# A Clear Future

## UK glass manufacturing sector decarbonisation roadmap to 2050

Summary


Architect: 3DReid
Photographer: Len Grant

In 2013, this building received the highest score ever awarded in a BREEAM sustainability assessment.

## Our key messages:

### Decarbonisation must be sustainable.

The challenge is to create a low-carbon AND economically prosperous manufacturing sector which ensures greater environmental protection.

### Glass is a solution for a low-carbon economy.

UK glass manufacturers operate using world class environmental, social and quality standards. Glass products, including energy efficient glazing and wind turbines, save energy and $CO_2$. Glass packaging preserves food for longer, reducing waste, and glass is infinitely recyclable.

### Positive collaboration is key to finding powerful and practical solutions.

The glass industry, policy makers, consultants, academics and others need to work together to solve environmental challenges.

Contact us to discuss your ideas and studies.

# Glass is a solution for a sustainable, low-carbon economy

**Social benefits** – 6500 people directly employed, 45 000 more downstream. UK glass companies operate to world class employee and product standards.

**Economic benefits** – £1.3 billion value to UK economy (sales revenue).

**Environmental benefits** – UK glass companies operate to world class environmental standards.

IF ENERGY EFFICIENT GLAZING IS INSTALLED IN A BUILDING, IT WILL SAVE MORE ENERGY IN LESS THAN A YEAR THAN WAS REQUIRED TO PRODUCE THE GLASS.

GLASS IS USED TO MAKE SOLAR PANELS WHICH GENERATE RENEWABLE ELECTRICITY.

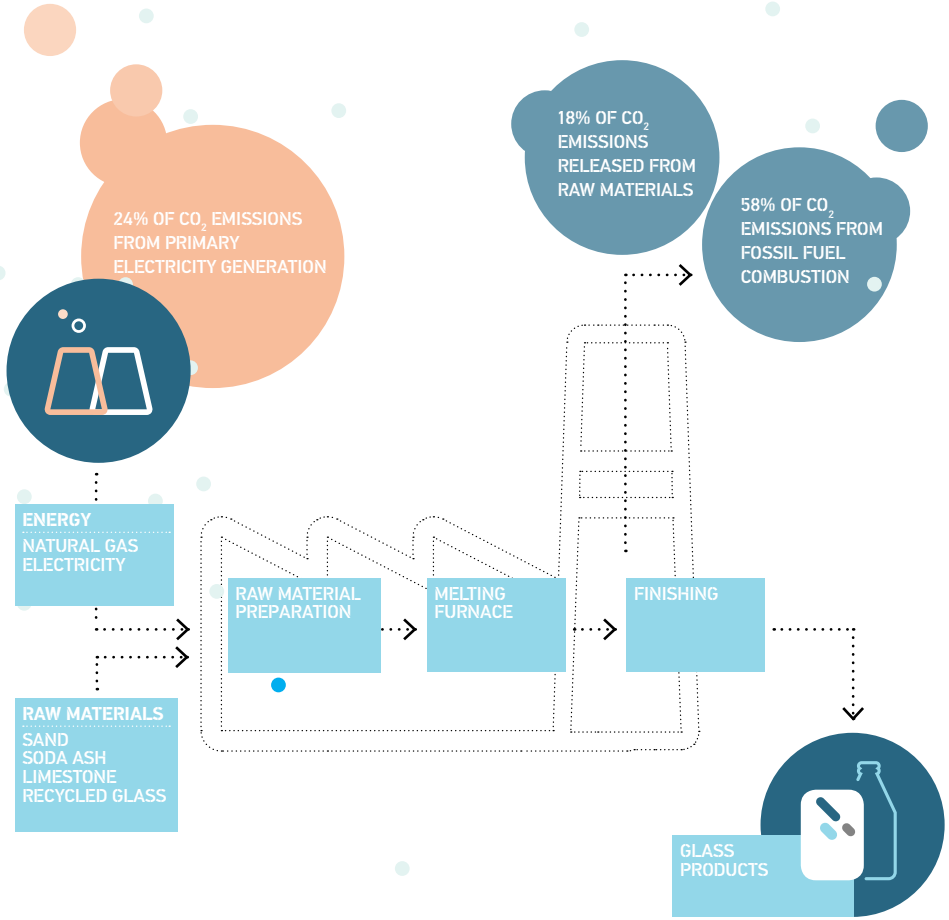
LIGHTWEIGHT BOTTLES SAVE TRANSPORT FUEL. GLASS PACKAGING PRESERVES FOOD FOR LONGER, REDUCING WASTE, AND GLASS IS ENDLESSLY RECYCLABLE.

Glass Products save energy, $CO_2$ and reduce waste

CONTINUOUS FILAMENT GLASS FIBRE IS A KEY COMPONENT OF WIND TURBINES WHICH CURRENTLY GENERATE 5% OF THE UK'S RENEWABLE ENERGY.

LIGHTWEIGHT WINDSCREENS AND FIBRE GLASS PARTS IMPROVE THE FUEL EFFICIENCY OF VEHICLES.

# $CO_2$ from glass manufacturing




**Key Statistics (per year)**

| |
|---|
| 3 million tonnes of glass manufactured in the UK. |
| 9 GWh energy (primary) used to make glass. |
| 2 million tonnes $CO_2$ emissions.<br>2 million tonnes $CO_2$ is produced by just over 1% of UK motor vehicles each year. |

# Environmental improvements achieved so far

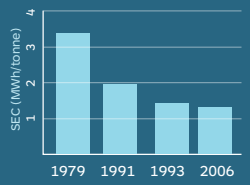
## RECYCLING

47% of container glass collected for recycling in the UK in 2012 was transformed into new glass. We are striving to further increase this.

In 2012, the average recycled content of UK made bottles and jars was 32%.

The UK glass industry set up the first bottle banks in 1977. Over 25 billion bottles and jars have been collected since.

## ENERGY CONSUMPTION




Carbon Trust analysis of UK container glass furnace melting efficiency.

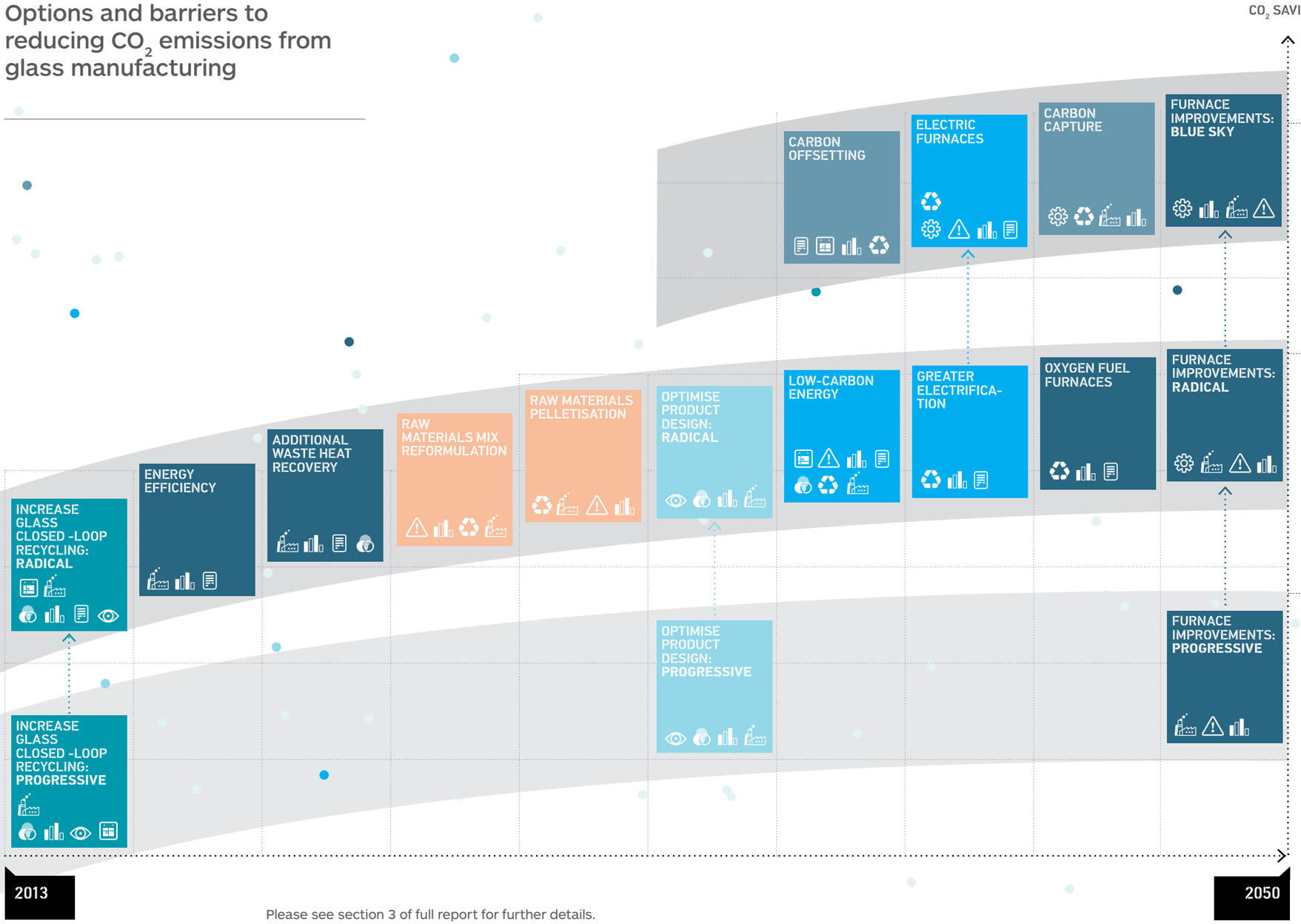
The efficiency of glass furnaces has been improved by 54% since 1979.

2014

## EMISSIONS REDUCTION

In the last decade, glass makers have installed additional pollution abatement equipment to further improve air quality.

# Options and barriers to reducing $CO_2$ emissions from glass manufacturing




Please see section 3 of full report for further details.

## Key to Barriers

- TECHNICAL ISSUES / SITE SUITABILITY
- COMMERCIAL RISK
- FINANCIAL VIABILITY
- UNPROVEN TECHNOLOGY
- POLICY
- COLLABORATION
- AESTHETIC AND QUALITY REQUIREMENTS
- AVAILABILITY
- LIFE-CYCLE ENVIRONMENTAL IMPACT TO BE DETERMINED

**TO IMPLEMENT: STEP CHANGES REQUIRED IN TECHNOLOGY AND OTHER AREAS**

**TO IMPLEMENT: IDENTIFIED BARRIERS MUST BE OVERCOME. POLICY SHOULD SUPPORT POSITIVE CHANGE AND AFFORDABLE, LOW-CARBON ENERGY**

**CURRENT TRAJECTORY**

## Example

FURNACE IMPROVEMENTS: PROGRESSIVE

→ $CO_2$ REDUCTION OPTION

→ BARRIERS TO IMPLEMENTATION [SEE KEY]

# Description of $CO_2$ reduction options

**RECYCLED GLASS:**

**INCREASE GLASS CLOSED-LOOP RECYCLING:** Improving the quantity and quality of glass recycled in the UK to increase recycled glass available for making new glass. Each tonne used to make new glass saves 322 kWh energy and 246kg $CO_2$.

**ENERGY:**

**LOW-CARBON ENERGY:** Use of low-carbon fuels such as biogas and electricity from renewable sources.

**GREATER ELECTRIFICATION:** Utilising electricity instead of gas could reduce $CO_2$ if electricity was decarbonised.

**ELECTRIC FURNACES:** Use electricity instead of gas to melt raw materials to improve efficiency.

**RAW MATERIALS:**

**RAW MATERIALS MIX REFORMULATION:** Modifying the composition of glass to reduce melting energy requirement e.g. adding lithium.

**RAW MATERIALS PELLETISATION:** Each pellet contains the correct proportion of mixed, powdered raw materials in close contact improving efficiency.

**PROCESS TECHNOLOGIES:**

**ENERGY EFFICIENCY:** Improving efficiency in all areas of operation.

**ADDITIONAL WASTE HEAT RECOVERY:** Use of residual waste heat to generate electricity and pre-heat raw materials.

**OXYGEN FUEL FURNACES:** Burning fuels in oxygen instead of air to improve the efficiency of the furnace.

**FURNACE IMPROVEMENTS:** Evolutionary and revolutionary modifications to furnaces to improve energy efficiency.

**PRODUCT DESIGN:**

**OPTIMISE PRODUCT DESIGN:** To further reduce material required or facilitate recycling.

**OTHER:**

**CARBON CAPTURE:** Emerging technology which separates $CO_2$ from other exhaust gases to be utilised or permanently stored.

**CARBON OFFSETTING:** A carbon offset is a reduction in emissions in one area, made in order to compensate for an emission created elsewhere e.g. planting trees to compensate for $CO_2$ emitting activities. Offsetting should be considered in addition to direct reductions.

# Roadmap to a prosperous and low-carbon glass manufacturing sector in 2050

## 1 Lead The Way

**FOR THE GLASS SECTOR:**

Lead the way and create proactive strategies to adapt to environmental needs and legislation. Glass sector employees are the foremost experts on glass and are the best people to lead changes in the sector.

**FOR POLICY MAKERS:**

**Decarbonisation must be sustainable.** Policies should not make it more difficult for UK businesses to compete with imported goods which may be manufactured with lower environmental and labour standards.

**Support progressive UK manufacturing sectors** to generate large social and economic benefits and lead the world in environmental best practice.

**FOR THE GLASS SECTOR, POLICY MAKERS, OUR SUPPLY CHAIN, CONSULTANTS, ACADEMICS AND OTHERS:**

**Positive collaboration is key to finding powerful and practical solutions to environmental challenges.** The glass industry wants to be involved in the search for solutions. The industry can provide ideas, appropriate data, expert advice and are best placed to lead change. Contact the British Glass environmental team to discuss.

## 2 Create Delivery Structures

**FOR THE GLASS SECTOR:**

**Planning: Create clear, practical plans** such as long-term sector R&D and technology plans.

**Research & Development (R&D): Create a framework to enable R&D to be carried out**. Options include a centre of glass research and a glass knowledge transfer network. A successful example is 'The Advanced Manufacturing Research Centre' which is used by aerospace companies to develop and test ideas.

**Funding:** Identify and put in place funding to support industry plans for R&D and innovation.

**Training & Skills:** Fully utilise training provided by the Glass Academy (such as 'making the business case for energy efficiency improvements') and establish a training centre for the UK glass sector.

**FOR POLICY MAKERS:**

**Design funding streams** to support innovation and R&D in energy intensive sectors.

## 3 Carry out Research and Development

**FOR THE GLASS SECTOR:**

**Carry out R&D.** See recommendations in section 3 of the full report for identified research areas.

**Explore the viability of setting up a large-scale demonstration facility** to prove existing and new technologies, to reduce risk and encourage uptake.

**FOR POLICY MAKERS:**

**Carry out studies** which could benefit the wider manufacturing sector. See full roadmap report for a list of required studies.

## 4 Communicate, Collaborate, Implement

**FOR THE GLASS SECTOR**

**Promote** the environmental, social and economic benefits of glass and glass products.

**Strengthen dialogue** with government and others on environmental issues. Find out what information they need and what areas they are interested in. Inform and support.

**FOR POLICY MAKERS, OUR SUPPLY CHAIN, CONSULTANTS, ACADEMICS AND OTHERS:**

**Enable positive change** through supportive policies such as encouraging more closed-loop glass recycling to save large quantities of energy and $CO_2$, expanding the enhanced capital allowances and improving energy efficient building and automotive standards.

A E CHAPMAN & SON LTD / AEGG / AFT (UK) LTD / ALLGLASS REPROCESSORS LTD / ALLIED GLASS CONTAINERS LTD / APOLLO FURNACES LTD / ARDAGH GROUP / BEATSON CLARK PLC / BERRYMAN (REUSE COLLECTIONS LTD) / BFBI / BOC LTD / BUCHER EMHART GLASS SA / CORDSTRAP LTD / CROXSONS / CUMBRIA CRYSTAL / DAEDALIAN GLASS DESIGN / DARTINGTON CRYSTAL LTD / DIAGEO / DISMATEC LTD / GB CULLET / GLASS RECYCLING (UK) / GLASS WORLDWIDE / GRAPHOIDAL DEVELOPMENTS LTD / GUARDIAN INDUSTRIES UK LTD / HANSON CEMENT (HEIDELBERG GROUP) / HUNPRENCO PRECISION ENGINEERS LTD / LG OPTICAL (MFG) LTD / LONGCLIFFE QUARRIES LTD / MAGMA CERAMICS AND CATALYSTS / NAZEING GLASS WORKS LTD / O-I MANUFACTURING UK LTD / OMYA UK / PARKINSON SPENCER REFRACTORIES LTD / PILKINGTON GROUP LTD / PLOWDEN & THOMPSON (A DIVISION OF ET ENTERPRISES) / POTTERS EUROPE LTD / POULTEN & GRAF LTD / PPG INDUSTRIES (UK) LTD / PQ SILICAS (UK) LTD / QUARTZ BUSINESS MEDIA LTD / QUINN GLASS IRELAND / QUINN GLASS UK / REGINA INDUSTRIES LTD / REUSE GLASS UK LTD / RIO TINTO / S MURRAY & CO LTD / SAINT GOBAIN GLASS UK / SCILABWARE LTD / SIBELCO / SIEMENS INDUSTRY AUTOMATION / STEVENSON REEVES LTD / STOELZLE FLACONNAGE / TATA CHEMICALS EUROPE / THE INSTITUTE OF VITREOUS ENAMELLERS / VIRIDOR LANCOTTS LANE / WHEATON UK LTD /

With thanks to our member companies and other stakeholders who helped to build this roadmap.

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See full technical roadmap report here
www.britglass.org.uk/decarbonisation-roadmap

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