

UK glass industry net zero strategy summary

The route to net zero



British Glass

British Glass and the glass industry have set out a strategy to achieve net zero CO₂ emissions by 2050.

In 2015, in conjunction with the Department for Business, Energy & Industrial Strategy (BEIS), British Glass and the glass industry published a decarbonisation roadmap with the aim to reduce carbon emissions by 2050. Since then, the UK government has committed to the UN Climate Change Paris Agreement which will require the UK to reduce greenhouse gas emissions to net zero by 2050.

The glass industry has already made significant strides to reduce CO₂ and improve resource efficiency, with:

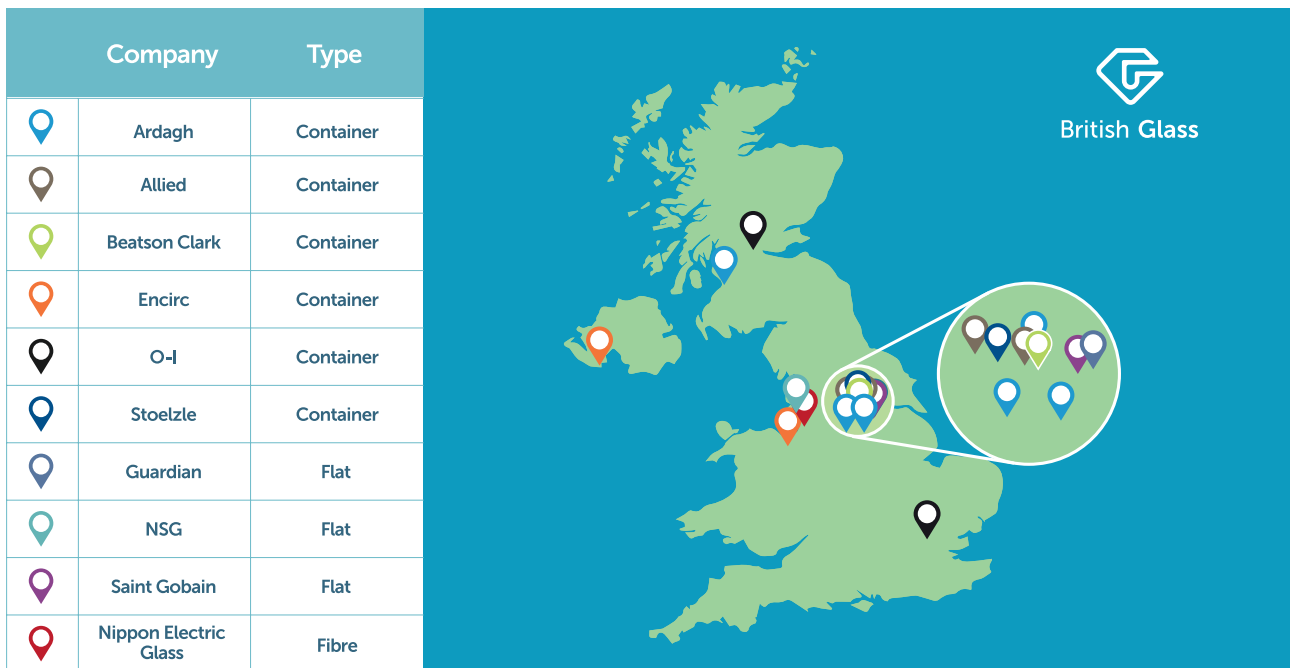
- an increase of 50% in the energy efficiency of UK glass furnaces over the past 40 years;

- investment in waste heat recovery for UK plant from two multinational glass companies in the past three years.

About the UK glass industry

The UK large scale glass manufacturing industry is significant and includes 10 companies with 17 sites throughout England, Scotland and Northern Ireland manufacturing container, flat and continuous filament fibre glass.

The glass industry contributes almost £2 billion to the UK economy each year and directly employs around 6,000 people, with an estimated 150,000 more indirect jobs.



Key statistics for UK glass 2019

People and Jobs



6,000 direct jobs and around 150,000 indirect jobs in the glass industry

Production tonnages



3.5 million tonnes of glass melted per year

Whole site energy use



Natural Gas: 6 TWh
Electricity use: 1 TWh

Recycling



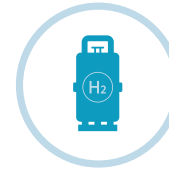
71% of container glass was recycled in 2019

View the UK glass industry net zero strategy at www.britglass.org.uk/knowledge-base/resources-and-publications

Route to net zero



Electrification



Hydrogen

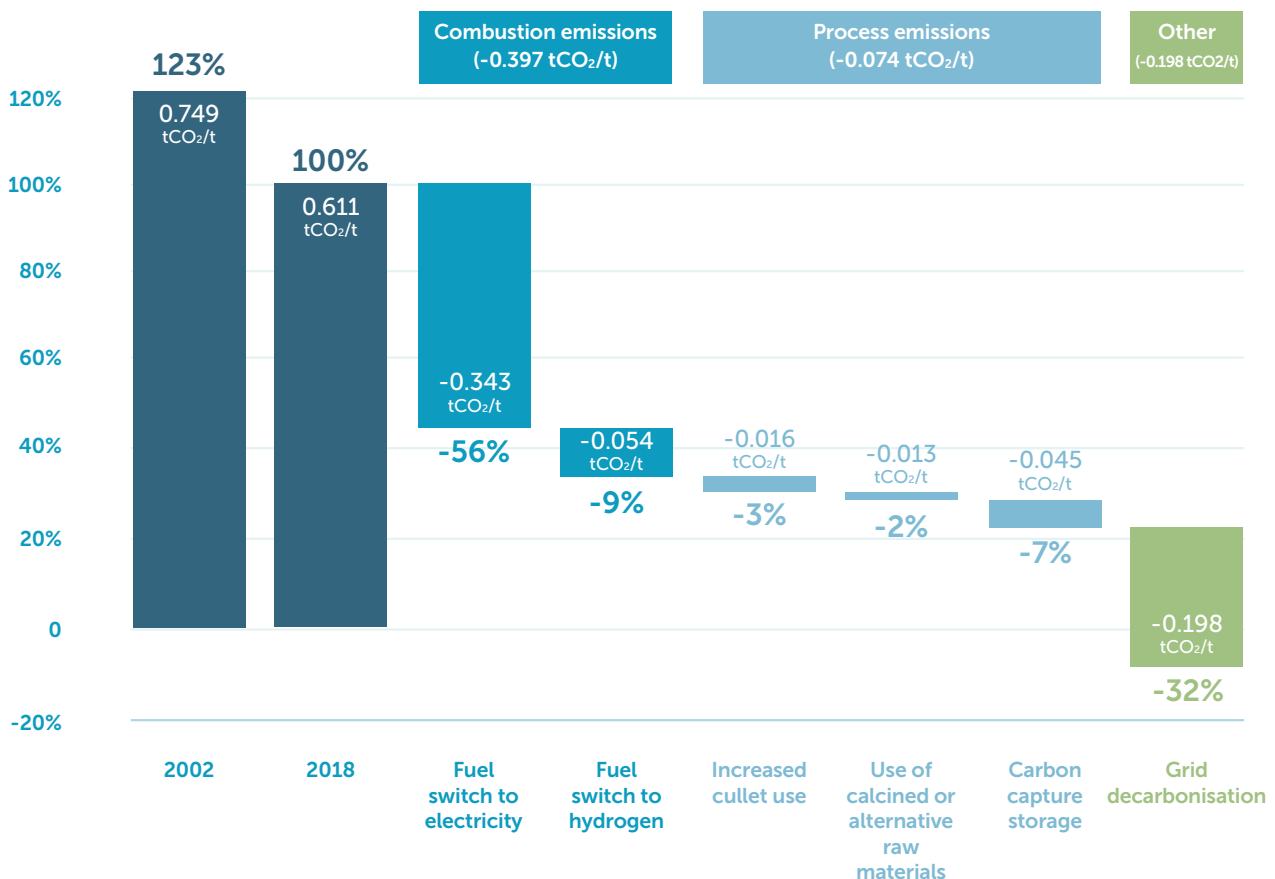


Biofuels

Decarbonisation options

As part of the net zero strategy, British Glass has developed a model which looks at how the glass sector can work towards net zero by 2050.

The model assumes all necessary research and large-scale industrial demonstrations of new technologies take place; the grid decarbonises and becomes carbon negative by early the 2030s; and government implements the policies outlined in the strategy. This will enable the industry to transition to net zero at a cost that remains competitive.



Combustion Emissions (-0.397 tCO₂/t)

Fuel Switch to electricity (-0.343 tCO₂/t)

Improvements to the electricity grid, government support for upgrading site connections and policies on electricity pricing for large industrial users enable the sector to gradually transition from natural gas to electricity. Successful large scale industrial demonstration of oxyfuel hybrid furnaces capable of running on up to 80% electricity enables this technology to be adopted in the container glass sector. Hybrid furnaces with a lower electricity input are utilised by the flat glass sector. Some smaller furnaces (<250 t/d) are converted to all-electric.

Fuel switch to hydrogen (-0.054 tCO₂/t)

Innovation projects followed by large scale industrial demonstration show that hydrogen is a viable option to replace natural gas. Hydrogen is initially available inside the clusters by 2030 and the hydrogen network is extended to reach all glass sites by 2050. Sites using hybrid furnaces gradually transition to hydrogen from natural gas as it becomes available.

Route to net zero

Process Emissions (-0.074 tCO₂/t)

Increased cullet use (-0.016 tCO₂/t)

Improvement in the container glass recycling rate and policies which incentivise the recycling of glass to remelt applications increase the availability of cullet to the container glass sector. It is assumed there will be a colour imbalance between what is placed on the market and produced in the UK if current production remains the same, so there will be a shortage of good quality cullet to produce some glasses, especially clear (flint). Policies which incentivise recycling of flat glass from buildings increase the availability of cullet which is suitable for flat and container glass production.

Use of calcined and alternative raw materials (-0.013 tCO₂/t)

Successful research into calcined and alternative raw materials followed by large scale industrial demonstration allows sites to replace some carbonate raw materials in the batch, where economically feasible.

Carbon capture storage (-0.045 tCO₂/t)

By 2050 research into CCS in the glass sector finds a viable solution to capture CO₂ from glass furnace emissions. Government investment in infrastructure allows for transport of CO₂ from dispersed sites outside the industrial clusters. CCS is only seen as a solution for the larger furnaces (>500t/day) running on lower cullet ratios.

Grid decarbonisation (-0.198 tCO₂/t)

The grid continues to decarbonise in line with the National Grid, Future Energy Scenarios forecast and becomes negative by the early 2030s due to electricity generation from biomass, combined with CCS (BECCS). The high proportion of electricity used by the sector and the negative grid factor results in the sector going beyond net zero in 2050.

How glass can help achieve net zero in other sectors

Recycling – each time one tonne of glass is recycled, approximately 580kg¹ CO₂ is saved through the supply chain, air pollution is reduced by 20% and water pollution is cut by 50%.

- The container glass sector has set itself a 90% target for container glass collected for recycling by 2030 to further the GHG reductions from the sector.
- The flat glass sector is working to increase the recycled content of flat glass, which reduces the carbon footprint of glass.

Double glazing – double glazing and triple glazing has the potential to significantly increase energy efficiency in buildings, reducing energy use and CO₂.

Wind Turbines – continuous filament glass fibre is used in the construction of wind turbine blades which provide renewable energy.

Light weighting vehicles – continuous filament glass fibre is used as an alternative material to reduce the weight of vehicles, improving efficiency.

Solar – glass products are used for solar products which provide renewable energy.

Glass wool insulation – used for commercial and domestic buildings for improved thermal efficiency to reduce energy use and CO₂.

¹ <https://feve.org/about-glass/facts-product-details/>

Barriers and policy recommendations

The success of the glass industry net zero strategy is reliant on a number of factors and future government policy.

Barriers

- **Financial viability** – Energy costs account for around a third of overall manufacturing costs. The high cost of alternative fuels which are typically over 3 times that of natural gas, currently prohibit manufacturers from fuel switching.
- **Infrastructure** – Most sites would need to upgrade their connection for hydrogen and electricity.
- **Compatibility with future technologies** – Up to 2050, new technology will be introduced, and it is essential compatibility is considered and incorporated if possible.
- **Technical feasibility** – Many glass manufacturing sites have limited space for additional saving technologies, and it is essential new processes, fuels and materials are trialled before they can be utilised on a full-scale manufacturing site.
- **Large scale demonstration** – New technology, materials and fuels must be trialled at full production scale.
- **Security of supply** – There is uncertainty over the long-term availability of biofuels. Availability may be affected by increased use of biofuels in other industries such as aviation and transport.
- **Availability of fuel** – Hydrogen is initially planned to be available in a small number of industrial clusters. Initially only a few glass sites which are located close to these clusters will be able to use hydrogen.
- **Availability of alternative raw materials** – Any new material would need to be available in sufficient quantities with no interruption in supply. There may be competition from other foundation industries for supply. The composition of such materials can be variable and new technical solutions are required to address such challenges.
- **Availability of cullet** – There is a shortage of good quality cullet for glass manufacturers to maximise the CO₂ saving.
- **H&S** – New fuels and materials will impact on H&S risks and mitigation controls on production sites and will need to be considered.
- **Education** – There remains a lack of public awareness around the value of closed loop recycling compared to low value recycling such as glass being 'recycled' as aggregate. There is also a perception in the construction and demolition industries of glass being difficult to recycle.

Section	Policy recommendations
<p>Energy costs HIGH priority</p>	<ul style="list-style-type: none"> • Establish a funding mechanism to support operational, as well as capital costs associated with switching to low carbon fuels such as hydrogen, biofuels, and electricity (CCC recommendation). • Reform electricity pricing to reflect the much lower costs of supplying low carbon electricity in the mid-2020s and beyond (CCC recommendation). • The design of policies to reduce UK manufacturing emissions must ensure that it does not damage UK manufacturers' competitiveness and drive manufacturing overseas. (CCC recommendation) • In the near term, taxpayer funding or innovative financial schemes should be used to support deep decarbonisation in manufacturing sectors at risk of carbon leakage (CCC recommendation). • Clear long-term policy to support industrial decarbonisation and protect UK manufacturers from the risk of carbon leakage (CCC recommendation).

Barriers and policy recommendations

Section	Policy recommendations		
Energy costs HIGH priority	<ul style="list-style-type: none"> • Clear policy which allows first movers using higher priced low carbon fuels to remain competitive. • Ensure all EIs (including glass) are exempt from policy costs on natural gas to protect against carbon leakage. 		
Energy infrastructure HIGH priority	<ul style="list-style-type: none"> • Upgrade and future-proof electricity capacity and networks to enable electrification of glass manufacturing. • Support for upgrading site electricity connections for electrification of glass manufacturing. • Ensure that the Biomass Strategy reviews address concerns over availability and sustainability of biofuels. • Ensure that hydrogen infrastructure allows non-clusters connections by 2035. 		
Decarbonisation technologies MEDIUM priority	<ul style="list-style-type: none"> • Continue support for deep decarbonisation innovation projects. • Establish funding for large scale industrial demonstration projects which covers additional OPEX costs as well as CAPEX. 		
Circular economy HIGH priority	<table border="0"> <tr> <td style="vertical-align: top;"> <p>Container glass</p> <ul style="list-style-type: none"> • Improve consistency across UK glass recycling. • A new reformed extended producer responsibility for packaging. • A new remelt target for obligated producers of glass. • Obligations on businesses across the UK to recycle a core set of dry recyclables including glass. • Continued innovation in the recycling system to reduce losses to a minimum and increase yields of glass available for remelt. • Exclude glass from the upcoming UK wide deposit return schemes. </td> <td style="vertical-align: top;"> <p>Flat glass</p> <ul style="list-style-type: none"> • Recycling of flat glass written into public sector contracts. • Boost to collection infrastructure for flat glass to improve quality and increase flat glass recycling. • Regulate for flat glass recycling – there is a duty of care in the UK for waste handlers to prioritise high value recycling – this must be upheld. • A landfill tax that incentivises flat glass recycling. • Reformed building regulations on design for end of life to increase recycling of flat glass. • Raising awareness of the circular options within the construction industry. </td> </tr> </table>	<p>Container glass</p> <ul style="list-style-type: none"> • Improve consistency across UK glass recycling. • A new reformed extended producer responsibility for packaging. • A new remelt target for obligated producers of glass. • Obligations on businesses across the UK to recycle a core set of dry recyclables including glass. • Continued innovation in the recycling system to reduce losses to a minimum and increase yields of glass available for remelt. • Exclude glass from the upcoming UK wide deposit return schemes. 	<p>Flat glass</p> <ul style="list-style-type: none"> • Recycling of flat glass written into public sector contracts. • Boost to collection infrastructure for flat glass to improve quality and increase flat glass recycling. • Regulate for flat glass recycling – there is a duty of care in the UK for waste handlers to prioritise high value recycling – this must be upheld. • A landfill tax that incentivises flat glass recycling. • Reformed building regulations on design for end of life to increase recycling of flat glass. • Raising awareness of the circular options within the construction industry.
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Glass products can help to decarbonise other sectors MEDIUM priority	<ul style="list-style-type: none"> • Update building regulations for new builds and refurbishments for domestic and non-domestic buildings to be mandated to install the best available glazing products (B standard EPR as a minimum or 1.4 U value). • The public building sector to lead the way by specifying high efficiency glazing products via the public sector decarbonisation fund. • Ensure that British Glass and the Glass and Glazing Federation are included in stakeholder plans for the Social Housing decarbonisation fund, public sector decarbonisation scheme and the future homes standard. • Ensure that UK manufactured glass fibre is used in the manufacture of UK windfarms. 		

For further information visit www.britglass.org.uk or contact:

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