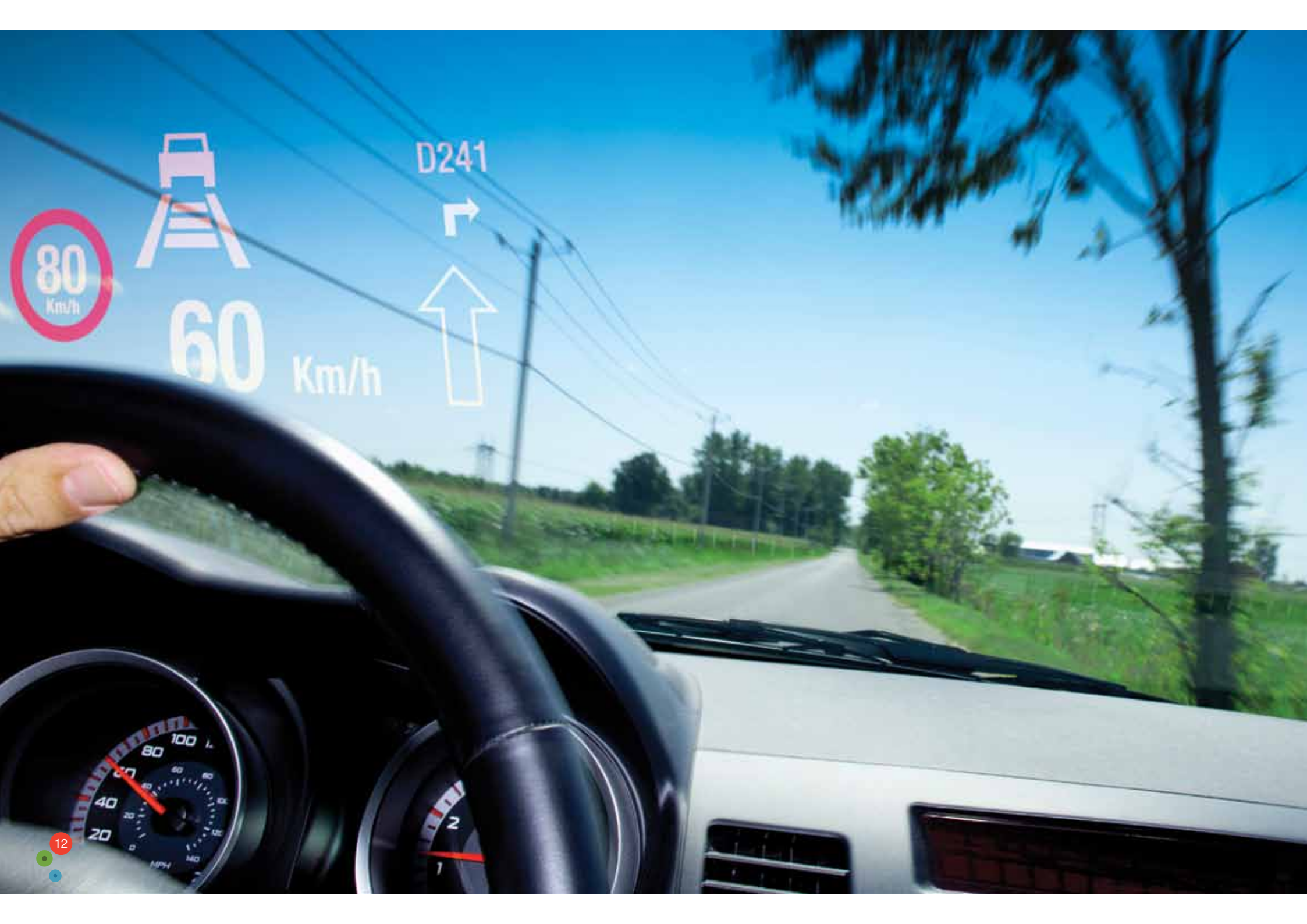
Recommendation

In the framework of policies to address excessive noise, the well-being of passengers and drivers must also be preserved, particularly since, for many professions, vehicles can be people's workplaces. For this reason, car manufacturers should be encouraged to use advanced glazing products that provide acoustic comfort, in addition to ensuring safety.



³ Advanced Automotive Glazing Manufacturers Association (AAGMA)





D241



80

Km/h

60

Km/h



So much more to automotive glass...

Glass enhances automotive design

Glazing is an essential element of the curves and angles that help define the style and character of vehicles. Light and aerodynamic design requires **glazed surfaces of increasingly complex geometries**, which can be real manufacturing challenges to ensure durability and perfect vision. Manufacturers are therefore continuously developing advanced glass shaping techniques which allow for the bending and shaping of the glass to offer car makers **the freedom to achieve their design and style concepts**. In addition, the design of cars often requires the spare parts to be assembled on the car body in a way that offers a flush surface without any unsightly junctions. According to the specific design characteristics of the brand and the expectations of clients, glass manufacturers also offer a range of different colours (e.g. green glass, dark tinted, etc.) which contribute to the car's colour harmony and make the car model unique ('VIP look').

Towards greater integration of technological components in glass

Glass is designed in such a way that it can accommodate the latest technological components that are now part of our daily driving experience. For example, it allows the integration of antennas with excellent reception qualities for the use of all communication devices in the cabin: radio, telephones, GPS systems, etc. Such integration not only leaves the car design unaltered but it usually enhances the performance of devices through better reception. Moreover, windscreens are also now able to display the speedometer and other information on the glass itself while the car is in motion. This technology, also called 'head-up display', allows the driver to receive key information on the windshield directly while driving, without the need to refer to the information on the dashboard and therefore to look away from the road.

Continuous R&D in automotive glass

Glass manufacturers work hand in hand with OEMs to offer continuous improvements in design that match their needs and **research solutions that contribute to the long term vision of tomorrow's 'green cars'**. We are leaders in innovative glazing products and are constantly striving to bring new added-value products that benefit consumers. Hence, glass manufacturers are investing in R&D applications ranging from the reduction of glass weight, to new shaping and manufacturing technologies, to system integration and new functionalities. As electric and hybrid vehicle up-take increases, one may see more photovoltaic cells integrated into glass components of vehicles allowing for energy generation in the car itself.



Glass benefits other transport modes

Transport glass technology is being continually developed to respond to the specific needs of each transport mode.

As in cars, **flat glass is also used in lorries, buses, trains, trams and also planes, boats and agricultural and forestry machinery**. The challenges faced in these other modes of transport are very similar to those of cars, as glass needs to provide optimum visibility, whilst presenting a high level of durability, noise and thermal comfort and strength.

Glass is used for the cabin in **lorries** to protect the driver against bad weather conditions. For this reason, **heated wind-screens and water repellent coatings** have been developed for side windows, providing for an improved driver vision during bad weather externalities, such as rain, ice, fog and mud.

Another important feature of the glass used in lorries is that it protects drivers against fatal accidents and therefore **laminated glass** is increasingly being used also in side windows, as it is more resistant to shock and prevents the cabin from being penetrated in the case of an accident.



In **buses**, new types of **inter-layer in laminated windows** – different to those used for cars – have been developed to ensure higher levels of noise protection to limit the driver's tiredness and provide better travelling conditions for the passengers.

In the case of **agricultural machinery**, one of the most important features is thermal comfort. **Heat-absorbing and UV-protecting glass** can also be engineered especially for vehicles of low speeds, including in particular agricultural tractors that spend long hours in fields with full exposure to the sun, which is considerable and can

be damaging to the health of the occupants. Moreover, safety is paramount, and most of the cabin's glazing can be equipped with laminated glass in order to create a safe workplace.

Glass strength is of particular importance for several types of **aircrafts: commercial planes, regional commuter planes,**

helicopters and military aircraft. Especially for cockpit windows, but also for cabin windows, **glass is reinforced to a very high strength** by making its surface permanently compressed to create a very strong glass with a high optical quality. For helicopters, special weight-reducing yet durable bird-proof glass is used.

Another important property that glass needs to have on planes is **protection against extreme weather conditions.** Windscreens on aircraft are equipped with heating systems, usually made by conductive coatings or wire-grids, in order to withstand fog and ice.

Automotive and transport glass technology is being continually developed to respond to the specific needs of each transport mode and present further possibilities in safety, comfort, aesthetic choice, and environmental sustainability terms to its users.

Reducing the environmental impact of glass

Flat glass is commonly used in the construction industry for windows, façades and doors, in automotive for windscreens, sidelights and backlights as well as in solar-thermal and photovoltaic modules. All these end products commonly derive from flat glass, which is primarily made of sand as main raw material and also from recycled glass known as 'cullet'.

The manufacturing process for flat glass is becoming more and more efficient, and flat glass products are fully recyclable.

The Manufacturing Process

The float process is the initial process for the production of large sheets of flat glass that are then transformed in automotive, building or solar energy products. This process is energy-intensive, since raw materials need to be heated to temperatures of 1600°C at which point they melt to become glass. Considerable efforts have already been made and are constantly undertaken to minimise energy use. Furthermore, **flat glass in most of its applications helps save energy and CO₂** to the extent that savings realised throughout the lifetime of products most usually offset those generated by their production. This is one major contribution of the industry to sustainable development.

The large sheets of flat glass are then transformed into a windscreen or window according to the original equipment manufacturers' specifications, in a dedicated automotive glass plant. This downstream processing of glass products requires considerably less energy input, although the glass most often needs to be reheated for bending and laminating. In their automotive plants, **automotive flat glass manufacturers are increasingly using renewable energy sources** and signing up to "green supply" contracts to ensure that a proportion of electricity used on site comes from renewable sources.

Waste and Recycling

The glass industry takes sustainability issues very seriously and we are continuing our efforts to minimise and recycle automotive glass waste. The float process recycles virtually all of its glass waste during production. This glass, also called 'cullet' is reintroduced to the float batch mix to aid melting, therefore **reducing the need for raw materials and energy input**. In turn, it helps achieve reduced CO₂ emissions: one tonne of cullet allows a saving of approximately an equivalent amount of raw materials and 230 Kg in CO₂ emissions. This helps glass manufacturers meet their targets in addressing climate change and in particular to respect their emissions allocations in the framework of the EU Emission Trading Scheme.

It is also to be noted that between eight and nine million tonnes of end-of-life vehicle (ELV) waste is generated each year in the European Union. Automotive glass represents approximately 3% (by mass) of the total composition of a car. Recovering and dismantling automotive glass is a complex and therefore lengthy process. If the **glass is recyclable, it needs to be properly dismantled from cars and sorted** from the other scrap to remove the antenna, connectors and solders. Then, it needs to be treated in special facilities before it can be melted again as glass, or alternatively used as a secondary aggregate material to produce materials and products such as fibre glass and abrasives.

It is of utmost importance to glass manufacturers that the treatment of glass is improved, as it will contribute to achieving the targets set out in the ELV Directive (2000/53/EC), i.e. 80% of the vehicle to be reused and recycled (for vehicles produced after January 1980), and to reducing emissions from manufacturing.



Steps in automotive glass manufacturing

With the automotive industry demanding more and more stringent tolerances and introducing more complex forms and shapes, the production process of automotive glass panels has become extremely complex. Once the large sheets of flat glass in jumbo sizes (6 x 3.68 meters) are delivered to the automotive processing plant, seven essential steps are required to manufacture a windscreen:

1. Pre-processing

During the first stage of car windscreen production, the flat glass is cut out from the jumbo sheets of automotive float glass, to sizes required by the car makers for specific pieces, e.g. windscreens, backlights, etc. The sharp edges of the glass are smoothed.

2. Silk Screen Printing

The borders of the glass are painted black, to protect the glue holding the windscreen inside the vehicle body. The logos and signs of compliance with the relevant standards are also applied at this stage, as well as some decorative elements.

3. Glass Bending

The windscreen is introduced into a bending furnace. When at the right temperature, the soft glass will accurately take the form desired. Afterwards, a slow cooling cycle strengthens the glass.

4. Lamination

The glass is cleaned of powder and the lamination process starts. The PVB foil is placed between two panels of glass to serve as the protection in case of glass fracture.

5. De-Aeration and gluing

The vacuum rings and systems, along with the placement of windscreens in a special cabin with appropriate temperature air suction, squeeze air pockets out. The gluing of the two glass panels and the foil then takes place in an autoclave under the pressure of 12-13 bars at a temperature of 140°C.

6. Finishing

The 'encapsulation process' involves the injection moulding of a polymer trim, shaped precisely to fit the vehicle body, to the periphery of the glazing. It also provides the opportunity to incorporate additional styling and technological features such as antennas.

7. Quality Control & Packing and storage

All windscreens are inspected to certify there are no scratches or chips and that there is no contamination of the laminated glass. The windscreens are packed and stored in dry compartments, ready to be shipped to car factories.



An important actor of Europe's automotive industry value chain

Along with the developments of the automotive industry, the glass industry has to adapt to an increasingly competitive environment to provide added-value to its customers under very strict and tough conditions.

An increasingly worldwide business

As the automotive industry continues to become more and more global, the same happens for its suppliers, such as automotive glass makers. It remains largely true for the moment, that automotive glass fitted on new cars tend to come from suppliers in the same continent, i.e. European manufactured cars fitted with European glass, Korean manufactured cars with Asian glass, etc. That being said, with enhanced competition in the glass sector and the increase in car trade, **more and more automotive glass travels across the globe**. In addition, the automotive replacement or spare part market is even more international since timing constraints are usually less strict than for the original market. In this new environment, the quest for technological advance and for the provision of solutions tailored to car makers' needs are a major driver of competition.

A strong European base for the glass industry

The flat glass sector is the second largest of the glass industries in the European Union after container glass (bottles, jars, etc.). In 2008, the sector reached a production capacity of 12.7 million tonnes of float glass from the 58 float lines operating in the European Union. Of these, between 15 and 20% is then used to process automotive glass.

There are **about 50 automotive glass plants in the European Union** that transform flat glass into windscreens, sidelights, backlights, rear mirrors, etc. These plants are usually located next to both float installations and automotive assembly plants to minimise transport at both ends and therefore reduce cost and the environmental footprint. With **nearly 10 R&D centres researching automotive glass**, European-based manufacturers are at the forefront of innovation. The automotive glass processing industry alone employs about 15.000 people across Europe, to which can be added another 18.000 workers in flat glass manufacturing plants.

Time and logistics are crucial for automotive glass

Efficient logistics is crucial to the supply of automotive glass to car manufacturers. With the multiplication of car models and the adoption of the 'just-in-time production' principles by car makers, automotive glass manufacturers have to be able to deliver all requested types of glass to an automotive assembly plant within a matter of a few days only. This is even more challenging when one considers all the different pieces of glass needed to assemble a car, the very stringent and diverse specifications and the range of different colours, treatments and components which can be added to each pieces of glass. This requires automotive glass manufacturers to be able to switch and increase production at all time, to have enough diversity and quantity in flat glass stocks and to be able to organise on-time delivery. **Efficient manufacturing and logistics are therefore essential for the automotive glass industry** to continue supplying safe, durable, and environmental-friendly products that will shape Europe's green transport future.

How can **policy makers** help?

The right policies and legislations are essential in order to drive Europe towards **innovative, green and safe transport solutions for Europe**. Advanced automotive glass has a great role to play in achieving that goal but to ensure that real progress is made in the coming years, EU and national policy makers need to commit to concrete actions that activate market mechanisms to promote safety and energy-efficiency in road transport.

Glass for Europe calls for the following actions:

Green transports

- Standards and norms on fuel consumption, CO₂ emissions and ranges of electric vehicles should consider all real-life conditions of vehicles and not only engine characteristics. This entails that the benefits of using advanced glazing solutions could at last be really accounted for.
- Once test procedures are in place to quantify fuel consumption and CO₂ emissions generated by air-conditioning, mechanisms should be put in place so that car buyers are properly informed about the performance of these systems and how they affect the overall fuel and range performance of vehicles.
- Car manufacturers must be incentivised to equip their vehicles with advanced glazing solutions.

Safety and security in transport Health and well-being

- Car manufacturers should be encouraged to use products such as laminated glazing not only in wind-screens but also in rear and side windows, to ensure the highest level of protection to passengers.
- For the same reasons, all cars should be equipped with the most advanced and high quality glass, which must be UNECE and EC compliant and marked adequately.
- International standards on glass quality should remain strongly enforced and need to continue to cover all possible hazards that windscreens or windows may face during their lives.
- In the framework of policies to address excessive noise at workplaces, the well-being of passengers and drivers should be addressed, considering that for many professions vehicles are people's workplaces. For this reason, car manufacturers should be encouraged to use advanced laminated glazing products that in addition to ensuring safety, also ensure acoustic comfort.





About Glass for Europe

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 / Sekurit** and **Sisecam-Trakya Cam**. It works in association with **Guardian**. Altogether, these five companies represent 90% of Europe's flat glass production and supply nearly all the advanced technology glazing used by all European-based automotive manufacturers.

Glass products not only provide light, comfort, style, security and safety, they primarily contribute to innovative, green and safe transport solutions for Europe.

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