

In association with:



MANUFACTURING SECTOR NET ZERO ROADMAP

A blurred background photograph of a man with a beard and earphones, wearing a dark shirt, looking towards the camera while working on a piece of machinery in a factory environment.

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EXECUTIVE SUMMARY

Make UK has committed to help its members in their transition to net zero and has developed a roadmap in partnership with experts from Inspired Energy.

The manufacturing industry overwhelmingly supports the ambition to achieve net by 2050 and a 67% reduction in Scope 1 emissions – those generated directly by the manufacturer - and Scope 2 greenhouse gas (GHG) emissions - indirect emissions from purchased energy - by 2035. This is compared to a 2018 baseline and in line with a 78% reduction compared to 1990 emissions and equates to an absolute emissions reduction of 48 million tonnes of CO₂ equivalent.

This roadmap was developed in consultation with Make UK's membership and some of the major manufacturing sub-sectors including food and drink, electronics, chemicals, paper, metal, and steel industries. Several sub-sectors have already set their own decarbonisation journey paths, and all agree to support a net zero by 2050 target for UK manufacturing. Clearly manufacturers are stepping up to the plate and are now ready for the challenge.

Net zero presents one of the single biggest opportunities for the manufacturing sector as the industry is in a unique position to help the whole of the UK achieve its net zero ambitions. Manufacturing will be key to developing technologies, designing, and making the products and providing the services that will help the rest of the economy decarbonise. The progression to net zero presents many opportunities for the manufacturing industry, including:

- Receiving new grants and funding for green investments
- Improving process efficiency and productivity
- Harnessing innovation to develop and manufacture new products and services, which will create new revenues in many sectors based on the wider economy enablers e.g. the continued manufacturing of wind turbines between 2020-2030, the development and manufacturing of electrical vehicles and batteries, the manufacturing of small modular and advanced nuclear reactors and the development of hydrogen infrastructure and products between 2030-2040, and the development of commercial CCUS equipment and infrastructure between 2040 and 2050
- Attracting new talent and creativity to a greener industry, enabled, and enhanced by the introduction of industrial digital technologies

The roadmap commitments now indicate the industry's readiness to work towards net zero. There are however conditions required for the manufacturing sector to reach its net zero goal and fully realise the opportunities presented by the net zero ambition. A deeply or fully decarbonised power supply in sufficiency and at a reasonable cost is one of these conditions. Specific government support is required in several areas to kickstart the process and help manufacturers overcome their challenges, including:

- Additional funding and an adapted fiscal and financial landscape to incentivise the adoption of low carbon but higher cost processes (such as replacing fossil fuels, raw materials efficiency, and electrification)
- Policy to prevent carbon leakage (i.e., preventing manufacturing companies relocating to countries where production costs are not impacted by emission constraints or customers choosing lower cost products from countries with laxer environmental and sustainability standards)
- Rehauling the whole energy (and carbon) pricing system to ensure a supply of energy at a reasonable cost.
- Filling the skills gap to meet the demand for more qualified workers with green and digital skills, particularly innovation skills as well as effective management and leadership skills in sustainability.
- Safeguarding lenders and businesses against the erosion of the value of green investments due to the rapid obsolescence of disruptive technologies as these evolve into better performing ones.

The UK manufacturing industry will without a doubt have a major contribution to the UK's journey to net zero. Being the UK's third most emitting sector and responsible for a sixth of the country's total emissions, a concerted effort to reduce manufacturing emissions will have an important impact on the country's overall emissions profile.

Working together will be an important part of overcoming the challenges facing the industry, whether that be through manufacturers developing a circular economy, supporting their supply chain, or enabling their customers, collaboration will be key. Make UK calls for its members to join in the collective effort of the manufacturing sector to take without delay the steps towards achieving the required greenhouse gas emission reduction goal.

In doing so, Make UK commits to support its members in their journey by re-enforcing its existing net zero framework. This will include the continued refinement of the roadmap milestones, an education and training programme, facilitated sharing of best practice amongst members, and collaboration with government and other stakeholders to create optimal conditions for businesses to transition to the low carbon economy.

"I am delighted to see that the manufacturing sector is ready to tackle its net zero goal. You will find a massively important consensus across all sub-sectors on the need for ambitious targets to be set now to ensure action is taken in the short term. These manufacturers want to start on this new journey with hope for the opportunities it can bring, as well as travelling with trepidation for the many challenges that we need to work together to solve. I wish us all good luck."

Prof. Steve Evans Professor Steve Evans, Institute for Manufacturing, University of Cambridge

NET ZERO COMMITMENTS

MANUFACTURING SECTOR KEY COMMITMENTS

2035

↓ 67%

Scope 1 and 2 emissions reduction vs 2018¹

2050

NET ZERO

Scope 1 and 2 emissions reduction of at least 90%



Help establish 4 low carbon industrial clusters by 2030, 1 zero carbon cluster by 2040² and decarbonise the mini-clusters at dispersed sites



Support our suppliers and customers to get to net zero, to reduce our Scope 3 emissions



Offer net zero products³



Utilise carbon removal⁴ where needed, to achieve net zero by 2050



Engage with Government and other stakeholders to create the optimal business and regulatory environment

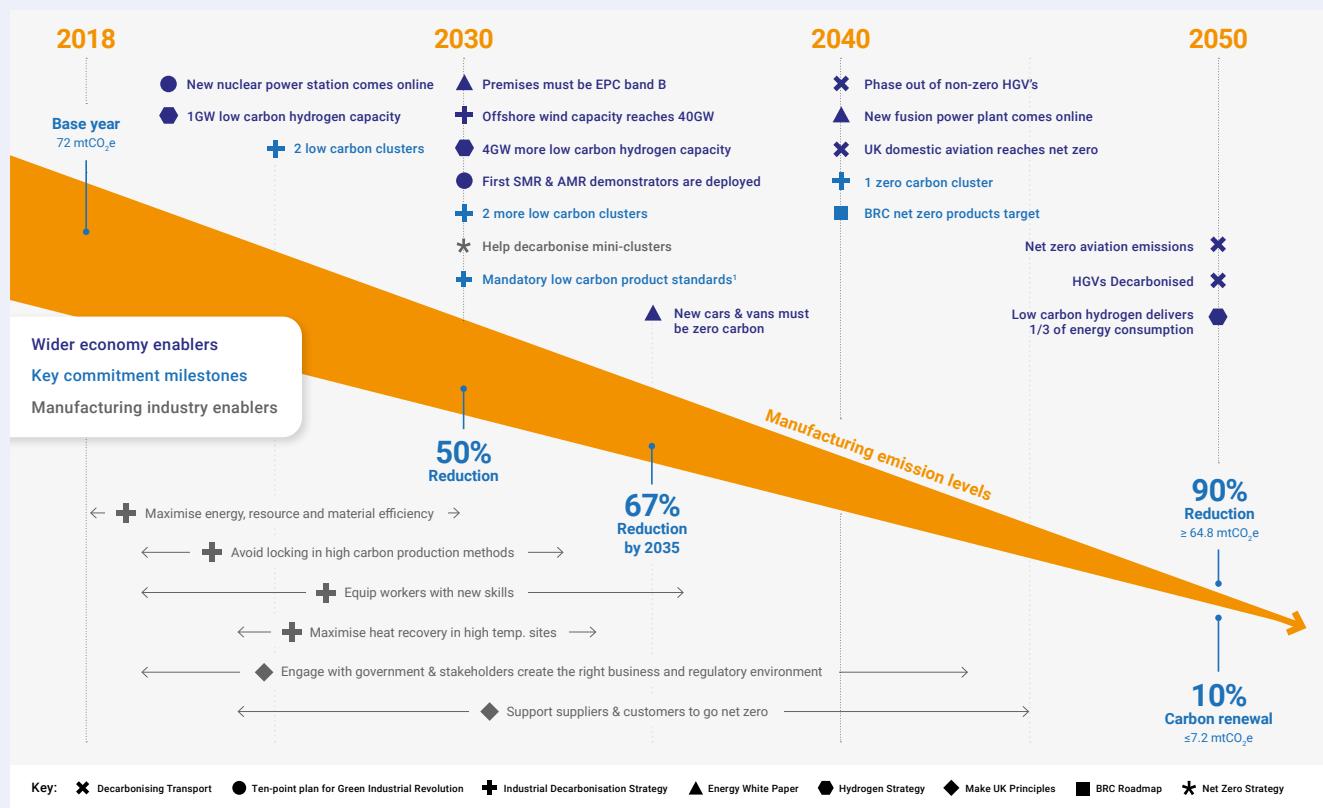
¹In line with absolute Scope 1 and 2 emissions reduction of 78% vs 1990

²As per the UK Industrial Decarbonisation Strategy

³Each sub-sector to decide when it can offer net zero Products

⁴All carbon removal routes to be considered, including nature-based solutions, technology solutions and CCS

NET ZERO ROADMAP



MAKE UK IS HELPING PREPARE THE MANUFACTURING SECTOR TO OPERATE IN A NET ZERO ECONOMY

Make UK has produced this roadmap to:

- Give guidance to Make UK members on the strategic direction of the sector, how they can play their part, and chart their progress.
- Inform the Government of the manufacturing industry collective position and its needs, and support delivery of the Industrial Decarbonisation and Net Zero strategies.
- Share information on the position of the sector with external stakeholders.

This is in keeping with and building on the *Make UK Net Zero Guiding Principles*, which are:

1.

Ambition, commitment, and action

We commit to an ambitious, rapid, and just transition to a net zero economy limiting warming to 1.5°C while meeting the global goals.

We deliver action in the short-term, focusing on what is material.

2.

Science-based and transparent

We measure our impact and adjust our strategy to the latest science.

We adapt to a warming world, evaluating risks and growing resilience to protect our businesses.

We report on progress in a transparent, consistent, and accessible way.

3.

Innovation and systemic societal change

We move beyond business as usual. We innovate business models, product and service design and initiatives in our own facilities and across the value chain.

We advocate for a resilient, future-proof, clean, sustainable, and thriving UK manufacturing industry.
We support policy aligned to Net Zero.

We support positive change in society. We design to benefit communities and nature. We promote fairness, solidarity / co-benefits

4.

Joining forces and collaboration

We collaborate across our own and other industry sectors, governmental and non-governmental organisations, joining forces, seeking coherence, sharing learning, and promoting best practices.

Make UK has been careful to ensure that its members are able to support the commitments presented and that notwithstanding the challenges, no one is left behind. This explains why this first roadmap is very high level, providing an overall direction that all can recognise and rally

around. It focuses on mitigation (e.g., carbon emission reduction) and further work will be undertaken at a later stage to further refine the milestones and extend considerations to adaptation.

THE MANUFACTURING INDUSTRY HAS A MAJOR ROLE TO PLAY ON THE UK'S JOURNEY TO NET ZERO

The UK was the first major economy to nationally commit to reach net zero greenhouse gas (GHG)¹ emissions within our boundaries, as well as for the UK's share of international aviation and shipping, by 2050. The pathway towards this has been set into law via the Climate Change Act of 2008, amended in 2019, through the 6th Carbon Budget and added to by a new law in 2021. This has committed the country to reductions of 68% by 2030 and 78% by 2035, compared to 1990 (which equates to a 67% reduction compared to 2018 levels); and net zero by 2050.

According to the latest data from BEIS, the manufacturing and construction industry is the third most polluting industry in the UK and was responsible for 13% and 18% of UK greenhouse gas emissions in 2019 and 2020 respectively. Although emissions from the manufacturing and construction industry have reduced by 17% over the last five years, the industry still produced 61 million tonnes of carbon dioxide equivalent (tCO₂e²) in 2020. Hence there is a long way to go to net zero.

The manufacturing sector has a major role to play both in decarbonising its own operations and in the wider decarbonising of the entire economy by designing and manufacturing the products and services that all others will need for the low-carbon economy to work:

Net zero means limiting overall greenhouse gas (GHG) emissions to 100% below 1990 levels across the whole economy. Any remaining emissions which cannot be eliminated in the first place must be balanced by finding ways to absorb an equivalent amount (e.g., carbon removals) of greenhouse gases (GHG) from the atmosphere.

- The manufacturing industry will be vital to developing the low-carbon hydrogen needed to help decarbonise buildings and transport emissions
- The development and manufacturing of new electric vehicles will be necessary to reaching low-carbon transportation targets
- Manufacturing innovation in the carbon capture, utilisation and storage space will be pivotal to carbon removal of residual emissions from hard to decarbonise industries
- And the manufacturing of new wind and nuclear power machinery and equipment will be essential for achieving national low-carbon electricity targets



Scope 1 emissions (directly generated by a manufacturing operations) are under the business's direct control so energy and process efficiency management are key to reducing them.



Scope 2 emissions (indirect, from purchased energy) will depend on the carbon intensity of the energy supplier, so mostly on the choice of supplier.



Scope 3 emissions (value chain): are likely to constitute the bulk of the emissions, and are not directly under the business's control, so more difficult to manage. They are however, influenced by supplier selection, supplier development, product design and marketing. The first step is to make an inventory of these emissions and deal with them at a later stage, although there are actions that can be taken immediately depending on the level of the organisation's commitment.

¹The GHG causing man-made climate change are CO₂, methane (CH₄), nitrous oxide (N₂O), F-gases (hydrofluorocarbons or HFCs, perfluorocarbons or PFCs, sulphur hexafluoride or SF₆), and nitrogen trifluoride (NF₃).

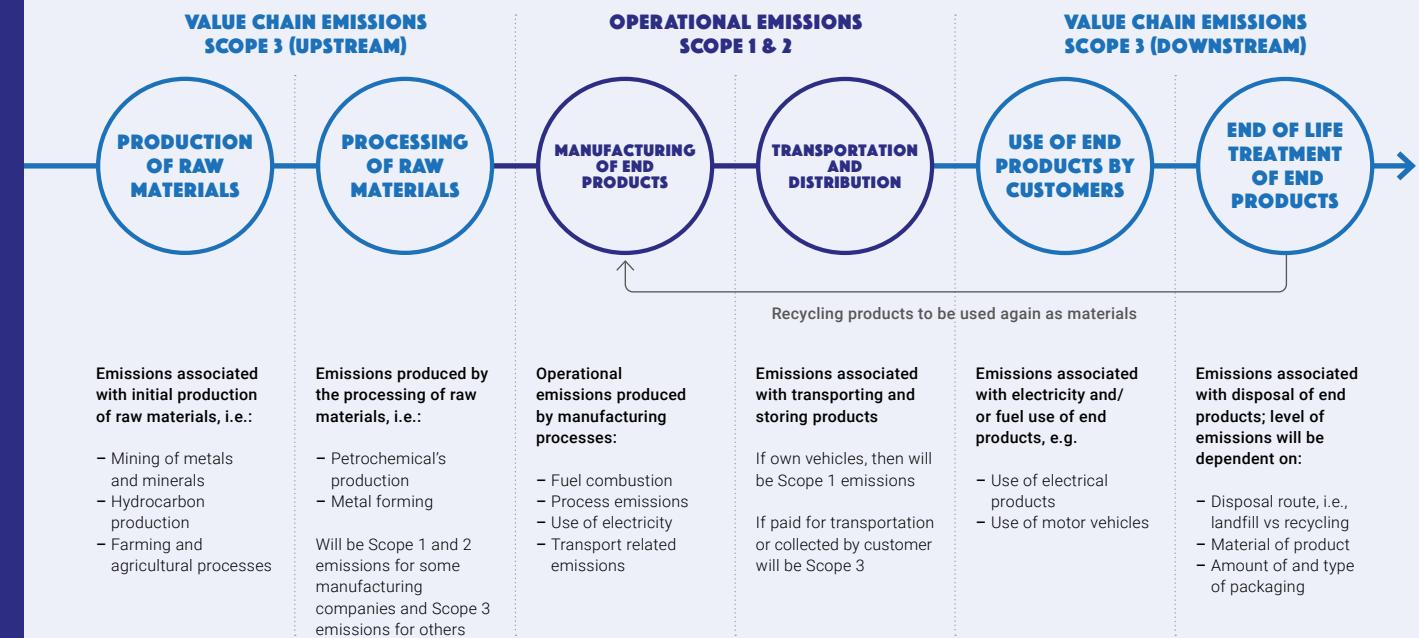
²CO₂ equivalent or CO₂e means the number of metric tons of CO₂ emissions with the same global warming potential as one metric ton of another of the greenhouse gases (GHG).

WHERE DO CURRENT MANUFACTURING EMISSIONS COME FROM?

Approximately 90% of emissions from the manufacturing and construction industry come from manufacturing activity, with over 85% of these produced by fuel combustion (for high- and low-grade heat, drying/separation, space heating and on-site electricity generation) and the remainder originating from process emissions (i.e., produced by chemical processes)³. The remaining 10% of emissions from the manufacturing and construction industry are produced by off-road mobile machinery (i.e., machinery used in construction, mining and transport infrastructure).

**85% OF
MANUFACTURING
EMISSIONS
ARE PRODUCED BY
FUEL COMBUSTION**

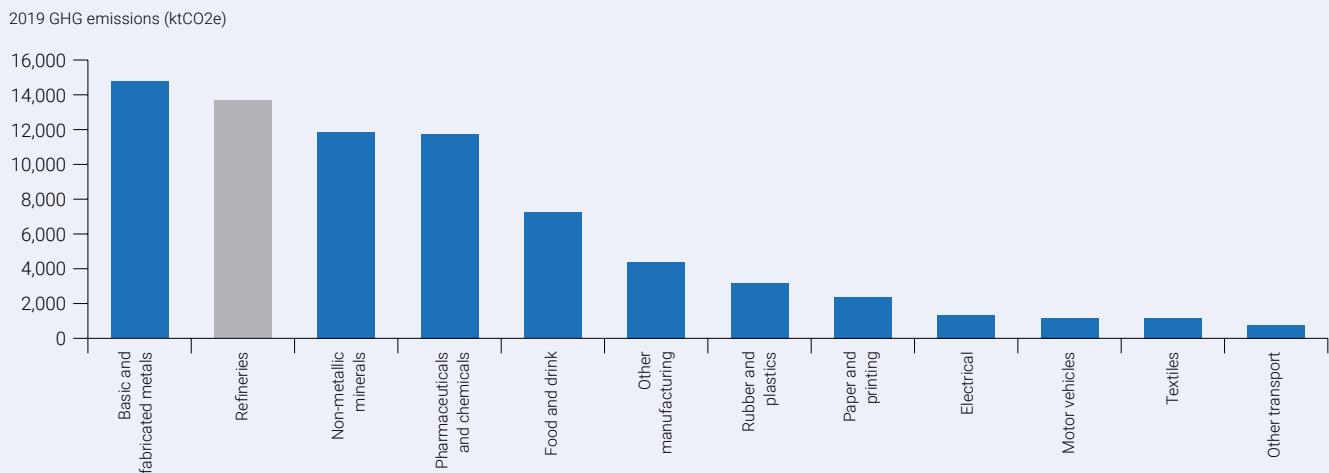
MANUFACTURING EMISSIONS



Source: Inspired Energy, 2021

³CCC: <https://www.theccc.org.uk/wp-content/uploads/2020/12/Sector-summary-Manufacturing-and-construction.pdf>

Industrial GHG emissions by sub-sector SIC code (1990-2019)



Emissions are reported on a source basis, meaning emissions are attributed to the sector that emits them directly (e.g. emissions produced by a power station are allocated to the power station as opposed to the end-users of the electricity it generates).

Source: BEIS, *Industrial Strategy, 1990-2019 report*

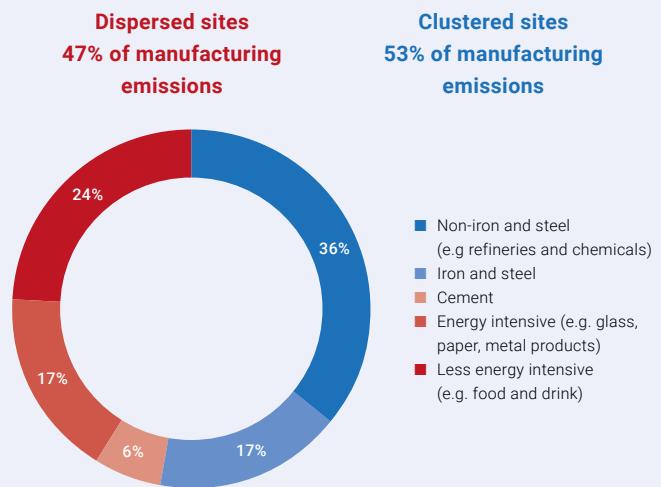
Over two thirds of the UK's manufacturing emissions (excluding electricity associated emissions) come from three sub-sectors: basic and fabricated metals, non-metallic minerals (e.g., cement, ceramics, glass, and lime) and pharmaceuticals and chemicals. These sectors involve fossil fuel intensive processes resulting in high emissions.

The manufacturing sector overall is composed of a wide range of sub-sectors of very different size and nature. The sector has over 80% of small and mid-size enterprises SMEs (mostly medium sized) and are either located in one of the seven major industrial clusters or dispersed. Some sectors are energy intensive (EIs) and others less so, with each having their own challenges.

Just over half of manufacturing emissions come from clustered areas, such as industrial hubs along the UK's North Sea coast, Southampton, or South Wales, while the remainder come from dispersed sites spread out across the country. Of the industrial clusters, Humberside is the largest, producing a third of all 'clustered sites' emissions and approximately 3% of the UK's total greenhouse gas emissions.

Dispersed sites collectively produce just under half of all manufacturing emissions and tend to be made up mostly of SMEs, which will face different decarbonisation challenges to the industrial clusters. Getting new infrastructure, i.e., hydrogen and CO₂ networks, to the geographically disparate sites, will be a major challenge.

Manufacturing emissions split by location, based on 2017 emissions



Source: BEIS *Industrial Decarbonisation Strategy*

Regardless of size and location, all manufacturers have their part to play in decarbonisation, and additional support to ensure the transition to net zero is time and cost efficient will be key for dispersed manufacturers as much as for those in industrial clusters.

SEVERAL MANUFACTURING SUB-SECTORS HAVE ALREADY COMMITTED TO NET ZERO TARGETS

Over a dozen of the UK's manufacturing sub-sectors have either committed to achieving the Government's 2050 net zero target or have developed and committed to more ambitious targets. Some sub-sectors, such as the Food & Drink Federation (FDF) and British Retail Consortium (BRC)

have committed to achieving net zero emissions across their entire value chain (i.e., including Scope 3 emissions) whereas others, such as Water UK and British Glass, have committed to achieving net zero operational emissions (i.e., Scope 1 and 2).

Net Zero Commitments by Sector

Net Zero targets	2030	2040	2050
Scope 1 & 2			 The Manufacturers' Organisation
Scope coverage unclear			 
Scope 1, 2 & 3	 fdf food & drink federation passionate about food & drink		  
Carbon Negative targets			

Source: Inspired Energy, 2021

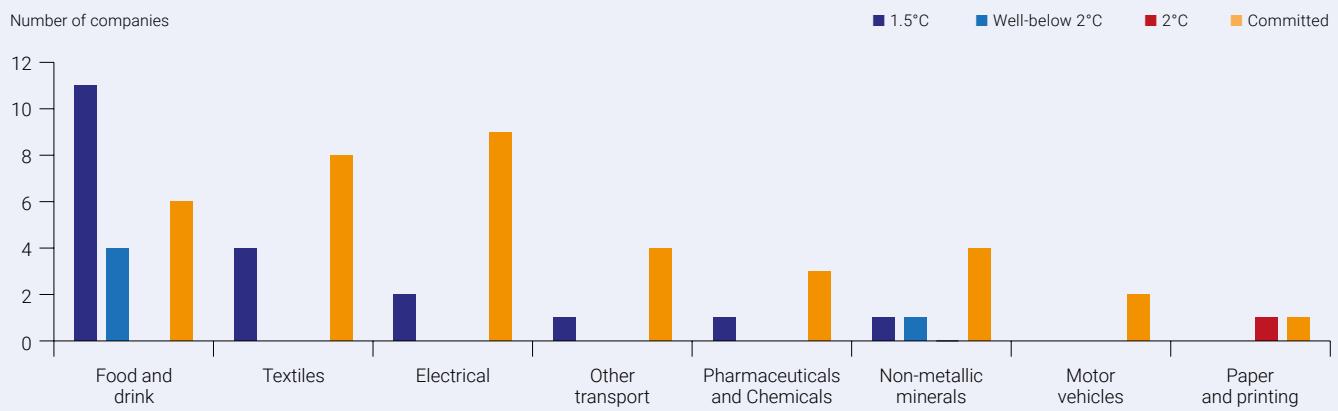


OVER 60 MANUFACTURING COMPANIES HAVE ALSO COMMITTED TO SCIENCE BASED TARGETS

As well as sub-sector targets, over 60 UK manufacturing companies have committed to setting or submitted Science Based Targets. At this stage, the majority of companies have committed to setting a target and are therefore in the process of developing a target

for validation. Of the companies that have submitted targets, most have submitted to 1.5 °C targets. Of the manufacturing industry, companies from the food and drink sector have submitted the most targets.

Manufacturing companies that have committed to set or submitted Science Based Targets



Source: Science Based Targets Initiative



THE MANUFACTURING INDUSTRY IS CONTRIBUTING ITS EXPERTISE TO HELP THE UK ACHIEVE NET ZERO

The manufacturing sector has a great history of being flexible and innovative to overcome challenges. The challenges of the net-zero transition and Covid-19, have increased the need for this sector's sustainability so that the country and the sector can prosper in a low carbon economy.

The manufacturing industry will play a major role in six decarbonisation areas that will be key to enabling the UK to achieve its 2050 net zero target; resource efficiency, transport, low-carbon energy, built environment, greening supply chains and product standards. Below are several examples of how manufacturing sub-sectors are already taking, and plan to take, action in these areas (see references at end of report for list of roadmaps and sustainability reports referenced in the six areas).



RESOURCE EFFICIENCY

- **UK Steel:** Steel will be 100% recyclable. British Steel will increase in recycling and reuse, deploying circular economy and material efficiency methodologies
- **Chemicals (CIA):** Lighter plastic parts will reduce a car's weight and better tyres improve energy efficiency
- **Food & Drink (FDF):** Food waste reduction and improved production, use, food security and disposal of food and drink packaging. Promote fewer and friendlier food miles
- **Engineering (ECIA):** Embed low-carbon design and implementation at scale so products perform adequately by 2030. Increase materials reuse and retrofit of buildings
- **Paper & Pulp:** Raise awareness of state-of-the-art energy efficiency technology and invest in R&D to lower carbon emissions and improving energy efficiency
- **Concrete and Cement (MPA):** Concrete is 100% recyclable and naturally absorbs atmospheric CO₂ throughout its lifetime from carbonation. Carbonation increases when concrete is crushed for reuse at the end of its life and during any secondary use but can also be accelerated during concrete production
- **Ceramics:** Produce high temperature process insulation
- **Textiles:** Agree good practice design principles, including durability, recyclability, use of recycled content and minimising waste, to lower the impacts of products. Pilot reuse business models to decouple business growth from the use of virgin resources. Close the loop on materials to accelerate commercialisation of fibre-to-fibre recycling in the UK
- **Automotive (SMMT):** Recommends battery recycling facilities to develop UK as a ULEV manufacturing location
- **Metal Casting (CMF):** Foundries use scrap metal from products and components at the end of life as the raw material for its manufacturing process
- **Aluminium (ALFED):** As a lightweight and highly recyclable material, aluminium is a key contributor to the UK's low-carbon economy. E.g., has achieved up to 40% in the foil thickness of packaging without jeopardising content quality. 95% less energy required to produce recycled aluminium (compared with primary aluminium)



LOW-CARBON ENERGY

- **Chemicals (CIA):** Enabling larger rotor blades on wind turbines, more efficient solar panels, and steam turbines for nuclear reactors (SMRs), developing Green and Blue Hydrogen with CCUS.
- **Paper & Pulp:** Identify and implement waste heat recovery projects, the use of sustainable biomass
- **Glass:** Flat glass is in solar technology and glass fibre plays key role in the construction of wind turbine blades. Improved glass fibre products are allowing manufacturers to construct longer, lighter, and more efficient rotor blades for larger wind turbines
- **Ceramics:** Produce refractory insulation used in renewable applications (wind turbines and solar) and nuclear applications
- **Metal Casting (CMF):** Die casting components provide precision products needed for a wide range of renewable energy technologies
- **UK Steel:** British Steel to assess and adopt technologies like CCS, hydrogen, increasing scrap utilisation and Electric Arc Furnace steelmaking
- **Electronics (Tech UK):** The data centre sector is a consistent and predictable energy user and could enable greater adoption of intermittent renewables and a more distributed grid



BUILT ENVIRONMENT

- **UK Steel:** Reducing weight of steel will reduce embedded carbon, steels strength can extend life spans
- **Chemicals (CIA):** High rated energy efficient windows and doors are manufactured from PVC
- **Glass:** Flat glass - if all buildings in the UK updated glazing to (1.4 U value) by 2030, it would result in a 32% reduction in energy consumption from buildings.
- **Ceramics:** High thermal mass construction products e.g., bricks and electric storage heater components
- **Water UK:** Increase use of grey water and rainwater to decrease water demand and emissions
- **Aluminium (ALFED):** Intelligent facades incorporating aluminium systems can decrease energy consumption in buildings by up to 50%
- **Concrete & Cement (MPA):** Concrete's thermal performance properties help construct highly energy efficient buildings and infrastructure. Thermal mass is a property of concrete and masonry, where heat can be absorbed, stored, and released slowly. Concrete buildings with high thermal mass generally have lower energy requirements and emissions from heating and cooling



GREENING SUPPLY CHAIN

- **Food & Drink (FDF):** Work with agriculture industry to reduce emissions and improve food security
- **Engineering (ECIA):** Include whole-life carbon assessment into public procurement. Improve whole-life carbon performance of products
- **Paper & Pulp:** UK pulp and paper expertise to support UK bio-refining initiatives and to developing the bioeconomy
- **Water UK:** Work with farmers on spray chemicals and chemical alternatives improves water quality and limits treatment needs. Work with Local authorities to encourage water efficiency and grey and rainwater reuse through planning regulations
- **Automotive (SMMT):** EV production will grow the domestic EV supply chain. Fuel cell capacity and supply chain needed to support cars, heavier vehicles, and rail units by 2030. Fleet renewal remains the quickest way to lower emissions and supports essential net zero technologies, like light weighting and advanced materials in the supply chain



TRANSPORT

- **Glass:** Flat glass and continuous filament glass fibre products can reduce weight of vehicles to reduce transport emission
- **Ceramics:** Produce electric vehicle battery components
- **Automotive (SMMT):** With appropriate production facilities and supply chains they could produce up to one million electric vehicles a year domestically
- **Metal Casting (CMF):** Casting's sector is key part of electric vehicles and rail transport supply chain
- **Aluminium (ALFED):** Can provide alternatives to single-use plastics to supporting more sustainable transport. e.g., Aluminium-driven light weighting
- **Aerospace Manufacturing:** Supporting the UK supply chain to develop new hybrid-electric and electric technologies



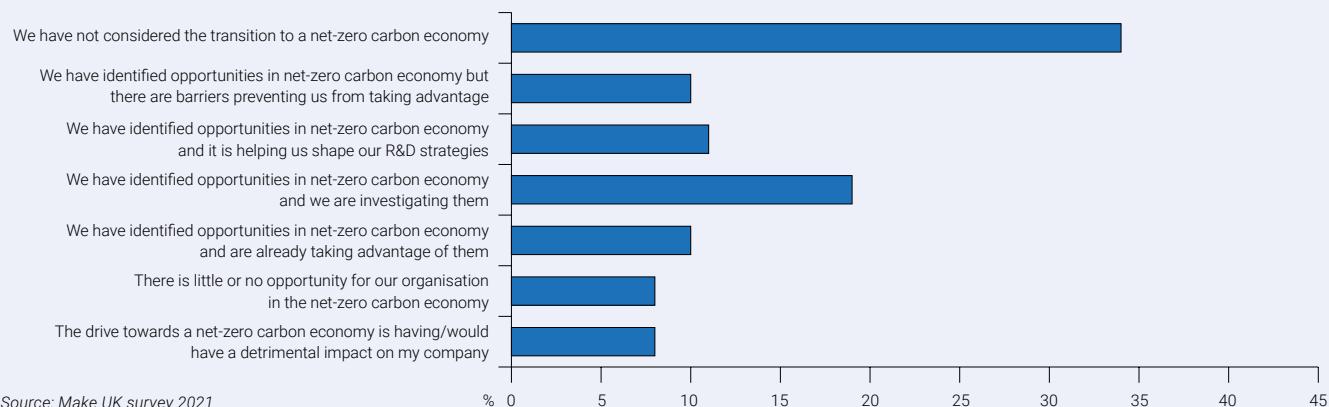
IMPROVING STANDARDS

- **Food & Drink (FDF):** Promote sustainability standards and initiatives in the sector
- **Engineering (ECIA):** Design and performance will increase material efficiency, carbon performance of buildings and infrastructure, including reuse of materials and components
- **Sustainable Cement:** Switching to sustainable cement, depending on technologies used to make it, can reduce carbon emissions by between 50 and 80%. Changing the material mix used in cement to include industrial waste and by-products of coal fly ash or blast furnace slag can make a significant reduction in the amount of CO₂ produced during production
- **Water UK:** White good manufacturing: more water efficient, reduces treated water demand
- **Textiles:** Work to align with Textiles Exchange – Creating Material Change, UN SDGs, Sustainable Apparel Coalition and The Microfibre Consortium - Introduce voluntary standard and 'carbon-checker' labelling for the UK textiles manufacturing sector by 2025 to enable fashion consumers to make an informed choice, (supported by Make it British).



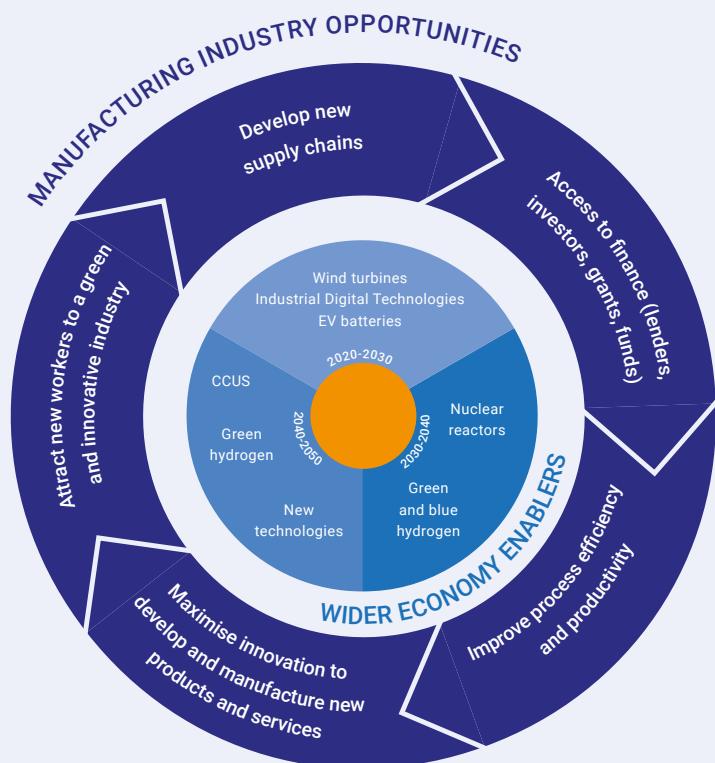
NEARLY HALF OF UK MANUFACTURERS SEE THE TRANSITION TO NET ZERO AS AN OPPORTUNITY

Net zero is seen as an opportunity by manufacturers



The manufacturing industry is one of the largest GHG emitters in the UK, therefore, manufacturers will be significantly impacted by changes in policy and consumer behaviours resulting from net zero targets. A survey carried out for the Towards a Net-Zero Carbon UK Manufacturing Sector report found that nearly half of UK manufacturers see net zero as an opportunity.

Make UK members identified opportunities around consumer preferences, new product standards, access to lender/investor finance, attracting new workers to the industry and improve process efficiency and productivity.



Access to finance (grants/funds/lenders /investors)	Make UK recommends that the Government should encourage and reward investment in the green economy by making the grant schemes simpler, fewer, and more accessible to SMEs and expand fiscal incentives, e.g., tax allowances for investment that support the transition to a net zero economy
Improve process efficiency and productivity	Improving efficiency will reduce GHG emissions as well as cutting operational costs
Maximise innovation to develop and manufacture new products and services	Taking advantage of changing consumer preference towards greener products will allow manufacturers to develop new types of green products, generating new revenue
Develop new supply chains	New products and markets will lead to new supply chains that will allow manufacturers to expand and access new revenue
Attract new workers to green and innovate industry	Increased social awareness of environmental issues means new graduates and other workers consider green credentials when deciding on where to work. Decarbonising manufacturing will bring new talent and skills to innovate industry.

Examples of existing funding/grants:

- BEIS Industrial Fuel Switching Competition
- Clean Heat Grant
- BEIS Industrial Energy Efficiency Accelerator
- BEIS CCUS Innovation 2.0 Competition
- Scotland's Net Zero Infrastructure (SNZI) programme

Examples of measures to manage and reduce energy demand:

- Manufacturing equipment improve efficiency
- Manufacturing process improvement
- Building efficiency improvements to reduce consumption
- Sustainability measures to reduce waste
- Behaviour changes to reduce consumption
- Digitisation to monitor and control consumption

Examples:

- New products: Wind turbines, electric batteries, nuclear reactors, blue & green hydrogen, CCUS, new technologies, industrial digital technologies etc...
- Innovation: 100% recycled steel, lightweight glass and plastic parts for vehicles, sustainable cement

Examples:

- Bio refining supply chain
- CCUS supply chain
- Hydrogen supply chain
- EVs supply chain
- Closed loop textiles
- Circular steel supply chains

Examples:

- Offshore Wind Industry Council (OWIC) predict an increase of jobs in the wind sector from 26,000 in 2021 to more than 69,800 by 2026
- Automotive sector deal 2018 aims to create a new National Retraining Scheme that supports people to re-skill, beginning with a £64m investment for digital and construction training
- Types of green jobs that will drive innovation include Biomimicry, Materials Innovation, Green Chemistry, Lifecycle Management, Lean Manufacturing, Adaptive Leadership, Equity and Regenerative Capitalism

ACHIEVING DECARBONISATION TARGETS WILL INVOLVE MAJOR CHANGES TO MANUFACTURING PROCESSES

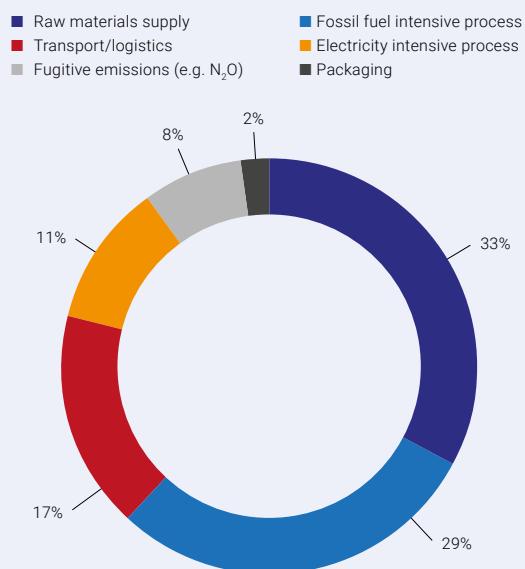
Long established manufacturing businesses and processes were developed against a backdrop of abundant and low-cost fossil fuels; therefore, their use is embedded in many manufacturing workflows. Until now there has been no need to find alternatives, nor be particularly efficient, and so no real drivers to innovate process changes. This poses major challenges now as the industry needs to decarbonise. Changing existing processes and workflows will be costly and innovation will be required to develop new, low-carbon alternatives.

Make UK members identified decarbonising the supply of raw materials, decarbonising fossil fuel intensive processes and decarbonising transport and logistics as the hardest aspects of their operations to decarbonise. These challenges will impact all manufacturing sectors to varying degrees.

DECARBONISING FOSSIL FUEL INTENSIVE PROCESSES WILL BE THE KEY CHALLENGE FOR THE MANUFACTURING INDUSTRY TO OVERCOME

Decarbonising fossil fuel intensive processes poses economic and logistical challenges for almost all manufacturing sectors. Many manufacturing processes use fossil fuels, mostly natural gas, in their processes, both to produce energy but also as a raw material. Changing processes that use fossil fuels as a raw material will be costly as equipment will need to be upgraded or retrofitted and alternative low-carbon fuels are often more expensive. Changing processes that use fossil fuels to generate energy or heat will also be expensive, as again alternative energy options, including electricity, are currently more expensive than traditional fossil fuels.

What aspects of your business are the hardest to decarbonise



Source: Make UK net zero roadmap consultation, 2021



Source: Inspired Energy, 2021

Key: Low High

Switching from fossil fuels to low-carbon alternatives, such as green hydrogen or bioenergy, to produce heat or power could significantly help manufacturers reduce emissions from energy intensive processes. Although some of these options are still in developmental stages, such as low-carbon hydrogen which requires significant innovation to provide supply in sufficient quantities and distribution outside industrial clusters, other options are more readily available.

The **Steel industry** is currently investigating switching from integrated blast furnaces and basic oxygen furnaces, which use coal, to alternative low-carbon processes, such as electric arc furnaces (EAF) process which use electricity to power operations.

Generating energy from electrification rather than fossil fuels would help reduce emissions, especially if renewable electricity is used. Although preferential to high carbon fossil fuels, electrification is currently an expensive process as equipment would need to be converted to operate on electricity. Additionally, electricity prices have been about ten times higher than gas prices for

many years, making the running costs of operations commercially unsustainable. This problem is exacerbated for sectors exposed to international trade (such as steel and other commodities) which have been suffering from a very uncompetitive price differential of electricity with their European counterparts.

Carbon capture, utilisation and storage (CCUS) will be a key technology in completely decarbonising manufacturing processes where fossil fuels cannot be replaced. However, CCUS is still being developed and has yet to be rolled out commercially in the UK. Improvements in the efficiency of capture material and the development of a CO₂ transportation network, need to be achieved to allow the potential of this technology to be fully realized. Natural CO₂ sequestration processes, such as that takes place in the formation of cement, could be utilised sooner.

Carbonation - the ability for concrete to absorb carbon dioxide during its use - is already being deployed across the **concrete industry** and is a key enabler for the cement industry to reach net negative emissions by 2050.

Green hydrogen is made using water and renewable energy

Blue hydrogen comes from natural gas with carbon capture and storage (CCS) to capture emissions produced during the process

There are several key **enablers** that will incentivise and help the switching of high fossil fuel intensive processes:

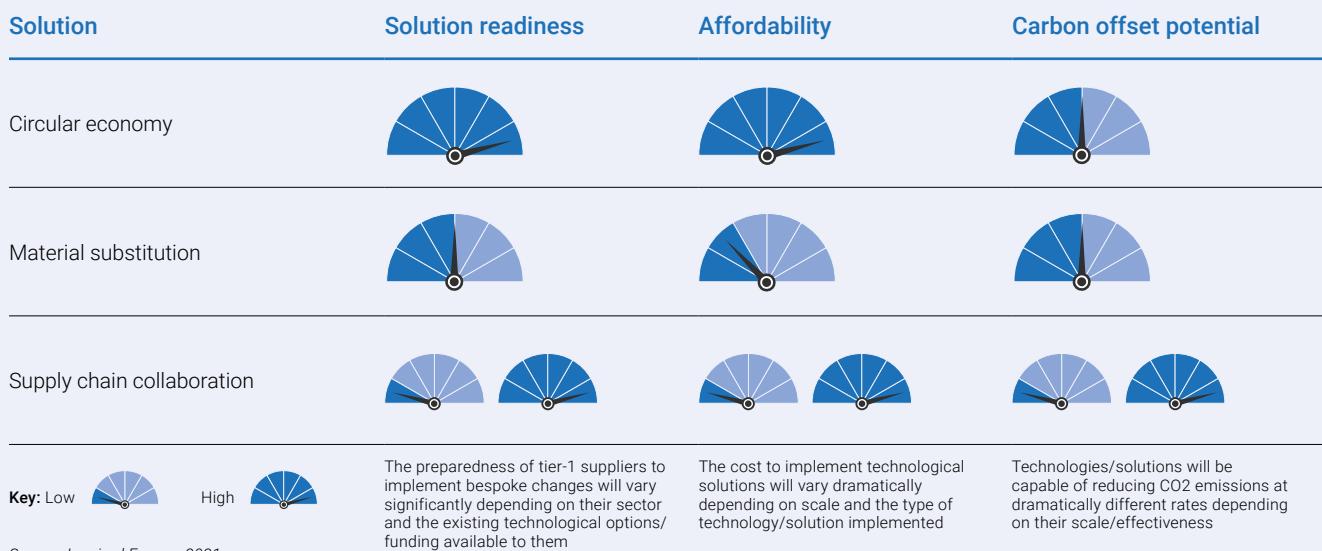
- Government hydrogen capacity targets of 1GW by 2025 and 5GW by 2030 will encourage the development of hydrogen production and mean hydrogen becomes available as an alternative fuel
- Government targets around industrial clusters and the development of hydrogen infrastructure will help industrial areas access and use hydrogen
- Targets to decarbonise electricity production whilst maintaining and increasing capacity – in particular the target to reach 40GW offshore wind capacity by 2030 and new nuclear power plants – will increase the availability of low-carbon electricity
- The development and implementation of innovative CCUS technology – encouraged by BEIS funding research and development in this space – will enable wide scale deployment across industrial sites and so use with hard to decarbonise processes
- Government policy to incentivise electricity usage will be a key enabler to encourage fuel switching

DECARBONISING RAW MATERIAL SUPPLY WILL INVOLVE MAJOR CHANGES TO SUPPLY CHAINS AND PROCESSES

Decarbonising raw material supply is a huge challenge to the manufacturing industry as it requires decarbonisation across the entire value chain. It will involve industries outside of manufacturing, such as the mining and oil and gas industries, to decarbonise their processes to ensure any raw materials or purchased products have a low-carbon footprint.

Embodied carbon footprint is the total carbon footprint of a material/product and includes all emissions associated with its production, i.e., extraction of the raw material, refinement, processing, manufacturing, and transportation.

Changing the materials used in manufacturing processes from those with high-embodied carbon to low-embodied carbon would help significantly reduce emissions associated with manufacturing processes.



Source: Inspired Energy, 2021

The **glass industry** is already using recycled glass in operations. This results in a much lower carbon footprint of glass products as there are no emissions associated with glass production.

The use of recycled raw materials rather than new, primary resources significantly reduces the embodied carbon of products, reduces waste, and often reduces energy usage. Many industries are already encouraging a 'circular economy' in their processes which ensures materials are reused as far as possible. Already, 'Urban mining' (e.g., extracting previous metals from recycled electronic equipment) and extracting metals and minerals from slags, is significantly reducing the carbon footprint of raw materials. However, demand for these minerals currently outstrips existing stock, and so raw material producers will need to lessen their operational emissions to ensure a reduction in the carbon footprint of new raw materials.

Changing the materials used in manufacturing processes from those with high-embodied carbon to low-embodied carbon would help significantly reduce emissions associated with manufacturing processes. For example, using wood in construction rather than metals, results in significantly lower emissions. Creating new green supply chains and products is a key opportunity created by the net zero journey, both in terms of providing opportunities for new businesses but also to help existing manufacturing businesses decarbonise.

The **steel industry** is transitioning away from new materials to the reuse of scrap metal as well as powering processes by electricity rather than fossil fuels:

- Electric Arc Furnaces (EAFs) utilize scrap metal rather than iron ore as the main fuel. Coke and iron ore that are needed for blast furnaces are no longer being predominantly sourced in the UK and instead are imported – EAFs are therefore associated with lower scope 3 – category 1 and 4 emissions as materials can be sourced locally

Working with suppliers to reduce the emissions associated with their processes will reduce the embodied carbon of raw materials significantly. Offering green products will also be beneficial to suppliers as it will allow them to supply existing customers while also benefiting from income from new green supply chains.

Insetting – investing in carbon reduction projects within a company's own supply chain

Big manufacturing companies can work with suppliers to encourage uptake of innovative technology/infrastructure or implementation of emission reduction initiatives, such as procuring green electricity, this process is also known as insetting. This will serve to reduce the Scope 1 and 2 emissions⁴ of tier-1 suppliers, and reduce the emissions attributed to manufacturers Scope 3 emissions⁵ as a result of purchasing manufacturing materials/goods with lower embodied carbon.

The **food and drink industry** are already collaborating with farmers to reduce the emissions of agricultural processes, through initiatives such as:

- Livestock production efficiency – increased efficiency through diet management/strategic feed selection will reduce methane emissions per unit of product
- Nitrogen efficiency – slow/controlled-release nitrogen products to optimize the amount being absorbed by plants and reduce the amount degrading to N₂O
- Precision agriculture – tailor production inputs to specific plots within a field – reduces input costs and increase yields

⁴Scope 1 emissions are direct emissions from owned or controlled sources. Scope 2 emissions are indirect emissions from the generation of purchased energy.
⁵Scope 3 emissions are indirect emissions related to value chain

Several important **enablers** will help decarbonise raw material supply:

- Government policy and funding to support smaller manufacturing companies to decarbonise products in a cost and time efficient way
- The introduction of low-carbon caveats in tenders will encourage suppliers to decarbonise their activities
- The introduction of low-carbon product standards – under considering to be introduced in 2030, with some pilots in 2025 – and the achievement of the British Retail Consortium's net zero products from 2040 target, will make it a requirement to only provide low-carbon products
- Funding and fiscal measures to support and encourage implementation of circular economies, such as the Low-carbon and Circular Economy Fund in Greater Birmingham & Solihull LEP, will help all manufacturers change processes to allow the use of recycled raw materials
- Support and funding for upstream technological innovation that will allow tier-1 suppliers to decarbonise operations

DECARBONISING TRANSPORT AND LOGISTICS WILL BE A LONG-TERM PROCESS AS NEW TECHNOLOGIES BECOME AVAILABLE

Transportation of goods and materials is often one of the top value chain emission sources as almost all freight options, regardless of transport type, still use fossil fuels as the main source of energy. Air freight is generally the highest emitting mode of transport on a unit basis, followed by road freight, rail freight and then sea freight. The key challenge around decarbonising manufacturing transportation is therefore the current lack of existing low-carbon transportation technologies. Although electric vehicles are now commonplace for personal transport, commercial electric trucks and other heavy-goods vehicles (HGVs) are not commercially available. Low-carbon flights are even further from being an option, and while there is a major push to develop low-carbon shipping options, shipping is still currently a fossil fuel intensive industry. Manufacturers are therefore limited, especially in the short-term, as to what low-carbon transportation options they can use



Source: Inspired Energy, 2021

Key: Low  High 

Electric trucks and lorries are still low on the development scale, however the phase out of non-zero carbon HGVs is targeted for 2040. Several companies are in the process of developing pilot and trial electric trucks, but size and range are still major hurdles to overcome before these vehicles can be used commercially.

Due to the weight and size of batteries needed to power HGVs, hydrogen is currently viewed as the likely alternative fuel for larger vehicles. Indeed, hydrogen is already being used commercially as a fuel for large vehicles such as buses. The continued development of hydrogen fueled engines, particularly for the likes of HGVs and lorries, will significantly help to decarbonise manufacturing transport emissions. The supply of low-carbon hydrogen throughout the country is a technical issue that needs to be solved to allow the wider roll-out of hydrogen powered vehicles.

LeylandTrucks have been conducting a recent project to test and log the performance of 20 DAF LF electric 19-tonne rigid trucks to help support the UK Government's Department for Transport (DfT) efforts to encourage the use of electric vehicles in commercial transport. This project is part of the Government's £20 million zero emissions road freight trials and aims to help fleet operators understand the strengths, challenges, and deployment options of electric trucks.

Tevva – a British zero-emissions truck manufacturer – have been developing an electric truck with a hydrogen powered range extended, which would allow drivers to travel 700km plus in one go. The range extender technology (REX), which uses a hydrogen fuel cell, is not expected to be available for commercial use until 2023.

Electric motorways are an alternative option which would allow vehicles to attach to overhead wires and run-on electricity, like rail and trams. The vehicles that use them would have batteries that charge while in motion so that when they detach from the wires, they can continue their journey while producing zero emissions. An economical and technical feasibility study - led by the infrastructure solution company Costain - is being conducted as part of the DfT's zero emissions road freight fund with an aim to have an eMotorway in action by 2030.

Procuring raw materials, products and services from local sources is a non-technology option for reducing emissions from transport and logistics. Although unlikely to completely decarbonise transport and logistics, having a local supply chain would minimise the energy required for transporting materials, especially if the need for long-distance, international transportation was removed. As well as reducing emissions, there are social and economic benefits of developing a local supply chain, in that it would provide more local jobs and have an indirect impact on the local economy.

Food and drink sector example of benefits of decentralising supply chains:

- Current centralised resourcing systems result in materials being shipped or hauled significant distances from overseas tier-1 suppliers, resulting in significant emissions per kg of product transported
- Sourcing produce locally would reduce the need for additives (pretreatments, chemicals etc.) as food wouldn't need to be preserved for long-haul journeys – this would have indirect benefits through reducing the lifecycle carbon footprint of products
- Sourcing materials locally would also mitigate against delays in deliveries due to logistical issues

To enable the decarbonisation of manufacturing transport and logistics, there are several key technology enablers that will require Government help to allow continued development:

- In line with Government targets to phase out fossil fuel powered vehicles (personal vehicles from 2035 and HGVs by 2040), the development of electric and/or hydrogen HGVs will be required – Government funding to encourage innovation and trials will be key to ensure commercial roll out of these vehicles
- To allow wide-scale, commercial roll out of hydrogen vehicles, Government policy to support the development of low-carbon hydrogen production and infrastructure will be needed
- Decarbonising electricity generation whilst maintaining and increasing capacity in order to meet the demand required to facilitate a transition to electric vehicles and eHighways

THE MANUFACTURING INDUSTRY MUST FOCUS ON BUILDING RESILIENCE IN RESPONSE TO THE CHALLENGES PRESENTED BY BOTH CLIMATE CHANGE AND TRANSITIONING TO NET ZERO

Our aptitude to manage an evolving risk landscape depends on our ability to both predict and adapt to identified and unexpected challenges.

Predicting new challenges is of course often difficult but the importance of having industry ready and fully equipped to react is vital.

Building Resilience:

Digitisation and New Technologies

Manufacturers regard the acceleration of digitisation and the adoption of new technologies as priorities in ensuring future growth and resilience. Investing in technology and further digitisation has provided numerous benefits for the manufacturing sector, from increasing productivity to improving the standardisation of output and reducing waste. In research undertaken by Make UK, 'reduced costs and improved productivity' were seen as the overwhelming benefit (cited by 91% of respondents).

Managing Climate Risk

Managing the impact of climate change is a key priority in creating a resilient British industrial sector. Mandatory climate-related reporting (Task Force on Climate-Related Financial Disclosures) for large listed and non-listed businesses has been introduced and will be extended to cover most businesses by the mid-2020s.

Securing investment money will depend more and more on the ability of manufacturing businesses to reassure investors and lenders that they have duly and realistically considered climatic risks.

Adapting to Climate Change

Manufacturers are increasingly investing in research to understand the factors that impact on their resilience, but Government support is vital. Extreme weather events can create cascading risks that spread globally across sectors and countries. The current model of conventional risk governance which focuses on single events and single sectors does not account for these types of risks.

Adaptation actions include increased global capacity building for climate resilience including supply chains, health systems and early warning systems and identifying financial risks to businesses through setting international standards for eligibility of green projects and transparent reporting.

Make UK and its members are ready to work with policy makers to deepen understanding of manufacturing resilience and plans to mitigate risk from future crises.

WHAT ARE THE MANUFACTURING INDUSTRIES NEXT STEPS TOWARDS NET ZERO?

THE MANUFACTURING INDUSTRY SUPPORTS NET ZERO BY 2050 AND 67% REDUCTION BY 2035 TARGETS

Consultation with Make UK members indicated general, strong support for setting the net zero by 2050 and 67% reduction by 2035 targets, with the right help and business environment. Several of the reservations came from sectors in which achieving both the short and long-term targets will be impossible without government support and new infrastructure.

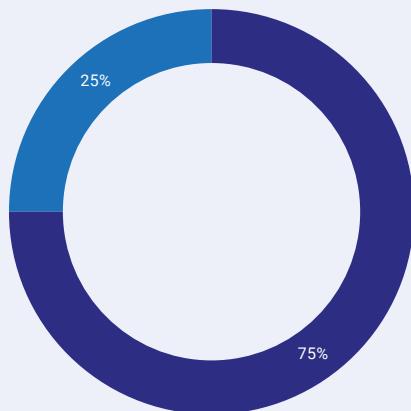
Make UK is encouraging UK manufacturers to align with these targets, for example through:

- Setting Science Based Targets, or equivalent, for Scope 1 & 2 emissions
- Conducting climate risk assessments in line with forthcoming TCFD-aligned reporting legislation

Through the Industrial Decarbonisation Strategy, the Government is exploring additional product-level data transparency requirements, as well as low-carbon labelling and standards, that aim to increase consumer demand for green products. These proposals will need to be discussed with members; especially as further details emerge from the government. UK manufacturers need to be making changes now to prevent investment in long-term energy intensive equipment and processes. To achieve net zero manufacturing companies must focus on reducing their individual Scope 1, 2 and 3 emissions.

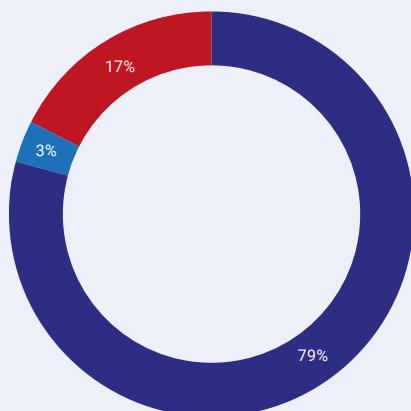
Do you support Net Zero by 2050 target for UK manufacturing?

■ Yes fully ■ Yes with reservations ■ No



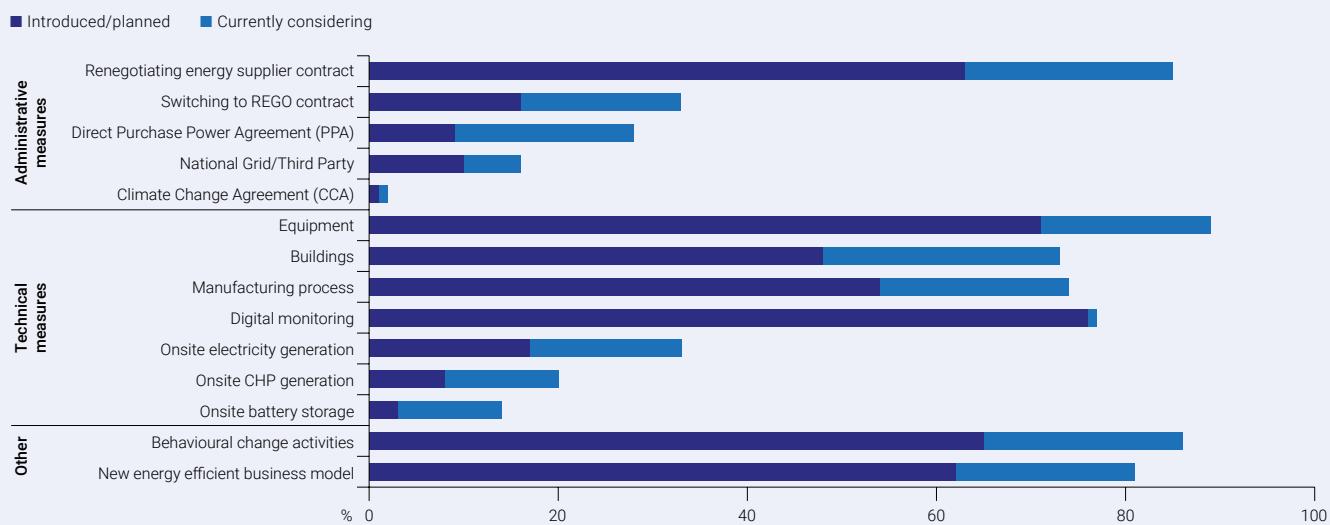
Do you support a 67% reduction by 2035 in absolute terms? (vs. 2018)

■ Yes fully ■ Yes but needs more ambition ■ No, too steep



Source: Make UK net zero roadmap consultation, 2021

Range of options to reduce scope 1 and 2 emissions



Source: Make UK survey 2021

MANY MANUFACTURERS ARE TAKING OR CONSIDERING A RANGE OF ACTIONS TO REDUCE THEIR SCOPE 1 AND 2 CARBON EMISSIONS

When surveyed for the Make UK and E-ON's 'Towards a Net Zero Carbon UK Manufacturing Sector report' on steps taken to action Scope 1 and 2 emissions, almost 63% of UK manufacturers had taken administrative measures, 40% had invested in technical measures, and another 20% are currently considering investment in these areas. All manufacturing companies need to decide on the range of carbon reduction actions most suitable for their operations and implement them.

These further proposed commitments are based on market trends and legislation where relevant but are meant to be further tested against the Make UK membership in consultation.

- All businesses to have their roadmaps ready by end of 2023 and ready to take the first meaningful steps thereafter (conditional to government laying out the necessary policies, and providing the right level of support)
- All businesses to have measured their carbon emission baseline by the end of 2022, and installed half-hour (or less) electricity metering on the top 3 lines of production
- By 2025, manufacturers of products with in-use emissions commit to only produce products such as vehicles, machinery, heating systems and industrial plant, in line with a net zero future

TO REACH NET ZERO MANUFACTURERS NEED TO INFLUENCE THEIR SCOPE 3 SUPPLY CHAIN EMISSIONS

To target Scope 3 emissions, the following commitments are also proposed to be taken forward in the next step and tested against the Make UK membership in consultation:

- All manufacturers to start screening and identifying their Scope 3 emissions (at least the ones in the UK)
- All manufacturers to engage with their value chain to gauge the willingness and potential of their suppliers and customers to reduce their own Scope 1 and 2 emissions (at least the ones in the UK)
- All Manufacturers over the threshold for Streamlined Energy and Carbon Reporting to:
 - Require their own direct suppliers to report their Scope 1 and 2 carbon footprints by 2023
 - Have measured their Scope 3 Inventory by 2024 (at least the ones in the UK)

We recognise that there will likely need to be different commitments for influencing UK and overseas suppliers. As proposed above, the suggested approach is that UK manufacturing commits to requiring their direct suppliers to baseline their own full carbon footprints, make this data available, and produce products compatible with a net zero future. This approach can also be taken to overseas suppliers, though for suppliers in countries with a different net zero pathway the requirements will need to be phased differently.

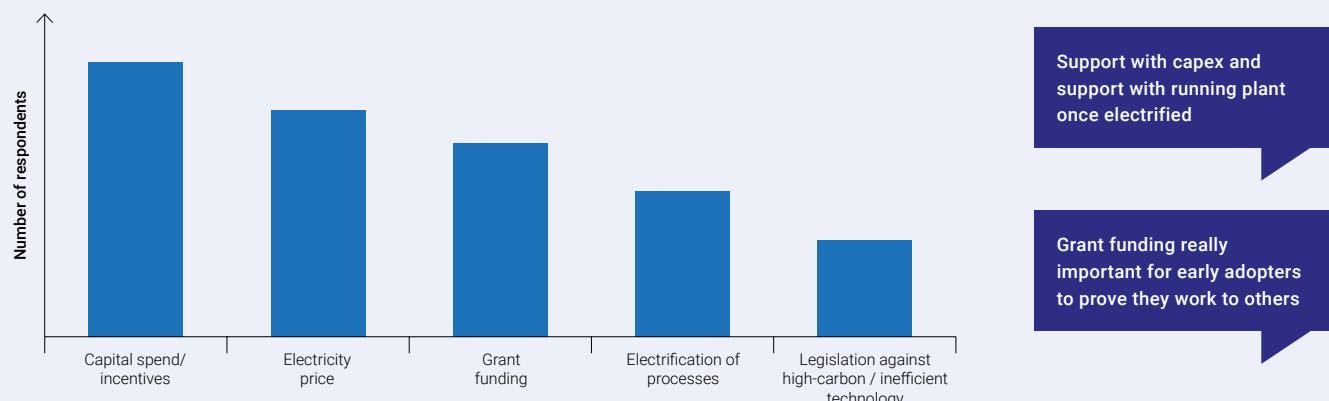
EASILY ACCESSIBLE FUNDING AND SUPPORT WITH DEVELOPING THE RIGHT SKILLS WILL BE KEY TO THE MANUFACTURING INDUSTRY ACHIEVING NET ZERO

Make UK members identified funding as key for overcoming decarbonisation challenges and highlighted the need for specific support around capital spend incentives, subsidies for the cost of electricity and grant funding. There are currently a wide range of low-carbon funding schemes however these are not available to all manufacturers as they are often geographically focused. Funding opportunities that are available nationally and that mirror investment cycles to provide long-term investment security will help action decarbonisation risks and challenges.

Despite the available funding, access to schemes remains an issue and SMEs in particular have trouble knowing where to look for funds, and when they find them, understanding their eligibility for the funding, and with the applications themselves. A clearer and streamlined funding landscape is therefore needed to ensure funding is accessible to all manufacturers.

The manufacturing sector also sees the need to develop the right skills within the industry to achieve net zero, in particular through the 'greening' of existing jobs, creation of new green jobs and educating employees across manufacturing businesses.

What are your priorities for financial and policy support?



Source: Make UK net zero roadmap consultation, 2021

Make UK's own research⁶ tells us that the three technical skills that will be in most demand are:

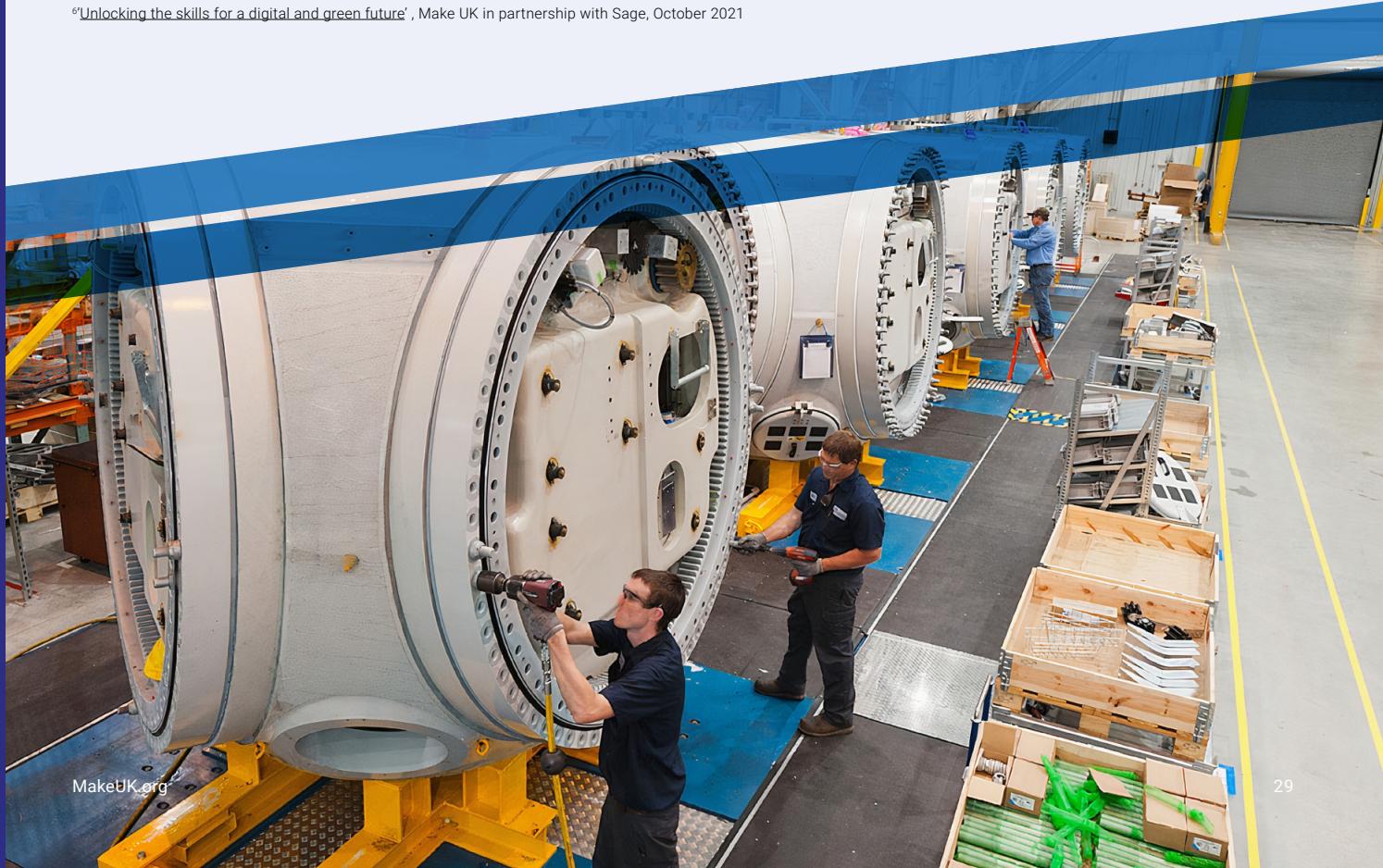
- Resource efficiency, e.g., carbon accounting, lean manufacturing
- Low-carbon economy, e.g., nuclear, and renewable energy generation, carbon emission minimisation
- Development of new or amended products, e.g., design and production of electric vehicles

The average skill level of a net zero job is 26% higher than the current occupations across industry in the UK, so the quality of the training needs to be higher. The acquisition of in-depth skills would enable companies to accelerate the deployment of clean technologies, increase productivity and resource efficiency. In parallel, improving sustainability skills amongst leadership will help with educating manufacturing workforces about small changes that will help reduce emissions – this could include improving staff awareness of energy efficiency, improved waste management and more carbon-conscious business travel and commuting.

The government, training providers and manufacturers need to make a collaborative effort to address the green skills gap. As education and skills policies will be crucial for long-term economic growth, Make UK are recommending Government to:

- Implement a green skills tax credit to encourage manufacturers to prioritise the acquisition of green skills in the race to reach net-zero
- Prioritise rapidly increasing provision of training at Level 4 and 5 to meet the green skills demand
- Encourage the Institute for Apprenticeships and Technical Education (IfATE) and Skills Productivity Board to work in partnership with the National Manufacturing Skills Taskforce
- Introduce a Help to Grow Green program for managers and leaders to support training in sustainability

⁶'Unlocking the skills for a digital and green future', Make UK in partnership with Sage, October 2021



POLICY RECOMMENDATIONS FOR GOVERNMENT:

Over the next decade, government will need to support the manufacturing sector to overcome the barriers that currently prevent the industry from investing in low-carbon activities.

A combination of policy and funding changes are required:

Carbon pricing	The use of carbon pricing is required to provide certainty around the UK's net zero ambition and to send a clear market signal, thus helping manufacturers secure investment in low-carbon activities
Fuel switching	To encourage manufacturers to start fuel switching, the correct policy framework needs to be established. This could be in the form of subsidies on the use of green electricity or gas instead of more carbon intensive energy options. Putting the price of electricity at a par with gas prices in the UK, and of both gas and electricity at a par with their cost in other European countries.
Negative emissions technology market	The Government also needs to trigger the development of a market for negative emission technologies. This will provide manufacturers with long term security when starting to develop and manufacture these technologies and unlock UK's potential to export the knowledge.
Carbon Leakage	A key concern for manufacturers is the potential for carbon leakage, as their goods and services increase in cost due to investment in low-carbon alternatives. The government needs to put a plan in place to mitigate the risks of carbon leakage
EU Carbon Border Adjustment Mechanism (CBAM)	Governments needs to work with the manufacturing industry to help understand the impact the CBAM will have on their business. The impact of any potential UK carbon border taxes will also need to be well communicated to the manufacturing industry.
Funding CCUS & Low-carbon technologies	Funding to support the development and use of CCUS, low-carbon hydrogen and nuclear power will be key to allowing manufacturers to develop and invest in these key low-carbon technologies
Green Skills Tax Credit	To ensure manufacturers have the right skills for the net zero challenge, the government should introduce a Green Skills Tax Credit which encourages high emitting companies to invest in 'green collar' jobs.

CONCLUSIONS

Make UK has committed to help its members achieve net zero by 2050.

- On the pathway to net zero, the manufacturing industry will achieve a 67% reduction in Scope 1 and 2 emissions by 2035.
- Make UK and the manufacturing industry are also committed to engaging with Government and other stakeholders to create the right business and regulatory environment for the manufacturing industry to become net zero, supporting suppliers and customers to go net zero and developing net zero products.
- They also commit to supporting the establishment of 4 low-carbon clusters, 1 zero carbon cluster by 2040 and several mini, dispersed low-carbon clusters.

There are six key areas in which the manufacturing industry will play a major role in enabling the UK to achieve its 2050 net zero target; resource efficiency, transport, low-carbon energy, built environment, greening supply chains and product standards. Many manufacturing sub-sectors have already made pledges and set targets to contribute to these six areas of decarbonisation.

When surveyed, Make UK members identified opportunities around maximising innovation to develop and manufacture new products and services, meeting new consumer preferences and accessing new finance from grants/funders/lenders/investors. Further opportunities have been identified by Make UK which include improvements to process efficiency and productivity, development of new supply chains and attracting new workers to green and innovate the industry.

Decarbonising long established manufacturing businesses and processes will not be easy. Changing existing processes and workflows will be costly and innovation will be required to develop new, low-carbon workflows.

THE KEY CHALLENGES FOR MANUFACTURERS IN REACHING NET ZERO ARE:



Decarbonising fossil fuel intensive processes:

Solutions at various stages of development include CCUS, BECCS, Switching from fossil fuels to low-carbon alternatives and/ or electrification. These solutions could all significantly help manufacturers reduce emissions from energy intensive processes.



Decarbonising raw materials supply:

Material Substitution, Circular Economy and Supply Chain Collaboration all have a big role to play in decarbonising the supply of materials for the manufacturing industry. The use of recycled raw materials rather than new, primary resources significantly reduces the embodied carbon of products, reduces waste, and often reduces energy usage.



Decarbonising transport and logistics:

Solutions in various stages of development include electric and hydrogen vehicles, eHighways/ electric motorways, and decentralised supply chains. Although electric vehicles are now commonplace for personal transport, commercial electric trucks and other heavy-duty vehicles are not commercially available and therefore present an ongoing challenge that needs to be resolved



Staying cost competitive:

Reducing emissions and staying cost competitive by not losing out to global competition is a key concern of the manufacturing industry and needs to be supported with the correct policies to reduce the risks to the industry from transition to net zero.

To overcome these challenges and to speed up the development of the proposed solutions, the government will need to support the manufacturing sector by investing in low-carbon activities and developing the correct policies.

To create the right business and regulatory environment for the manufacturing industry to become net zero Make UK asks the Government to; manage carbon pricing, fuel switching and carbon leakage in a way that supports the manufacturing industry to transition to net zero without major impacts on their competitiveness; explain the EU Carbon Border Adjustment Mechanism (CBAM) to the sector so that they understand how it will impact their businesses; and provide the right access to finance that will support the development of low-carbon technologies and green skills.

Working together will be an important part of overcoming the challenges facing the industry. Therefore, Make UK calls for its members to join in the collective effort of decarbonising the manufacturing sector. In return, Make UK commits to supporting its members by re-enforcing its existing net zero framework by continuing to refine roadmap milestones, education and training programmes and facilitating the sharing of best practice amongst members, while collaborating with government and other stakeholders to create the conditions needed for businesses to transition to the low carbon economy.

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Make UK is backing manufacturing – helping our sector to engineer a digital, global and green future. From the First Industrial Revolution to the emergence of the Fourth, the manufacturing sector has been the UK's economic engine and the world's workshop. The 20,000 manufacturers we represent have created the new technologies of today and are designing the innovations of tomorrow. By investing in their people, they continue to compete on a global stage, providing the solutions to the world's biggest challenges.

Together, manufacturing is changing, adapting and transforming to meet the future needs of the UK economy. A forward-thinking, bold and versatile sector, manufacturers are engineering their own future.

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Inspired Energy PLC provides expert insight and consultancy to optimise the energy strategy of over 500 manufacturers and energy intensive clients.

With UK businesses facing increasing pressure to get serious about sustainability, we create their own perfect-fit utilities management solution, helping them reduce the price they pay, as well as reducing their consumption.

Our solutions create a clear and actionable long-term plan, making investment easier to obtain and carbon reductions quicker to realise. Net zero is a challenge but with the right support and advice, can present businesses with a range of commercially and operationally beneficial opportunities.

Inspired Energy PLC values its own role in meeting the UK's target and we will continue our drive to achieve net zero by 2035. We have 550 experts located throughout the UK and Ireland, giving us a depth of experience and expertise that is reflected by our position as the UK's number one advisor by Cornwall Insight (2018-2021).

If you need advice on creating and delivering your energy strategy, Inspired Energy PLC can advise you on how best to start and how we can support your decarbonisation journey.

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