



2050 FLAT GLASS INDUSTRY CLIMATE NEUTRALITY VISION: THE START OF THE JOURNEY

Bertrand Cazes
Secretary General of Glass for Europe



Spring School 2024 – Lloret del Mar



CLIMATE
URGENCY



A GLOBAL
MATERIAL



LOSS OF
BIODIVERSITY

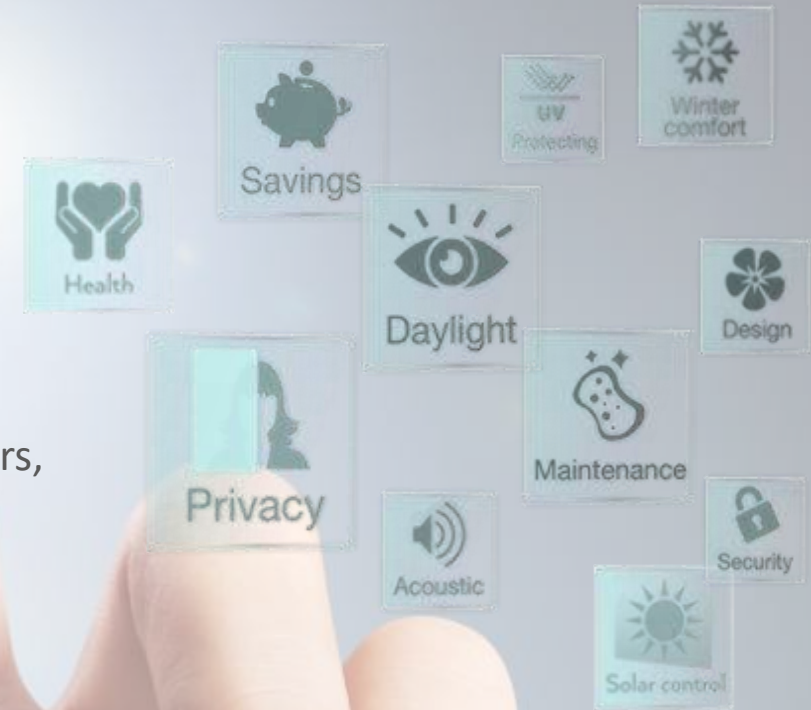
EUROPEAN CLIMATE POLICY...

OVER 20 YEARS OF CLIMATE POLICY BASED ON KEY PRINCIPLES

- REDUCE CO₂ EMISSIONS FROM ALL ECONOMIC ACTIVITIES
- ENERGY EFFICIENCY / CONSUMPTION REDUCTION
- POLLUTER-PAY PRINCIPLE APPLIED TO INDUSTRY
- DECARBONISATION OF THE ENERGY SECTOR
- RESSOURCE EFFICIENCY
- CARBON BORDER ADJUSTMENT MECHANISM^{NEW}
- STIMULATING GREEN INVESTMENTS^{NEW}
- CLIMATE DIPLOMACY
- SUPPORT TO INNOVATION
- ADAPTATION TO CLIMATE CHANGE

FLAT GLASS IS KEY for climate-neutrality, circularity, digitalisation, safety, health, innovation

- **Energy efficient** glazing solutions for **buildings**
- More **efficient and interactive glass solutions**, which preserve security, offer new functionalities and contribute to **clean and automated mobility**
- Extra clear glass to capture more **solar energy**
- Innovative **IT integration** to support **digitalisation** with touch-screen, smart mirrors, solar-heat modulation, glazing enhancing radio and telecom signals, invisible sensors and radars, etc.
- Specific glass solutions with **hygienic properties** for use in hospitals and most exposed environments
- **Recyclable** product with potential for enhanced collection



THE TRADE ASSOCIATION'S DUTY to support the flat glass sector

GLASS
FOR EUROPE

AGC

GUARDIAN GLASS

NSG GROUP

SAINT-GOBAIN

ŞİŞECAM

AGN

ASSOVETRO

BF
Bundesverband Flachglas

BYGLAS

UDTVP
Unión Das Transformadores de Verre Plat

FEDERATION DE L'INDUSTRIE DU VERRE
VERBOND VAN DE GLASINDUSTRIE

Bouwend Nederland
de vereniging van bouw en installatie voor energie R&D

GGF

GGF

POLSKIE SZKŁO
Związek Przemysłowców Szkła



THE EUROPEAN FLAT GLASS SECTOR

TAKES IT AS ITS ROLE TO PRODUCE AT A COMPETITIVE PRICE THE **MATERIALS ESSENTIAL FOR RENOVATING EUROPE'S BUILDINGS, FOR SUPPORTING THE CLEAN MOBILITY TRANSITION AND FOR INCREASING THE SHARE OF RENEWABLE SOLAR ENERGY IN EUROPE.**

WHILE ALREADY PROVIDING NET CARBON-AVOIDANCE PRODUCTS, THE FLAT GLASS SECTOR IS LOOKING INTO WAYS TO **MASSIVELY SCALE UP ITS CONTRIBUTIONS TO THE EU'S CARBON NEUTRALITY OBJECTIVE**, INCLUDING BY DEVELOPING NOVEL WAYS TO LOWER ITS INDUSTRIAL EMISSIONS.



DELIVERING THE FLAT GLASS PRODUCTS WHICH ARE ESSENTIAL
FOR EUROPE'S TRANSITION TO CLIMATE-NEUTRALITY

FLAT GLASS AND BUILDINGS

-40%

High-performance glazing can help cut nearly 40% of CO₂ emissions from buildings in the EU.



INSULATING
GLASS UNITS

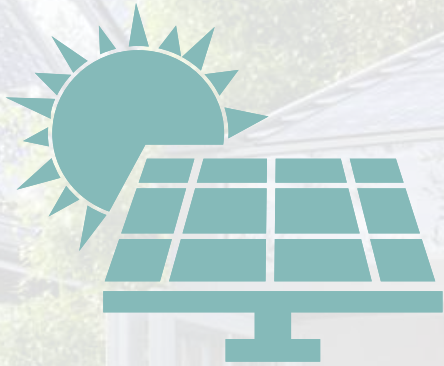


SWITCHABLE
GLAZING

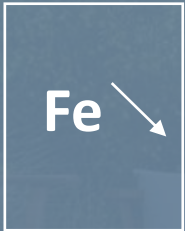


BIPV
TRANSPARENT
PHOTOVOLTAICS

FLAT GLASS AND SOLAR ENERGY



Glass represents from 65% to over 95% of the weight of PV modules.



LOW IRON



SELF
CLEANING



SOLAR
MIRRORS

FLAT GLASS AND MOBILITY

+17%

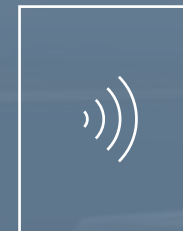
Average increase in glass area
in passenger cars since 2000.



LIGHTER SAFETY
GLASS



COATINGS FOR
EFFICIENCY AND
RANGE



AUTOMATED
DRIVING
COMPONENTS

RESEARCHING, TESTING AND DEVELOPING NOVEL WAYS TO LOWER INDUSTRIAL EMISSIONS




-43% CO₂
IN 25 YEARS PER TONNE
OF FLAT GLASS



0.13%
OF TOTAL EU
EMISSIONS



25%
OF PROCESS EMISSIONS



-75%
ENERGY SWITCH



-85%
CCU/CCS



-7%
RECYCLING

-7%
INCREMENTAL POTENTIAL

NEW FRONTIERS IN FLAT GLASS MANUFACTURING



RECYCLING: KEY EUROPEAN DATA

26%
of cullet
in a flat glass batch/
furnace*
(est. 2.75 Mt)



2 to 3%
reduction in energy consumption
for every **10%** extra cullet
in the batch



1t (tonne) of cullet
saves **1.2t** (tonne) of raw materials
310kg CO₂ in glass manufacturing
+/- 600kg CO₂ (including CO₂ saved upstream)

OBJECTIVE:
FLAT GLASS TO FLAT GLASS

CHALLENGES

- ✓ COLLECTION AND SORTING
- ✓ HIGHEST QUALITY LEVELS REQUIRED
- ✓ COST-BENEFIT BALANCE
- ✓ COMPETITION

MAIN SUCCESS FACTOR:
COOPERATION ACROSS THE SECTOR



ENERGY SWITCH: TESTING & PILOTS



ELECTRICITY

AGC and Saint-Gobain partner to create a revolutionary pilot flat glass line with drastic CO2 emissions reduction.

AGC and Saint-Gobain, worldwide flat glass manufacturers leading in sustainability, announce that they are collaborating on the design of a **pilot breakthrough flat glass line** that is expected to reduce very significantly its direct CO2 emissions.

As part of this R&D project, the new pilot line in the Czech Republic, will be on the cutting-edge of the art of the line that targets to be the most sustainable flat glass line of oxygen and gas. This is a technology used in flat glass production towards carbon neutrality of the industry decarbonization.

AGC Glass Europe (55,675 followers) ... AGC and energy company E.ON strengthen their existing partnership with a joint project for waste heat recovery and production of green power at AGC's flat glass plant in Saingbouse, France. Read more on <https://nkd.it> ... see more



AGC and E.ON deepen their partnership to improve energy efficiency and decarbonization by signing the first Green PPA in France | AGC Glass Europe



BIOGAS

Pilkington UK runs furnace on biofuel in four-day trial

Published 23rd February, 2022 by Jess Mills



Pilkington UK, part of the NSG group, has become the world's first flat glass manufacturer to fire its furnace on 100% biofuel. <https://youtube.com/watch?v=5B713W-VWwQ>

A WORLD'S FIRST: TWO WEEKS OF ZERO CARBON PRODUCTION

- ✓ ANICHE (FRANCE)
- ✓ 100% MADE OF RECYCLED GLASS
- ✓ 100% GREEN ENERGY
- ✓ MARCH 2022



HYDROGEN

Saint-Gobain (14,517 followers) ... #PressRelease #SaintGobain achieves the first flat glass production using more than 30% hydrogen ... see more



NEWS RELEASE

5 September 2021
Nippon Sheet Glass Co., Ltd.

Architectural Glass Production Powered by Hydrogen in World First

The NSG Group has successfully manufactured architectural glass at its facility in the UK, using hydrogen power in a world-first trial.

As previously announced on 27 February 2020, this trial is part of the "HyMet Industrial Fuel Switching" project ("I"). The successful three-week trial late August was conducted at the Greengate site of Pilkington United Kingdom Limited, a group company, in St Helens.

In the trial the NSG Group managed to achieve a seamless transition between its current main fuel, natural gas, and hydrogen, with the expertise overcoming many challenges. The trial proved that hydrogen was as capable as natural gas in achieving excellent melting performance and that it could be possible to operate the furnace with vastly reduced carbon emissions. It is a key step in the Group's plans to decarbonize. The switch to hydrogen to power the production from natural gas means that flat glass furnaces – which account for the majority of the Group's overall carbon emissions – would be able to operate with hugely lower emissions.

ENERGY CHALLENGES TO GO LOW-CARBON



ELECTRICITY

*Full electric melting
not yet ready in flat
glass*



BIOGAS

*Availability
challenge*



HYDROGEN

*Availability and
infrastructure lacking*



HYBRID

*The most probable
middle-term
solution*



CAPEX (roll-out) + OPEX (competitiveness)

MORE AVENUES PURSUED

EFFICIENT FURNACES

AGC Glass inaugurates renovated furnace

Published 15th October, 2021 by Zahra Awan



Guardian Glass invests in expanded capacity and energy-saving technology for Goole plant

OCTOBER 7, 2021

Beitrage, Luxembourg - October 7, 2021 - Guardian Glass is investing significantly in its Goole, East Yorkshire float glass production plant to increase the company's ability to supply float glass, primarily to the United Kingdom (UK) and Ireland, while also improving the plant's energy efficiency.

RAW MATERIALS

Synthetic raw materials for float-glass production

A.S. Jha¹, J.N. Gupta², L.M. Bartoloni³, G.S. Byker⁴, S.L.E. Goster⁵
¹Advanced Ceramics, #F, 149-051 Janta | Chhatkumbha
² #2 Anand | Mohali

It is shown that there is promise in replacing the conventional mix with one that includes synthetic raw materials (SRMs) or consists entirely of SRMs. This will permit economizing raw materials and fuel-energy resources, simplify the technology for preparing glass mix, identify the technological process of making glass, increase the equality and stability of the characterization of the glass produced, and improve the environment. SRMs will make it possible to organize glass production in regions which do not have their own raw materials



RESEARCH

Glass Futures construction nears completion

Published 16th March, 2023 by Greg Hines



The main contract works of the 100,000sq glass research and development building has been completed. (The) have handed over to Glass Futures ready for the pivotal fit out works to commence next month. The building is expected to be operational later this year. Delivery of the project has been managed by architect and developer Network Space Developments (NSD), on behalf of a partnership including non-Arabic Glass Futures, St Helens Borough Council, the Liverpool City Region Combined Authority and UNITE Research & Innovation.

LOGISTICS & AUTOMATION



A CHALLENGE FOR THE ENTIRE FLAT GLASS ECO-SYSTEM REQUIRING COOPERATION



A STRATEGIC AGENDA



GLASS REMAINS RELEVANT IN SUSTAINABLE BUILDINGS

- ✓ LOW-CARBON
- ✓ LITTLE WASTE
- ✓ AFFORDABILITY
- ✓ CLEAN ENERGY
- ✓ RESPONSIBLE PRODUCTION
- ✓ INDUSTRY INNOVATIONS
- ✓ GOOD HEALTH & WELL-BEING
- ✓ ...



BREEAM®



DGNB
DEUTSCHE GRÜNE NORMEN



LIFE-CYCLE THINKING IN BUILDINGS

Types of Carbon in Buildings



Embodied Carbon

The emissions from manufacturing, transportation, and installation of building materials.

Operational Carbon

The emissions from a building's energy consumption.

POORLY EFFICIENT BUILDINGS:

OPERATIONAL OVER 70% - EMBODIED BELOW 30%

HIGH-PERFORMANCE BUILDINGS:

OPERATIONAL AS LOW AS 25% - EMBODIED OVER 75%



**REDUCE & OPTIMIZE
ENERGY DEMAND
+
GENERATE BALANCE
WITH RENEWABLES**

GLASS SOLUTIONS

- ✓ Laminated safety glass
- ✓ Tempered glass
- ✓ Acoustic glazing
- ✓ High-transparency glass
- ✓ Glass louvres
- ✓ Building Integrated PV
- ✓ Connected glazing
- ✓ Dynamic glazing
- ✓ etc.

HEALTHY BUILDINGS

Forhealth foundation is a Program at the Harvard T.H. Chan School of Public Health - www.forhealth.org



LIGHT AND COMFORT



GLASS
FOR EUROPE



*Cloud Cities
Barcelona*

DESIGN

MIRADOR DE LA TORRE GLORIÈS - BARCELONA

OUR WAY TO GROW



RENEWABLE ENERGY

CARBON REDUCTION

CIRCULARITY

COMFORT

RESILIENCE

DURABILITY

INNOVATION

URBANISATION

SUSTAINABILITY

RENOVATION

EFFICIENCY

EMOBILITY

SHARED ECONOMY

DIGITALIZATION

PEOPLE-CENTRIC

THANK YOU!

BERTRAND.CAZES@GLASSFOREUROPE.COM

BUILDINGS

ENERGY

CLIMATE NEUTRALITY

RESOURCES

ENVIRONMENT

JOBS

INVESTMENTS

INNOVATION

TRANSPORT