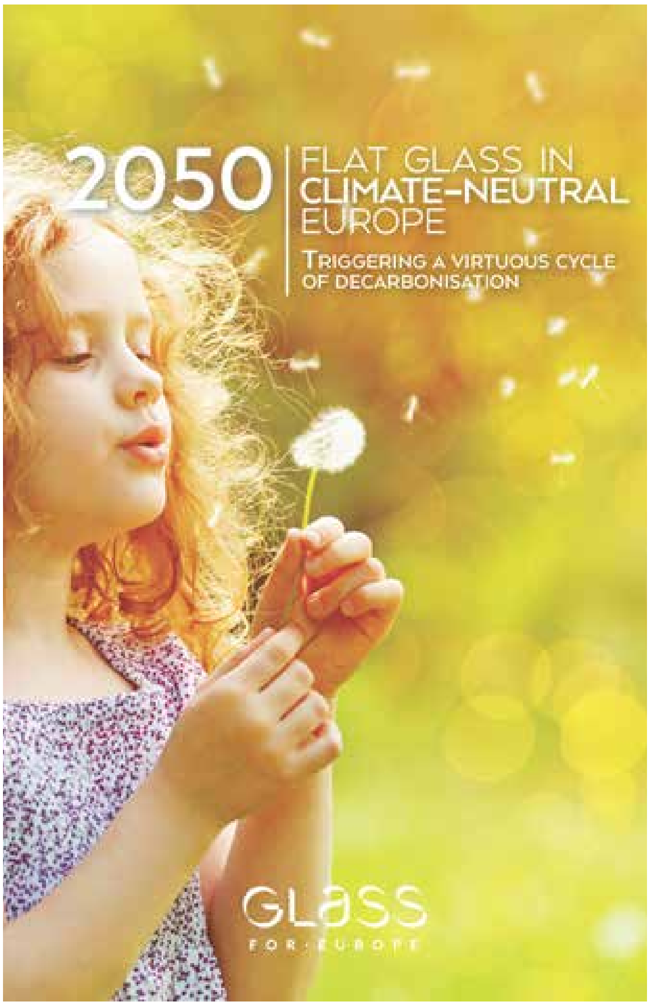
In driving flat glass decarbonisation, GLASS FOR EUROPE shines

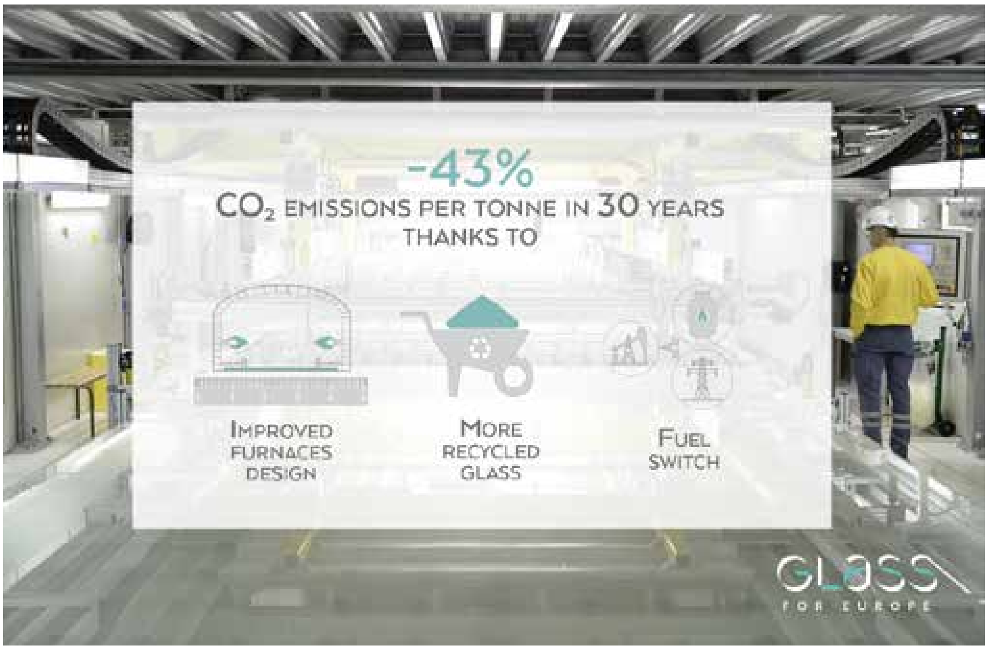


For years, Europe's flat glass industry has operated at the crossroads of energy-intensive production and rapidly expanding demand for advanced glazing technologies. Today, however, the sector stands before a structural transformation: the imperative to decarbonise melting processes while simultaneously delivering new functionalities for buildings, mobility, health and digital infrastructure. As summarised by Glass for Europe, flat glass is essential to climate-neutrality, circularity, digitalisation, safety, health, innovation, and this broad relevance amplifies the urgency of a successful yet highly-challenging transition.

A SECTOR CENTRAL TO EUROPE'S STRATEGIC GOALS

Flat glass applications continue to diversify, enhancing energy efficiency, providing interactive digital interfaces and enabling automated mobility. High-performance glazing contributes to building energy savings, while extra-clear glass increases solar-energy capture. Advances in digital integration -such as touch-enabled surfaces, smart mirrors, telecom signal-optimising glazing, or invisible sensors and radars- further demonstrate how the material is evolving into a foundational enabler of Europe's digital econo-

Outlining the sector's efforts to reduce CO2 emissions in flat glass production, GLASS FOR EUROPE takes its vision forward in new melting technologies, improved recycling, energy-system adaptation and ecosystem-wide cooperation. The association stresses that efficiency, hybrid melting and enhanced circularity form the essential pillars in Europe's low-carbon transition.



my. Meanwhile, specialised hygienic glass for hospitals and high-exposure environments underscores the material's health value. And with flat glass being fully recyclable, improving collection systems could significantly enhance circularity.

This breadth of societal contribution reinforces the trade association's mandate: to support the sector's pathway toward sustainability, competitiveness and innovation in a context where melting represents the core environmental challenge.

UNDERSTANDING TODAY'S MELTING LANDSCAPE

Europe's flat glass furnaces are already highly efficient relative to global benchmarks, yet further reductions in CO_2 emissions require a shift away from fossil-based heat sources. The landscape of available low-carbon options remains complex, marked by technological maturity gaps, infrastructural limitations and economic pressures.

Electricity: Full-electric melting, while attractive in theory due to zero on-site combustion emissions, is not yet ready for flat glass production at industrial scale.

Biogas: A renewable alternative, but hampered by limited availability and insufficient infrastructure. These constraints make large-scale adoption difficult without broader European energy-system restructuring.

Hydrogen: A promising vector, potentially compatible with high-temperature processes, but still dependent on extensive infrastructure and sustainable production methods.

Hybrid melting: The PPT identifies hybrid technology

-combining combustion and electrical boosting- constitutes a very probable middle-term solution, providing a realistic bridge between current operations and long-term carbon-neutral technologies.
Together, these options illustrate that decarbonising flat glass is not merely a matter of fuel substitution but of turning technological promises into viable solutions, investment and systemic energy transformation.

THE ECONOMIC AND OPERATIONAL EQUATION

The transition toward low-carbon melting carries heavy capital expenditure for furnace upgrades and rebuilds, combined with operational expenditure challenges tied to energy costs and market competitiveness. Higher energy costs inevitably mean higher glass and glazing costs, which could hamper both the decarbonization of buildings and the industry's competitiveness in a fully open market.
This makes the planning and timing of each furnace rebuild critical. The solutions adopted in the coming years will shape the sector's carbon footprint for decades.

RECYCLING: EXPANDING EVERY POSSIBLE AVENUE

Improving recycling remains a key component of decarbonisation. Although flat glass is intrinsically recyclable, bottlenecks in collection systems prevent the sector from fully benefiting from its circular potential. Multiple tracks are now being pursued to expand cullet availability and optimise its use. Greater recycling directly reduces CO_2 emissions by lowering melting temperatures and reducing raw-material demand.
But unlocking this potential requires systemic cooperation: better collection logistics, upgraded sorting technologies and expanded recycling streams across construction, renovation and end-of-life sectors.

RESEARCH AND EFFICIENCY AS STRATEGIC PILLARS

Beyond energy sources and recycling, the PPT highlights an industry investing heavily in furnace efficiency, raw-material optimisation, logistics and automation. These parallel efforts are essential for a holistic decarbonisation roadmap.
More efficient furnaces reduce energy demand regardless of the energy vector. Improved raw materials can lower melting temperatures or help stabilise new hybrid processes. Enhanced logistics and automation streamline operations, avoid waste and support consistent energy use - every incremental gain becoming vital throughout the value-chain.

A VALUE-CHAIN CHALLENGE REQUIRING COOPERATION

The decarbonisation of flat glass is not a task for manufacturers alone. It is a challenge for the entire flat glass eco-system requiring cooperation. From energy suppliers and raw-material producers to building designers, recyclers and policymakers, collective alignment is indispensable.
Infrastructure for biogas, hydrogen and renewable electricity must expand. Regulatory frameworks must support investment cycles. Customers must embrace low-carbon products and facilitate glass recovery. Research centres must accelerate trials. Logistics networks must adapt to circularity needs.

A CLEAR DIRECTION, A COMPLEX JOURNEY

The flat glass industry has charted its direction: constant sustainability improvements through a combination of advanced efficiencies, recycling, hybrid melting and low-carbon energy sources. The possibilities are tangible, but so are the constraints. Technology maturity, infrastructure, cost and availability will define the pace.
Yet the potential rewards -lower emissions, stronger circularity, smarter and safer applications and deeper integration into Europe's digital and energy transition- all position flat glass not merely as a sector undergoing transformation but as an essential driver of Europe's sustainable future.