Le verre : certains de nos défis pour 2023

Le Verre: d'hier à demain

IPGP 25/11/2022

International Year of Glass

F. Boland

R&D AGC Glass Europe

Your Dreams, Our Challenge

Agenda

AGC
Your Dreams, Our Challenge

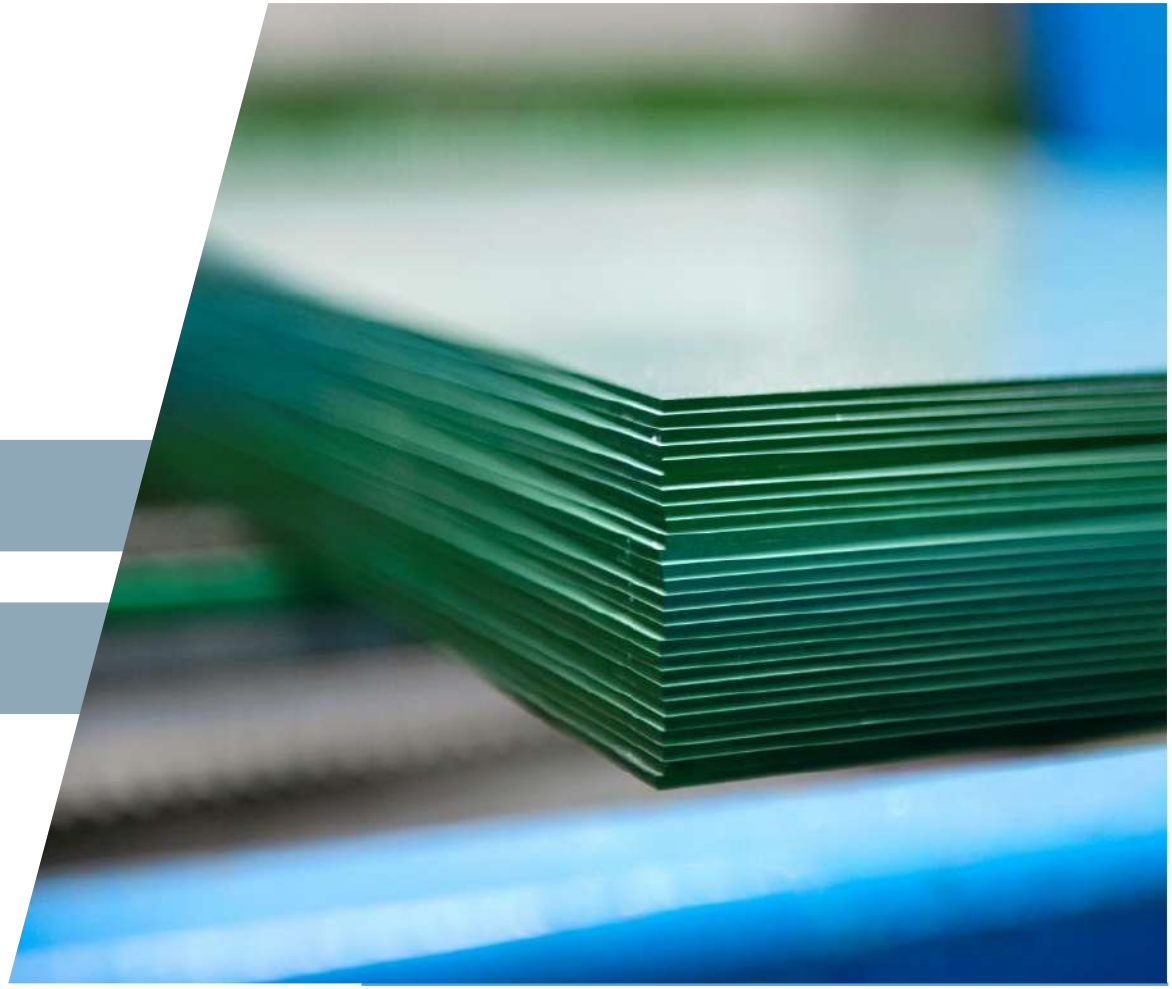
1. **AGC group : who are we ?**
2. **Our windows of tomorrow : Low carbon glass**
3. **Autonomus cars need special glass : Wideye**
4. **Thin glass inside our futur cars : Feel In Glass**
5. **Questions ?**

AGC group : who are we

AGC
Your Dreams, Our Challenge

AGC Group

AGC Glass Europe



AGC Group

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- 3 main business segments:
  - Glass
  - Electronics
  - Chemicals
- Sales: € 13.068 billion*
- 56,000 employees*
- 206 companies in over 30 countries
- Listed in Derwent Top 100 Global Innovator™ 2021
- Headquarters and stock exchange listing: Tokyo

** end 2021*

AGC Glass Europe

- 2 business segments:
  - Architectural glass
  - Automotive glass
- Over 100 sites throughout Europe
- R&D Centre and Headquarters in Belgium
- Worldwide sales network
- 1 car out of 4 glazed by AGC
- Nearly 1 building out of 4 with AGC coated glass
- 15,200 people
- € 2.4 bn sales (2021)

Our windows of tomorrow : Low carbon glass

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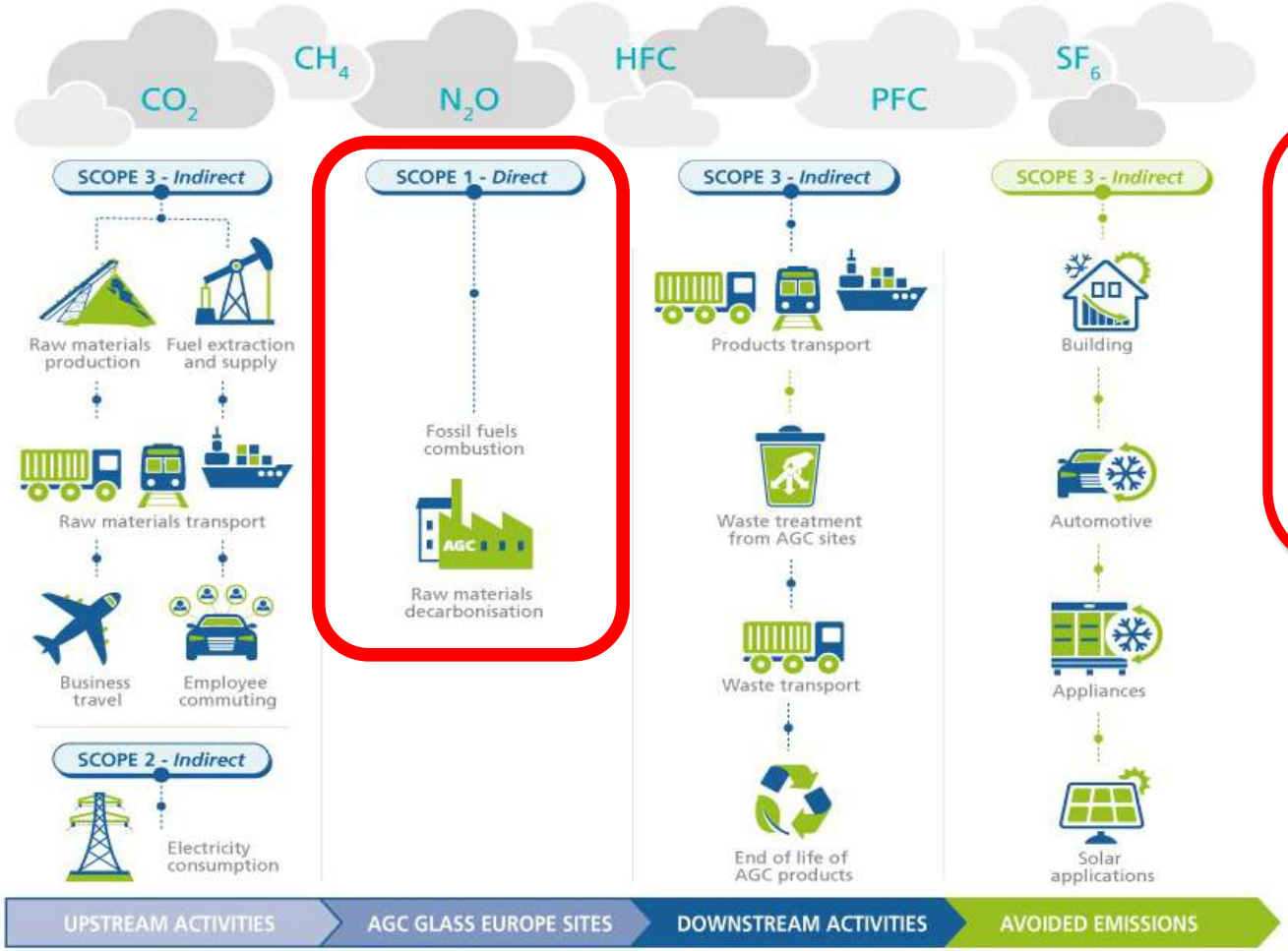
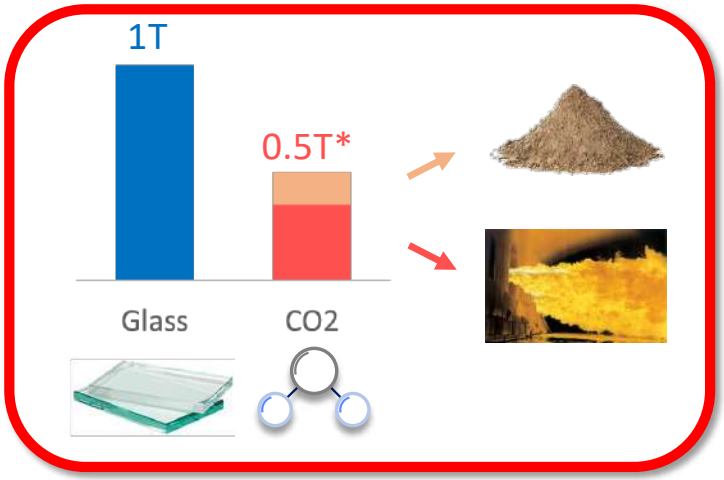


GLASS PRODUCTION TODAY



- **Scope1 : 1T of Glass → ~0.5T Of CO2**

Raw materials

$CaCO_3 \rightarrow CaO+CO_2$
$MgCO_3 \rightarrow MgO+CO_2$
$Na_2CO_3 \rightarrow Na_2O+CO_2$

Energy

$CH_4+2O_2 \rightarrow 2H_2O+CO_2+Energy$

- **All scopes : 1T of Glass → ~ 1.15T Of CO2**

AGC roadmap to carbon neutrality

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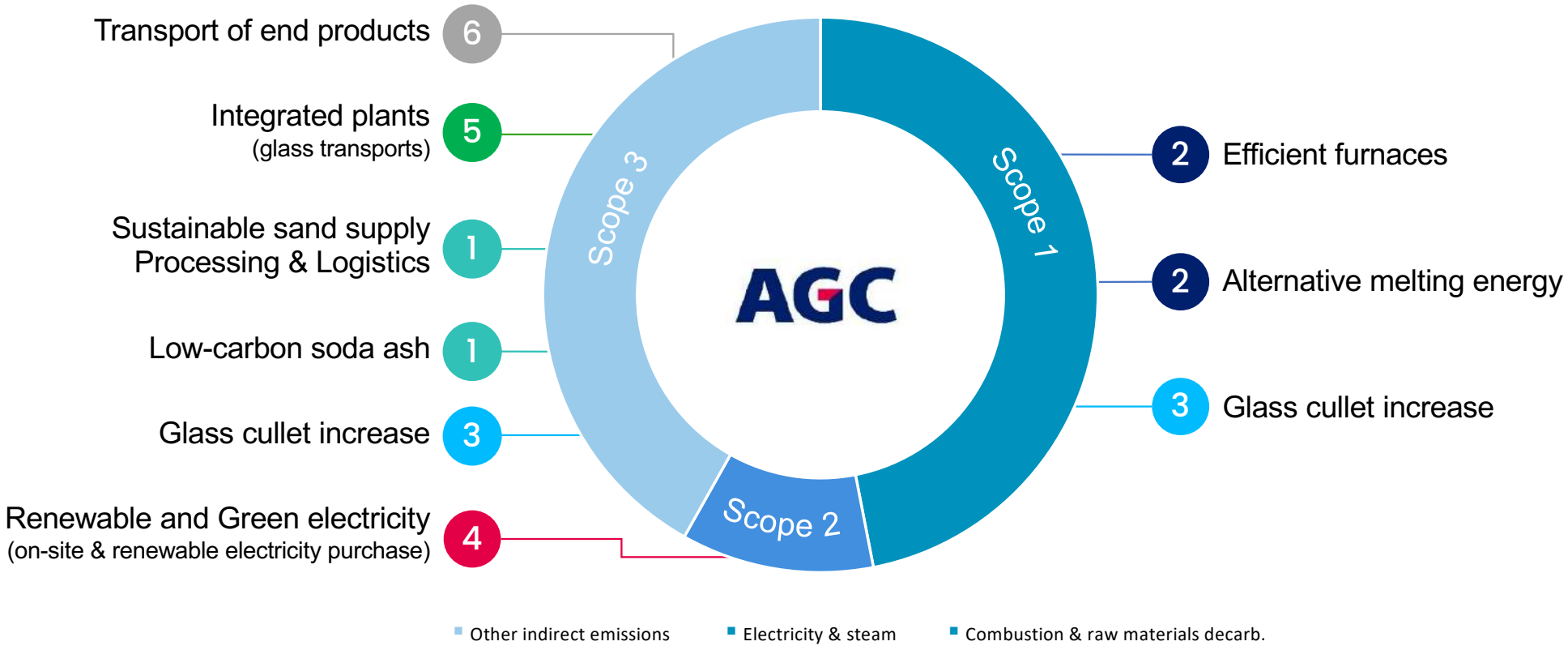
Reduce overall
greenhouse gas emissions
by 30% by 2030*

**Scope 1 + 2 compared to 2019*
Scope 3 compared to 2019

Continuously improving our carbon footprint



An integrated value chain approach

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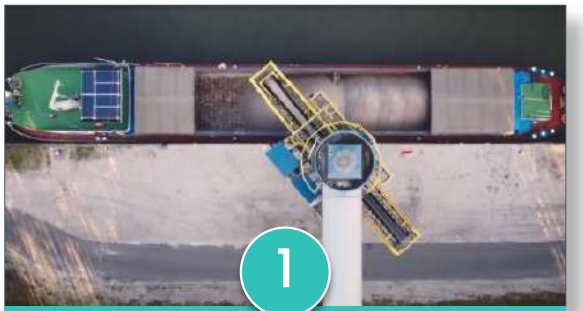
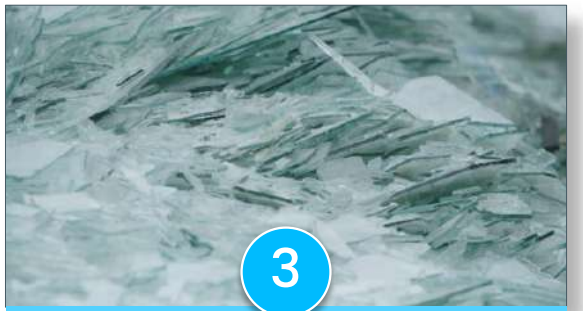
To produce Low-Carbon glass, AGC takes a holistic approach:



Sustainable sourcing of raw materials

Highly efficient melting furnaces



Increased use of cullet

Green energy sources

Transport optimisation
for finishing process

Transport optimisation
for finished products

1 Sustainable sourcing of raw materials

1. Sustainable sourcing of raw materials

Soda ash

- Selecting low-carbon soda ash, as soda ash is highest carbon contributor in raw materials

Sand

- Local sands
- Minimal treatment
- Transported mostly by barges or with trucks using bio diesel

2 Highly efficient melting furnaces

2. Highly efficient melting furnaces

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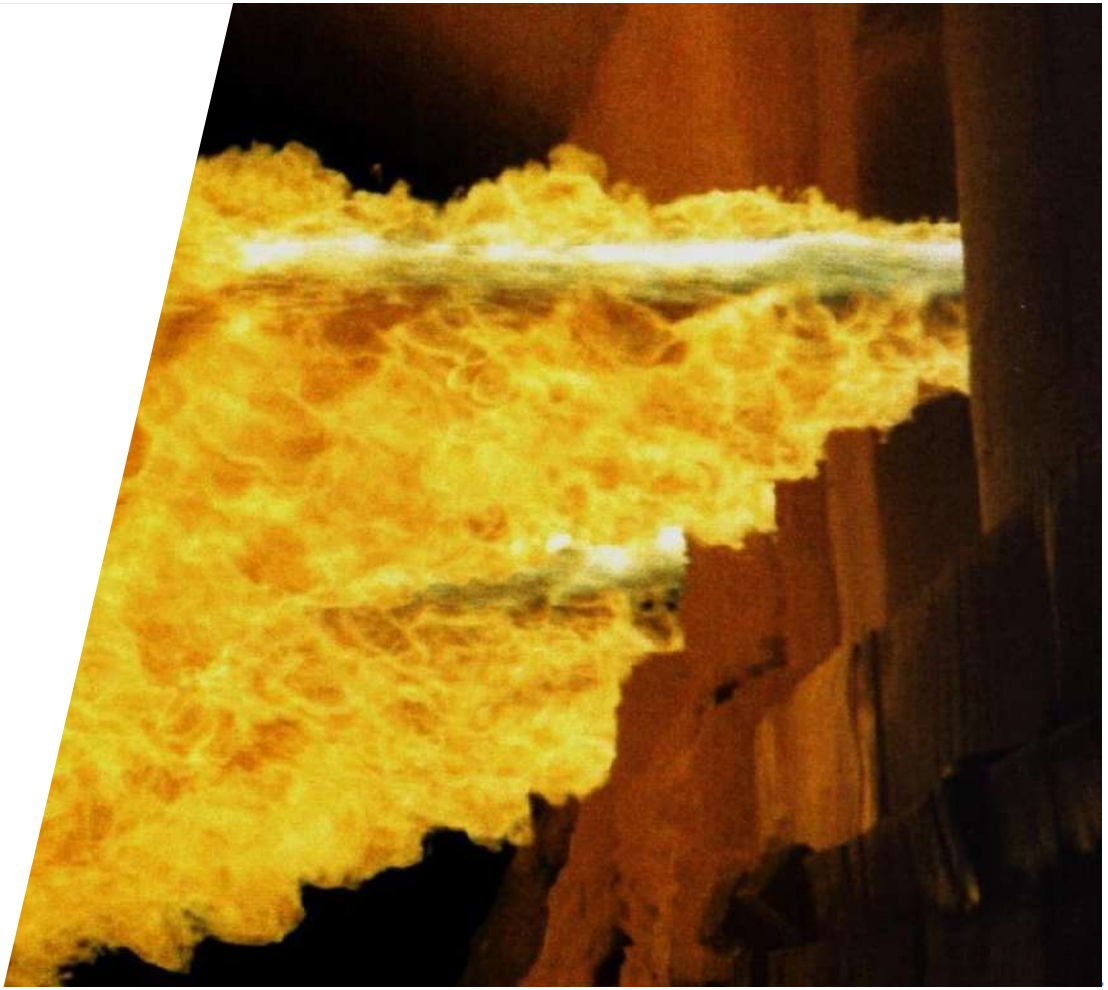
Optimised furnaces

- Top class energy-efficient furnaces
- Using electro-boosting technology



What is electro-boosting?

Electrodes using electricity to melt the sand, to reduce dependence on imported natural gas.

What is electro-boosting?
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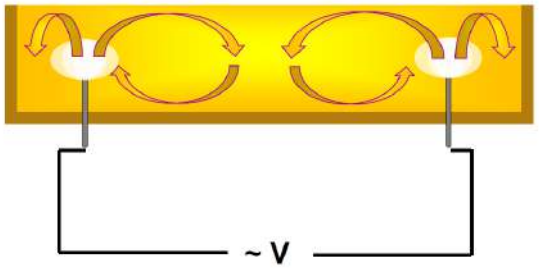
ELECTRICAL MELTING

PRINCIPLE

- Molten glass (>1200°C) = Electrical conductor
- Direct heat dissipation by electric currents flowing between **immersed electrodes** in the glass bath (Joule effect)
- **Energy efficiency** much higher than combustion



Combustion	Electricity
55-60%	>90%

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3 Increased use of cullet

3. Increased use of cullet

Low-carbon glass:
More than half of the raw glass material is recycled glass

Local eco-system

- Numerous processors
- Long-standing customers
- Subsidiaries of the group

What is glass cullet? Recycled glass, crushed and processed to be ready for remelting.

4 Green energy sources

4. Use of green energy sources

On-site renewable and green electricity generation

- Cogeneration plant (electricity + heat) to complete existing photovoltaic production
- Heat from glass melting will be soon valorised into electricity with additional photovoltaic production

Off-site electricity supply

- Purchase of renewable electricity

5 Transport optimisation for finishing process

5. Transport optimisation for finishing process

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Internal logistics to minimise glass transport

MOUSTIER plant (Belgium)

- Float glass line
- Production of laminated glass on site
- Coating possibilities in Lodelinsart

SEINGBOUSE (Alsace France)

- Float glass line
- Production of laminated glass on site
- Production of soft coatings on site

6 Transport optimisation for finished products

AGC Low-Carbon range

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Identical product…

- Same aesthetics, quality and performances as traditional float glass

… with a reduced carbon footprint

- < 7 Kg/m² for a 4 mm float glass
  (reduction by **>40% for float**, under evaluation for other products)

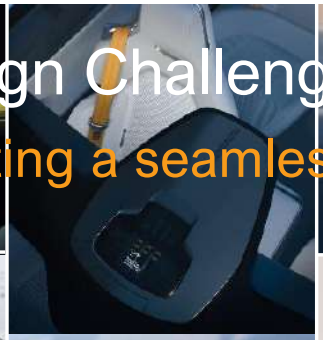
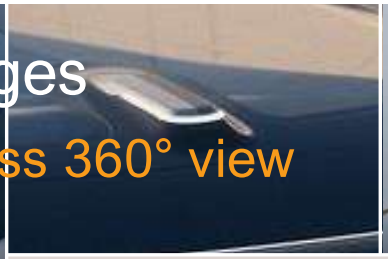
- **40%** = Huge CO2 Emission **Decrease**

Autonomus cars need special glass : Wideye

Lidar is a kind of Radar working in the near Infra red wave length
850 – 1050 nm & 1550 nm

Design Challenges

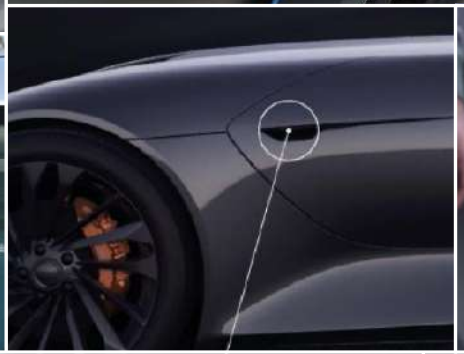
Creating a seamless 360° view

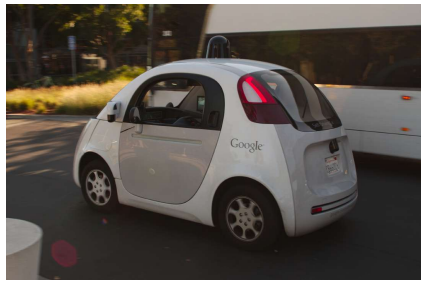












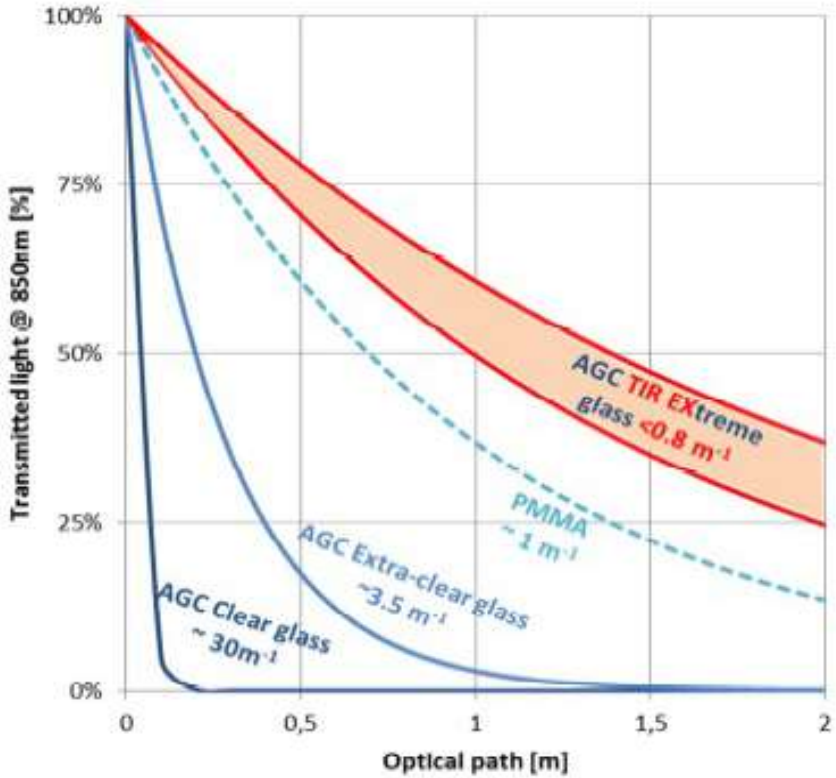



Near Infra red transmission in glass is key

Main absorber in IR

$$Cr^{6+} + 3Fe^{2+} \rightarrow Cr^{3+} + 3Fe^{3+}$$

Coloring in visible



GLASS SOLUTIONS FOR 360° SENSOR INTEGRATION

Wideye
by AGC

How does Wideye develop **glass solutions** that overcome the challenges of sensor integration?

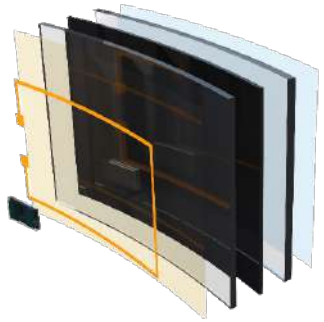
Maximize sensor **performance**	With a **reliable and resistant product**	While allowing for an **aesthetically and pleasing solution**
Sensor performance Integration position Optical quality	Reliability Sensor protection Thermal management	Car styling Seamless design

WIDEYE

Glass solutions for **smart**, **safe** and **robust** ADAS sensor integration

Optical sensor covers

Sensor cover for LiDAR & Camera integration: Front, Rear, Side



Glass trim

2D or 3D shaped **glass trim for seamless integration:** B-pillar, Fender, Grille, Roof,…

Vision glazing

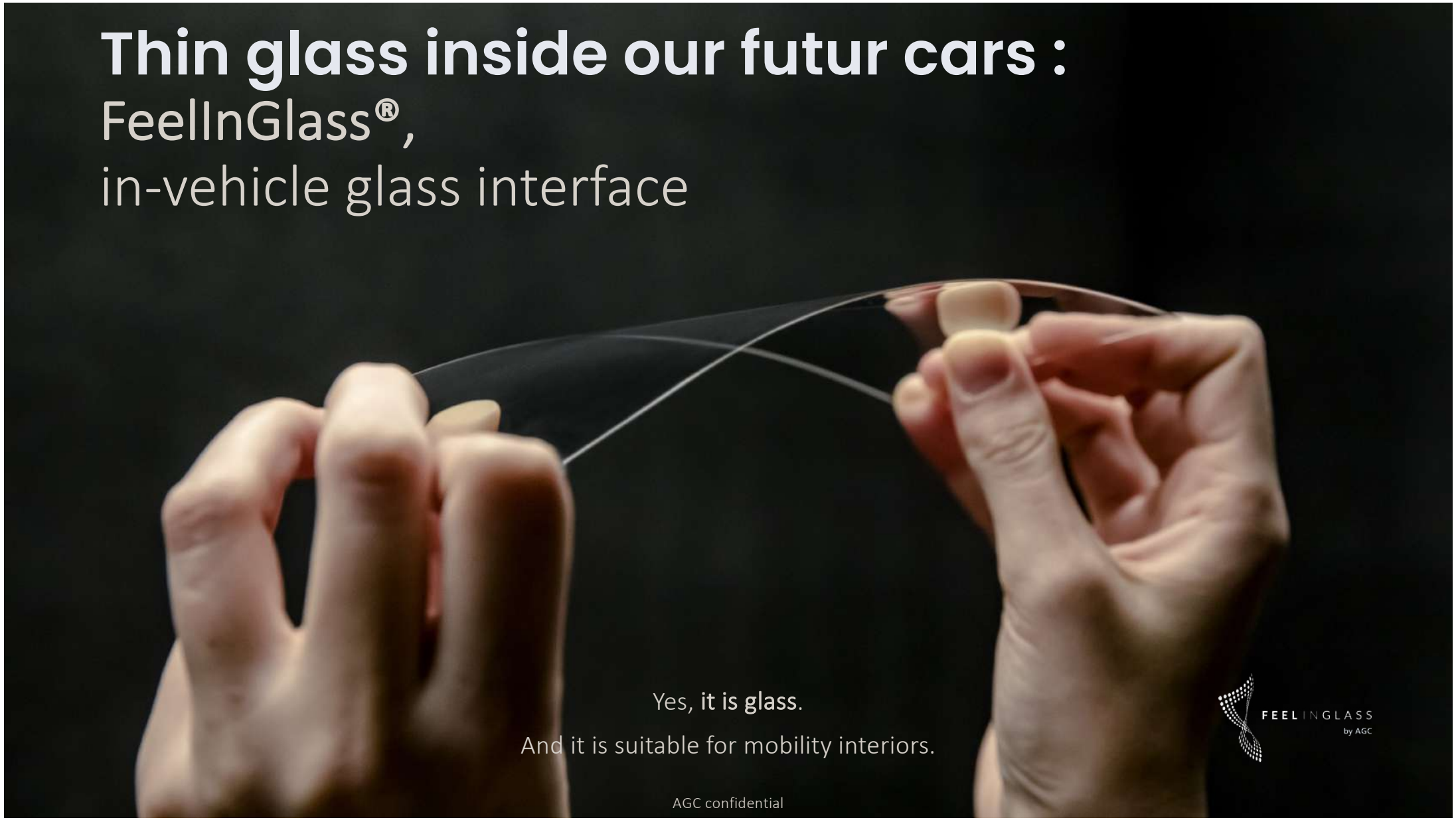
Integration of **LiDAR & Camera sensors** using existing glass parts: Windshield, Backlite, Sidelite

Video

Wideye
by AGC

Thin glass inside our futur cars :

FeelInGlass®,
in-vehicle glass interface



Yes, **it is glass**.

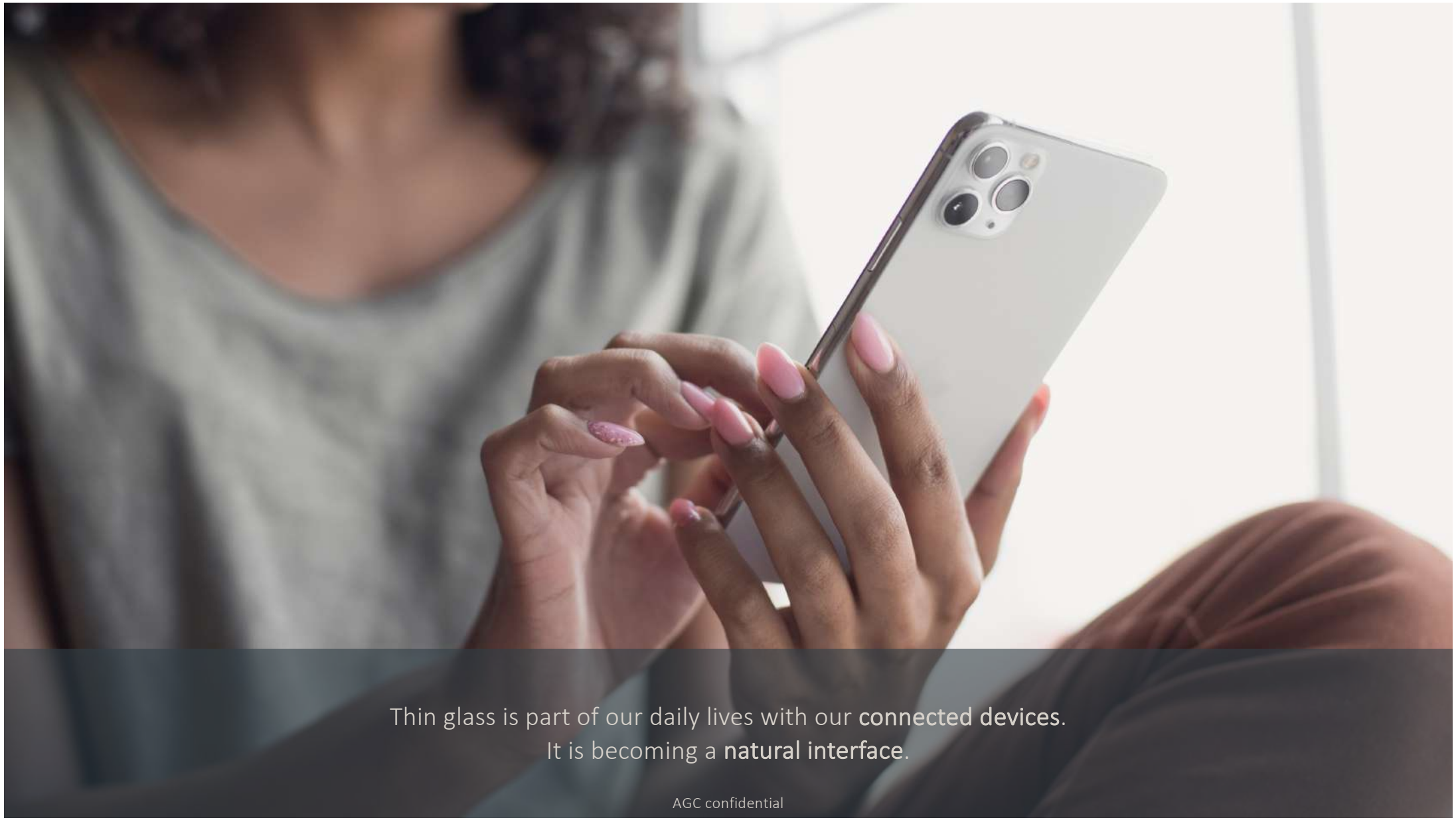
And it is suitable for mobility interiors.

FEELINGLASS by AGC

Thin glass inside our futur cars : Feel In Glass

We believe in the development of glass surfaces that are **more durable than plastic,** offering **greater rigidity for less material**, and many **other benefits**.

- Scratch resistance
- Perceived quality
- Durability
- Lightweight
- Connectivity
- Cleanability

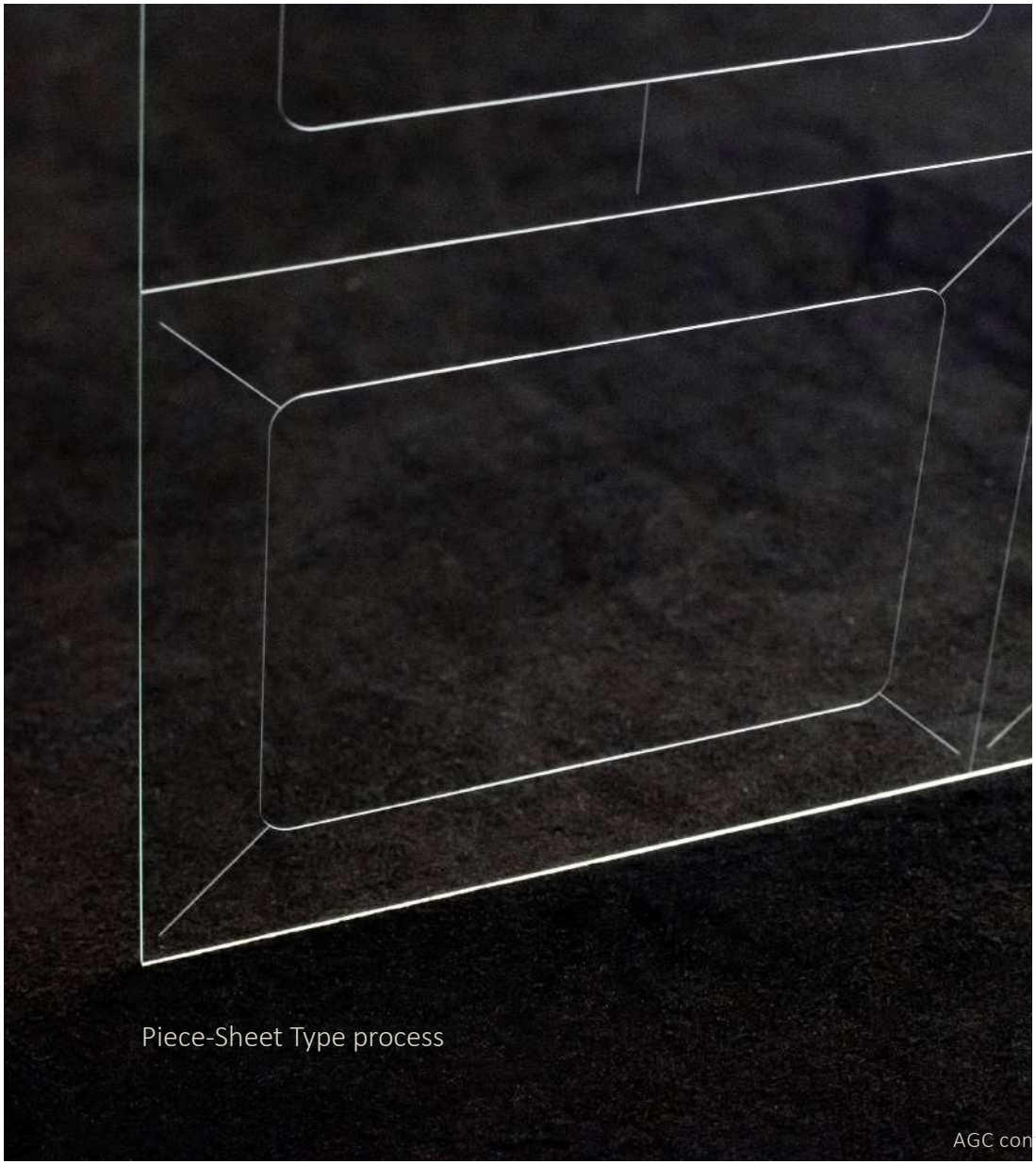


FeelInGlass® cover glass range is an entry door for thin glass integration into cockpits and interiors.

FEEL INGLASS
by AGC

Glass is a material capable of handling several **surface treatments**. Our team has developed a significant expertise in this area.

Our solutions range from **anti-glare** (acid etching), **easy-to-clean, anti-fingerprint** and **anti-reflective coatings**, each being layered specifically on-demand.



Piece-Sheet Type process

Forming on the support

glass with a thickness of 0.5mm,
chemically tempered

FEEL INGLASS by AGC

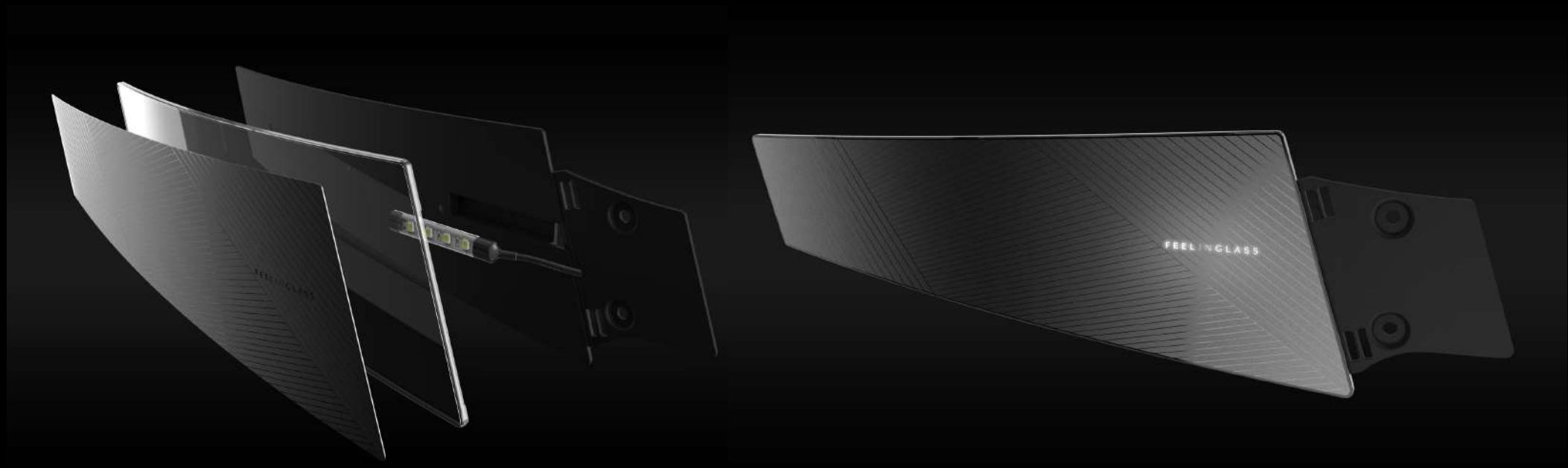
Glazing module

Approach to safety & durability

Module	Safety	Durability

Glazing module

Opening up possibilities of integration



with a **module approach**

www.feelinglass.eu

CONCLUSION

Wideye by AGC

FEEL INGLASS by AGC

Glass is key to solve many of our challenges of tomorrow :

* sensor protection for autonomous cars
* decorative & interactive interior cars
* insulate our houses (new windows = Fineo)

But we need to improve our global production impact on environment
the first step is done with our low carbon glass
and we work hard to prepare the next steps that will come soon.

Vous avez des questions ?

FEEL INGLASS
by AGC

Electricity & CO_2 Context in Europe

Continuous decrease of Electricity CO_2 intensity