Department for Business, Energy & Industrial Strategy

Food and Drink

Joint Industry - Government

Industrial Decarbonisation and Energy Efficiency Roadmap Action Plan

October 2017

JOINT ACTIONS TO DELIVER THE 2050 DECARBONISATION ROADMAPS

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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. 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 food & drink 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 food & drink 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 ensure this Action Plan makes a significant contribution to the Industrial Strategy's aim of delivering clean economic growth,

[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

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

The global food system is set to face unprecedented pressures over the coming decades. Competition for land, water and energy will intensify, with the use of inputs such as water and land already reaching their limits. Perhaps most concerning of all, the effects of climate change will become increasingly apparent and will bring us towards, and perhaps over critical thresholds in coming decades. But the pressures on food security in the future come not only from production challenges but also demand; by 2050 the global population is predicted to reach 9.3 billion with global demand for food rising by 60%[3].

These challenges are all taking place against a wider backdrop of ever changing expectations. The launch and adoption of the UN's Sustainable Development Goals (SDGs) and the Paris Agreement at the UN Climate Conference (COP21) towards the end of 2015, are driving an unprecedented movement of private sector action.

The UK food and drink manufacturing sector is committed to playing its part. Emissions from energy use have fallen by 42% between 1990 and 2015[4]. We therefore welcome the publication of this collaborative government-industry Action Plan which builds on the conclusions set out in the 2015 "Food and Drink Sector – Industrial Decarbonisation and Energy Efficiency Roadmap to 2050".

This voluntary plan will help support existing cross sector and company commitments and actions to address the clear challenges of improving energy use productivity and decarbonisation. At the same time, it recognises the importance of improving competiveness, growth and productivity in, what is, the UK's largest manufacturing sector.

This Action Plan has identified a number of specific opportunities for our sector in innovation, skills, the use of state of the art technology and on 'building in' energy efficiency and decarbonisation at the process design stage. When taken forward, and backed with the appropriate resources, these actions will make a substantive contribution to emissions reductions and improve energy use productivity.

We also recognise that this plan is part of the start of what we hope will be a wider process of engagement to deliver decarbonisation and improve competitiveness in the longer term. Some opportunities identified during the development of this plan, such as innovation mapping, could not be included and it is hoped that they can be revisited if additional resources become available. Future energy and climate change policy needs to build on the success of current approaches, such as our Climate Change Agreement, to help provide the longer term policy framework, regulatory stability and support mechanisms which will be essential for delivering the 2050 Roadmap ambitions.

[3] http://www.parliament.uk/business/committees/committees-a-z/commons-select/international-development-committee/news/substantive-global-food-security-report-publication/
[4] DUKES 2015

As we continue to work together from an industry cross-sector perspective, a number of general industry priorities have been identified where we would welcome further action by Government and industry to allow opportunities identified by the 2050 Roadmaps to be delivered.

These include

- Support for energy efficiency to bring the best available technologies to UK operations
- Providing long-term regulatory stability against which investments can be made
- Delivering secure energy supplies at competitive prices
- Confirming that support schemes are long-term and cover all affected installations
- Ensuring any regulatory targets are realistic and achievable
- Supporting the development of markets for lower carbon products
- Further developing training schemes to provide suitably skilled staff
- Taking the concept of a circular economy to maximise resource efficiency
- Reviewing the planning system to ensure investments in efficiency can be effectively delivered

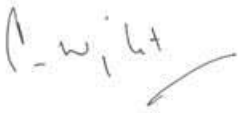
The food and drink sector supports these wider priorities as a starting point to ensure ongoing development of the Action Plans.

Placing the Action Plan in the wider context, the food and drink sector supports the Government's modern industrial strategy as an important first step which will help the UK's food and drink manufacturers manage the range of significant economic challenges we currently face. We look forward to continuing our close work with government on sector deals, which could support food and drink manufacturers' ambitions to grow and thrive in the UK and address long term productivity growth through greater resource efficiency, innovation, upskilling and trade.

Pledge

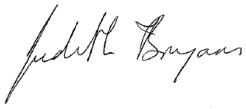
We the undersigned agree in principle to actively participate in a collaboration between the UK government, UK food and drink sector manufacturers, food and drink sector trade associations, and other key stakeholders, to reduce carbon emissions to contribute to overall decarbonisation of the UK by 2050 while strengthening the commercial viability of the UK food and drink sector. This collaboration is outlined in the UK Food and Drink Sector Decarbonisation and Energy Efficiency Action Plan.

fdf passionate about food & drink

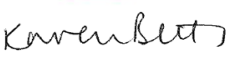


Ian Wright,
Director General
Food and Drink Federation

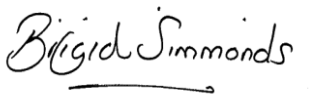
Dairy UK



Dr Judith Bryans *BSc PhD RNutr*
Chief Executive
Dairy UK



Karen Betts
CEO
Scotch Whisky Association



Brigid Simmonds,
Chief Executive.
British Beer & Pub Association

Dr Julian B South
Executive Director
The Maltsters' Association of Great Britain

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 42%[5] since 1990 while growing the overall economy by over 67%[6]. 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[7].

This action plan presents actions and tasks to support decarbonisation and energy efficiency objectives while maintaining sector competitiveness in the UK food and drink sector[8]. The focus is on increasing UK industry confidence in making investment decisions relating to energy efficiency and decarbonisation measures, and maintaining a competitive industrial sector by overcoming barriers and delivering the decarbonisation pathways identified in the published 2050 Industrial Roadmaps reports[9].

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[5] As in footnote 1.
[6] As in footnote 2.
[7] Statistics derived from ONS data on exports and workforce
[8] The actions and tasks under this action plan are subject to all relevant legal requirements, including competition law. Those involved should ensure they have sought appropriate legal advice, where required
9 Industrial Decarbonisation and Energy Efficiency Roadmaps to 2050: Food and Drink https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/416672/Food_and_Drink_Report.pdf

The UK food and drink industry has an annual turnover of around £90 billion[10]. The sector is very heterogeneous, manufacturing a highly diverse range of food and drink products but with identifiable sub sectors such as baking, ready meals, brewing, dairy etc that show a degree of commonality in their manufacturing processes.. It directly employs ~400,000 people in over 7,000 companies, and is dominated by Small to Medium sized Enterprises (SMEs)[11].Out of the eight roadmap sectors, food and drink is the fourth-highest energy user and CO2 emitter in the UK. In 2014, it consumed 24.6TWh of energy and emitted approximately 9.1MteCO2, or just over 1% of total UK CO_2 emissions[12]. Direct emissions originate from the heat demand of various processes, for example drying, evaporation, and baking ovens. Indirect emissions result from electricity being used from the grid used to power equipment for a range of uses, such as refrigeration, mixing, and grinding. The fuel use in the sector is dominated by natural gas (about two-thirds), followed by electricity, and a minor amount of oil and coal, particularly in rural areas which are off the gas grid. Electrification of heat is one of the most important options for decarbonising the food and drink sector[13]. Clearly grid decarbonisation will play an important part in the long-term delivery of emissions reduction in the sector.

Between 1990 and 2015 the food and drink sector grew by almost 20%[14], and since 1990, it has lowered its carbon footprint considerably – with a 42% emissions reduction by 2015; although there has been an increase in electricity consumption due to factors including automation, process control and growth in frozen and chilled foods, this has been offset by greater efficiency of use, and overall consumption has stayed more or less at the same level[15]. Energy efficiency is perceived by industry as important, but decarbonisation is not systematically seen as a high priority in the current investment climate, because energy presents only a low proportion (2-10%) of total production costs across the sector[16], on average. Moreover, according to industry sources, the high market heterogeneity and product diversity, in what is a dynamic and highly competitive market driven by consumers and retailer demands, has put a constant pressure on product innovation and differentiation, frequently attracting management focus and available finance. Product safety and quality cannot be jeopardised, and therefore companies are often only willing to invest in technologies that have already been proven to be successful. Large upfront costs and long

[10] Industrial Decarbonisation and Energy Efficiency Roadmaps to 2050: Food and Drink https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/416672/Food_and_Drink_Report.pdf
[11] Industrial Decarbonisation and Energy Efficiency Roadmaps to 2050: Food and Drink https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/416672/Food_and_Drink_Report.pdf
[12] DUKES 2015
[13] https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/416672/Food_and_Drink_Report.pdf
[14] ONS GVA data, real terms, adjusted for inflation
[15] DUKES data (more recent detail to be added)
[16] Industrial Decarbonisation and Energy Efficiency Roadmaps to 2050: Food and Drink https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/416672/Food_and_Drink_Report.pdf

lifecycles of equipment (20-40 years) are other disincentives to regularly invest in new technologies[17].

Food and drink sector commitments

Around 98% of food and drink sector energy use CO_2 emissions are covered by the EU Emissions Trading System (EU ETS) and/or the Climate Change Agreement Scheme (CCA).

Industry perceives compliance with other environmental regulations as important to the decarbonisation of the sector. For example, a large number of food and drink companies are directly affected by national legislation arising from the transposition of the Industrial Emissions Directive.

Other policies and regulations that directly affect companies in the food and drink sector are the Energy Saving Opportunity Scheme (ESOS), and compliance with the 2014 F-gas Regulations for those companies that use cooling and refrigeration technologies that contain F-gasses. Some companies with wider corporate undertakings are also in the CRC Energy Efficiency Scheme and are subject to mandatory greenhouse gas (GHG) reporting requirements. Some food and drink manufacturers who utilise biofuels as their energy source, make use of the Renewable Heat Incentive (RHI), and benefit from Feed-in Tariffs (FITs) and Renewables Obligation Certificates (ROCs) for renewable electricity generation. An increasing number of food and drink manufacturing companies are using the ISO50001 energy management system to improve energy efficiency and environmental management. This is an approach aligned with other ISO systems.

Aside from these measures, there is another government initiative, specific to the food and drink sector, which receives its own funding to drive forward energy efficiency, decarbonisation and collaboration across the food and drink value chain. The latest Courtauld 2025[18] agreement, developed by the Waste & Resources Action Programme (WRAP) is an industry-led collaborative 10-year voluntary agreement with the food and drink sector to reduce waste and increase the resource efficiency of the food and drink supply chain which also supports decarbonisation. The targeted overall outcomes by 2025, relative to 2015, are:

- 20% per capita reduction in the GHG emissions associated with production and consumption of food and drink in the UK
- 20% per capita reduction in food and drink waste
- A reduction in impact associated with water use and water stress in the supply chain

[17] Industrial Decarbonisation and Energy Efficiency Roadmaps to 2050: Food and Drink https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/416672/Food_and_Drink_Report.pdf

[18] http://www.wrap.org.uk/content/courtauld-commitment-2025

Food and drink trade association commitments

In addition to responding to the regulatory framework, the food and drink and sector has taken active steps to tackle climate change. The Food and Drink (FDF) Federation's 'Ambition 2025[19], initially launched in 2007, brought together businesses across the food and drink manufacturing sector to look at how it could reduce its environmental impact by promoting more efficient use of water, reducing packaging, embedding environmental standards in transport practices, and eliminating food waste to landfill. Having met its 2020 target over five years early and reporting a 46% reduction in 2015 from a 1990 baseline, a new target of a reduction in emissions by 55% by 2025, also baselined to 1990 levels has now been set. The Ambition 2025 seeks to continue its work and further improve resource efficiencies and address the wider sustainability agenda for the sector – something that is recognised as being vital to decarbonising the whole food and drink value chain, from farms to manufacturers to consumers.

The Scotch Whisky Industry Environmental Strategy[20], first launched in 2009, sets out challenging voluntary goals for the sector, that aim to protect the natural environment for future generations, whilst ensuring that the industry grows sustainably. It has four key themes: reducing energy use and greenhouse gas emissions; using water responsibly; embracing a circular economy in the industry supply chain; and using land sustainably. The industry is making progress against its targets. In 2014 non-fossil fuels accounted for 17% of total energy use, up from 3% in 2008. Energy efficiency has improved in the production process with a 2% improvement in distilleries and 20% in bottling since the 2008 base year. SWA is a signatory to the Courtauld 2025.

The Dairy Roadmap[21] is a joint sustainability initiative led by Dairy UK, the NFU and AHDB. Started in 2008, the aim of the Roadmap was to tackle key environmental issues such as GHG emissions, waste across the supply chain, biodiversity, water use and pollution. Targets are set for 2020 and 2025 and include ambitious goals such as a 30% relative reduction in carbon related to energy use at processing sites and sending zero ex-factory waste to landfill. Dairy UK is also a signatory to Courtauld 2025 and has consequently set up a Dairy Working Group in association with WRAP to target waste hotspots across the supply chain. In addition to this Dairy UK hosts quarterly Sustainability and Environment Committee meetings which regularly include input from NGOs and charities.

Scotland

Scotland has a national food and drink policy which looks at the impact of food and drink on health, the environment and the economy in Scotland. Food and the bioeconomy is one of four priority areas in 'Making Things Last – A circular economy strategy for Scotland', because of the major scope for economic and environmental benefits, particularly emissions reductions. Scotland's new target to reduce food waste by 33% by 2025 is the focus for

[19] https://www.fdf.org.uk/corporate_pubs/Ambition-2025-booklet.pdf
[20] http://www.scotch-whisky.org.uk/what-we-do/environmental-strategy/
[21] [1] http://www.dairyuk.org/media-area/press-releases/item/industry-publishes-2015-dairy-roadmap-report

action across manufacturing, retail and household food waste. The strategy complements the Biorefinery Roadmap for Scotland and Scotland's Industrial Biotechnology Innovation Centre (IBioIC). Key actions include mapping of bio-resources in Scotland and helping SMEs scale up bioeconomy action through Scotland's Circular Economy Investment Fund.

Wales

The Welsh Government's 2014 – 2020 Food and Drink Action Plan[22] aims to grow the sector by 30% by 2020, including focusing on exports whilst being mindful of wider sustainability and environmental issues.

The food chain accounts for 17% of Wales's greenhouse gas emissions. Wales's 2010 Action Plan focuses on reducing food packaging and waste, sourcing food locally, and reducing food miles, consequently reducing carbon emissions from the sector.

Northern Ireland

The agri-food industry is a priority in Northern Ireland's Programme for Government, Economic Strategy and in Invest NI's Corporate Plan. In recognition of the importance of the industry to Northern Ireland, in 2011 Ministers agreed to appoint a Board to develop a longer term vision for the industry. The Agri-Food Strategy Board[23] was appointed in May 2012, comprising an independent Chair from industry, eight industry members representing both the primary and processing sides of the industry, and four senior public servants from the Department for the Economy, Invest NI and the Department of Agriculture, Environment and Rural Affairs. During its first year the Board developed a strategy for growing the industry – the 'Going for Growth Strategy[24] which was launched in May 2013.

Conclusion

There is substantial scope for collaboration between industry, government and others to take steps in the short term that could enable the food and drink sector to make deeper 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. The food and drink sector is working with its supply-chain and other sectors, for example with chemicals, paper & pulp, and glass, to think more about sustainability and the wider circular economy, to ensure the most resource efficient and sustainable products are available to consumers.

This document goes a step further and builds on the existing work undertaken by the sector to decarbonise it and make it more energy and resource efficient. This document will add

[22] Link
[23] http://www.agrifoodstrategyboard.org.uk/
[24] http://www.agrifoodstrategyboard.org.uk/uploads/Going%20for%20Growth%20-%20Web%20Version.PDF

value to existing initiatives and policies, and introduce additional steps and measures that sector stakeholders, including government, industry, and trade associations, will take to realise the decarbonisation potential identified in Phase 1 of the Roadmaps project.

Following publication of the Roadmaps, Government and Food and Drink sector trade associations have now agreed this Action Plan that sets out voluntary actions which, if implemented, could enable the food and drink sector to make deeper emissions reductions over the longer-term, while staying competitive.

A cross-sector Roadmap Strategy Group will be established to provide an ongoing forum for BEIS and the roadmap sectors to discuss and review Action Plan delivery. The group will focus on reviewing delivery and progress, providing an overview of cross-sectoral actions, and to oversee the development of any further actions.

2. Actions

2.1 Action 1: Increase collaborative R&D undertaken by the Food and Drink sector

- This action aims to build on[25] and improve the R&D currently being undertaken in the food and drink sector relating to lowering carbon emissions and energy efficiency. This action will build on and fully exploit the potential of the UK's world-class R&D capability in low carbon and energy efficiency technologies, and extend progress to make the sector highly innovative, whilst taking into account considerations of intellectual property and confidentiality. Government, trade associations and industry will contribute information where possible and appropriate. This action should build upon the recommendations of the "Leading Food 4.0: Growing Business-University Collaboration for the UK's Food Economy"[26] report published by the National Centre for Universities and Business (NCUB).
- The overall objective of this action is to deliver more low carbon innovation and increase competitiveness of the sector through closer and more widespread relationships with the wider UK R&D base.
- This is a short to medium-term action to build on the current R&D knowledge base, and to ensure there is a continuing collaborative relationship between government, trade associations, industry, and UK research facilities. In the longer term, this knowledge base should be kept up-to-date to ensure R&D opportunities can be acted on when they arise.
- This action is linked to all other actions in this action plan.
- Implementation of this action aims to deliver the technology innovations required to lower the carbon emissions of the sector, thereby reducing costs and driving product innovation. As an enabling action, the carbon reduction impact of this measure is difficult to quantify with any certainty.

[25] For example the work currently being undertaken by the Food Innovation Network (FIN) to map current activity by developing the Knowledge Transfer Network's Agri-Food landscape tool

[26] http://www.ncub.co.uk/reports/fe-report.html

Action 1 tasks

Task 1A: Launch a web portal that facilitates greater industry collaboration by enabling companies in the food and drink sector and research organisations 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 Food and Drink 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 Food and Drink Trade Associations and its member companies to help ensure it meets business requirements. It will also draw on any relevant resources in the similar FIN portal. The website will also enable industry and research bodies to match the supply of collaborative R&D with demand for it.

Task Owner: BEIS, with input from the industry

Timing: 2018

Task 1B: Maintain a portal that enables industry to collaborate and share information.

BEIS will maintain the website 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 C).

Owners: BEIS

Timing: Ongoing

Task 1C: 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 A) 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 1D: BEIS and Trade Associations continue to meet in a regular forum, including to enable the discussions on R&D mentioned in the following tasks, but also to act as the main point of ongoing contact between government and the sector on the Action Plans.
Owners: BEIS, Trade Associations.
Timing: Ongoing

Task 1E: Explore options to support food and drink process design innovation by holding a discussion on R&D best practice twice-yearly at the BEIS/Trade Association Forum (Task 1D), and then engaging with InnovateUK to input food and drink sector requirements to shape and drive InnovateUK funding opportunities, including taking advantage of the industrial strategy challenge fund, to better understand how the food and drink sector fits within such funding calls. This should support work being done under 'Factories of the Future' and ensure a more targeted use of funding into research, development and demonstration. Consider organising innovation-focused events for suppliers, manufacturers and research groups to create networks to address specific challenges, and share case studies and exemplars.
Owners: Forum members to ensure that this discussion happens twice a year at Steering Group meetings, and feed outputs to InnovateUK. BEIS Science and Innovation team and universities to collaborate and input where required.
Timing: 2017-2021

Task 1F: Provide and promote guidance resources, in the form of documentation and educational programmes, that support industry understanding of the legal framework for how intellectual property could be shared. This could be included in the portal mentioned under Task A, and will allow companies to be ready to act upon business opportunities immediately when they arise.
Owners: The Intellectual Property Office
Timing: 2017-2018

Task 1G: Continue to monitor regularly how activities relating to value chain collaboration, for example, the circular economy, food waste prevention, packaging, and recycling issues, can be fed into the R&D needs of the sector. This could be done through holding a twice yearly discussion at the ongoing BEIS/Trade Association Forum (Task 1D) at the same time as the discussion in Task 1E.
Owners: FDF, DairyUK, SWA, BBPA, MAGB to lead the Group, with input from BEIS, DEFRA and WRAP
Timing: 2017 onwards

2.2 Action 2: Increase the adoption of state-of-the-art (SAT) technologies

- Trade associations to illustrate examples of currently available, proven technologies and the sharing of best practice and learning across food and drink sub-sectors. This will encourage adoption which will lead to lower energy costs and lower carbon emissions in a short time frame at a lower technology risk. Examples of SAT include inductive heating, microwave drying and heating, advanced ovens (i.e. direct/indirect, natural and/or electrification, modularisation/decentralisation), low temperature steam/hot watering (natural gas, bio-methane and electrification), anaerobic digestion, waste heat recovery and CHP, and pasteurisation (i.e. microwave, hot water, heat transfer and ultra-violet), and new refrigeration technologies.
- The action seeks to increase the adoption of SAT by overcoming the current lack of reliable and complete information on technology suitability for specific applications and the lack of confidence in technology performance in practice. A number of SAT are electrification of heat technologies, and therefore currently face the gas/electricity price differential barrier. In the longer term this differential will need to even-out to enable increased adoption.
- These are short to medium term actions, to realise the long-term benefits of increased uptake of SAT
- The success of this action will depend upon Action 3 (industry being made aware of and able to access appropriate funding opportunities), Action 4 (increase the skills levels in the sector), Action 5 (identify opportunities for using bioenergy) and, Action 6 (increase the uptake/use of Industrial Heat Recovery).
- Implementation of this action will deliver increased uptake of SAT, which will result in a reduction in carbon emissions from the sector. The carbon reduction impact of this measure cannot, however, be quantified.

Action 2 tasks

Task 2A: Using the portal from Action 1 Task A, signpost and actively disseminate independently obtained, objective information on SATs including best-practice and learning obtained from sources including Energy Savings Opportunity Scheme (ESOS) information, Best Available Technique Reference Document[27] (BREFs), the Energy Technology List and Energy in Buildings and Industry (EIBI) guides. Where practical this information will include data on CO_2 savings, performance and total cost of ownership by technology and by application. Information will draw from and build upon sources already created by trade associations, such as that prepared for BBPA. The deployment of such technologies should bear in mind the regulatory requirements for energy efficiency standards. Information dissemination could be via the online portal mentioned in Action 1 above.
Owners: BEIS to deliver the portal in line with Task 1A, and content will be provided through input from FDF, DairyUK, SWA, BBPA, and MAGB.
Timing: 2017-2018

Task 2B: As part of task A and linking with Action 1 task D, share process design guidance/best practice (in the form of case studies and examples from Campden BRI New Technologies Bulletin) to ensure the benefits from state-of-the-art energy efficiency and low carbon technologies are realised. Case studies/examples such as those for low friction pipework, continuous retorting, freeze-drying and free-cooling should be used, and should build upon relevant work relating to SAT being done under 'Factories of the Future'. This information could be shared on the portal mentioned under Action 1 above.
Owners: FDF
Timing: 2017

[27] Food, Drink and Milk Industries: http://eippcb.jrc.ec.europa.eu/reference/BREF/fdm_bref_0806.pdf and the Energy Efficiency BREF: http://eippcb.jrc.ec.europa.eu/reference/BREF/ENE_Adopted_02-2009.pdf

Task 2C: Trade Associations to encourage food and drink manufacturers to consider undertaking feasibility studies for installing and deploying SAT, including identifying operational issues and replacement cycle planning, for example by disseminating the outputs of Task A and B This will help understand where equipment can be replaced and provide information to plan operational requirements and replacement programmes.
Owners: FDF, DairyUK, SWA, BBPA, and MAGB to work with members.
Timing: 2017 onwards

Task 2D: Equipment suppliers to showcase state-of-the-art equipment and best practice to sector companies, to the extent that they can do this without breaching competitive concerns of the host company. This could potentially extend to technologies still in the demonstration phase.
Owners: Equipment suppliers including Frigesco and Heliex.
Timing: 2017 onwards

Task 2E: 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.
Owners: BEIS
Timing: 2017 - 2021

Task 2F: Undertake a feasibility study to establish the potential for fuel switching, including electrification of heat, to achieve carbon savings in both heavy and light industries.
Owners: BEIS
Timing: 2018

2.3 Action 3: Improve the food and drink sector's awareness of existing funding and finance options for both mature energy efficiency and decarbonisation technologies.

- Ensure that industry is aware of and knows how to access the full range of funding and finance sources that could be used to support R&D and mature energy efficiency and decarbonisation investments, taking into account how small, medium and large businesses have different financing options. These funding streams include public sector funding, current EU funding (if applicable), and third party finance. This will be useful for a wide range of companies, especially SMEs which often lack the capacity to identify and access external funding and finance options.
- The objective of this action is to overcome the barriers to accessing finance for mature energy efficiency technologies and, separately, R&D. This action and tasks could encourage greater investment in industrial energy efficiency and decarbonisation technologies which could lead to significant emissions reductions and competitiveness benefits.
- These are short to medium term actions, but the long-term ambition is to reduce companies' reliance on funding from public sources by unlocking more external finance.
- This action is linked to Action 1 (increase collaborative R&D), and Action 2 (implementation of SAT).
- The decarbonisation impact of this action is difficult to quantify, but it will improve industry's awareness of the finance options available to it, which in turn could encourage more investment in energy efficiency technologies.

Action 3 tasks

Task 3A: Improve the signposting to available sources of funding and finance for state-of-the-art energy efficiency/carbon efficiency technologies. This information could be shared via the online portal mentioned in Action 1 above.
Owners: BEIS to deliver the portal (Task 1A) with content delivered collaboratively by BEIS and Industry.
Timing: 2017 - 2019

Task 3B: FDF, DairyUK, SWA, BBPA, and MAGB to investigate the options for providing advice to help industry access these sources of funding and finance. For example disseminating information and guidance on funding opportunities.
Owners: FDF, DairyUK, SWA, BBPA, and MAGB, with support from KTN and/or BEIS. The information could be disseminated in the portal mentioned in Action 1 above).
Timing: 2017 - 2018

Task 3C: Government to establish an industrial energy efficiency scheme to help companies install measures to cut their energy use and their bills.
Owner: BEIS
Timing: 2017-2022

Task 3D: 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 (trade associations will lead on encouraging engagement from the Food and Drink sector including identifying participants / individual businesses for the group).
Timings: 2017-2019

2.4 Action 4: Increase the supply of Science, Technology, Engineering & Maths (STEM) graduates with the skills and knowledge (energy efficiency and decarbonisation) needed to deliver a low-carbon competitive future for the food and drink sector

- Industry to continue to work with government, academia, professional skills bodies and others, to identify and address the skills gaps in the food and drink sector, through increased take-up of training and development courses, from potential at secondary-school age, to upskilling within the sector. All parties to work together to ensure the increased supply and availability of STEM graduates with a focus on energy efficiency and decarbonisation, by increasing the quality and uptake of STEM subjects at schools. Trade associations should set out the available evidence to government, particularly the Department for Education, to advocate for steering existing government funding for STEM teaching and career development towards energy efficiency and decarbonisation related modules. Networking events and training courses could be held to improve knowledge sharing and best practice, with a focus on learning lessons from other energy-intensive industries both in the UK, EU and worldwide. Apprenticeships and skills are devolved policy areas; separate arrangements are in place in Scotland – information on apprenticeships in Scotland can be found at www.apprenticeship.scot
- The objective of this action is to encourage STEM graduates to work in industry (particularly the food and drink sector) and focus on energy efficiency and decarbonisation within those jobs, thereby ensuring that the sector has the appropriate quantity of skilled professionals working within it to drive forward the sectors' decarbonisation objectives.
- This action will be long-term, running from 2017 onwards and will help ensure an increase of skilled professionals working within the food and drink sector.
- This action is linked to Action 1 (increase collaborative R&D), Action 2 (implementation of SAT), Action 3 (improve sector's awareness of existing funding and finance options), Action 5 (identify opportunities for using bioenergy), and Action 6 (increase the uptake/use of Industrial Heat Recovery).
- The decarbonisation impact of this action cannot be quantified, but it may increase the competitiveness of the sector and lead to greater efficiencies and improvements in ways of working.

Action 4 tasks

Task 4A: Continue to identify the gaps in skills and knowledge relating to energy efficiency and decarbonisation technologies that exist in the food and drink industry. This will build on the existing work being done by trade associations e.g. FDF's 'Unlocking Talent' report[28] and the National Skills Academy for Food and Drink's "Tasty Careers[29]" campaign., and will help to raise awareness amongst industry of the importance of having skilled employees with in-depth knowledge of energy efficiency and decarbonisation technologies.
Owners: FDF will continue to work with the NSAFD to identify future skills and knowledge gaps within the food and drink industry, in line with the Government's Industrial Strategy.
Timing: 2017

Task 4B: Trade Associations to work with professional training bodies and Engineering UK to assist employees in the design of apprenticeship schemes (under the Department for Education's "Trailblazer" programme) specifically around decarbonisation, energy management, energy efficiency and environmental matters. Government, employers, industry and training providers to collaborate in creating energy-specific apprenticeships[30].
Owners: BBPA to collaborate with professional trading bodies and EngineeringUK, working within the Department for Education's Trailblazer programme. FDF is already working with the NSAFD to develop Apprenticeship Trailblazer standards required by the industry, these Apprenticeships standards will have elements of energy management and other skills built in to maximise resource efficiency in the manufacturing process.
Timing: 2017 onwards

[28] https://www.fdf.org.uk/corporate_pubs/Productivity-brochure.pdf
[29] http://nsafd.co.uk/tasty-careers
[30] https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/487350/BIS-15-632-apprenticeships-guidance-for-trailblazers-december-2015.pdf

Task 4C: FDF, SWA, BBPA, and MAGB to collaborate with accreditation bodies to diversify and update the standards for accreditation of engineers in new and emerging areas, such as bio-tech, and new or innovative decarbonisation and energy efficiency technologies, and extend the accreditation system to apprentice/technician level. A more focused approach to R&D and innovation, thinking about future engineering skills in line with the “Industry 4.0” concept. To create bespoke accreditation standards for engineers to reflect changes in landscape, i.e. the emergence of new areas of growth of apprenticeships as a route to the engineering profession.
Owners: SWA, BBPA and MAGB to work with accreditation bodies. FDF is supporting the University of Lincoln’s National Centre for Food Manufacturing, Sheffield Hallam University and the National Skills Academy Food & Drink to deliver degree apprenticeships in the food and drink industry including Food Engineering, Technical Management and Operations Management. Accreditation bodies will be involved in this process
Timing: 2017 onwards

2.5 Action 5: Identify additional opportunities for using bioenergy in the food and drink sector to lower carbon emissions and improve resource efficiency

- Government, trade associations and industry to develop a clearer understanding of how much bioresource is available to the UK economy from all sources including from industry and a greater understanding of current and potential future competing demands on it across all sectors of the economy. Industrial sectors can then use this information to agree its best uses in industrial energy to maximise the economic and decarbonisation benefits for the sector while minimising potential downsides. This view should be informed by the emerging findings from Government's Bioeconomy Strategy so that it takes into account how bioenergy fits in the UK's wider bioeconomy. It should also be informed by evidence of bio-resource availability more widely, and of bioresources demand in other industrial sectors.
- The objective of this action is to clarify the potential for supply and use of bioenergy in the food and drink sector, overcoming the uncertainty about limits to availability and lack of knowledge of available technologies. Currently most bioresources arising from the have alternative economic uses, for example animal feed or land spreading, and it should be noted that their diversion to energy production could have wider food system implications. Therefore a broad approach to Life Cycle Analysis is needed to avoid unintended consequences. From this it should be possible to identify feasibility studies and demonstration projects that could help the sector decide how to prioritise supplies of bioresources, and whether it would be better used in other stages of supply chains, whilst bearing in mind the waste hierarchy.
- Depending on the outcomes of the wider Bioeconomy review initial studies could be carried out in the short-term, with an ambition to have demonstration projects underway in the medium term to continue to drive adoption in the longer-term.
- This action is linked to Action 1 (increase collaborative R&D), Action 2 (implementation of SAT), and Action 6 (increase the uptake/use of Industrial Heat Recovery)
- The carbon reduction impact from switching to bioenergy could be up to 13% in 2050, based on the MaxTech pathway identified in Phase 1 of the Roadmaps project[31].

[31] Industrial Decarbonisation and Energy Efficiency Roadmaps to 2050: Food and Drink https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/416672/Food_and_Drink_Report.pdf

Action 5 tasks

Task 5A: Government and industry to set up a cross-sector group. This group will then develop a collective view of the best uses of bioresources across the UK economy and industry including for for the food and drink sector. This will also cover which current and future-potential technologies, processes and stages of the supply chain are of interest. This group would use existing analytical tools such as BEIS's Bioenergy Resource Model, and UK landuse assessments, to get a better idea of its current and future availability, technological feasibility, cost, and environmental sustainability. The 2012 Bioenergy Strategy and Energy Technology Institute's (ETI) work could be used as starting points, and this should build on work already being done by WRAP under Courtauld 2025. The outcome could be in the form of a guidance document to businesses, encouraging them to look into particular uses of bioresources.
Owners: BEIS
Timing: 2017-2019

(Subject to the completion of task 5A) Task 5B: FDF, DairyUK, SWA, BBPA, and MAGB to encourage individual companies to take forward feasibility studies in areas/technologies identified (under Task A) as to the best uses of bioresources. These should address the technical, commercial and/or policy enablers and barriers of both new and innovative technologies, and of innovative uses of existing technologies, to ensure longer term goals are met.
Owners: FDF, DairyUK, SWA, BBPA and MAGB to use existing forums to raise awareness and where possible collaborate with individual companies, and the BioVale and Bio Renewables Development Centre.
Timing: 2017 onwards

(Subject to the completion of task 5A) Task 5C: Identify locations where switching to and using bioenergy or piloting such a switch, represents a low risk option for decarbonisation for the sector. This could be in the form of a map identifying possible sites where a secure supply of competitively-priced, sustainable feedstock is available.
Owners: The cross-sector group
Timing: 2020

(Subject to the completion of task 5A) Task 5D: Industry to provide context and evidence, to government, for the consideration of a post-Brexit environmental regulatory landscape around the uses of bioresources to make it clear how different regulations could affect the uses of bioenergy within the food and drink sector.
Owners: Where appropriate sector members to provide the context and evidence to FDF, DairyUK, SWA, BBPA, and MAGB, and they will work alongside Government to ensure that the information is considered in policy making.
Timing: 2017 onwards

(Subject to the completion of task 5A) Task 5E: The food and drink sector to proactively share success stories, best practice and lessons learned on adoption of bioenergy technology, both within the sector and more widely between the other energy-intensive industries.
Task Owner: Where appropriate sector members to share success stories with FDF, DairyUK, SWA, BBPA, and MAGB, and they will collate this information and publish it on the portal identified under Action 1 above.
Timings: 2017 onwards

Task 5F: As part of their evidence gathering exercises, individual companies can refer to the Renewable Energy Tool [developed by the Scotch Whisky Association (SWA), Carbon Trust Scotland, and Resource Efficient Scotland] to screen and assess the financial viability and technological suitability of a range of alternative energy technologies:http://www.scotch-whisky.org.uk/news-publications/publications/documents/distillers-renewable-energy-tool-2014#.WG4ZdGcfyUk
Task Owner: Resource Efficient Scotland to provide guidance on the tool, for individual companies to use
Timings: 2017 onwards

2.6 Action 6: Identify and implement industrial heat recovery projects that realise benefits for the sector.

- Industry and Government will collaborate to identify and deliver industrial heat recovery projects that realise benefits for manufacturing sites in England and Wales. Government will support this by introducing an Industrial Heat Recovery Scheme. This will provide financial support for feasibility studies, to identify opportunities for recoverable heat projects and assess their costs and benefits. It will also provide financial support for capital investment, to help make industrial heat recovery projects commercially viable.
- The objective of this action is to develop a pipeline of industrial heat recovery projects, some of which companies will be able to take forward themselves, and some of which may be eligible for capital support from government. The action will enable and encourage more industry investment in, and deployment of, recoverable heat technologies, in order to reduce primary energy demand and increase low carbon heat use. It will help to tackle financial barriers to uptake, and realise economic and commercial potential for recoverable heat in industry.
- This action links to the Action 3 (improve the sector's awareness of existing funding and finance options).
- Implementation of this action will contribute to a potential for industrial recovery in the UK in the range of 5TWh/yr to 28 TWh/yr, arising from hundreds of source-sink-technology combinations from just 73 large industrial sites[32]. Also primary energy demand will be reduced, leading to a reduction in fuel bills.

[32] Link

Action 6 tasks

Task 6A: Introduce Industrial Heat Recovery Scheme (IHRS) to de-risk capital investment in industrial heat recovery technologies: • Government to introduce a financial support programme, providing: (i) 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. (ii) 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, with input from industry
Timing: 2017 - 2021

Task 6B: 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 is already doing a study to assess the potential for adding technologies to the ETL.
Task Owner: BEIS
Timing: 2017 – 2020

Task 6C: Improve knowledge sharing and exchange of best practice in IHR. Government, industry, academia and others will look to improve knowledge sharing and exchange of best practice in the field of IHR. This information could be contained on the online portal mentioned in Action 1.
Owners: BEIS with input from KTN, FDF, DairyUK, SWA, BBPA, MAGB, academia, and industry
Timing: 2017

Task 6D: Investigate further options for incentivising the use of industrial waste heat. Further work to be undertaken on the options around incentivising use of waste heat in industry, using learnings from the IHR scheme to build a case for future support. The objective of this task is to increase the evidence base and understanding of the costs and benefits of IHR, to enable further consideration of the technical and economic case for providing support beyond the scheme.
Owners: Industry to provide information to FDF, DairyUK, SWA, BBPA, and MAGB, who will work with Government to build the evidence based and understanding around incentivisation reuse of industrial waste heat.
Timing: 2021 onwards

Task 6E: Work collaboratively with industry seeking to export waste heat to heat networks with a view to 1) quantifying the benefits of export 2) understanding the perceived risks associated with supply to a network 3) identifying technical and contractual solutions which mitigate these risks and 4) sharing examples of these solutions in practice.
Owners: BEIS with input from FDF, DairyUK, SWA, BBPA, MAGB, industry, Heat Trust, local authorities, and Scottish Government.
Timing: 2017-2018

3. Glossary

	Definition
Action	An activity that will be delivered through a series of separate tasks
Task	A specific piece of work to deliver an action
Impact	A qualitative or quantitative description of the impact on carbon, financial or competitiveness as a result of successfully implementing the action
Dependency	How one action might influence another action, for example a shorter term action may be linked to longer term actions or ambitions.
Resources	Staff or funding required to deliver a specific task
Objective	The impact on strategic outcome of the action (e.g. increased energy efficiency in xx sector – or the objective is to decarbonise and do this using CCS technology and a transport and storage network).
Output	[Tangible] Result achieved by the action being undertaken (e.g. better awareness amongst industry managers of opportunities etc) – an Emphasis on the overall action delivery or result – e.g. delivers Carbon capture network so that industry can use it to capture and store carbon.
Short Term Action	Action that will be undertaken between 2017 and 2020
Longer Term Action	Action that will take place beyond 2020
Barrier	A factor that needs to be overcome for an action to be achieved