

Accelerating the European container glass industry's energy transition

Our progress in 2025



FEVE
The European Container
Glass Federation

February 2026

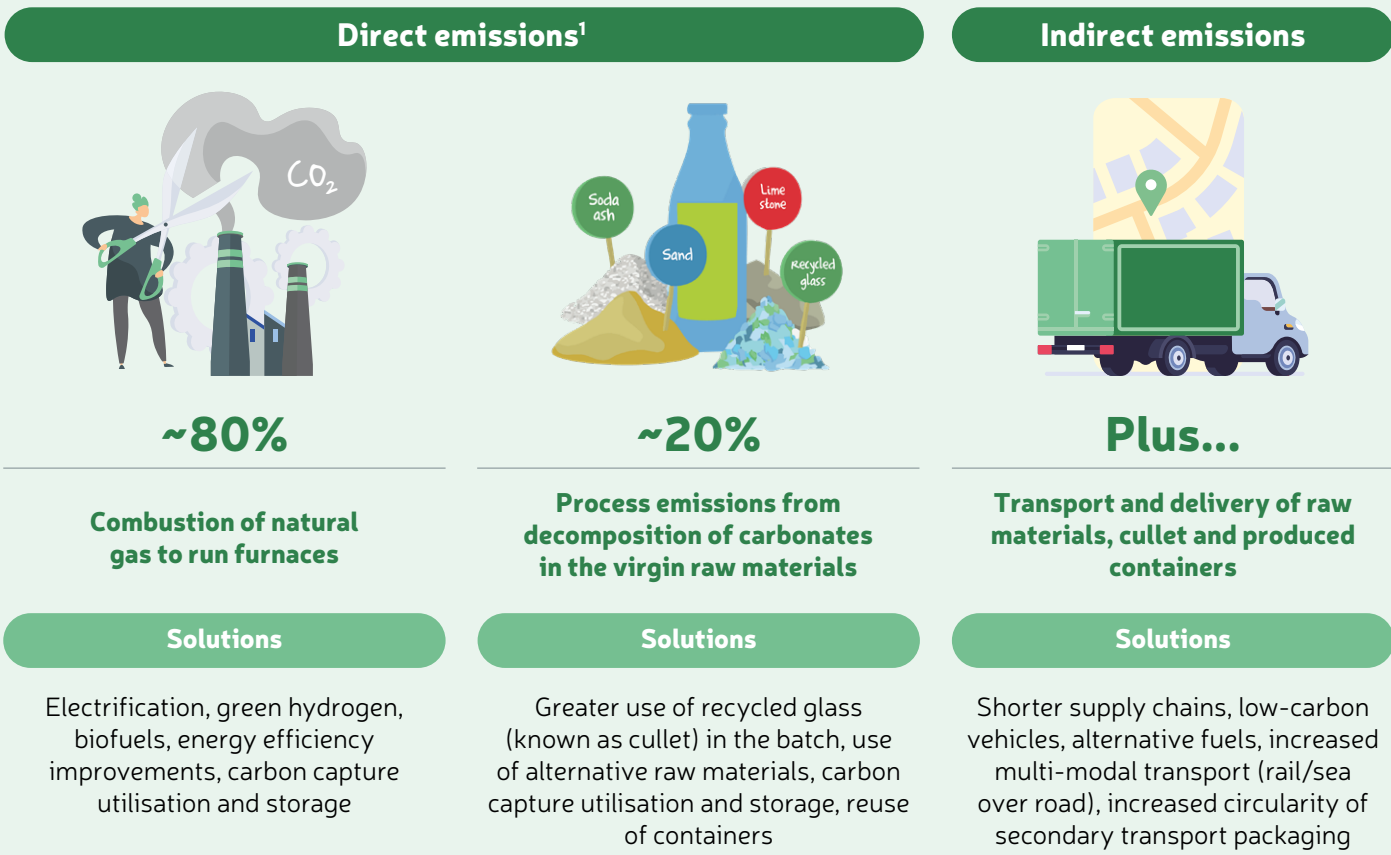
Toward fully circular and climate neutral glass packaging by 2050

Glass production is a strategic asset for Europe's industrial leadership and competitiveness, and a committed partner in delivering sustainable, circular packaging to the market. To ensure glass packaging remains fit for the future, the industry is committed to reduce its carbon footprint.

Today, in 2026, Europe's container glass industry stands at a pivotal moment in its transition toward climate-neutral, fully circular packaging, and the momentum is unmistakable. Across Europe, dozens of initiatives are underway to reduce the carbon footprint of glass packaging and achieve net zero emissions by 2050, as outlined in the glass industry's [2024 publication on decarbonisation](#). Technologies once viewed as prototypes – electric and hybrid melting, hydrogen co-firing, large-scale biofuel trials, advanced cullet recovery, and multimodal low-carbon transport – are now operating in real furnaces, real logistics networks, and real value chains across Europe.

With over **160 decarbonisation and innovation projects** now active, **this update provides a snapshot of the industry's latest progress** and tracks key milestones reached by glass packaging manufacturers in 2024/25.

Where do glass packaging emissions come from?



The container glass industry is addressing our four strategic pathways to decarbonisation, through:

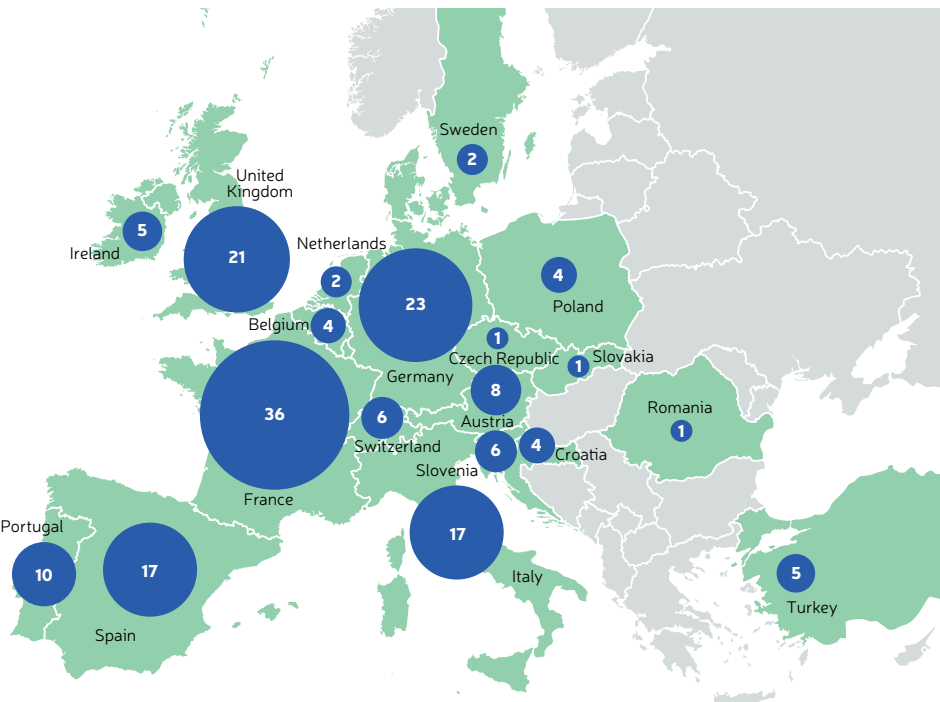
-  **Furnaces of the Future**
-  **Closing the Glass Loop**
-  **Sourcing & Design**
-  **Transport & Delivery**

Projects include:

- Breakthrough electric, hybrid & hydrogen furnaces
- Lightweighting packaging design for lower emissions
- More recycled content, reuse & alternative raw materials
- Waste heat recovery & energy efficiency



Scan to view FEVE glass packaging decarbonisation projects



160+ decarbonisation projects underway

144 glass manufacturing sites

79 billion bottles and jars produced each year

This momentum is proof of our constant commitment and tangible progress, guided by long-term commitments to the [Science Based Targets](#) initiative (SBTi) framework and with over €600 million invested annually by the glass packaging industry.



The picture that emerges in 2025 is one of an industry that is innovating systemically, and actively reshaping the foundations of its production model. Melting technologies are evolving; circularity initiatives are boosting the availability and quality of recycled glass; design and sourcing strategies are reducing embedded carbon in every container; and logistics chains are shifting to cleaner, smarter modes. Each pathway advances decarbonisation from a different angle, yet all converge toward a common objective: **a climate-neutral glass packaging system that preserves product integrity, strengthens European value chains, and maintains the material's unique circularity advantage.**

What distinguishes 2025 is no longer the question of whether solutions exist, but how fast they can scale. With furnaces operating on higher shares of electricity, alternative fuels proving viable at industrial scale, recycled content rising, and circular models expanding, the industry's transition has moved from concept to implementation. The trajectory is clear: glass packaging is evolving, and the decade ahead will determine the speed at which these technologies become standard across Europe.

Innovation is systemic in delivering progress – furnaces, energy sourcing, logistics, and design all contribute to a lower carbon footprint, but scale, timing and level of investment needed are pivotal challenges. Furnaces are long-term assets with 20-year investment cycles, so the coming decade is critical for aligning investment with decarbonisation opportunities.

To achieve net zero by 2050, an additional €20 billion in capital expenditure will be needed from the container glass industry. To match this investment, sustained support is needed in enabling infrastructure, energy supply and eco-design, along with clear policy frameworks that create the right conditions to accelerate progress.



90%

of Europe's glass packaging (by tonnage) is produced by companies signed up to the Science Based Targets initiative (SBTi)²



~€20 billion by 2050

for upgrade and decarbonisation of production technologies across Europe



+€600 million

is invested annually in innovation and decarbonisation initiatives³



01 Furnaces of the Future

Most emissions from glass packaging production (around 80%) come from the melting process, where manufacturers are piloting hybrid furnaces, electrification, and hydrogen trials to improve performance.

These "Furnaces of the Future" are already delivering immediate CO₂ reductions for glass producers and the brands and businesses that rely on them. A variety of energy pathways include electricity, green hydrogen, and biofuels, to match infrastructure and energy mix in their locations.

Europe's glass furnaces of the future use a range of energy pathways:



Electricity



Hybrid technology



Biofuels & biogas



Hydrogen

in addition to energy efficiency upgrades to existing furnace technology.

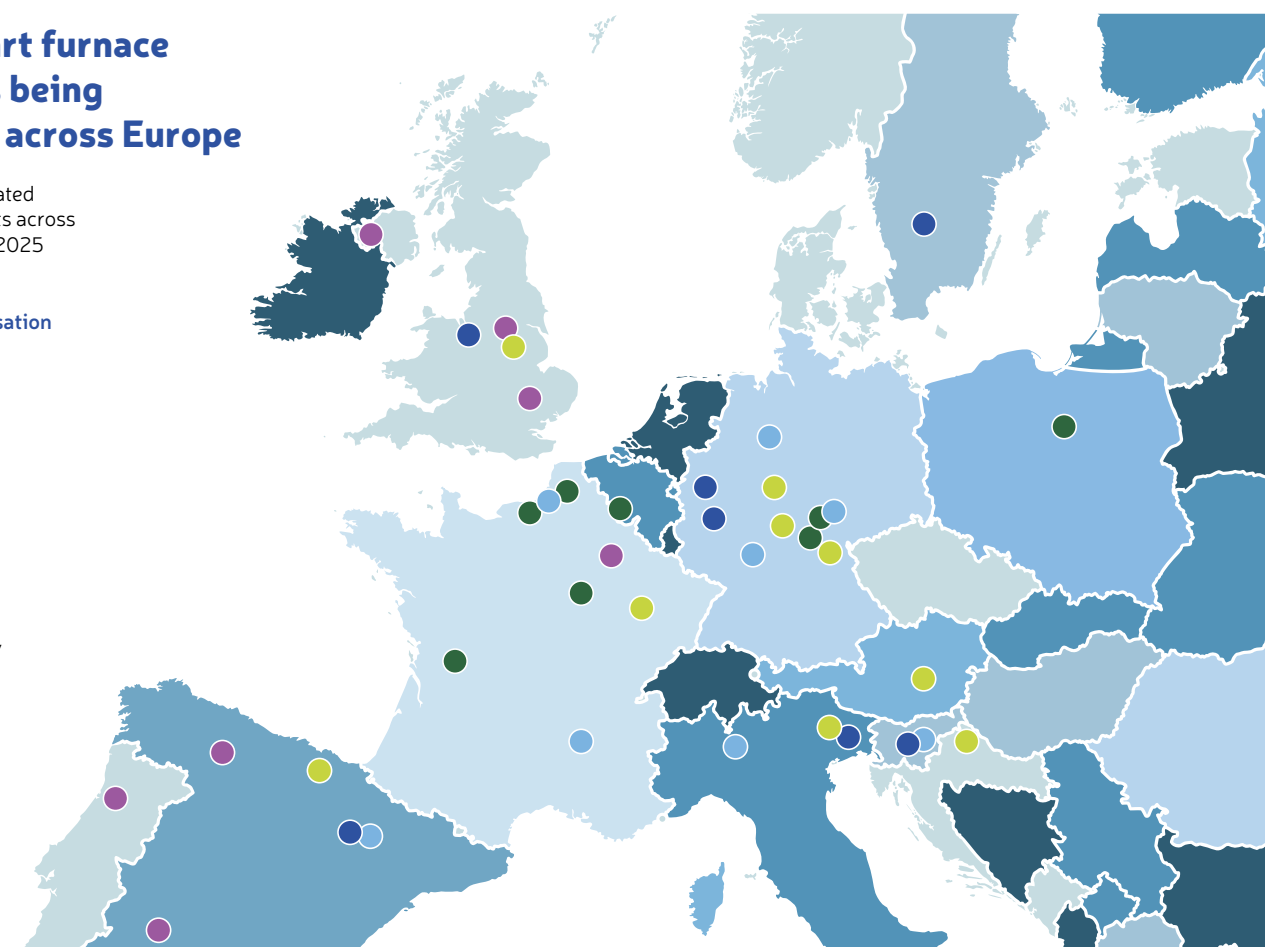
State of the art furnace technology is being implemented across Europe

Snapshot of furnace-related energy transition projects across Europe as of December 2025

For more examples, see feve.org/decarbonisation



- Electricity
- Hybrid technology
- Biofuels & biogas
- Hydrogen
- Energy efficiency upgrades



Electricity

Electrification of production technologies is the most efficient way to cut emissions in glass production because molten glass conducts electricity, allowing electrodes to heat the melt more efficiently than fossil-fuel firing.

When powered by low-carbon electricity, this can significantly reduce CO₂, and switching fully to all-electric melting would eliminate combustion-related emissions. Scaling the technology to high-volume production has been demonstrated as technically feasible; however, commercial deployment remains challenging because it requires substantial capital investment and reliable access to competitively priced green electricity.

Electric furnaces are already operating in Europe for smaller production runs in sectors such as spirits, perfumery, pharmaceuticals, and specialised food and beverage packaging. These furnaces typically produce under 100 tonnes of glass per day and operate with low recycled-content glass, compared with conventional large-scale furnaces that produce approximately 350 tonnes per day using high recycled-glass ratios. In 2025, the most visible progress occurred in the flaconnage segment for perfumes, cosmetics and pharmaceutical products, and in premium glass for the spirits sector.

Company	Project	Location	Progress in 2025
Gerresheimer	Electric furnace	Momignies, Belgium	An electric furnace for low-carbon cosmetics glass aims to increase renewable electricity to 100% by 2030, via on-site production, PPAs and certificates. ⁴
Groupe Pochet	Electric furnace	Guimerville, France	A new electric furnace for luxury glass packaging became operational in February 2025, consuming half the energy per tonne of conventional gas furnaces. ⁵
Heinz-Glas Group	Electric furnaces	Kleintettau and Piesau, Germany	All furnaces at Heinz Glas’ German sites for production of perfume and cosmetic bottles have been fully electric since 2024. ⁶
SGD Pharma	Electrification projects	Sucy-en Brie, France	Electrification of feeders supports SGD Pharma’s efforts to reduce CO ₂ emissions per tonne of molten glass by 65% by 2040, replacing fossil fuel with low-carbon electricity. ⁷
Verallia	Electric furnace	Cognac, France	Verallia’s first 100% electric glass furnace dedicated to the beverage sector has been in operation since 2024, achieving a 60% reduction in CO ₂ emissions. ⁸
Verescence	Electrification projects	Mers-les-Bains, France	Replacing a gas-powered lehr with a 100% electric annealing lehr in 2024 reduced annual emissions by 192 tonnes CO ₂ eq, while new electric lacquering lines in Spain and France and additional electric lehrs and infra-red tunnels aim to decarbonise decoration activities. ⁹



Hybrid

Hybrid furnaces offer a significant decarbonisation pathway by replacing up to 80% of natural gas with renewable electricity, thereby sharply reducing direct furnace CO₂ emissions. Their mitigation potential increases further when combined with complementary low-carbon energy sources such as green hydrogen or biogas.

Across Europe, multiple commercial and pre-commercial projects are now demonstrating these capabilities. Some have already achieved substantial CO₂ reductions at industrial scale; others are deploying hybrid methane-electricity configurations for specialised glass segments; several are introducing oxy-hybrid designs capable of operating with up to half of total energy from renewable electricity; and additional initiatives are progressing toward super-hybrid models with increasing electric input. New furnaces operating with high shares of green electricity and low-carbon combustion are also being commissioned, collectively strengthening operational experience and accelerating the transition toward lower-carbon melting technologies.

Company	Project	Location	Progress in 2025
Ardagh Glass Packaging	NextGen Furnace	Obernkirchen, Germany	The world’s first commercial-scale hybrid furnace reached a consistent 64% CO ₂ emissions reduction on typical 330ml bottles in 2024, and saves up to 35,000 tonnes of carbon every year compared to a conventional furnace (depending on production mix). ¹⁰
Bormioli Luigi	Project VITRUM (Virtuous Innovative TRansformation of high-qUality container glass Manufacturing)	Abbiategrosso, Italy	Project VITRUM aims to demonstrate a replicable, commercially viable model to reduce GHG emissions, and is projected to avoid around 26 kilotonnes of CO ₂ during its years of operation. It combines hybridisation, energy efficiency, circularity, digitalisation and automation solutions. The EU-funded furnace became operational in January 2025, combining a hybrid methane and electricity furnace for cosmetics glass production with high PCR use in the feedstock mix. ¹¹

Company	Project	Location	Progress in 2025
Gerresheimer	Oxy-hybrid furnace	Lohr am Main, Germany	Furnace modernisation completed in May 2025, replacing one of the two glass melting furnaces with an oxy-hybrid furnace which can operate with up to 50% electricity (fed by renewable energies). ¹² Another furnace rebuild to operate with up to 50% electricity is ongoing in Tettau.
O-I Glass	Hybrid furnace	Veauche, France	Ongoing rebuild of one furnace through a flexible hybrid furnace model, expected to be running in 2026. ¹³
Saverglass	Hybrid furnace	Feuquières, France	Work continues to replace all existing furnaces with low-carbon hybrid furnaces by 2027, powered by 20% biomethane and hydrogen combustion and 80% electricity. ¹⁴
Vaider / Steklarna Hrastnik	Project BEAR and CITADEL	Hrastnik, Slovenia	Hybrid regenerative furnace (BEAR) reduces more than 50% of natural gas consumption, which will save more than 100,000 tonnes of CO ₂ emissions over the next decade. ¹⁵ Upcoming CITADEL pilot will upgrade the existing hybrid end-fired regenerative furnace to a super-hybrid operation, increasing electric power beyond the starting 40% to substantially reduce natural gas consumption and CO ₂ emissions. ¹⁶
Verallia	Hybrid furnace	Zaragoza, Spain and Romain-Le-Puy, France	Verallia's first hybrid furnace has been operational in Zaragoza since October 2025, with a second scheduled to launch in Saint-Romain-Le-Puy in 2026. Furnaces will operate using up to 70% green electricity and 30% oxy-gas, cutting CO ₂ emissions by 50%. ¹⁷
Verescence	Hybrid furnace	Mers-les-Bains, France	Furnace 6 in Mers-Les Bains will complete its rebuild in 2026 with hybrid technology using up to 80% of electricity sourcing. ¹⁸



Hydrogen

Hydrogen – particularly renewable “green” hydrogen – is emerging as a potential pathway to decarbonise glass production because it can deliver the required melting temperatures while emitting only water vapour. Yet large-scale adoption remains constrained by the limited availability and high cost of truly green hydrogen, which must be produced through energy-intensive electrolysis.

Despite this, European initiatives are progressing: some glass manufacturers are already co-firing green hydrogen with natural gas using on-site electrolyzers powered by renewables; others are advancing hybrid furnaces that combine electric boosting with planned hydrogen/oxygen firing to move toward carbon-neutral glass. Additional research and regional 'hydrogen valley' programmes are testing high hydrogen shares – including up to full hydrogen firing – to evaluate effects on furnace stability, energy use, and glass quality, while parallel studies examine partial fuel substitution to build industrial readiness for future deployment.



Company	Project	Location	Progress in 2025
Ardagh Glass Packaging	Hydrogen electrolyser	Limmared, Sweden	AGP partnered with a spirits customer to replace up to 18% natural gas with hydrogen from an on-site electrolyser launched in late 2024. ¹⁹ The system produces a supply of green hydrogen to the furnace using renewable electricity, proving that hydrogen can be used alongside natural gas to produce lower-carbon glass.
BA Glass, Şişecam, Stoezl Glass, Vetropack, Vidrala and Wiegand-Glas	ZeroCO2Glas	Aachen, Germany	The 2022-2026 ZeroCO2Glas project, part-funded by the German government, aims to produce the world's first carbon neutral bottle that does not require an offset. The first glass from its hybrid furnace was produced in October 2024. Operational testing into varying electric boosting is ongoing, with future testing on hydrogen/oxygen firing planned. ²⁰

Company	Project	Location	Progress in 2025
BA Glass, Crisal, Secil Maceira, Vidrala Gallo and Rega Energy	Nazaré Green Hydrogen Valley (NGVH) project	Marinha Grande, Portugal	The €90 million Nazaré Green Hydrogen Valley project – part of the EU's Clean Hydrogen Alliance – received environmental approval in 2025 and began construction in December. Once operational, it will supply renewable hydrogen to replace natural gas for several companies, including FEVE members Vidrala Gallo and BA Glass, and cover 11% of Portugal's industrial CO ₂ e emissions. ²¹
Encirc	Hydrogen fuel	Elton, UK	Encirc plans to use ultra-low carbon furnaces at its Cheshire site from 2029 onwards, fuelled by low-carbon hydrogen and electricity supplied via the UK's HyNet industrial cluster . ²²
Vaider / Steklarna Hrastnik	North Adriatic Hydrogen Valley (NAHV)	Hrastnik, Slovenia	Hrastnik1860 is part of the EU-funded North Adriatic Hydrogen Valley (NAHV), which aims to create a hydrogen-based industrial ecosystem. The company is exploring the use of renewable hydrogen in glass production via water electrolysis. ²³
	H2 Glass		Hrastnik1860 continued testing operations on two furnaces (oxyfuel and hybrid EP regenerative) with 100% hydrogen as fuel, aiming to reach 90% of the total energy used in the furnace while maintaining high glass quality. ²⁴
Verallia	Hydrogen as natural gas alternative	Essen, Germany and Zaragoza, Spain	Following initial conclusive trials in Zaragoza (Spain) in 2023, a major industrial project was launched in Essen (Germany) in November 2024 to supply the site's two furnaces with a gas containing 60% hydrogen. This industrial-scale trial has reduced emissions at the Essen site by 10%. ²⁵
Zignago Vetro	H2Glass	Fossalta di Portogruaro, Italy	Ongoing H2GLASS research evaluates feasibility of replacing a portion of natural gas used in the furnace with green hydrogen, strengthening industrial expertise in alternative fuel technologies. ²⁶



Biofuels & biogas

Biofuels derived from organic waste streams – such as used cooking oils, waste oils, and other biomass residues – offer a practical route to lowering the carbon footprint of glass melting without requiring a fundamental change in furnace technology.

Industrial trials across Europe have now demonstrated the feasibility of operating furnaces on 100% liquid biofuels for continuous production runs, achieving substantial CO₂ reductions while maintaining product quality and operational stability. Parallel initiatives are progressively integrating biomethane, replacing notable volumes of natural gas and delivering measurable emissions savings. Additional programmes are exploring regional biomethane supply development and piloting syngas from biomass pyrogasification as a renewable furnace fuel. Collectively, these efforts confirm that bio-based fuels can serve as an effective transitional solution for decarbonising glass production at scale.

Company	Project	Location	Progress in 2025
Ardagh Glass Packaging	Biofuel trial	Knottingley, UK	In May 2025, Ardagh took part in a £6 million biofuel trial, funded by the UK Government and led by Glass Futures . ²⁷ Over seven days, it replaced 100% of natural gas with liquid biofuels, producing 4.1 million glass containers and cutting CO ₂ emissions by 242 tonnes, showing that lower-carbon glass can be made at scale without affecting quality or efficiency.
BA Glass	Biomethane implementation	Avintes, Portugal and Leon and Villafranca de los Barros, Spain	In 2025, BA Glass continued to explore progressive implementation of biomethane energy – as a chemically identical substitute for natural gas that does not require structural modifications to existing furnace installations – in countries with favourable energy conditions, including at its Spanish and Portuguese plants. ²⁸
Encirc	Biofuel trial and biomethane gas implementation	Derrylin, UK	Industrial trials in 2024-2025 with Glass Futures continued to test liquid biofuels in glass production, alongside engaging with stakeholders to develop the regional potential of biomethane in Northern Ireland. ²⁹
O-I Glass	Biofuel trial	Harlow, UK	O-I Glass' Harlow furnace completed its trial run on 100% biofuel in March 2025, demonstrating the potential for using biofuel on a large scale. ³⁰
Verallia	Biofuel projects	Zaragoza, Spain and Cognac and Vauxrot, France	Verallia aims to power three furnaces with 100% biofuels by 2030, already in use in Zaragoza and Vauxrot plants. Its Cognac site launched a pilot syngas production project with Charwood Energy in 2025, producing green gas generated using biomass pyrogasification to fuel one furnace. ³¹



Energy generation, efficiency upgrades and storage

Glass manufacturers are increasingly expanding their own sources of renewable and low-carbon energy to reduce the carbon intensity and cost exposure of production.

This includes recovering and re-using waste heat from advanced furnace designs, deploying on-site photovoltaic capacity, and complementing these measures with power purchase agreements to stabilise access to renewable electricity.

Digital modelling tools are being used to assess the impact of alternative energy pathways – from electric melting to hydrogen or oxyfuel combustion – while ongoing furnace rebuilds and efficiency upgrades are improving thermal performance and reducing overall energy demand. New renewable generation assets are also being installed at production sites, reinforcing supply resilience. Given that energy represents well over one-fifth of total industry costs,³² these measures are becoming both an environmental necessity and a core component of long-term competitiveness.

Company	Project	Location	Progress in 2025
O-I Glass	Gas oxy furnace & waste heat recovery	Holzminden, Germany	The Holzminden site’s conversion to a gas oxy advanced technology (GOAT) furnace with waste heat recovery adds to progress made via previous rebuilds in Reims, Vayres, and Gironcourt-sur-Vraine, France and Alloa, UK. ³³
Stoelzle Glass Group	Digital Twin	Koeflach, Austria	Stoelzle is using a digital twin of its factory to test energy-saving options like electric melting, hydrogen burners, oxyfuel combustion, and increased recycled glass, showing that electric heating can cut CO ₂ emissions where technically feasible. ³⁴
Stoelzle Glass Group	Furnace rebuild	Knottingley, UK	Stoelzle’s flaconnage plant in Knottingley was rebuilt with new furnace technology that enables improved energy performance, after a fire in July 2025. ³⁵
Vetropack	Furnace rebuild	Hum na Sutli, Croatia	Vetropack increased production capacity while optimising energy efficiency through a furnace modernisation at its Croatian plant, completed in March 2025, along with installing new, more efficient glass forming machines and new precision inspection technology at the cold end. ³⁶
Vidrala	Energy efficiency upgrades	Llodio, Spain	Aiala Vidrio plant introduced multiple actions to improve energy efficiency in 2025, including furnace upgrades and automation systems, supported by IDAE government co-funding and European Regional Development Funds. ³⁷
Wiegand-Glas	Renewable energy production	Steinbach am Wald and Großbreitenbach, Germany	An 8MWp photovoltaic plant in Großbreitenbach came into operation in 2025 to generate renewable energy for production. Another system will be installed in Steinbach am Wald in 2026. ³⁸

Looking ahead

As of 2025, the European container glass industry continues to make incremental but meaningful progress on furnace decarbonisation pathways. The technological building blocks – from full-electric and hybrid furnaces to biofuel, biomethane, hydrogen, waste-heat recovery, and on-site renewables – are no longer hypothetical: they are now being implemented, tested or actively scaled across multiple plants.

Yet the pace of transformation remains constrained by structural barriers. Availability of reliable, affordable low-carbon energy is uneven; in many locations, grid capacity is insufficient or connection costs unpredictable, which delays deployment of electrification and hybrid solutions despite their readiness. At the same time, scaling hydrogen supply or bioenergy depends on the parallel rollout of supporting infrastructure, including hydrogen networks and CO₂ transport/storage.

Given these constraints, it is essential to retain openness to all viable pathways – electrification, biomethane, green hydrogen, biofuels, hybrid furnaces, and renewables – allowing them to compete based on local energy conditions and infrastructure readiness. Long-term regulatory certainty and realistic decarbonisation targets must align with actual energy supply, planned infrastructure rollout, and the industry’s typical investment cycles. Stable policy frameworks (including those covering carbon-removal technologies where relevant), along with public support for early-stage deployment, will be critical to avoid lock-in to high-carbon infrastructure, and to enable industrial-scale transition without compromising competitiveness.

In short: 2025 marks a transition phase where the technical feasibility is established and diverse decarbonisation routes coexist. However, full-scale deployment depends on systemic support: energy infrastructure, forward-looking regulation, and strategic investment.

“Our industry is deeply embedded in local economies. To shape a transition pathway that is aligned with industrial realities, we need long-term visibility, access to affordable low-carbon energy, and infrastructure that enables electrification.”

MICHEL GIANNUZZI
PRESIDENT OF FEVE



02 Closing the Glass Loop

Around 20% of direct CO₂ emissions from glassmaking comes from the chemical decomposition of carbonates in virgin raw materials during melting. Increasing the use of recycled glass (cullet) directly cuts these emissions, as it avoids virgin carbonates and lowers the energy needed for melting.

Glass is a permanent material that retains quality when recycled. “Close the Glass Loop” was initiated to boost the quantity and quality of recycled glass packaging by partnering across the value chain, and already, data for 2023, released in 2025, shows the EU’s average glass collection for recycling rate hit 80.8%.³⁹

However, to hit the 90% target by 2030, each citizen would need to collect an additional 4.11 kilograms of glass packaging per year.⁴⁰ To bridge this gap, new value chain partnerships were launched in 2025 – including with the cosmetics sector⁴¹ and private waste operators⁴² – while targeted pilot projects are underway to improve collection in more challenging areas such as hotel chains and low-collection municipalities.

Container glass collection for recycling in Europe

In 2023, in the EU27, on average **80.8%** of glass packaging was collected for recycling.⁴³

- >90%

70-90%

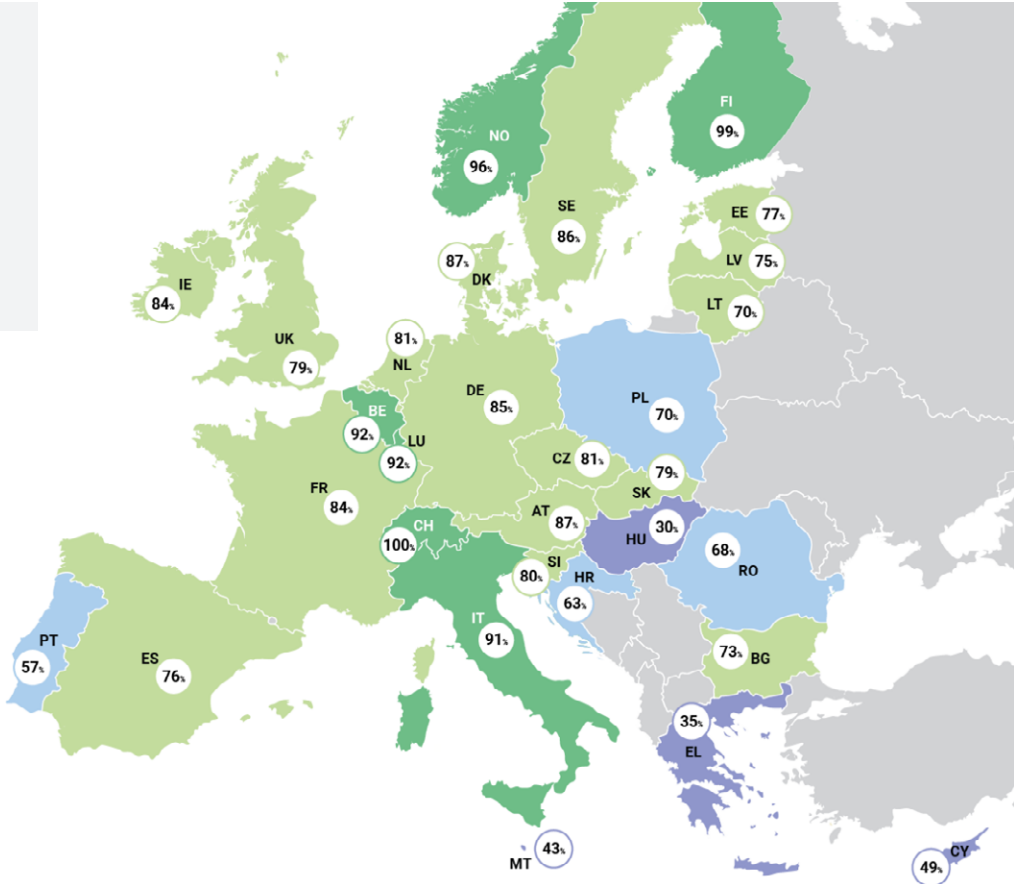
50-70%

<50%
1. The EU average is calculated from total tonnes collected for recycling vs. total tonnes placed on the market in the EU. The data for non-EU countries is for reference only.

2. In some cases, the national rates reflect a “recycling rate” and not a “collection for recycling rate.”

3. Where estimates for 2023 were not available, Eurostat 2022 data (Bulgaria, Croatia, Denmark, Estonia, Hungary, Lithuania, Luxembourg, Malta, Norway, Poland, Portugal, Slovakia, Slovenia, Sweden) was used.

Source: Close the Glass Loop – 2023 data.



80.8%
of glass containers collected for recycling in Europe (2023)⁴⁴

85%
of collected glass packaging is recycled back into new containers⁴⁵

74.9%
of Europe's glass containers are recycled (2023)⁴⁶

20%
of beverage packaging sold in reusable glass (2024)⁴⁷

In 2025, the circularity pillar of the glass packaging sector advanced meaningfully, driven by stronger collaboration across the value chain and targeted local initiatives.

Digital recycling pilots continued to demonstrate their ability to raise collection performance in both hospitality settings and municipalities, while large-scale reuse schemes entered real-world testing with standardised refillable bottle formats designed for multi-brand use. At the same time, several producers increased post-consumer recycled (PCR) content in their furnaces, with some achieving exceptionally high cullet rates and even producing bottles made entirely from locally sourced recycled glass.

These developments confirm that, alongside technological decarbonisation measures, improved collection, high-quality cullet availability, and scalable reuse models are becoming core levers for reducing the environmental footprint of glass packaging in Europe.

“Glass packaging has a unique role in Europe’s circular economy: we estimate that 85% is effectively recycled in a closed loop. We share a strong commitment to keep improving cost-effective separate collection systems.”

CARLO PIRRONE
SECRETARY GENERAL OF FEVE



Company	Project	Location	Progress in 2025
AIVE	Recycling pilot: A Tip For Nature	Lisbon, Portugal	An AIVE-FEVE digital recycling initiative piloted with The Editory Hotels chain trained hospitality employees on glass recycling, raising the hotels chain's average recycling rate from 68% in 2023 to 80% in 2024. ⁴⁸
O-I Glass and Verallia	Citeo reuse partnership	Paris, France	Waste management alliance Citeo signed a partnership with Verallia and O-I Glass to develop the first large-scale reusable packaging. The first “R-Cœur” bottle – a standardised 750 ml reusable beer bottle designed to be used by several brands – is currently being tested across four regions in France, involving 750 stores, 50 brands, and potentially reaching 16 million consumers. ⁴⁹
O-I Glass	Increased cullet use	France and Italy	To minimise reliance on energy-intensive raw materials, O-I advanced their use of cullet to reach a global average of 40% in their plants in 2024, with highest-running cullet plants in France achieving 83% (Béziers), 79% (Labégude) and 79% (Wingles) cullet. ⁵⁰
Verallia	100% recycled content	Yorkshire, UK	In early 2025, Verallia UK produced glass bottles made from 100% post-consumer recycled glass (“Vista by Verallia”). This achievement was made possible by a unique local ecosystem and the exceptional availability of high-quality white cullet in the UK, enabling production without any virgin raw materials. ⁵¹
Verescence	Recycled content	Mers-les-Bains, France	Verescence expanded its production of bottles made from PCR glass, aiming to achieve 100% worldwide production coverage by the end of 2025 (from 83% in 2024). ⁵² Since August 2025, Furnace 1 at Mers-les-Bains has been producing Infinite Glass 20, a composition containing 20% PCR glass, meaning all Verescence perfumery furnaces worldwide now operate with PCR glass.
Vetropack	Recycling pilot	Koprivnica, Croatia	A 6-month digital pilot with municipal service provider Komunalac and food brand Podravka shifted local attitudes around glass collection in Koprivnica, Croatia, where the ~58% glass collection rate hovers far below the EU average. ⁵³
Wiegand-Glas	Increased cullet use	Germany	Wiegand-Glas increased the average use of cullet in its production process to just under 76% in 2025 (a 5 p.p increase). A major upgrade of the cullet treatment plant in Steinbach am Wald ensures that the average output of cullet is now increased and less waste is produced during processing, to achieve greater efficiency.

03 Sourcing and Design



In 2025, design innovation and material efficiency continued to accelerate across the glass packaging sector, reinforcing the trend toward lighter, stronger containers with a significantly lower carbon footprint.

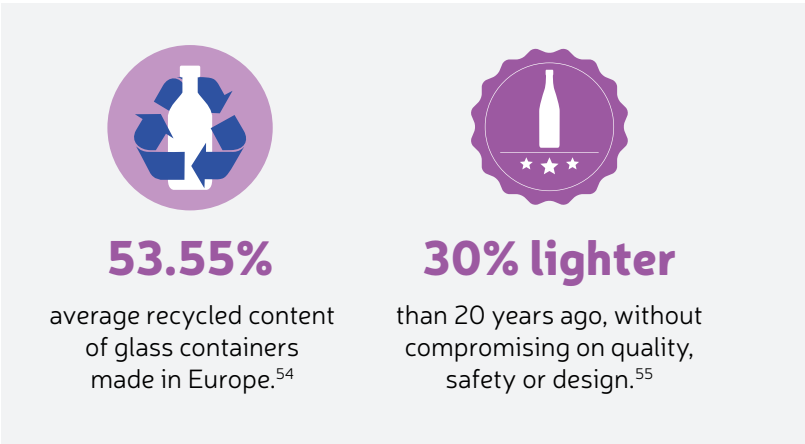
Producers expanded lightweighting programmes across multiple product categories, achieving notable reductions in container weight while maintaining mechanical performance and brand differentiation. Advances in recycled content deployment also progressed, with several manufacturers increasing post-consumer recycled glass in production and new technologies emerging to recover high-purity cullet from previously inaccessible waste streams. In parallel, research into alternative low-carbon raw materials and novel glass formulations demonstrated real potential to cut process emissions at the melting stage.

Together, these developments confirm that design optimisation, high-quality cullet availability, and material innovation are now central levers of decarbonisation – enabling lower-carbon packaging solutions without compromising Europe’s strengths in quality, aesthetics, and product identity.

Reuse should be encouraged without disrupting proven systems or overburdening SMEs, while ensuring access to affordable, high-quality recycled materials. Together, these measures will safeguard Europe’s €140 billion export sector, support circularity, and maintain consumer trust and product differentiation.

“Perfumery and cosmetics are a European strength, built on creativity, excellence, and local know-how. With a supportive policy framework, we can ensure that beauty and sustainability thrive together, here in Europe.”

XAVIER GAGEY
PRESIDENT OF THE FEVE FLACONNAGE BOARD



Company	Project	Location	Progress in 2025
Ardagh Glass Packaging	Lightweight programme	Barnsley, UK	Ardagh Glass Packaging partnered with a major spirits company to create an innovative spirits container that is 24-28% lighter than before, using an average 74% recycled content, cutting CO ₂ emissions by an estimated 25% annually and reducing transport weight. ⁵⁶
BA Glass	Lightweight programme	Marinha Grande, Portugal	BA Glass' lightweight programme increased by 28% in 2024 to cover 15 million units sold – reducing over 237 tonnes of CO ₂ emissions, thanks to new designs. ⁵⁷
Bormioli Luigi	Alternative raw ingredients	Murano, Italy	Engineered by Penn State researchers, LionGlass is a low-carbon alternative to soda-lime glass for cosmetics and perfumes, melting up to 400°C lower and eliminating carbonate emissions. Successful March 2025 test trials proved it can be melted at scale, formed into containers, and used with standard alumina-zirconia-silica (AZS) refractories and electrodes. ⁵⁸
GCA	Lightweighting projects	Kütahya, Turkey	GCA's lightweighting projects cover 8% of their total product range, covering water and spirits bottles to soft drinks and jars. Through their lightweighting projects, GCA prevented 1,416 tonnes of CO ₂ emissions in 2025. ⁵⁹
O-I Glass	Lightweighting programme	Paris and Vaulx-en-Velin, France and Origgio, Italy	O-I Glass' global ULTRA programme aims to make glass up to 25% lighter by design, including new lightweighted wine and beer bottles for the French and Italian markets, and the first eco-designed 75cl bottle to meet Carbon Trust's criteria for low-carbon packaging. ⁶⁰

Company	Project	Location	Progress in 2025
Saverglass	Lightweighting programme	Cuisles, France	Launched experimental 'Light 26' bottle, designed in a joint experiment with the Champagne industry and presented to industry in December 2025 – reducing the weight of a traditional 835-900g Champagne bottle to 725g. ⁶¹
Stoelzle	Cullet recovery technology	Krems and Köflach, Austria	Unique 'Glasy' sorting and recovery system launched in 2025 recovers glass from residual waste incineration with a purity level of 99.99%, recovering 20,000 tonnes of glass each year from Austrian waste incineration residues to supply high-quality cullet for production. ⁶²
Verallia	Lightweighting programme	Paris, France	Verallia has successfully delivered its 2019-2025 lightweighting programme. Over this period, the Group achieved its 3% weight reduction target for its non-returnable standard range. This achievement is exemplified by flagship developments such as the ultra-light Bourgogne Air 300G launched in November 2025, and the Bordelaise Air 300G introduced in November 2023, as well as lightweighted bottles for the Cava and Champagne markets, which are among the lightest available on the market. ⁶³
Verallia	R&D for decarbonised calcium and sodium	Chalon, France	R&D teams are working to identify low-carbon sources of calcium and sodium that are compatible with the operating conditions of glass furnaces. ⁶⁴
Vetropack	Lightweighting programme	Pöchlarn, Austria	Vetropack is moving towards large-scale production of thermally-strengthened, lightweight glass bottles from 2026, and has expanded quality testing at its new test machine in preparation. ⁶⁵
Vidrala	Biomass slag reuse with Acciona	Valencia, Spain	With over 18 million bottles produced, Vidrala and Acciona Energía's pilot reuses biomass combustion slags as raw materials for glass packaging, replacing traditional minerals. ⁶⁶



04 Transport and Delivery



In 2025, the container glass sector progressed efforts to reduce transport-related emissions within its Scope 3 footprint, accelerating the shift from conventional road freight toward lower-carbon logistics solutions.

Manufacturers expanded the use of electric, hybrid, biofuel and biomethane-powered vehicles, while integrating more rail and multimodal transport to replace carbon-intensive truck journeys where feasible. New logistics models – such as bulk product shipping, optimised routing, and smarter supply chain design – further contributed to emission reductions. At the same time, companies advanced initiatives to decarbonise secondary transport packaging by increasing recycled content, extending pallet lifespans, and deploying digital systems to track and reuse handling materials at scale.

Collectively, these developments signal a structural transition toward cleaner, more efficient, and more circular logistics networks across the glass packaging value chain.

Company	Project	Location	Progress in 2025
BA Glass	Electrical and biofuel transports	Villafranca de Los Barros, Spain and Bucharest, Romania	BA Glass expanded use of alternative fuels (e.g. biomethane, HVO) and intermodal transport systems through 2025, including rail transport between Portugal and Spain that cut 20% of emissions on this route. A new electric truck now operates at full capacity in Villafranca, with testing ongoing in the Bucharest plant, while use of bio-LNG trucks is increasing. ⁶⁷
Encirc	Bulk wine shipping and multimodal transport	Cheshire and Bristol, UK	Encirc's unique filling facilities can receive 24,000-litre bulk wine shipments from overseas for UK bottling, warehousing and distribution – triple the volume per journey. ⁶⁸ Combined with ongoing rail and HVO fuel trials, this enables lower-impact delivery of wine bottles across the UK.
O-I Glass	Powered by Biofuel	Reims, France	By 2027, O-I Glass' Reims plant aims to deliver all Champagne bottles to customers via trucks powered by locally-harvested grapeseed and fryer oil – saving 60% CO ₂ emissions compared to diesel fuel. ⁶⁹
Saverglass	Low-carbon transport	France, Spain, Portugal, Belgium and Italy	Saverglass' fleet of vehicles in Europe is now 100% electric or hybrid. ⁷⁰
Verallia	Recycled transport packaging	Bad Wurzach, Germany and Leeds, UK	An action plan targets transport packaging emissions by prolonging pallets through repair, collecting plastic dividers from customers, and redesigning stretch wraps with more recycled plastic. All supplies in Germany, Iberia and the UK are now wrapped with shrink and flat films with 30-60% recycled content. ⁷¹
Vetropack	Holistic Pallet and Pad Management (HPPM)	Bülach, Switzerland	A digitalised pallet and pad management system uses sensors to collate all information about reusable packaging across Vetropack and customer sites, to trace and reuse pallets. Around 1 million pallets and 6 million pallet pads are now in operation. ⁷²
Wiegand-Glas	Glass services	Schleusingen and Steinbach am Wald, Germany	Thanks to automated processes and the modern plant technology in its service centres, Wiegand-Glas is flexible and efficient when packing returnable glass products in individual crates. In 2025, the company achieved a 19.4 % increase in crate packing compared to 2024. ⁷³

Creating the conditions to accelerate progress

Investment in new technologies is increasing, while national glass industries are creating detailed decarbonisation roadmaps to guide their transition to climate neutrality.



Fédération des Industries du Verre's [roadmap](#)⁷⁴, which sets 2030 and 2050 decarbonisation targets through electrification and recycling, has been validated by the Ministry of Industry, while the [Sectoral Transition Plan \(PTS\)](#),⁷⁵ developed with ADEME (2024) outlines measures needed.



British Glass' [2024 Progress Update](#)⁷⁶ reviews progress on carbon reduction and policy implementation, building on the industry's [Net Zero strategy 2050](#).⁷⁷ The steady switch from natural gas to electricity and hydrogen (as it becomes available) will rely heavily on UK grid reinforcement and prioritised connections for glass manufacturers, alongside support for higher CAPEX and OPEX costs of switching.



BV-Glas' ['Glas 2045' decarbonisation roadmap](#)⁷⁸ outlines three scenarios for Germany's glass industry, all targeting replacement of natural gas with hydrogen, biogas or electricity. Extensive investments are needed by 2045: estimated at €3.2 billion for container glass electrification (CAPEX only) and €4.9 billion for hybrid technology.



Published in November 2025, the two-year ['RODIV2050' roadmap](#)⁷⁹ developed by AIVE and APICER is a reference guide of solutions, scenarios and transformation pathways that support decarbonisation of Portugal's glass industry.

Clear pathways give industry, policymakers and investors a shared view of the technologies, infrastructure and policy support and investment required for the next two decades. They also help manufacturers plan long-lived furnace investments, build resilience, and maintain competitiveness as energy systems shift rapidly.

Supporting the transition to low-carbon furnace technologies, improving access to clean energy and recycled materials, investing in innovation, and building the right infrastructure will help the industry continue on its trajectory to fully decarbonise.



Glass is the backbone of Europe's iconic industries:



€120+ billion value added

Equivalent to 0.8% of the EU's GDP⁸⁰



€140 billion in exports

6.1% of total EU exports in 2024⁸¹



45,000 customers

supplied by glass manufacturers – 98% SMEs⁸²



The developments of 2025 confirm that Europe's container glass industry has entered a decisive phase in its transformation. The technological feasibility of low-carbon melting is now well-established; circularity systems are strengthening; design and material innovations are maturing; and logistics chains are becoming progressively cleaner and more efficient.

Yet the full decarbonisation of the glass packaging sector will depend on whether Europe can create the enabling conditions for the marketplace that allow these innovations to scale.

Across all four pillars, one conclusion stands out: the transition requires a reliable, affordable and abundant supply of low-carbon energy – supported by reinforced electricity grids, hydrogen networks, and CO₂ transport and storage solutions. Without these foundations, projects ready for deployment risk years of delay, limiting the industry's ability to align long-lived furnace investments with climate objectives. Similarly, achieving circularity goals will require robust collection systems, stable access to high-quality cullet, and supportive reuse frameworks that strengthen rather than disrupt existing systems. Looking ahead, regulatory clarity will be essential.

Predictable, long-term policy frameworks – spanning energy, infrastructure, packaging design, carbon removals and investment support – are key to reducing uncertainty, accelerating capital deployment, and safeguarding Europe's competitiveness as global markets decarbonise. The next decade will define the sector's ability to meet its 2050 net-zero ambition, requiring more than €20 billion in investment and coordinated action across governments, energy providers, brands, recyclers, and manufacturers.

If Europe matches industry investment with supportive policy and infrastructure, the sector can deliver on its promise: **glass packaging made in Europe, fully circular and non-toxic, produced with net-zero emissions by 2050.**

The direction is clear:

01

Deploy electrification and hybrid melting at scale where infrastructure allows.



02

Advance green hydrogen, biofuels and biomethane where they offer viable, regionally appropriate pathways.



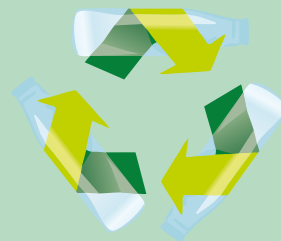
03

Maximise circularity through higher-quality cullet, stronger collection systems and well-designed reuse models.



04

Innovate continuously in container design, raw materials and secondary packaging.



05

Build smart, clean, multimodal logistics networks that cut Scope 3 emissions.



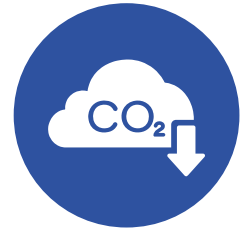
The progress of 2025 demonstrates that the pathway is credible. The task ahead is to scale it. By investing in glass and creating the right conditions for the glass packaging sector to thrive, we can achieve:



Glass packaging that is made in Europe, supporting European industries



Fully circular, non-toxic packaging that preserves products



Net zero glass manufacturing by 2050



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FEVE – the European Container Glass Federation – represents the container glass industry. With 144 container glass plants operating in 22 countries in Europe, our members produce bottles, flacons, and jars for the food and beverage, cosmetic and perfumes, and pharmaceutical sectors that consumers, brands and retailers rely on.

This publication has been produced based on data provided by member companies of FEVE, representing over 90% of European container glass production by tonnage. Unless otherwise stated, any references to 'the glass packaging industry' should be understood to refer to the industrial container glass production footprint of the member companies of FEVE within Europe.

For further information on the range of decarbonisation pathways underway across the industry, please refer to our 2024 report, available at: www.feve.org/decarbonisation

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