Department for Business, Energy & Industrial Strategy

British Glass

Glass Sector

Joint Industry - Government

Industrial Decarbonisation and Energy Efficiency Roadmap Action Plan

October 2017

JOINT ACTIONS TO DELIVER THE 2050 DECARBONISATION ROADMAPS

Foreword from the Minister of State

With industry representing nearly a quarter of UK emissions, helping industrial sectors decarbonise and improve their energy efficiency is a crucial part of our Clean Growth Strategy for meeting the UK's legally binding Carbon Budgets. It will also be essential for achieving the Industrial Strategy's aims of reducing business energy costs, improving industrial productivity and competitiveness, and driving clean economic growth.

Globally, investment in clean technologies is rising while costs fall. Against this backdrop, few countries have been more successful than the UK in growing their economy while reducing emissions – cutting UK emissions by over 40 per cent[1] while growing the gross domestic product of the overall UK economy by 67 per cent[2]. In parallel the UK has been improving energy security, creating jobs and realising export opportunities from the new industries and companies that have been created.

The Industrial Decarbonisation and Energy Efficiency Roadmaps project is a key collaboration between Government and industry to help industry make the low carbon transition while also maintaining its competitiveness. The publication of this action plan is an important milestone for the project, as it identifies commitments from all parties to enable the glass sector to decarbonise and improve its energy efficiency. These commitments build on the potential identified in Phase 1 of the Industrial Roadmaps project, which provided an evidence base of the carbon savings industry could expect to make in different decarbonisation scenarios.

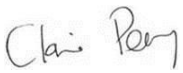
The actions in this plan would not have been possible without such strong and constructive input from the glass sector so I would like to extend a huge thank you to them for helping us get this far. They are voluntary but provide an important framework for future decarbonisation and energy efficiency improvements, all the way up to 2050. They cover specific technological solutions such as industrial heat recovery and fuel switching, and also wider themes such as innovation, skills development and investment which are all key pillars of the Industrial Strategy.

The identification and publication of these actions is not the end of the Industrial Roadmaps project. All parties are committed to working together to implement this action plan, while also meeting future decarbonisation challenges and opportunities as the landscape evolves. So its publication is in many ways a starting point to build on for further collaborative working, as well as a key project milestone in its own right. By building on the collaborative way of working that has been so effective so far, we will

[1] Provisional 2016 emissions: BEIS provisional UK emissions statistics 1990-2016: https://www.gov.uk/government/statistics/provisional-uk-greenhouse-gas-emissions-national-statistics-2016

[2] Office for National Statistics, 2017, ABMI GDP series,1990-2016: https://www.ons.gov.uk/economy/grossdomesticproductgdp/timeseries/abmi/pgdp

ensure this Action Plan makes a significant contribution to the Industrial Strategy's aim of delivering clean economic growth, and that it maximises the economic benefits from the UK's transition to a low carbon economy.



Claire Perry
Minister of State for Climate Change and Industry

Industry Foreword

Glass already makes a significant contribution to building a sustainable society – for example through developing high performance glazing, light-weighting of products and, most significantly, being a 100% recyclable material that meets circular economy principles.

Our industry appreciates the global need to reduce carbon emissions, including improving the resource and energy efficiency of glass products at every stage – from raw materials and manufacturing right around the loop to recycling. This isn't just environmentally responsible – it's good business sense – and we aspire to reducing emissions in a way that meet our primary business goal of competing successfully in an international market.

Indeed, improving resource and energy efficiency are longstanding competitive priorities for the glass sector, and through continuous improvement we have already seen:

- 50% increase in the energy efficiency of UK glass furnaces over in the past 40 years[3]
- increase to 37% average recycled content in UK-made glass packaging[4]
- millions of pounds worth of investment in waste heat recovery for UK plant from two multinational glass companies in the past three years.

British Glass and its members have welcomed government engaging with us to develop this decarbonisation action plan through genuine partnership and collaboration. For these planned actions to be realised, and translated into real improvement, it is essential that three key parties fulfil their roles.

- Government to work in partnership with industry stakeholders to develop a supportive policy landscape by providing continuity in communication and points of contact with the Department of Business, Energy and Industrial Strategy and continue discussions on access to finance, skills, uptake of existing technologies and innovation.
- British Glass to facilitate development of the necessary evidence, skills and relationships between stakeholders.
- UK glass manufacturers to play their part by actively engaging with the most relevant action plan activities to their companies, and using the emerging learning and opportunities to guide their strategic decision making and investment.

[3] Report ECG027 Energy use in the Glass Container Industry, Carbon Trust, 2005
[4] Recycling content fact sheet http://www.britglass.org.uk/publications/recycled-content-fact-sheet

The challenges of industrial energy efficiency and decarbonisation include structural, policy and practical interventions that are beyond the power of any individual company or sector. That's why we urge government to continue its support of the cross-sectoral shift in operating conditions and thinking that is vital for industry to succeed in the coming decades. This includes government ensuring:

- additional support for energy efficiency to bring the best available technologies to UK operations
- long-term regulatory stability against which investments can be made
- secure energy supplies at competitive prices
- support schemes are long-term and cover all affected installations
- any targets set are realistic and achievable
- support for the development of markets for lower-carbon products
- policy making that better accounts for embedded carbon in imported goods
- further development of training schemes to provide suitably skilled staff
- circular economy concepts are adopted to maximise resource efficiency
- the planning system is reviewed to ensure investments in efficiency can be effectively delivered.

By making this country an attractive home for glass companies transitioning to lower-carbon production, the government can help UK manufacturing to remain viable. Given that UK glass factories are among the cleanest and safest in the world – production moving overseas would not only cause the UK to lose jobs, skills and investment – it would potentially increase global carbon emissions.

In developing this action plan the UK glass industry has come together and shown its ambition to be at the forefront of a shift in thinking and operating that is vital for industry to decarbonise and prosper in the coming decades.

I believe we have, in this action plan, a powerful blueprint for achieving change which is specific, practical and solution-focussed. British Glass is wholly committed to playing its part helping government and the industry and we look forward to continuing collaboration to build a sustainable and flourishing glass manufacturing sector, fit for the UK.

Dave Dalton
CEO, British Glass

Pledge

We the undersigned agree in principle to actively participate in a voluntary collaboration to further improve the energy efficiency of UK glass production at challenging levels, in order to reduce carbon emissions and improve the long term competitiveness of the industry. We also agree to acknowledge the contribution that glass products make towards decarbonising the economy. This collaboration will include the UK government, UK glass manufacturers, British Glass Manufacturers' Confederation and other key stakeholders, as outlined in the 'UK Glass Decarbonisation and Energy Efficiency Action Plan.

British Glass

Department for Business, Energy & Industrial Strategy

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The parties named in this action plan support the actions attributed to them, but have not made a legally binding commitment to fulfil those actions.

1. Introduction and Policy Overview

In 2015 the world committed to the historic Paris Agreement which saw 195 countries commit to take action to reduce emissions. This Agreement included the goal of keeping the global mean temperature rise to well below two degrees, whilst pursuing efforts to limit temperatures rises to less than 1.5 degrees. Additionally, the Agreement enshrines a goal of net zero greenhouse gas emissions in the second half of this century. The UK is already playing its part in delivering the Paris Agreement through its domestic climate framework. This framework includes the UK Climate Change Act which sets a target to reduce greenhouse gas emissions by at least 80% by 2050, against 1990 levels. To do so, the UK needs to move to a more energy efficient, low-carbon economy whilst also ensuring a thriving and internationally competitive industrial sector.

As part of the UK's commitment to the Act the government is required to publish a plan which sets out how the UK will decarbonise its economy through the 2020s. For industrial sectors, this plan draws on the collaborative work of the 2050 Industrial Roadmaps project and these Action Plans. The UK has already successfully reduced its territorial emissions by 38%[5] since 1990 while growing the overall economy by over 60%. Industrial carbon emissions including those from energy-intensive industries (EIIs) have halved since 1990, which has mainly been due to efficiency gains, fuel switching, a change to industrial structure of the UK and re-location of production overseas.

However, more will need to be done, and it is a shared challenge for Government and industry to realise not only these emissions savings but also the industrial opportunities of the transition to a clean economy. These emissions savings will be predominately achieved by the eight industrial sectors that currently emit approximately two thirds of industrial carbon emissions: cement, ceramics, chemicals, food & drink, glass, iron & steel, oil refining, and pulp & paper. These sectors make a significant contribution to our economy, employing around 2% of the UK's workforce - often in regions of high relative deprivation - and making up approximately 18% of our exports[6].

The glass sector

The UK glass sector produces over 3 million tonnes of glass per year, and is an essential part of the supply chain for many of the country's most important manufacturing sectors including food and drink, construction, renewable energy and the automotive sector. Container glass, mainly bottles and jars, accounts for around 60% of all UK glass production, whilst glazing for the construction and automotive industries accounts for a further 30%. The remaining 10% of glass manufacture consists of fibreglass and special glasses (lighting, oven hobs, optical, medical and scientific uses). The total value of all glass sectors to the UK economy is estimated to be over £1.3 billion[7]. The sector is

[5] Meeting Carbon Budgets – 2016 Progress Report to Parliament – Committee on Climate Change – June 2016 - https://documents.theccc.org.uk/wp-content/uploads/2016/06/2016-CCC-Progress-Report.pdf
[6] Statistics derived from ONS data on exports and workforce
[7] Prodcom sales figures, 2015, Office of National Statistics

concentrated in North East England, North West England and Scotland, and consists of thirteen large manufacturers and a number of smaller specialist companies. Around 6,000 people[8] are employed by the sector in a range of highly skilled roles, and the sector contributes to maintaining a large number of indirect jobs in downstream sectors including construction, packaging, wind turbine manufacturing and lab and scientific equipment.

The sector is highly dependent on the industry trends affecting its primary customers. During the recession, demand for flat glass fell sharply due to contraction of the construction industry. However, the construction sector has since stabilised and demand for flat glass is expected to grow at around 3.7% annually between 2014 and 2019[9]. In the container glass sector, long term growth prospects depend on the continued ability of bottle and jar manufacturers to compete against alternative packaging materials. The growth of sectors including wind energy, electronics and bathroom industry will affect the growth prospects of the fibreglass sector.

Energy use and environmental context

Glass manufacturing is an energy intensive sector, with high temperature melting furnaces accounting for around 85% of the fossil fuels used on site. Most furnaces are fired with natural gas and are used to melt raw materials including sand and limestone. Electricity is used to run other equipment and sometimes to supplement the furnace. Glass factories emitted 2.2 million tonnes of CO_2 in 2012[10]. Because energy purchasing represents a significant cost to the sector, it has worked hard to improve energy efficiency and over the past three decades, energy consumption per tonne of glass produced has halved to 1.47 MWh[11].

Although energy is required to manufacture glass, many glass products save energy and carbon in use. For example, energy efficient double glazed windows save more energy in homes and buildings than is required to manufacture the glass. Glass packaging is designed to reduce food waste, and continuous filament fibre glass is a key component for manufacturing wind turbines. Hence, glass manufacturing results in emissions from the factories, but glass products are also a solution to reduce emissions in the wider economy.

Further engagement

There is therefore substantial scope for collaboration between industry, government and others to take steps in the short term that could enable industry sectors to make deeper

[8] British Glass (unpublished data)
[9] Industrial Decarbonisation & Energy Efficiency Roadmaps to 2050 – Glass - https://www.gov.uk/government/publications/industrial-decarbonisation-and-energy-efficiency-roadmaps-to-2050 (p.11)
10 Industrial Decarbonisation & Energy Efficiency Roadmaps to 2050 – Glass - https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/416675/Glass_Report.pdf (p. 10)
[11] http://www.britglass.org.uk/industry

emissions reductions over the longer term while staying competitive. The first phase of the Industrial Decarbonisation and Energy Efficiency Roadmaps to 2050 show that deep decarbonisation of EIIs is achievable, however, there are significant barriers, including cost; economic, business and policy uncertainty; knowledge and skills and access to finance.

Following publication of the Roadmaps, Government and British Glass have now agreed this Action Plan that sets out voluntary commitments that each party will undertake to enable the glass sector to make deeper emissions reductions over the longer-term while staying competitive.

The merger of the business and energy portfolios under the Department for Business, Energy and Industrial Strategy is a significant opportunity to develop cohesive policies for all UK businesses. This will be vital in driving long term growth and productivity in the UK. The department will ensure that the economy grows strongly in all parts of the country, based on a robust industrial strategy and that the UK has secure energy supplies that are reliable, affordable and clean. It will encourage investment and innovation that fully utilises the UK science base; and enable a whole economy approach to deliver the UK's climate change ambitions.[12]

Engagement in Scotland

The Scottish Government and its agencies are working with the glass sector to support progress against the key policy objectives of decarbonisation, energy efficiency and circular economy contained in the Scottish Manufacturing Action Plan. Scottish Enterprise has supported furnace rebuilds, achieving energy reduction through the economic development route. As part of 'Making Things Last – A circular economy strategy for Scotland', the Scottish Government is working to improve the quality and quantity of glass reprocessed in Scotland by harmonising Local Authority collections under the Household Recycling Charter and amalgamating contracts for the sale of glass cullet through the Scottish Materials Brokerage Service.

[12] Nick Hurd, Minister of State for Climate Change and Industry, 04 August 2016 - https://www.parliament.uk/business/publications/written-questions-answers-statements/written-question/Commons/2016-07-11/42339/

2. Actions

2.1 Action 1: Create a leadership group tasked with reducing energy and carbon in the UK glass sector to ensure that the industry is fit for the future.

- Industry and the trade body in the glass sector will provide leadership on decarbonisation through the creation of a leadership group, whose remit will be to implement the action plan, act as a communication channel between British Glass, industry and other stakeholders, and oversee and inspire activities dedicated to the adoption of leading edge technology, innovation and skills development.
- The objective of this action is to provide a platform through which companies will lead and oversee the delivery of the agreed sector initiatives and align their decarbonisation strategies with the overall sector vision outlined in this action plan where appropriate. It will also provide the leadership to assist in understanding and attempting to manage concerns around intellectual property and competitiveness issues. In doing so, the Leadership Group will need to take into account the fact that R&D and Board level decision making is mostly outside the UK.
- Although this action will be started in the short-term, it must continue in the long-term throughout the period of this plan to ensure that the priorities of decarbonisation, energy efficiency and competitiveness in the sector are maintained.
- This action underpins all the actions in the plan.
- As this is the key enabler for all other actions in this plan, implementation will drive all subsequent decarbonisation actions to reduce carbon emissions and lower energy costs. Its impact cannot be quantified in isolation; however, it will be central to achieving the reductions identified in the rest of the plan.

Action 1 tasks

Task 1A: Create a 'Glass Leadership Group' to drive energy and carbon reduction activities in the sector.

This will include appropriate representatives from glass manufacturers, British Glass, the UK government and Devolved Administrations, academia, the glass supply chain, customers and other stakeholders.
Responsibilities include:

- Agree terms of reference
- Prioritising actions
- Defining the boundaries of where companies can collaborate
- Identifying resources such as staff time, in-kind contributions, and public and private sector funding.
- Agreeing sector level strategy and absorbing this into company level and government strategy where appropriate.
- Setting a strategic direction for communications with external stakeholders including glass customers, government departments, innovation bodies, academia and skills bodies.
- Engaging with other Energy Intensive Industry (EII) sectors individually and through existing government and industry led groups such as the EII Stakeholder Forum, Manufacturers' Climate Change Group (MCCG) and Energy Intensive Users' Group (EIUG) to maintain a cross-sectoral focus to the 2050 Roadmaps.
- Improve understanding of best practice in other sectors and other countries on planning and adapting for a sustainable future by exploring priority areas identified by the leadership group
- Provide input into the Industrial Strategy and other policy initiatives as they emerge

Task Owner: British Glass

Timing: 2018 and onwards

Task 1B: Deliver actions which have been prioritised by the Glass Leadership Group

The Leadership Group will consider the actions identified in this plan, as well as other ideas that may arise, and prioritise actions and tasks. Other relevant groups, such as the Glass energy & environment committee, may be involved. The Leadership Group will endeavour to deliver all actions, but implementation is subject to prioritisation and adequate resources being available at the relevant time.

Task Owner: Glass Leadership Group

Timing: 2018 - 2020

Task 1C: Assign a point of contact for the glass sector within BEIS to help drive the implementation of the action plan and to continue collaborative working dialogue between government and industry on decarbonisation and energy efficiency activities.

Responsibilities include:

- Acting as a link between industry and government departments
- Engaging with the action plan leadership and working groups
- Providing industry with constructive challenge
- Giving advance notice of upcoming work
- Seeking input from industry experts for practical solutions
- Seeking input from industry to continually improve the effectiveness of studies carried out by consultants

Task Owner: BEIS

Timing: 2017 - 2018

2.2 Action 2: British Glass and Government to work together to deliver industrial decarbonisation.

- British Glass and Government will work together on a collaborative basis to deliver real and lasting solutions to industrial decarbonisation. This work will involve agreeing a monitoring framework, and feeding into the wider policy agenda where appropriate.
- The objective of this action is to continue encourage constructive, long term engagement between industry and government, actively seeking the views of industry experts in addressing barriers to industrial decarbonisation, whilst at the same time taking account of wider, economic industrial and technological factors.
- Although this action will be started in the short-term, it must continue in the long-term throughout the period of this plan to ensure that the priorities of decarbonisation, energy efficiency and competitiveness in the sector are maintained.
- This action underpins all the actions in the plan.
- Effective implementation will drive all subsequent decarbonisation actions to reduce carbon emissions and lower energy costs.

Action 2 tasks

Task 2A: BEIS and the roadmap sectors to set up a Roadmap Strategy Group to provide an ongoing forum to discuss and review Action Plan delivery.

This group would focus on:

- Review Action Plan delivery, progress and reporting.
- Strategic overview of cross sectoral actions – to cover CCS, Bioenergy, electrification of heat, the proposed Technology Forum, skills and financial support for energy efficiency and decarbonisation investment. Where appropriate, work will be delivered through cross-sectoral working groups.
- Oversee development of future actions to support the objectives of 2050 Energy Efficiency and Decarbonisation roadmaps.

Task Owner: BEIS and industry trade associations

Timing: 2017 - 2020

Task 2B: The roadmap sectors and BEIS to explore the benefits of setting up cross-sectoral working groups on specific issues to help deliver industrial decarbonisation.

Cross sectoral working groups could provide a method for delivering co-ordinated approaches to the cross-cutting technical challenges and enablers such as access to funding, skills and knowledge transfer, where this is appropriate.

Task Owner: BEIS and industry trade associations

Timing: 2017 - 2020

Task 2C: Glass Leadership Group to consider what supplementary information could be reported on its consumption emissions.

- The Glass Leadership Group to explore what data and methodologies consistent with internationally recognised reporting practice could be used to undertake supplementary reporting of consumption emissions for the glass sector.
- Explore whether approaches such as whole life analysis can provide further detail of the role that products which are more energy intensive to produce, but which provide longer term carbon savings over their lifetime, can play in delivering decarbonisation benefits across the whole economy.

Task Owner: Glass Leadership Group, with oversight from BEIS as appropriate.

Timing: 2018 - 2020

Task 2D: BEIS and the roadmap sectors to explore and agree whether there is a need to improve the current government evidence base on costs of delivering decarbonisation in industry

The roadmap cross-sector summary[1] produced at the end of the Phase 1 of the Roadmap process noted that there is a large degree of uncertainty attached to the cost analysis underpinning the research, and that there is therefore a case for further work to investigate and analyse the cost impact of the pathways. This exercise could provide better quality data for modelling decarbonisation scenarios.

This will be taken forward by BEIS working with British Glass and other trade associations. Industry and the supply chain will be requested to provide input.

Task Owner: BEIS and industry trade associations

Timing: 2017 - 2020

Task 2E: As part of the Industrial Strategy, Government will commission a review into meeting our decarbonisation commitments in light of the current energy environment which will inform a long term roadmap to minimise business energy costs.

- Government will commission a review of the opportunities to reduce the cost of achieving our agreed decarbonisation commitments in the power and industrial sectors.
- The review will cover how best to support greater energy efficiency, and how Government can best work with Ofgem to make markets and networks more efficient in a low carbon system (see Industrial Strategy Green Paper).
- The review will inform a long-term road map to minimise business energy costs, which Government will set out during 2017.

Task Owner: BEIS

Timing: 2017 - 2019

[1] Page 13, Section 2.4 Cross-sector summary, Industrial Decarbonisation and Energy Efficiency Roadmaps to 2050, https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/419912/Cross_Sector_Summary_Report.pdf

Task 2F: DEFRA to work with the glass sector, as part of a wider cross-sectoral approach, to develop a collaborative dialogue about the overlap between improving air quality, decarbonisation and competitiveness and explore the feasibility of developing practical and achievable solutions to improving air quality, whilst meeting other priorities such as decarbonisation and maintaining competitiveness (case study at Annex A). Ideas to consider include improving how carbon dioxide is accounted for in air quality decisions, and how air quality impacts are considered in decarbonisation decisions and identifying approaches which will deliver co-benefits to both air quality and decarbonisation. One example where both decarbonisation and air quality should be considered is waste heat recovery / recovered heat technologies.
Task Owner: DEFRA
Timing: 2017 - 2020

Task 2G: Continue to build positive dialogue between government and the glass industry focusing on finding practical solutions to joint challenges. Ideas include: ➢ Organise educational site visits for government staff when required. ➢ Participate in government engagement exercises and maintain regular dialogue with the sector point of contact to be alerted to and prepare for upcoming areas of work. ➢ Focus on proactively gathering evidence, understanding joint priorities and identifying solutions
Task Owner: British Glass
Timing: 2017 - 2020

2.3 Action 3: Increase glass recycling in the UK to improve the supply of recycled glass (cullet) for the production of new glass products.

- The glass sector will work with partners including DEFRA, WRAP and local authority bodies to explore ways of improving the supply of recycled glass for the manufacture of new glass products. In Scotland, the glass sector will work with Zero Waste Scotland and Scottish Enterprise.
- Currently, each local authority takes a different approach to glass recycling, making a coherent national approach extremely difficult to achieve. The availability of waste glass could be greatly increased if all interested parties could work together to develop a strategic approach at national and regional level, and to better understand the needs of glass companies in terms of security of supply, quality and price. Consistency in the collection of glass is included in the Blueprint for Collections in Wales, the Framework for Greater Consistency in Recycling in England and the Scottish Charter so this situation may improve over time.
- Establishing the initial working group to take this forward is a short term action, but developing and implementing the strategy is a long-term action.
- This action links to Action 1 (leadership), Action 2 (engagement with the government) Action 6 (increasing demand for low carbon glass products), and Action 7 (engagement with the supply chain).
- An improved supply of cullet in terms of both quantity and quality (i.e. fewer contaminants in the cullet mix) would enable significant advances in decarbonisation by reducing the energy required to make glass.

Action 3 Tasks

Task 3A: British Glass, working with DEFRA, WRAP, the Scottish Government, Zero Waste Scotland, brands & retailors, and other relevant stakeholders from across the glass packaging life cycle to establish a working group for increasing domestic glass recycling in the UK.

- Working Group to explore how to deliver a supportive environment for increasing glass recycling, through the emerging circular economy agenda.
- Objective is to improve the quantity and quality of recycled glass to maximise closed loop recycling across the whole supply chain.

Task Owner: British Glass

Timing: 2017 onwards

Task 3B: Conduct further research to identify appropriate technical and non-technical research and activities necessary to increase glass recycling, and allocate resources to carry them out.

British Glass, DEFRA, WRAP, Zero Waste Scotland and the glass recycling working group will be involved in delivering this task. Ideas include:

- Conduct a strategic study to identify the opportunities and costs for improving the quality and quantity of domestic glass recycling across UK local authorities.
- Develop a support package for brands and retailers to help educate decision makers to increase recycled content above current levels
- Research and dissemination of best practice in glass collection. For example to reduce the high wear rate of glass collection trucks.
- Identify additional mechanisms to share knowledge and best practice across local authorities to improve recycling.
- Public awareness campaigns to increase recycling using Recycle Now
- Develop best practice methodology and technology to better sample cullet and control contamination.
- Investigate the feasibility of increasing recycling of flat glass streams which are not currently widely recycled, for example window glass, solar panels, fibre glass and windscreens.

Task Owner: Glass Leadership Group

Timing: 2018 - 2020

2.4 Action 4: Increase adoption of the most effective existing energy-efficiency technologies and practices.

- Industry, with support from Government, will set up mechanisms to collaborate across the sector in sharing knowledge on state-of-the-art technology, encouraging best practice in energy efficiency and disseminating information on available funding incentives.
- The objective of this action is to enable glass companies to increase their uptake of carbon reduction and energy efficiency technologies by making it easier for them to access the information and funding for investment.
- This action, which should be initiated in the short term, will generate activities throughout and beyond the period of this plan.
- This action links to Action 1 (leadership on energy efficiency and decarbonisation), Action 8 (funding), Action 9 (skills) and Action 10 (R&D). The link to action 10 is important because it will inform decisions on whether to invest in existing technologies, or wait till better ones are developed.
- The impact of increasing adoption of state-of-the-art technology will be increased energy and/or carbon efficiency, reduced energy consumption and/or carbon emissions and lower overall costs. Reduced energy costs will improve competitiveness, whilst also supporting the wider objective of reducing the UK's carbon emissions.

Action 4 Tasks

Task 4A: Identify the feasibility of improving the uptake of industrial heat recovery (IHR) in the glass sector. ➢ British Glass and industry to promote the uptake of industry site-level feasibility studies to identify the most appropriate IHR technologies ➢ British Glass and industry to engage with BEIS on the development of the cross-sectoral Industrial Heat Recovery Scheme (IHRS) programme in 2017. ➢ In Scotland, continue to work with Zero Waste Scotland's Energy Measurement & Quantification Studies programme where appropriate to map heat flows through processes and identify opportunities for heat recovery. ➢ Industry to carry out site level feasibility studies where appropriate.
Task Owner: Glass manufacturers
Timing: 2017 - 2018

Task 4B: British Glass to identify priority energy and carbon reduction technologies or practices, and support their implementation.
Task Owner: British Glass
Timing: 2018 – 2020

Task 4C: Government, British Glass / the glass sector, academia and others including Innovate UK and Knowledge Transfer Network (KTN) to work together and improve knowledge sharing and exchange of best practice in energy efficiency technologies. KTN, Innovate UK and BEIS, working with trade associations and industry to develop an engagement strategy that identify opportunities for sharing knowledge that will support industry to implement technologies.
Task Owner: Knowledge Transfer Network
Timing: 2017 - 2018

Task 4D: Launch a web portal that facilitates greater industry collaboration by enabling companies in the Glass sector to share information on R&D, best practice, knowledge and access to funding opportunities.

BEIS will develop and launch a website that facilitates greater industry collaboration by enabling companies in the glass sector to share information on research and development, best practice, knowledge sharing and access to funding opportunities. The website will be designed through close engagement with the glass trade association and its member companies to help ensure it meets business requirements.

Task Owner: BEIS, with input from the industry

Timing: 2018

Task 4E: Maintain a portal that enables industry to collaborate and share information.

BEIS will maintain the website (task D) that facilitates greater industry collaboration through the sharing of information on research and development, best practice, knowledge sharing and access to funding opportunities, subject to its annual review (task F).

Owners: BEIS

Timing: Ongoing

Task 4F: Undertake annual reviews of the portal that enables industry to collaborate and share information.

BEIS will be supported by industry to undertake annual reviews of the portal (task C) that facilitates industry collaboration through information sharing to ensure that it continues to be effective, utilised and aligned to business requirements.

Owners: BEIS

Timing: Ongoing

Task 4G: Government to provide a competition note about what information can be shared to improve energy efficiency and reduce greenhouse gas emissions under competition law.

Task Owner: BEIS

Timing: 2017-2018

2.5 Action 5: Explore the feasibility of using lower-carbon energy sources in glass manufacturing.

- British Glass to work with the glass sector and research bodies to improve understanding about opportunities offered by lower carbon energy fuel options, and feasibility of using these options in the sector.
- The objective of the action is to provide easily accessible, relevant information on the emerging opportunities of energy storage, intermittent renewable generation on the network, embedded renewable generation and demand side response, and their feasibility for the glass sector.
- This action begins with short term tasks but extends to long term opportunities.
- This action links to Action 1 (leadership), Action 9 (skills) and Action 10 (R&D)
- Implementation of this action could result in a multitude of benefits including lower carbon emissions due to increased use of renewables, lower energy costs and better matching of supply and demand – boosting the productivity and security of the energy network.

Action 5 Tasks

Task 5A: Identify how best to support effective company level decision making on uptake of lower carbon energy sources such as renewable energy and techniques such as electrification, energy storage, fuel switching and demand side management.
Task Owner: Glass Leadership Group
Timing: 2018-2020

Task 5B: Government and industry to set up a cross-sector group to develop a collective view of the best uses of bioenergy across industry. This group will use existing analytical tools to identify the likely future supply and demand of different bioresources, their costs and their environmental sustainability, such as BEIS's Bioenergy Resource Model and UK land use assessments. The group will be informed by evidence of the role bioenergy could play in the UK's future decarbonisation objectives, and by the emerging findings from the Government's Bioeconomy Strategy regarding the role of bioenergy in the UK's wider bioeconomy, taking into account sustainability considerations such as air quality.
Task Owner: BEIS to facilitate setting up the group, with industry input
Timings: 2017-2019

Task 5C: British Glass to communicate the energy infrastructure and security needs of the glass sector with the Government's industrial strategy consultation process.
Task Owner: British Glass
Timings: 2017

2.6 Action 6: Increase the use of low carbon glass products by removing barriers to adoption and creating market pull.

- Industry and the British Glass will collaborate with government, customers and the value chain to stimulate demand for low carbon products.
- The objective of this action is to improve dialogue with users and customers to identify how continued improvement in the environmental performance of glass products can support the environmental goals of customers. It is also to create more market pull for green products which contribute to creating a low carbon economy.
- The tasks in this action are short term, but they will put in place an effective engagement strategy for promoting low carbon glass products. They will also create a more viable environment for green products.
- This action links to Action 1 (leadership), Action 2 (engagement with the government) and Action 3 (increasing glass recycling).
- Improved communication with customers through an effective strategy for promoting for low carbon glass products will not only increase demand for low carbon glass products, but will also promote the decarbonisation of glass customers, thus supporting the UK's wider decarbonisation goals. Increasing the energy efficiency standards of buildings, and increasing the procurement of green products will save carbon in other sectors while also helping to transition the glass sector into the low carbon economy

Action 6 Tasks

Task 6A: Create a communications strategy to promote the environmental benefits of glass products and recent energy efficient improvements made by the UK glass sector to its customers, government and other key stakeholders. Dialogue should respect competition, and include the glass sector (marketing managers, environmental staff, BG), and key customer groups in both the container and flat glass sectors.
Task Owner: Glass Leadership Group
Timing: 2018 - 2020

Task 6B: Work with the Department for Communities and Local Government (DCLG) to ensure that any future review of Part L of the Building Regulations appropriately takes into account improvements in window energy efficiency. Section L of the Building Regulations specifies the minimum energy efficiency standard ('U' value) for a new window to be used in new and existing properties. Since this standard was set, more highly energy efficient windows have become widely available. There is an opportunity to upgrade this standard to increase the enegy efficiency of buildings.
Task Owner: Glass Leadership Group
Timing: 2018 - 2020

Task 6C: Crown Commercial Service to ensure that all major projects above £10m use the Growth Balanced Scorecard, which allows more straightforward matters such as cost to be balanced against more complex issues such as social and wider economic considerations. This type of approach will help to achieve Government's key objectives, like sustainable economic growth. The Growth Balanced Scorecard enables the taking account of economic, social or environmental considerations in procurement design, technical specifications, award criteria and contract performance conditions linked to the subject matter of the contract, including sustainability and whole life costing of materials.
Task Owner: Government departments
Timing: 2017 - 2020

2.7 Action 7: Increase communication and collaboration with the supply chain

- Industry to work with the pre-factory (such as suppliers of raw materials, equipment, furnaces) and the post-factory supply chain (such as logistics companies) to identify and implement opportunities for energy efficiency and decarbonisation.
- The objective of this action to work with supply chain partners to identify and implement opportunities for energy efficiency and decarbonisation throughout the whole of the glass manufacturing process up to (but not including) delivery to the customer (engagement with customers is covered in Action 6).
- This action will be carried out in the short to medium term.
- This action links to Action 1 (leadership) and Action 10 (R&D).
- Improved engagement across the whole supply chain will enhance the opportunities for new approaches and technologies to fully deliver their potential, and will also ensure that energy efficiency and decarbonisation opportunities are maximised in related sectors.

Action 7 Tasks

Task 7A: Glass Leadership Group to work with equipment suppliers to explore opportunities to increase energy saving and decarbonisation.
Task Owner: Glass Leadership Group
Timing: 2018 - 2020

Task 7B: Glass Leadership Group to work with customers, logistics providers and retailers to explore the potential for increased innovation in transport technology to deliver decarbonisation and energy efficiency.
Task Owner: Glass Leadership Group
Timing: 2018 - 2020

2.8 Action 8: Optimise public and private sector finance to support the uptake of energy-efficiency and decarbonisation activities

- British Glass will work closely with Government to improve sector awareness of the full range of financial incentives and instruments available, and to ensure that any funding programmes align well with sector needs.
- Lack of awareness about existing private sector financial incentives and instruments is often a barrier to the uptake of existing and new technologies. This can be addressed through raising awareness and providing investment options and business case development. There is also a role for British Glass to work closely with the Government to explore the case for further financial incentives and support.
- This action, which is to be carried out in the short term, links to longer term actions around supporting the uptake of existing technologies and the development of new ones.
- This action links to Action 1 (leadership), Action 4 (increasing the uptake of existing technologies) and Action 8 (supporting research and innovation)
- Implementation of this action will enable the deployment of energy efficiency and decarbonisation measures that should deliver reduced carbon emissions and lower energy costs. It may also result in increased investment in energy efficiency and decarbonisation-related technologies for the glass sector.

Action 8 Tasks

Task 8A: Glass Leadership Group to work with BEIS, KTN and other stakeholders to improve industry awareness of existing funding and finance options.

This includes public sector funding, EU funding and third party finance from equipment suppliers.

Ideas include:

- Providing access to funding and finance information through the web portal being developed by BEIS and detailed at Action 8, Task D.
- Arranging training courses on applying for funding for energy efficiency and low carbon projects.
- Identify ways to use existing financial opportunities to de-risk investment in IHR and other existing technologies.

Task Owner: Glass Leadership Group

Timing: 2018 - 2020

Task 8B: BEIS to organise a working group to facilitate dialogue between the finance sector and industry to explore how external finance could be used to support mature energy efficiency and decarbonisation investments, and to overcome the barriers to affordable external finance. The working group will set out its own Terms of Reference, including how frequently it should meet.

Task owner: BEIS (British Glass will lead on encouraging engagement from the glass sector including identifying participants / individual businesses for the group).

Timing: 2017-2021

Task 8C: Glass Leadership Group to work with Government / other Roadmap sectors to engage early with funders and funding programmes to ensure that funding calls meet the needs of the glass sector.

Task Owner: Glass Leadership Group

Timing: Ongoing

Task 8D: To explore the potential for additional technologies, such as burners, process control, industrial boilers, heat recovery etc. which could be included in the Energy Technology List (ETL) to encourage wider investment opportunities through Enhanced Capital Allowances. The Carbon Trust are already doing a study to assess the potential for adding technologies to the ETL.
Task Owner: BEIS
Timing: 2017 – 2020

Task 8E: Introduce Industrial Heat Recovery Scheme (IHRS) to boost industry confidence in and increase the deployment of industrial heat recover technologies: Government to introduce a financial support programme, providing: ➢ Match-funding support for onsite feasibility studies to increase knowledge and understanding of, and identify opportunities for, installation of industrial heat recovery technologies. This will help develop a pipeline of projects, some of which companies can take forward themselves, and some which may be eligible for capital support. ➢ Capital support for industrial heat recovery investments, which have the potential to result in significant energy and carbon savings but which are not commercially viable by themselves.
Task Owner: BEIS
Timing: 2017 – 2021

Task 8F: BEIS to run an Industrial Energy Efficiency Accelerator (IEEA) programme BEIS to run an Industrial Energy Efficiency Accelerator (IEEA) programme which is open to EIIs and worth £9.2m over four years. The accelerator will reduce energy costs for industry by funding the demonstration of close-to-market energy efficiency innovations and their wider roll out across the sector, while leveraging private sector investment.
Task owner: BEIS
Timing: 2017-2021

Task 8G: Government to establish an industrial energy efficiency scheme to help large companies install measures to cut their energy use and their bills.
Task Owner: BEIS
Timings: 2017-2022

2.9 Action 9: Put in place mechanisms to develop skills and share learning

- Industry to work with Government, academia, appropriate skills bodies and others to increase quality and take up of training and development which directly supports the uptake of energy efficiency and decarbonisation technologies and approaches in the glass sector. Any knowledge sharing and exchange of information will be in compliance with applicable competition law.
- The objective of this action is to increase decarbonisation and energy efficiency relevant knowledge and skills within the sector's existing and future workforces to ensure that the uptake of new approaches and technologies are fully supported. This will help increase skills and capabilities in the glass industry as it transitions to a low carbon competitive future.
- This action, which is to be carried out in the short term, links to longer term actions around supporting the uptake of existing technologies and the development of new ones.
- This action is dependent on Action 1 (leadership), Action 4 (increasing the uptake of existing technologies), Action 5 (exploring lower carbon energy sources) and Action 10 (supporting research and innovation)
- Increase in skills and knowledge relevant decarbonisation and energy efficiency will ensure that new approaches and technologies are fully supported. It will also provide the glass sector workforce with the skills and knowledge necessary to make their own improvements to existing processes and technologies.

Action 9 Tasks

Task 9A: Map out the glass sector's decarbonisation and energy efficiency learning needs, and explore how these can be addressed.
Task Owner: Glass Leadership Group
Timing: 2018 - 2020

Task 9B: Glass leadership group to explore with universities the potential of using student placements, sandwich cources and doctoral programmes to carry out activities to help implement energy efficiency projects.
Task Owner: Glass Leadership Group
Timing: 2018 onwards

2.10 Action 10: Increase activity in research, innovation and demonstration.

- The glass sector, led by British Glass, will assess the feasibility of increasing non-competitive research and innovation in the glass sector. British Glass will seek the support of government innovation organisations (BEIS, Innovate UK, KTN) and academia to identify innovation opportunities and build the necessary links with other sectors and organisations to improve or accelerate the market readiness of new technologies. British Glass is currently working with partners and investors to on the 'Glass Futures' project. This aims to create a facility to develop, test and demonstrate innovative technologies for glass, in order to accelerate uptake, and work is currently underway to investigate the financial viability of setting up a pilot scale glass furnace in the UK.
- Innovation adoption risk is often a barrier to developing new energy efficiency and decarbonisation technologies. This action will enable companies to reduce this risk through collaboration across the sector, through engagement with demonstrator projects and also by working with Innovate UK, the KTN and academia.
- This action, which should be initiated in the short term, will generate a series of projects that will run through the medium to long term.
- This action is dependent on Action 1 (leadership) to oversee progress and inspire collaboration. It is also relevant to Action 8 (funding) and Action 4 (increasing uptake of energy efficiency technologies).
- The impact of this action will be increased energy / carbon efficiency, reduced energy consumption, reduced carbon emissions and lower overall energy costs through the development and uptake of innovative new technologies and approaches in the glass sector.

Action 10 Tasks

Task 10A: Glass Leadership Group to produce a report on the feasibility of increasing non-competitive research activity in the sector.
Task Owner: Glass Leadership Group
Timing: 2018 – 2020

Task 10B: The Glass Leadership Group to engage British Glass, the glass sector, BEIS, Innovate UK and research institutions on future innovation priorities for the glass sector, and develop a strategy to address them.
Task Owner: Glass Leadership Group
Timing: 2018 - 2020

Task 10C: Explore the possibility of establishing a demonstrator site for glass sector innovations There are few accessible glass test furnaces in the world. Building a pilot scale glass furnace in the UK would support the adoption of new commercial and pre-commercial technologies by enabling testing without risking disruption to commercial furnaces, and enable this country to become a world leader in glass innovation. The demonstrator site would also provide open research and innovation facility for testing entirely new technologies. The process of determining the feasibility of building a test furnace in the UK has been started by the Glass Futures project.
Task Owner: Glass Futures
Timing: 2017 - 2020

3. GLOSSARY

Term / acronym	Definition
BEIS	Department for Business, Energy and Industrial Strategy
Courtauld Commitment	Voluntary agreement aimed at improving resource efficiency and reducing waste within the UK grocery sector
Cullet	Recycled glass before re-melting
DCLG	Department for Communities and Local Government
DEFRA	Department for the Environment, Food and Rural Affairs
DFE	Department for Education
EII	Energy-intensive industry
EIUG	Energy Intensive Users' Group
ESCO	Energy Service Company
FEVE	European Container Glass Federation
Glass Futures	Project to develop demonstrator site for glass sector innovations
IPGR	International Partners in Glass
IEEA	Industrial Energy Efficiency Accelerator
IHR	Industrial Heat Recovery
IUK	Innovate UK
KTN	Knowledge Transfer Network
MCCG	Manufacturers' Climate Change Group
Ofgem	Office of Gas and Electricity Markets
RHSP	Recoverable Heat Support Programme

Term / acronym	Definition
Refractory	Material that is chemically and physically stable at high temperatures, used in furnaces
WRAP	Waste and Resources Action Programme