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**SIEMENS**

**MAKE**uk  
The Manufacturers' Organisation

# DECARBONISING MANUFACTURING: CHALLENGES AND OPPORTUNITIES



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# FOREWORD

**Carbon emissions are among the list of industry's largest challenges – a fact that can't be stressed enough. It is everyone's responsibility to act and what were once 'nice-to-haves' are now business imperatives.**

The commercial and moral arguments for action stack up. Asset owners and operators increasingly see poor environmental performance as a serious commercial risk and are acting to address it. Meanwhile energy demand itself is an increasingly active debate too. Whether it is the current concerns about price, demand requirements to support the upcoming boom in electric vehicle charge point infrastructure, or, the way we generate energy and use renewables, it's rare that energy stories drop off the news agenda.

From the manufacturers we work with, we know energy and the environment are core focuses as a result. Many businesses are attempting to improve operational efficiency to reduce energy consumption while also investing in digital technologies that can reduce reliance on the grid or energy use in their factory. Siemens provides solutions and services in all these areas through our Digital Industries and Smart Infrastructure businesses.

But there are many other businesses that don't know where to start or find that the complexities of making change causes paralysis when it comes to making decisions. Of course, achieving net-zero is an intricate process for many organisations but delaying is now out of the question – and the rising cost of energy adds to the imperative.

One of the key findings we discussed with Make UK when reviewing this survey, is that a third of manufacturers now view decarbonisation as high importance and half place it in a mid-tier position in their list of priorities. In doing so, we debated whether this is where we expect the sector to be or whether it is, put bluntly, good enough. The answer is probably somewhere in between. While it is great to see progress on this front, sustainability must become the central discussion point for the manufacturing industry.

Yes, it is a long-term challenge, and yes there are many other challenges – costs, security of supply, business resilience – that are also important today. While missing the mark on

these short-term wins could be risky, in many ways these risks pale in comparison to the consequences of a lack of action on the environment.

Interestingly, many short-term challenges for manufacturers are also intrinsically linked to environmental performance. For instance, achieving carbon neutrality can come with increased productivity through process improvement and the use of technology to drive efficiencies.

From that perspective, it is great to see that nearly half of the manufacturers asked in our research say that they are acting on their decarbonisation plans with a further quarter intending to do so over the coming 12 months.

Decarbonisation and the transformation of energy use in the sector will be a core part of how UK industry modernises to remain competitive. The complexity of this task cannot be downplayed. And neither can its importance. I hope reading this report will help inspire manufacturing leaders in formalising, activating and accelerating their carbon reduction plans to create a resilient and productive sector that is ready for the future.



**Brian Holliday, Managing Director of Siemens Digital Industries in the UK and Ireland**

# EXECUTIVE SUMMARY

Despite manufacturers facing unprecedented economic challenges and supply chain pressures, companies have moved the decarbonisation of their businesses up the priority ladder with around eight in ten saying it is a priority within their business. This clearly demonstrates the importance manufacturers are putting on their active journey towards net zero.

Make UK's latest survey revealed that nearly half (46%) of manufacturing companies are already implementing their decarbonisation plans while a further quarter will start decarbonising within the next 12 months. An additional 17% aim to begin the process in the next 24 months.

Energy efficiency is seen as key to reducing emissions with almost half of manufacturers (47%) telling us they have already adjusted their business practices to cut energy consumption in response to the energy price hikes in 2022. Moreover, after the outbreak of hostilities in Ukraine, the situation began to reach critical levels with three-quarters of manufacturers escalating optimising energy efficiency to be the main focus of the decarbonisation agenda.

Two in five companies said that installation of onsite renewable electricity or heat had been helpful in mitigating against the high cost of grid-supplied energy and was helping them to meet their decarbonisation goals. The implementation of new Industrial Digital Technologies grew in momentum during the pandemic with companies having to find new ways of remote working almost overnight. Some 13% of manufacturers said they are now using IDTs as a focus of their decarbonisation pathways. Although this is somewhere off where we need to be, we are beginning to see more and more companies digitalise to decarbonise.

Just over a third of businesses surveyed said they had already saved money as a result of emission reduction - through improved productivity by streamlining processes. And with a company's 'green credentials' increasingly under the spotlight from customers, 16% of companies said they saw increased sales thorough access to new markets as a direct result of emission reduction their business. A further 14% said that reducing emissions had also helped them access specific finance routes for new projects.

However, manufacturers are still facing difficult barriers when it comes to decarbonising their operations and processes, and this is particularly felt by small and medium sized enterprises (SMEs). The real cost of upgrading or replacing capital equipment comes in top of the list of challenges to decarbonisation of operations for 42% of manufacturers, with 31% saying they are concerned about remaining cost competitive and the same number cited the rising costs of energy for fuel switching as the main barrier to change. A quarter are held back by the challenge of decarbonisation of transport and logistics, with 23% saying decarbonisation of their supply chains is a real challenge for them moving forward as they are not in direct control here. A lack of internal resource is an issue for some companies alongside a lack of appropriate skills.

**46%**  
**OF MANUFACTURING COMPANIES  
ARE ALREADY IMPLEMENTING THEIR  
DECARBONISATION PLANS**

Data collection is challenging but is key to further emission reduction with 59% of manufacturers already measuring their direct electricity consumption and a further half are also measuring their consumption of gas and other fossil fuels. The focus on decarbonisation is further demonstrated by the fact that 41% of manufacturers questioned are already measuring outright the emissions they make directly from production processes and emissions they made indirectly through buying energy from a supplier (scope 1 and 2 emissions). Two in five companies are already measuring the emissions from their supply chain (scope 3 emissions) with a further quarter planning to do so within the next 12 months.

On the whole, the picture is positive. A third of manufacturers agree that the strategies and initiatives that Government has announced on decarbonisation will help them, but to date we have found that understanding and take up of that support has been mixed. After the huge impact and awareness growth which surrounded COP26, awareness has dwindled, and understanding of the more practical steps to take is in many cases poor.

Moreover, while there have been numerous strategies published by Government, including the Net Zero strategy and the Industrial Decarbonisation strategy, there has been little or no, update or progress made against these. Government should deliver regular updates on progress in order to help business understand the Government's overall intentions and make investment decisions accordingly.

In addition to this we are calling on Government to deliver policy that will help manufacturers power on with their decarbonisation journey including:

**1 Incentivise investment in industrial decarbonisation technologies through capital allowances and take reliefs:** This should include expanding the R&D tax credit relief scheme to include green capital expenditure relating to industrial decarbonisation within qualifying expenditure and permanent full expensing of all assets relating to industrial decarbonisation.

**2**

**Introduce a Help to Grow Green programme:** Modelled on Help to Grow, encompassing vouchers for businesses to spend on products and services to make their firms greener and support to train leaders and managers in industrial decarbonisation.

**3**

**Incentivise on-site generation to service businesses and recirculate surpluses back to the grid:** Government should offer grants to businesses for on-site generation, for example 50:50 funding. Surplus energy produce could also be added to the national grid to increase the UK's energy security.

**4**

**Take forward plans with the Net Zero Review on UK carbon prices and electricity price structure:** While the Government has begun work on the demand side aspects e.g. a carbon border adjustment mechanism (CBAM), more needs to be done on UK carbon prices. The Government should look to work with industry to explore a broader carbon tax mechanism. The UK ETS should be extended to other sectors and linked it to wider ETS schemes to increase the market size. In addition, the Government must look at electricity network charges and policy costs in a bid to decrease costs, including exploring compensation and exemptions to current schemes.

## 59% OF MANUFACTURERS ALREADY MEASURING THEIR DIRECT ELECTRICITY CONSUMPTION



# PART 1: MANUFACTURERS ARE ACCELERATING THEIR PLANS TO DECARBONISE

## DECARBONISING IS A GROWING PRIORITY FOR MANUFACTURING BUSINESSES

Even at a time of unprecedented challenges, manufacturers consider decarbonising their businesses a priority. One-third (31%) of manufacturers said decarbonising their business is a high priority right now and a further half (49%) said it is a medium priority. This demonstrates the importance manufacturers are placing on decarbonisation and their journey towards net zero.

Larger businesses (those with over 1000 employees) were more likely to report that decarbonising their business than smaller firms. Indeed 61% of larger firms cited as a high priority and a further 28% a medium priority. Whereas among smaller sized firms (those with 10-249 employees) 21% cited it as a high priority.

In addition, nearly half (46%) of manufacturers we surveyed are already implementing their plans to decarbonise their operations. A quarter (25%) of firms will start to implement their decarbonisation plans within the next 12 months and a further 17% in the next 24 months. A small number will start from 2025. The next 12 months are therefore critical to ensure that manufacturers have the tools at their disposal to start reaping the benefits of decarbonisation, which we explore later in this report.

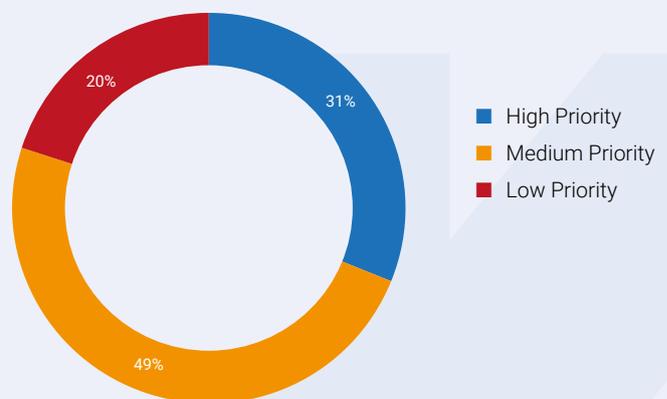
Manufacturers have clearly understood how important and urgent decarbonisation is. This is borne out not only within the survey but also from speaking directly to manufacturers who are beginning to take action towards net zero.

## ONE-THIRD OF MANUFACTURERS SAY DECARBONISING THEIR BUSINESS IS A HIGH PRIORITY RIGHT NOW

## 96% OF MANUFACTURERS ARE EITHER ALREADY DECARBONISING THEIR OPERATIONS OR HAVE PLANS TO DO SO

Chart 1: Decarbonisation is a high priority for manufacturers

% of manufacturers reporting if decarbonising is a priority for their business right now



Source: Make UK Decarbonising Manufacturing Survey (2022)

“For the first year our company collated Scope 1 and 2 carbon figures for 2021 which will be reported in line with SECR which we are not required to comply with. The intention is to achieve an annual reduction in carbon which this data will enable us to measure, monitor and target. A suite of principles has been agreed with the Executive Team against which decisions at strategic and operational level can be made which will embed Sustainable Decarbonisation within the organisation. On-site renewables and energy-efficient design were written into our new Estates Design Guide and collaborative partnerships formed with many organisations to begin progress in alternative fuelling for our operational vehicles and vessels.”

*Make UK member*

## THE MAIN PATHWAYS TO DECARBONISING

### Energy efficiency is seen as main pathway to emission reduction

Manufacturers see energy efficiency and the installation of new or upgraded equipment as the main pathways to effectively reduce emission within their businesses. The focus on energy efficiency is a trend we continue to see across Make UK’s research. In February this year, Make UK’s Manufacturing Monitor<sup>1</sup> found that almost half (47%) of businesses had adjusted their business practices to reduce energy consumption in response to heightened energy prices in 2022. This was consistent across manufacturers of all sizes, sectors and regions.

## 3 IN 4 MANUFACTURERS CITE ENERGY EFFICIENCY AS THE MAIN PATHWAY TO DECARBONISE THEIR PROCESSES

After the outbreak of the Russian conflict, the situation undoubtedly became more severe, and this survey on decarbonising manufacturing now shows that for three-quarters (74%) of manufacturers, optimising energy efficiency is the main focus of decarbonisation. This is a missed opportunity for the remaining 26% who will reap benefits by focus on energy efficiency.

Energy-efficiency measures are followed by the installation of new or upgraded equipment (in 42% of cases). Manufacturers are replacing old equipment that is no longer energy efficient with more modern equipment. It is often the case that when equipment has not reached the end of its life, an upgrade is sufficient to improve efficiency or reduce carbon emissions.

<sup>1</sup>Manufacturing Monitor, February 2022.

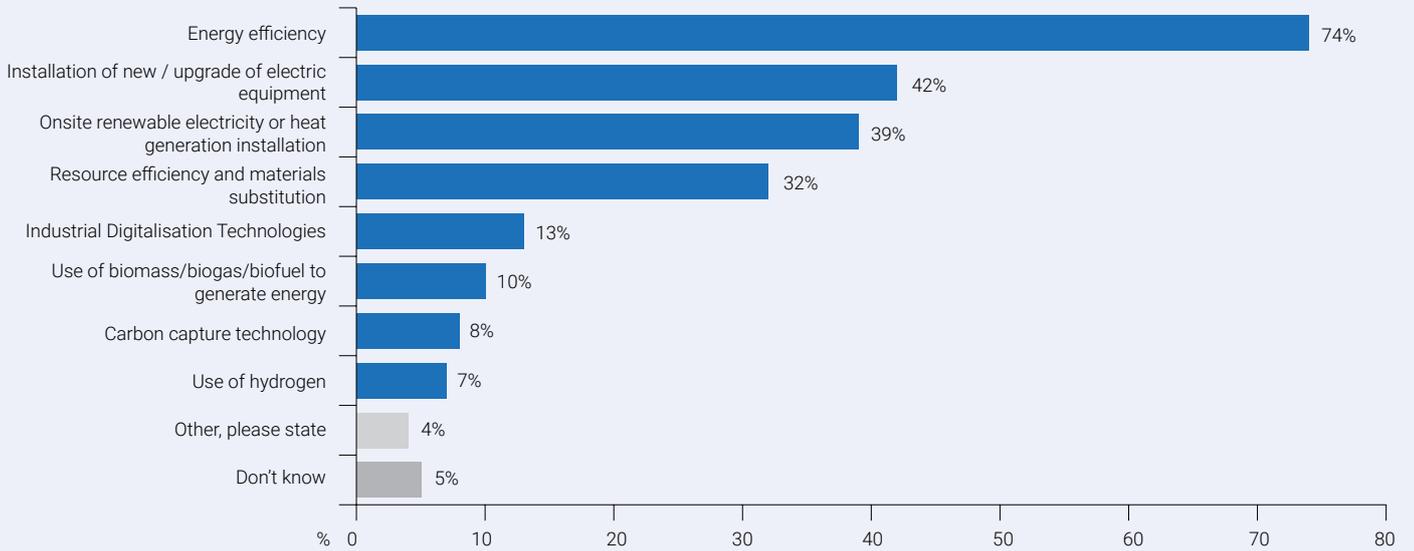
## 2 IN 5 MANUFACTURERS ARE INSTALLING OR UPGRADING EQUIPMENT TO HELP THEM DECARBONISE

The installation of on-site renewable electricity is highly ranked (cited by 39% of manufacturers). The need to reduce consumption of grid-supplied energy is growing as a result of out-of-control prices and creating uncertainty about energy supply. Where possible, manufacturers will opt to produce their own energy, which may or not cover all their needs.

Around one-third (32%) of firms cited resource efficiency and materials. The Covid-19 pandemic has led to significant supply chain disruption, causing raw material shortages, longer lead times and rising prices. As a result, manufacturers have begun to seek suppliers closer to home. Moreover, as businesses come under more pressure from their customers, they are having to find more sustainable sources of materials, which leads to the substitution of these materials and the redesign of their products for a lower environmental impact.

### Chart 2: Energy efficiency key pathway for decarbonising

% companies citing up to three pathways for decarbonising



Source: Make UK Decarbonising Manufacturing Survey (2022)

#### New Digital Technologies can play a fundamental role in boosting companies' sustainability

According to previous Make UK research<sup>2</sup> digitalisation is an enabler for increased green manufacturing. The Covid pandemic has further accelerated the speed of digital adoption. In the past 12 months we have seen a huge jump in the number of companies now in the revolution stage of the Fourth Industrial Revolution (4IR), from just 4% in 2018 and 13% in 2020 to 23% in 2022. This means that manufacturers are reaping the benefits of the applied technologies, changing their behaviour and relationships with their customers. The key benefit of adopting new digital technologies is the reduction in the cost of running the business, at 56%. In

addition, manufacturers believe it has a significant impact on energy-efficiency improvements (34%), reducing carbon emissions (33%) and raw material and reduced waste (33%).

A precision engineering company that invested in a pioneering 3D metal printing technique is achieving major reductions in cycle times for multi-impression mould tools:

- Reduction in energy use with increased impressions, reducing the size of the tools and therefore the size of the mould press, reducing energy consumption.
- Huge reduction in cooling water from tens of thousands of litres in 24 hours to only 10-20 litres.

<sup>2</sup>Industry 4.0 Green manufacturing: an enabler | Make UK



Manufacturers are still facing the barriers to digital adoption, such as access to finance, lack of digital skills and knowledge of where to start and how to apply different and very often expensive and complex technologies. Some 13% of manufacturers say they are already using these technologies. But this is far off where it needs to be given the benefits of improving sustainability, becoming more efficient and more competitive are clear. The Made Smarter initiative can unlock this potential and support manufacturers with technical advice, leadership and knowledge – giving them the tools to accelerate digitalisation. Made Smarter has had a significant impact on the businesses in the regions within which it has been rolled out. Government should now commit to rolling out Made Smarter across every region and expand its remit to include industrial decarbonisation.

In addition, government should enhance support through catapult centres to design and disseminate digital solutions to help to enhance efficiencies within factories and other workspaces. Internet of Things enabled industrial automation could help increase efficiencies across a variety of manufacturing contexts.

**“Coordination and consistency in the path to decarbonisation throughout industry would remove the frequent resistance to adoption of low-carbon technology which comes out of concern over adopting a technology which is not the one that becomes mainstream”**

*Make UK member*

**Use of emerging technologies is further down the list, but they have potential**

Unsurprisingly, new and emerging technologies (such as the use of biomass/biofuel, which can be used to generate energy; carbon capture, utilisation and storage (CCUS) technology; and the use of hydrogen) are not so widespread and not the dominant choice for decarbonisation at the present time. Virgin biomass (as opposed to waste), was although still a ‘better’ fuel owing to its renewable nature, is now becoming more controversial globally; this is because its combustion and transport (sometimes across continents) can cause substantial carbon emissions and deforestation depending on its origin and nature. The UK, however, has the highest standards for biomass burning in the world, prohibiting the use of primary biomass, and capturing emissions. Companies using this technology must ensure the installation they invest in complies with UK regulations.

Many manufacturers will be counting on these vanguard technologies. The Hydrogen strategy is well developed, and Government has recently doubled its production targets to 10MWh by 2035 and hydrogen roll-out with deployment pilot schemes is being accelerated.

Despite this, the general concern around the overall hydrogen supply (which would satisfy only 25% of the UK’s demand in 2050 and there is competition between the domestic and industrial needs) and distribution to dispersed sites. These plans are not sufficiently clear to provide the confidence to invest in this technology, which explains why the plans involving hydrogen are only burgeoning they are not insignificant (only 7% are considering hydrogen as their pathway).

In addition, prices of hydrogen are extremely high, and there is still a question on green/blue hydrogen. Other technologies e.g. CCUS are still in their infancy and there are concerns on how this would work in dispersed sites (especially for cement) as locations in natural beauty and the distance from clusters makes deployment challenging.

## **ENERGY COSTS ARE MAIN DRIVER BEHIND PLANS TO DECARBONISE**

It is unsurprising that the main driver among manufacturers’ plans to decarbonise is the rising cost of energy. Speaking to manufacturers across the country, energy bills are their biggest concern and, as we explore later, one of their biggest costs. The theme of costs continues with a quarter of companies also citing the rising price of raw materials as a key driver. These are real and live issues facing manufacturers right now. Yet decarbonising is providing a solution to these challenges.

Compliance and external pressures are also leading manufacturers down the decarbonisation path. Around one in five (22%) cited compliance or Government requirements, the same number again (22%) cited customer pressures, with investor and supplier pressures also playing a role. This figure was higher among those businesses with over 1000 employees, and therefore more likely to be within scope of formal requirements.

ESG (Environmental, Social and Governance) is increasingly on the agenda for Board rooms across the country. The growing importance of ESG combined with increased requirements on companies to report on climate risk management, including larger companies having to demonstrate sustainability in their supply chain, means that ESG strategies are increasingly linked to overall business’ objectives, including when it comes to cutting emissions.

## THE TASKFORCE ON CLIMATE-RELATED FINANCIAL DISCLOSURES

Since April 2022, more than 1,300 of the largest UK-registered companies and financial institutions have had to disclose climate-related financial information on a mandatory basis – in line with recommendations from the Task Force on Climate-Related Financial Disclosures. This includes many of the UK's largest traded companies, banks and insurers, as well as private companies with more than 500 employees and £500 million in turnover. The objective is to increase the quantity and quality of climate-related reporting across the UK business community, including among some of the most economically and environmentally significant companies. This will ensure businesses consider the risks and opportunities they face as a result of climate change and will encourage them to set out their emission reduction plans and sustainability credentials.

Already understanding the potential commercial benefits that decarbonising can bring, one in five manufacturers is motivated by the opportunities associated with decarbonisation, such as competitive advantage and commercial opportunities. Likewise, 13% cited branding as a key driver.

For almost half (47%) of companies, 'doing the right thing' is the reason they are putting into place plans to decarbonise, illustrating the industry's commitment to net zero and the need to play their part in it.

**"The opportunity created by the need to move to alternative manufacturing and propulsion methods for our maritime fleet is enabling development of more efficient asset allocation and manufacturing to move to more agile and resilient planning."**

*Make UK member*

### CRYSTAL DOORS – RICHARD HAGAN, CRYSTAL DOORS, ON HIS COMPANY'S DECARBONISATION JOURNEY:



**"If the purpose of a business is to achieve something, then Net zero has a real value for all to give our future generations a better world."**

I believe my role as a leader is to have responsibility for others, to provide the best environment, assets and training for my employees to be their best. Back in 2018 I was seen as an eco-warrior by my staff, customers saw no value and suppliers did not know much. Things have changed a lot since. When the win-win is real, everyone commits to the deal.

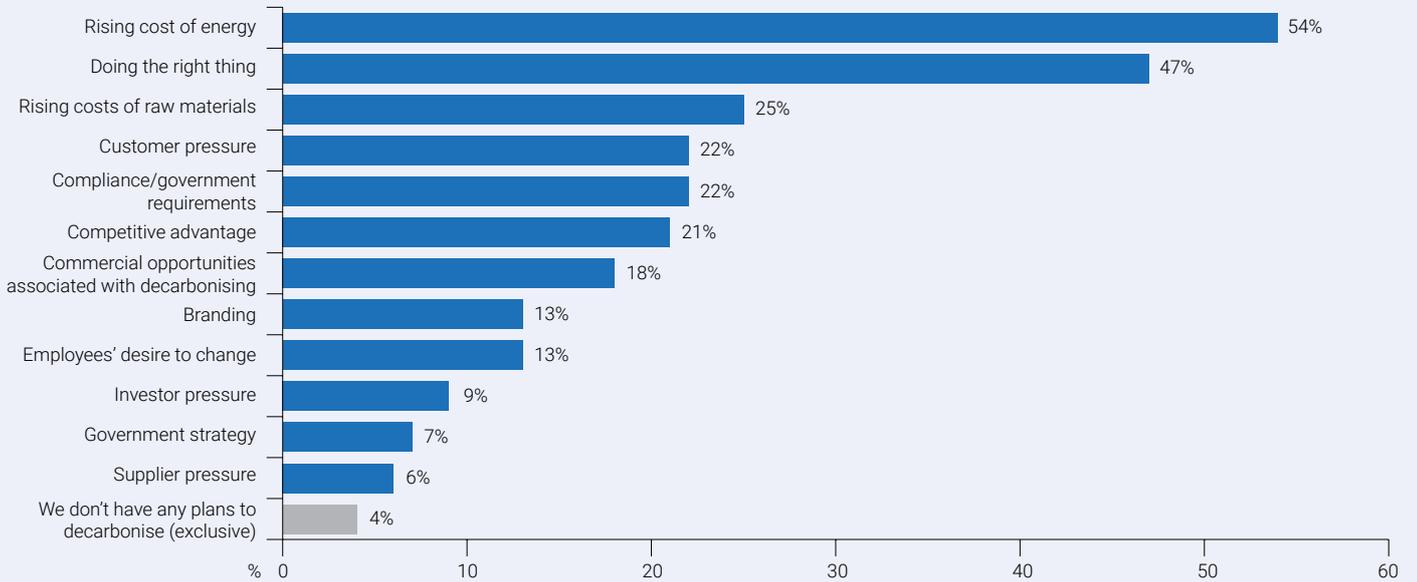
We started by installing our biomass burner which we fed with our wood chip waste. Then, by taking advantage of the funding initiatives available at the time, (the Renewable Heat Incentive) Crystal Doors generated £60,000 worth of heat from solar panels, enough for our factory and our offices. Dedicating 10% of our turnover over 5 years to green investments enabled us to invest another £1 million in assets, training and other improvements. This may sound a significant outlay but most of these investments are actually cash flow neutral or positive. As a result of our low-scale environmental initiatives, we have reduced our carbon footprint by over 75% since 2015 and will become Net Zero in less than 2 years. This year, our sales have exploded to almost double our capacity, despite having increased prices on our green products by 23% over the past year.

#### **Top tips for those thinking of decarbonising:**

1. Do your baseline assessment on digital, communication and sustainability.
2. Make the commitment to a sustainability target (e.g. Race to net zero for SMEs) and share it with all stakeholders!
3. Appoint a Chief Sustainable Officer and a Digital Transformation Manager to work from the inside.

**Chart 3: Cost of energy accelerating emissions reduction**

% companies reporting what is driving plans to decarbonise



Source: Make UK Decarbonising Manufacturing Survey (2022)

## AS A RESULT, THE FOCUS OF DECARBONISING ACTIVITIES HAS BEEN ON OPTIMISING EFFICIENCIES

Over the past 12 months the focus of manufacturers' decarbonising activities among manufacturing processes has been optimising efficiencies. Almost half (46%) of companies said they had been focused on optimising their energy efficiency including via an energy management system or by introducing more energy efficient equipment. This is not surprising given the rising costs of energy and manufacturers attempts to reduce energy consumption through increased efficiencies. The same proportion again (46%) cited optimising their operational and process efficiency.

The theme of energy continues. With over two in five (41%) reporting that their focus has been on better monitoring and control of energy consumption including sub-metering, and one in five (21%) have been focused on on-site renewable electricity or heat generation.

Three in ten (30%) said they had been introducing more resource efficient systems such as collecting and reusing packaging, raw materials and waste.

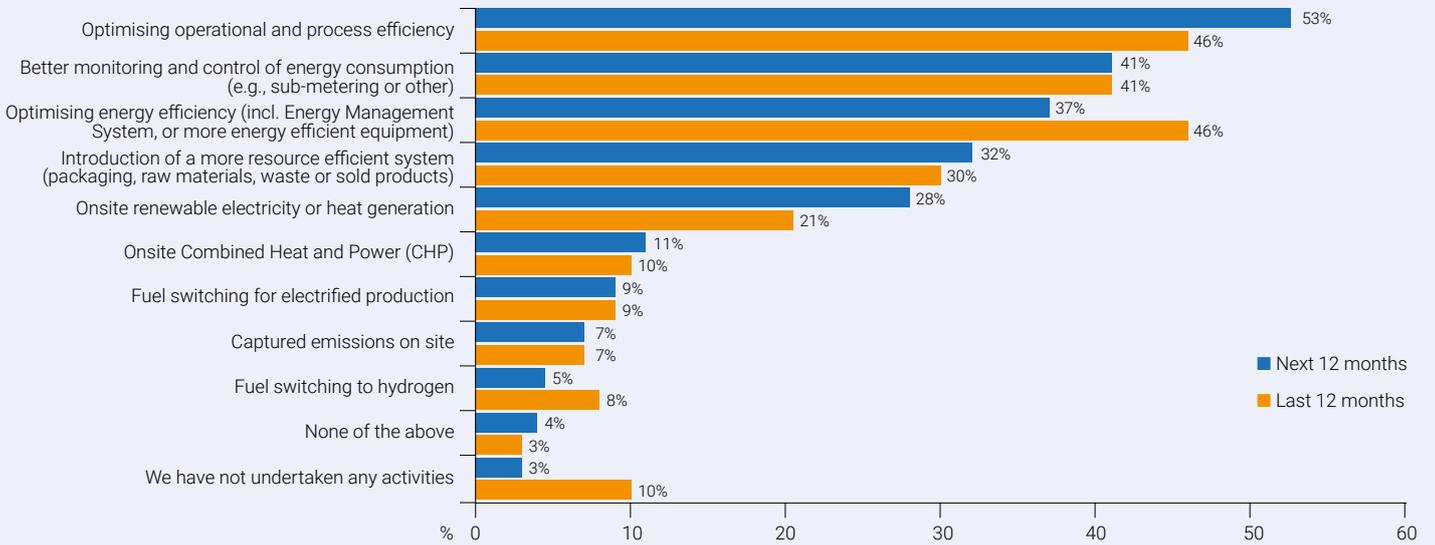
One in ten (10%) of manufacturers have focused efforts on onsite combined heat and power, just 9% have focused on fuel switching for electrified production and 8% focused on fuel switching to hydrogen.

## 9 IN 10 MANUFACTURERS HAVE UNDERTAKEN SOME FORM OF DECARBONISING ACTIVITIES IN THE PAST 12 MONTHS



### Chart 4: Operational, process and energy efficiency key actions to cut emissions

% companies reporting activities to decarbonise



Source: Make UK, Decarbonising Survey Manufacturing (2022)

When it comes to other operations across the business, improving energy efficiency of buildings, through insulation, more efficient cooling and heating systems or buildings management systems, ranked the highest, with 45% of companies citing this as the focus of their plans over the past year. In addition, around one in three (28%) have been installing on-site renewable or heat generation for either space heating or lighting.

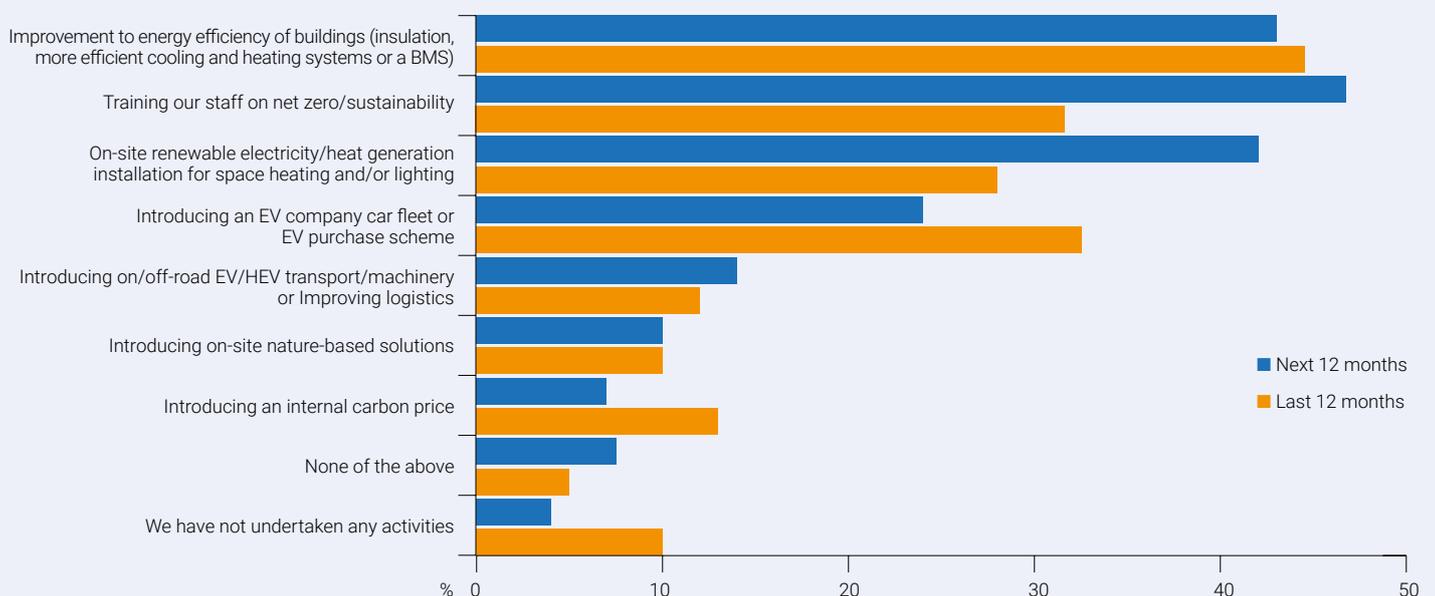
The role that employees play has been important, including when it comes to transport. A third (33%) said they have been

introducing an Electric Vehicle (EV) company fleet or EV purchase scheme, to reduce business trips and employee commuting when it comes to travel and almost a third (32%) said they had focused on training their staff on net zero and sustainability.

As manufacturers look to reduce emissions further, there has also been a focus on and off-road EV and HEV transport and machinery (scope 1 emissions) or changing their logistics strategies such as moving to sea or rail transport.

### Chart 5: Training staff is an increasing focus for manufacturers

% companies reporting decarbonising activities in the past and next 12 month



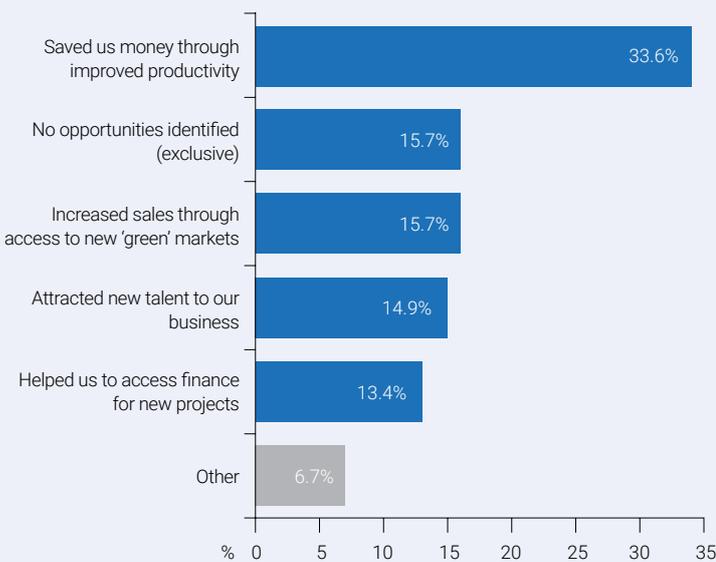
Source: Make UK, Decarbonising Survey Manufacturing (2022)

## MANUFACTURERS ARE ALREADY REAPING THE BENEFITS OF DECARBONISATION

Those manufacturers that are pressing ahead on their decarbonisation journey are already reaping significant benefits. A little more than one-third of manufacturers (34%) said they have saved money through improved productivity. With manufacturers making efficiency and process improvements and looking to adopt digital technologies as part of their transition to net zero, this is clearly having productivity paybacks and, as a result, they are saving money. Improving productivity within manufacturing can help close the productivity gap that the UK has experienced for some years.

Chart 6: Saving money by productivity boosts main benefit of decarbonisation

% of companies reporting benefits to cutting emissions



Source: Make UK Decarbonisation Survey (2022)

With a company's 'green' credentials increasingly under the microscope from customers, suppliers and investors, we also see 16% of companies with increased sales through access to new markets as a direct result of decarbonising their business. Some 14% of companies said that reducing emissions within their business has helped them to access finance for new projects.

Attracting new talent to the business has also been a benefit for 15% of companies. We know that access to skills, and in particular the industry's inability to attract a high volume of young people into the sector, has been its Achilles heel for decades. By demonstrating manufacturing companies' commitment to sustainability and net zero, we are seeing this trend begin to reverse.

## 16% OF COMPANIES HAVE SEEN INCREASED SALES THROUGH ACCESS TO NEW MARKETS AS A DIRECT RESULT OF DECARBONISING THEIR BUSINESS

# PART 2: THE CHALLENGES TO DECARBONISING MANUFACTURING

## SOME COMPANIES ARE BEING HELD BACK FROM DECARBONISING ALTOGETHER

As we have seen above, the vast majority (96%) of manufacturers are planning to decarbonise their operations either now or in the near future. The minority (4%) of manufacturers that don't have plans to decarbonise cited the following reasons:

- difficulty in decarbonising the supply chain.
- a lack of internal resources;
- remaining cost competitive;
- a lack of adequate on-site infrastructure;
- capital costs of upgrading or replacing equipment;
- a lack of skilled staff or internal knowledge to do it;
- a lack of demand for low-carbon products.

We also know from previous Make UK research that a small proportion (~2%) of businesses from specific sectors such as paper and glass have processes that can only run on fuels that produce extremely high combustion temperatures which

only fossil fuels can achieve at the moment. This may explain why they don't have any immediate plans to decarbonise. However, when speaking to manufacturers it is clear that they are continuing to participate in significant R&D programmes to develop future solutions for decarbonisation and innovation including in these sectors.

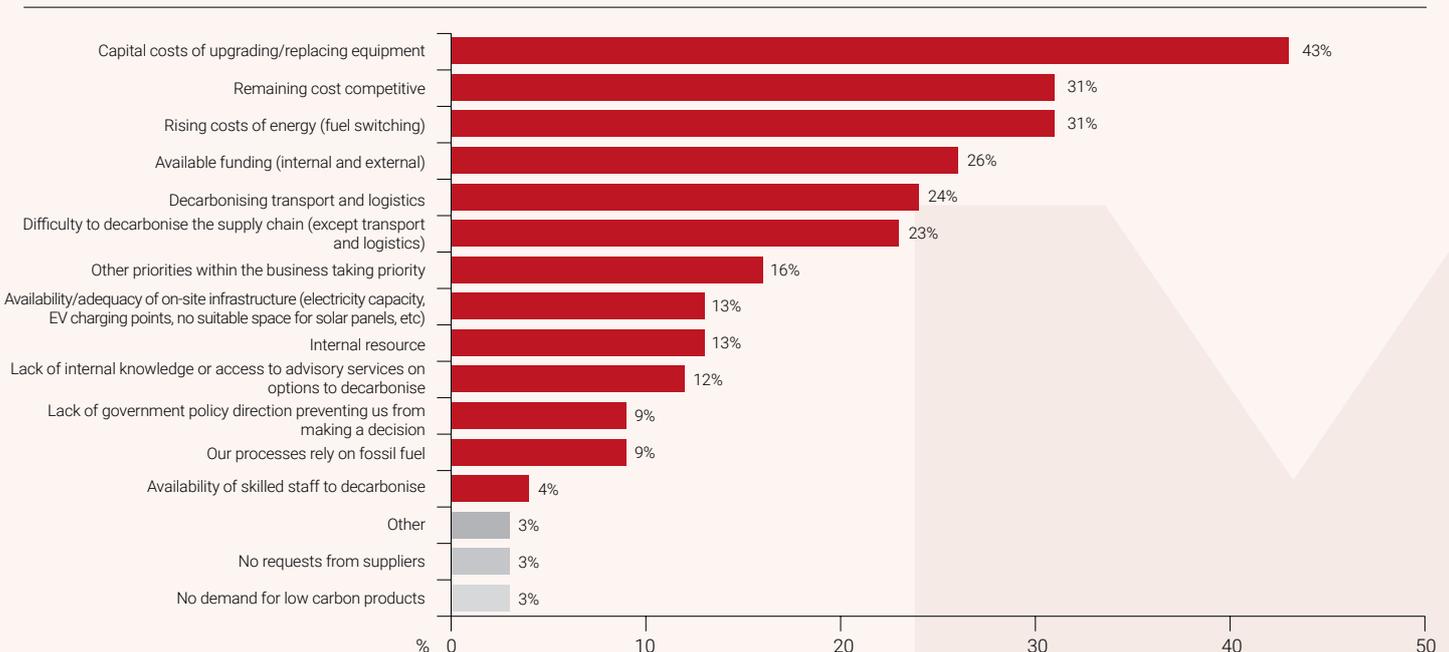
## EVEN THOSE ON THEIR DECARBONISATION JOURNEY ARE FACING BARRIERS

Overall, the majority of manufacturers are wanting to take action or already doing so. That said, there are barriers to accelerating action further action.

The financial cost of upgrading or replacing capital equipment tops the list of challenges (42%). It is a balancing act between tackling climate crisis and managing the financial outlay on the machinery owing to new, efficient machines having a very high capital cost. Most manufacturers are investing in their futures by focusing on decarbonisation strategies involving new, efficient machinery.

Chart 7: The cost of equipment is main challenge to cutting emissions further

% companies reporting challenges to decarbonise



Source: Make UK Decarbonising Manufacturing Survey (2022)

*“Manufacturing plans require surety about the design and technology integration; the maritime sector does not have a clear path to decarbonisation, but vessels are being manufactured which will be in operation for the next 25 years, by which time the current diesel-fuelled propulsion will likely be reducing. Greater clarity on the likely future technology would enable adaptation to accept these in future. The Clean Maritime Strategy gives some direction of travel, but not to a level at which practical measures can be made, especially with the lack of surety around regulation and design standards.”*

### Make UK member

One in three (31%) said their concerns are about remaining cost competitive, and the same number again (31%) cited the rising costs of energy for fuel switching. Clearly, and unsurprisingly at this time, cost is on the minds of many manufacturers.

Approximately a quarter (26%) are challenged by the lack of funding – whether internal or external. The reasons for this can vary depending on the type of company: low priority given to sustainability, soaring energy costs that are taking up all or most of the cash flow, or the combined impact of Covid-19 and the EU exit creating difficult market conditions.

A quarter (24%) are being held back by the challenge of decarbonisation of transport/logistics and of the supply chain (23%). These are much more difficult to tackle as they are not in manufacturers’ direct control and require a lot more effort in terms of engagement and collaboration with the value chain.

Other barriers cited were the business having other priorities (16%) and, on a similar theme, not having the internal resources (13%), which are no doubt being occupied by other priorities. Access to skills is again hindering progress. The internal knowledge/access to advisory services on options to decarbonise was cited as a challenge for more than one in ten (14%) manufacturers. Challenges around knowledge and information were particularly prevalent among small and medium sized businesses.

Moreover, the availability to skill staff to decarbonise is also cited as a barrier, but perhaps further down than we might have expected.

There are also technical barriers. For example, a lack of or inadequate on-site infrastructure, such as insufficient electrical capacity and not enough roof space for solar panel installations.

## DATA COLLECTION IS CHALLENGING BUT IS KEY TO FURTHER DECARBONISATION

Three in five (59%) manufacturers are already measuring sub-metered electricity consumption, which was far from being the case two years ago, and half (51%) are measuring their fossil fuel consumption (gas and other fossil fuels).

What is even more telling about the focus on decarbonisation is that 41% are already measuring outright their Scope 1 and 2 carbon emissions. There is more to do for Scope 3 emissions, but manufacturers are already making a very good start as almost one in five manufacturers (17%) are measuring their value chain emissions, and another quarter (25%) are planning to within the next 12 months. However, one to two in eight (7-17%) don’t have any plans to measure either their electricity or fossil fuel consumption or their emissions.

In this respect, the role of digitalisation cannot be emphasised enough as a powerful enabler of data collection for the monitoring and understanding of complex data patterns, and for taking control. Industrial Digital Technologies (IDTs) will definitely help with metrics, such as the carbon footprint or simply the production output, which are still hindering a significant number of manufacturers in their net zero/ decarbonisation progression. Our previous research<sup>3</sup> has shown that those who have adopted IDTs have seen the following benefits: lower costs, better-quality products, better customer engagement and service, improved raw materials, waste and energy efficiencies, and process improvements contributing to the reduction of carbon emissions.

Yet, although the aspect of IDTs in increasing productivity (e.g., robotics, additive manufacturing, virtual reality) is better understood, a significant proportion of manufacturers (42%)<sup>4</sup> are still unclear about its purpose and benefits for

<sup>3</sup>Industry 4.0 Fact Card, Make UK, November 2011.

<sup>4</sup>Reference: MAKE UK ‘COP 26 – Six Months On’ report, May 2022.

sustainability and long-term resilience. IDTs, and in particular Internet of Things, Digital Twin and Artificial Intelligence, have become much simpler and more affordable, and the lack of in-house skills or knowledge can be overcome by utilising the support of specialist partners.

Made Smarter has been a great example of this support with manufacturers in the Northwest, where Made Smarter was first piloted, more likely to be adopting digital technologies effectively than in other regions. We want to see full roll out of Made Smarter and given the close link between IDTs and decarbonisation, its remit broadened to capital industrial decarbonisation.

*“Our business undertook a collection of system-based metering at our production facilities which provides data on energy and fuel consumption and allows analysis and identification of excess consumption. In some cases, this just requires an adjustment to timing or controls on a system. Greater interrogation of energy consumption has reduced energy use at our factory (constructed in 2014) by around 5%. Other times a simple change to process is triggered, for example when the factory is operating out of hours all conditioning and process systems such as vacuum, compressed air, etc., were activated for those additional hours. A review of this led to a simple change to the out-of-hours operation request process to include a checklist of which systems were required, which delivered a c.8% annual energy saving as well as the associated carbon saving and reduction in run hours of the equipment.”*

*Make UK member*



# PART 3: WHAT SUPPORT IS OUT THERE AND IS IT ENOUGH?

## GOVERNMENT SUPPORT TO DECARBONISE IS HIT AND MISS

There has been a range of support programmes, grants and initiatives that the Government has announced to support manufacturers to transition to reduce greenhouse gas emissions. A few more<sup>5</sup> have been added over the past six months, and since the conclusion of COP26. However, our survey has found that take-up of support to decarbonise is mixed, with low levels of awareness. Awareness was particularly low among small and medium sized businesses – those companies that many of the schemes seek to support.

### Tax reliefs for all energy users

But when we look at what help they are obtaining, fewer than one in five (18%) are aware of and using tax reliefs for all energy users, such as the Annual Investment Allowance and the super-deduction. Almost one third are aware and considering using it (although when it comes to the super-deduction it will need to be quick given the scheme is set to end), and a further 9% are aware and have tried to access but been unsuccessful. One in five (22%) are aware and are not using the schemes and 22% are not aware.

### Tax reliefs for energy-intensive industries

The picture is similar for those reliefs for energy-intensive industries, such as Climate Change Agreements, whereby just 16% are aware and using and a further 13% are planning to use in the next 12 months. Some 11% have tried to apply but failed. This leaves 22% again aware but not using and a staggering 38% completely unaware. For those that have tried and failed, reasons behind this could be that energy intensity is not consistently defined across policies or that the qualifying criteria are very high (e.g., energy costs must represent 70%

of the total business revenue). The Government has recently consulted on CCAs, and existing participants can benefit from the scheme until 2025. Those who are fully engage with their industry associations are more likely to be beneficiaries of CCAs.

### Funds and grants

When it comes to grants and funds, such as the Industrial Energy Transformation Fund, there is even less take-up, with just one in ten (10%) of companies aware of and using. A quarter do plan to use these in the next 12 months, however, which may be a result of these funds being relatively in their infancy. Once again, we see a handful (8%) of companies that have attempted and failed, and awareness is still low.

The main Government fund for industry to decarbonise, the Industrial Energy Transformation Fund (IETF), raises concerns for competition-based nature and the complexity of entry criteria which deters SMEs from even trying to apply. It is for that reason Make UK has made calls to increase the funding of the IETF and to ease the criteria to make it accessible to more manufacturing businesses. This includes removing the competitive aspect and instead focusing on performance.

Fiscal measures, such as the super-deduction, while helpful, were not as accessible to manufacturers as it could be as it excludes second-hand or leased plant equipment and machinery. As we have seen, much equipment is not replaced but upgraded. Robots and cobots, for example, are significant investments and often leased instead of bought outright. The HM Treasury is consulting on the successor of the super-deduction which should be generous enough that it not only brings forward investment plans but increases them. Moreover, the chosen scheme must have longevity and mirror the investment life cycles of manufacturers.

*“More availability of grants would be helpful. It would also be a benefit if the Government were to ensure that its procurement process was far more demanding towards a zero-carbon supply chain.<sup>6</sup> This should focus on local, embodied carbon and resource efficiency. They may initially need to pay more for some products or services, but those costs will reduce as companies scale up.”*

### Make UK member

<sup>5</sup>The Intensive Energy Industry Compensation Scheme has been extended for three more years, the business rate exemption for eligible plant and machinery used in on-site renewable energy generation to support the decarbonisation of non-domestic buildings.

<sup>6</sup>Note: currently, any Government procurement contract more than £5M is conditional on the supplier having a carbon reduction plan.

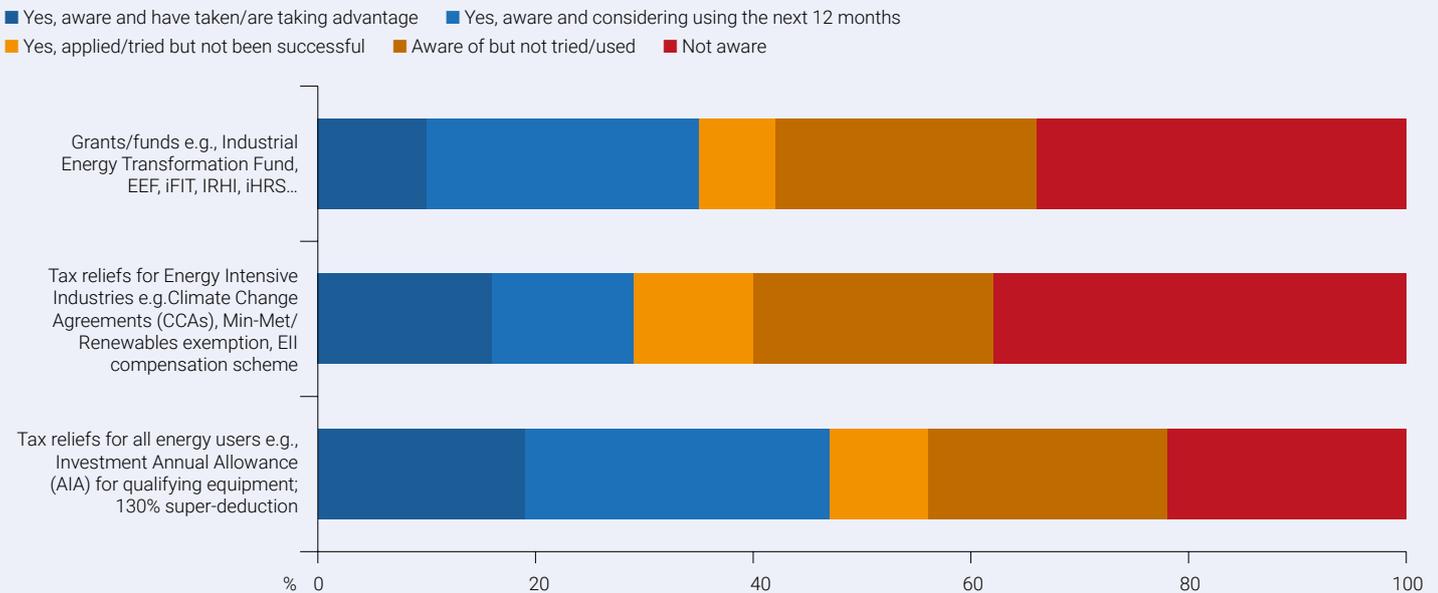
These barriers to accessing funds and poorly designed fiscal reliefs create discouragement and weariness of Government schemes, and lead to a negative feedback loop (e.g., businesses no longer try to apply if they think their application will fail).

What we need to see is the Government continuing to work closely with industry and its representative groups to raise awareness among businesses about the support schemes that are out there. As an initial step Make UK, in partnership with Siemens have set out the support schemes available to manufacturers within this report (See Appendix A).

**HOWEVER, MORE THAN ONE THIRD OF MANUFACTURERS AGREE THAT THE STRATEGIES AND INITIATIVES THE GOVERNMENT HAS ANNOUNCED ON DECARBONISATION WILL HELP THEM**

**Chart 8: Mixed awareness of support available**

% of companies reporting whether they are aware or using support schemes



Source: Make UK Decarbonising Manufacturing Survey (2022)

## THE WIDER DECARBONISATION LANDSCAPE - ISO 50001 AND ESOS

ISO 50001 is based on the management system model of continual improvement also used for other well-known standards such as ISO 9001 or ISO 14001. This makes it easier for organisations to integrate energy management into their overall efforts to improve quality and environmental management, ISO 50001 provides a framework of requirements for organisations to develop a policy for more efficient use of energy, fix targets and objectives to meet the policy, use data to better understand and make decisions about energy use measure the results review how well the policy works, and continually improve energy management.

ESOS is an Energy Savings Opportunity Scheme (ESOS) and is a mandatory energy assessment scheme, introduced by the UK government to make sure large enterprises in the UK are energy efficient. Under the scheme, large organisations are required to assess their energy usage every 4 years and to find new ways to save energy. Large organisations start at any organisation employing over 250 employees or has a turnover in excess of £43million p.a.

If an organisation gets UK wide accreditation to ISO 50001, they don't have to undertake ESOS audits, they instead simply register their accreditation to the International Energy Management Standard (ISO 50001) using the ESOS portal (note that multi-site organisations which only have part of their UK estate covered by ISO 50001, may still need to conduct an ESOS audit programme on some of their 'non ISO 50001' facilities).

# PART 4: FUTURE PLANS WILL UNLOCK NEW OPPORTUNITIES

## OVER THE NEXT 12 MONTHS PLANS TO RAMP UP THEIR DECARBONISING ACTIVITY

Looking ahead to the next 12 months, an increasing number of manufacturers will be undertaking decarbonising activities. In fact, just 3% say they have no plans in the next 12 months (a decrease from 10% over the past 12 months).

The focus for manufacturing processes takes a similar pattern to the past 12 months, but more companies are planning to take action. For example, over half (53%) will be looking at how they optimise their operation and process efficiency and 37% will focus on optimising their energy efficiency.

Once again energy consumption is up in the top three, with over two fifths (41%) planning to better monitor and control their energy consumption. With energy prices continuing to rise and not likely to move within the next 12 months it is clear this will drive further efforts to decarbonise. Once again one in three (28%) will look to on-site energy generation. This is something we have continued to pick up from manufacturers over the past 6 to 12 months.

As manufacturers are getting their teeth deeper into driving up their energy efficiency, monitoring and controlling at a more detail level (sub-metering) their consumption becomes more important.

Over a third (32%) plan to focus on resource efficiency systems. Further down the list – in a similar trend to what we have seen over the past 12 months – is fuel switching for electrified production (9%) and fuel switching to hydrogen (5%).

### Other operations (selecting up to three)

Across the wider manufacturing business, the biggest focus for the next 12 months is employees. Almost half (47%) plan to train their staff in sustainability. Decarbonisation can't be achieved without employee engagement and companies are ensuring that all employees understand the key role they, and the business they work for plays in the transition to net zero.

Once again building energy efficiencies will be a focus (44%) with manufacturers no doubt taking advantage of the business rates reliefs that were announced, and then bought forward. And over two-fifths (43%) will look to install on-site renewable electricity.

Transport is again important in the next 12 months with almost a quarter (24%) focused on EV company schemes and 14% on changing their logistics plans.

For companies who are looking to focus on operational and process efficiency that much better clarity and commitment from Government on the availability of infrastructure and technological options will be critical to enable businesses to decide which technology they can confidently invest in.

Better financial products will be needed from lenders to enable in new or upgraded machinery and widespread help to improve buildings and enable self-generation also needs to be readily available.

## EXPENDITURE WILL INCREASE TO TAKE ADVANTAGE OF DECARBONISING

### With expenditure set to increase, companies will be looking to use more support schemes

Capital investment in new and existing processes, as well as building improvements, is set to increase. These are the areas manufacturers have identified as the main challenges and they want to tackle them head on. Over half (53%) of manufacturers are planning to either significantly or moderately increase expenditure in new processes in the next two years. and 62% are planning to increase their expenditure in upgrading their existing equipment. Manufacturers clearly see the benefits of investment in equipment and capital to cut emissions and decarbonise their businesses further.

In addition, 52% are planning to increase expenditure in building improvements such as insulation and cooling/heating as companies once again seek to reduce energy consumption and costs.

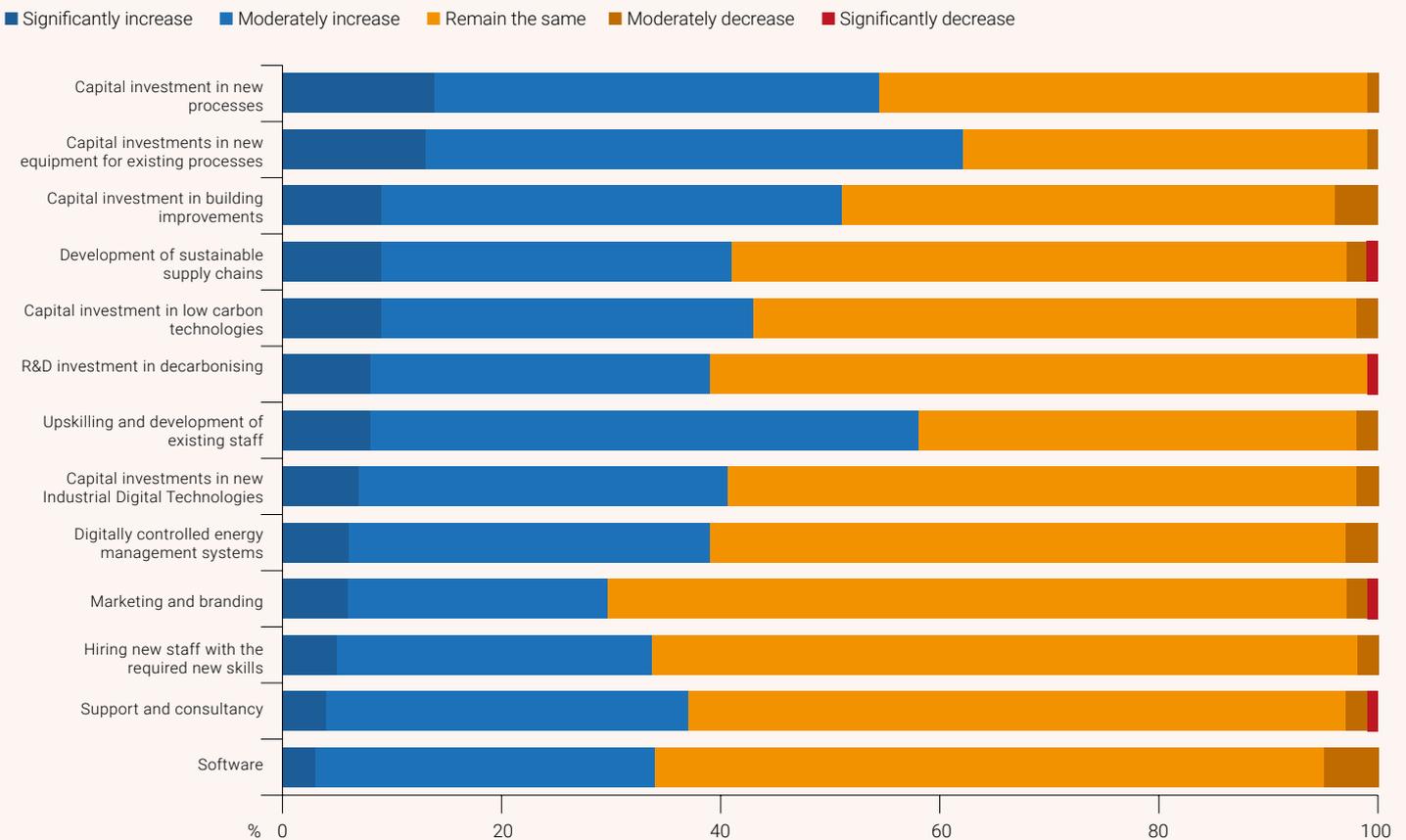
Understanding the important role that employees will play in decarbonisation, some six in ten manufacturers are planning to increase spending in upskilling their employees to take full advantage of decarbonisation. This planned increase in expenditure is perhaps the reason why access to skilled staff is lower on the list of barriers, as manufacturers are taking mitigation actions.

In addition, almost all the remainder of businesses plan to maintain their investment levels. Very few have actually decided to decrease their expenditure. This is a good sign that manufacturers are wanting to prepare their businesses for the future. Once again, they will no doubt be looking for more support to achieve their goals.

## 6 IN 10 MANUFACTURERS WILL INCREASE EXPENDITURE IN UPSKILLING STAFF TO SUPPORT DECARBONISATION

Chart 9: Capital investment expenditure set to increase to cut emissions further

% companies reporting changes to capital expenditure in next 2 years



Source: Make UK Decarbonising Manufacturing Survey (2022)

## RETURN ON INVESTMENT WILL COME SOONER FOR SOME THAN OTHERS

Decarbonising manufacturing processes, operations and buildings can mean investing quite significant amounts of money upfront, and companies may not see the benefits immediately. When asked, ‘How long do you anticipate your investments to decarbonise will be returned as a cost benefit?’, our survey found the following:

- Fewer than 1% said less than one year;
- Two-fifths of firms anticipate a return on investment between one and five years;
- Two in five expect to see returns in six to ten years;
- 13% expect to see investment returns within 11-20 years;

With manufacturers running cost liabilities and the risks posed by their levels remaining inflated, some manufacturers may find themselves becoming increasingly frugal about decarbonising investments. Payback periods are somewhat mixed. But there is a question is to whether companies can afford to stand still when it comes to investing in decarbonisation.

## MAKING THE SWITCH

### Renewable energy can technically replace fossil fuels as much for space heating as for industrial process heating in many cases

Currently, fossil fuels are being utilised as much for space heating (50%) as for direct- and indirect-fired industrial process heating (50%). But half (50%) of manufacturers have confirmed that they already use or could instead use renewable energy from a varied range of sources (e.g., solar, wind, hydrological, geothermal, wood, biofuels, waste), not only for their space heating but also for their industrial heating processes (Chart 8). Our survey data doesn’t seem to make a difference whether the industrial heating process is direct or indirect. The same seems to be applicable to chemical feedstock/processes.

Fossil fuels are also currently used for Combined Heat and Power (CHP) generation by a number of manufacturers. One-third (32%) of them have opted for this technology to reduce emissions from their manufacturing processes. While CHP is a more efficient fossil fuel system, it is still a fossil fuel system which is not compatible to achieving net zero in the long term. It could be seen as a transition technology in the short-term, however as heat pumps mature for space heating, CHP will be increasingly obsolete.

Chart 10: Current uses of fossil fuels and current/potential uses of renewable energy on a manufacturing site

% companies reporting usage

|  | Fossil fuels | Renewable energy |
|--|--------------|------------------|
| Other  | 10%          | 4%               |
| Chemical feedstock/process                                 | 7%           | 6%               |
| Indirect-fired applications for industrial process heating | 13%          | 22%              |
| Combined Heat and Power (CHP) generation                   | 13%          | 36%              |
| Direct-fired applications for industrial process heating   | 37%          | 28%              |
| Space heating  | 50%          | 38%              |

Source: Make UK, Decarbonising Manufacturing Survey (2022)

## ELECTRIFICATION HAS A HUGE PART TO PLAY IN DECARBONISATION, BUT WILL NEED TO BE SUPPLEMENTED IN CERTAIN PROCESSES

Electrification has a huge part to play in decarbonisation, particularly for large parts of heating and transportation needs which are currently being delivered by fossil fuels.

For space heating, certain electrical technologies for example, heat pumps which use electricity to extract and exchange heat from air, water or ground) are extremely efficient, but usually only in well insulated premises. There is a lot of focus now attached to using heat pumps for process heat, for example, recovering waste heat and converting it into more useful higher grade process heat, or even steam, therefore it is no longer a focus solely on air or ground source heat.

For the remaining housing/factory stock which will still be in use in 2050, photovoltaics and wind turbines to produce electricity have a significant role to play in decarbonisation.

The self-generation of electricity for space heating in particular has the added benefit of not only relieving the grid from supplying all this energy but also has the potential to feed back into it via appropriate demand-response type schemes.

Reliance on electrification alone, however, would not cover the UK's total energy demand, 90% of which is currently met by fossil fuels. In addition, certain industrial processes require very high heat which cannot be delivered via electricity, and a gas will therefore continue to be needed. Hydrogen, ideally green, but perhaps more realistically blue in the interim, has to factor in highly to fulfil the total demand, and for these specific processes. Effective decarbonisation needs to include hydrogen and the deployment of equipment ready to use it.

## THE RIGHT POLICIES AND RIGHT TECHNOLOGIES ARE THE KEY TO UNLOCKING DECARBONISATION

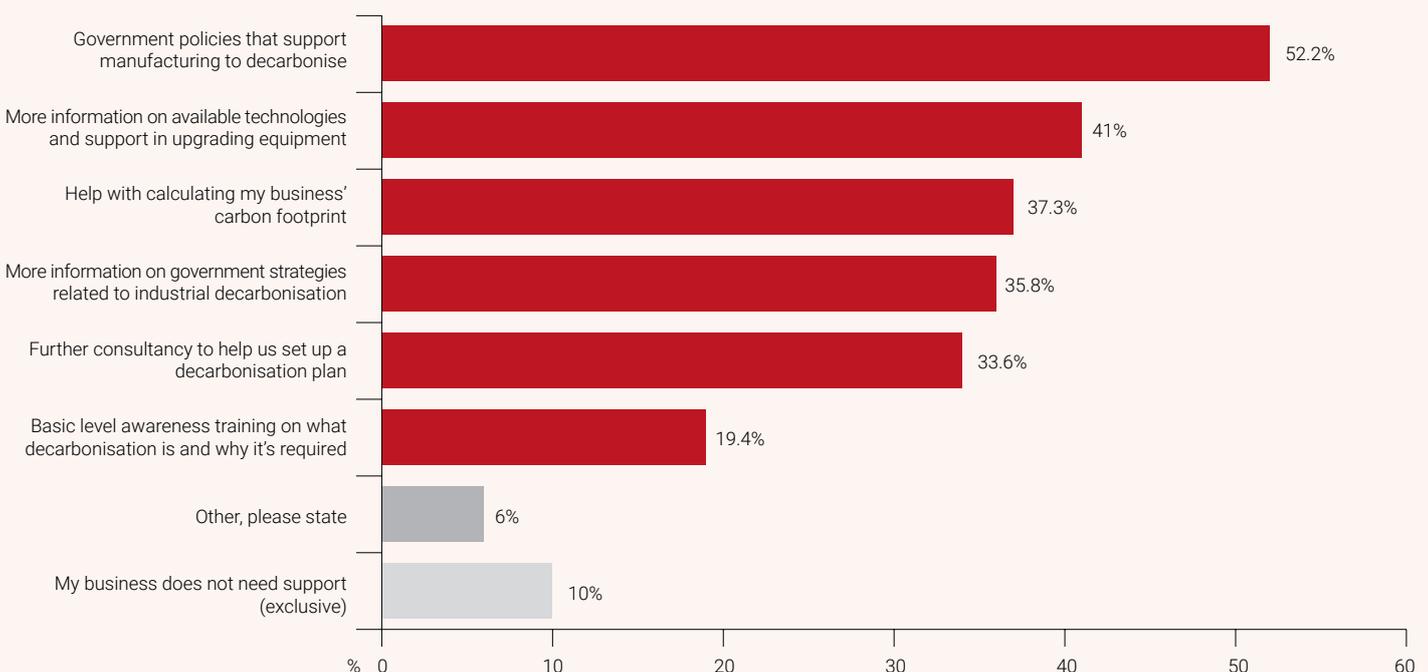
Half (52%) of manufacturers say policies to support manufacturing to decarbonise would accelerate their plans. But not having information to decide which technologies are right and not having the support in upgrading equipment is also a major barrier cited by two-fifths (41%) of manufacturers.

*“Our company is investing in a transition from gas-fired manufacturing to a new electrically powered process. This will cut energy use by 80% and the power used will be renewable. We are developing this technology and plan to license it for use by others. The transition across all our production will take up to five years and we are therefore investigating installation of an anaerobic digester to create our own gas from food waste. The main driver for this is the cost of gas, which has added £1m to our costs. The challenge is that, while we are investing and focusing resources into our electric production innovation, we are also having to deal with massive supply chain issues, runaway inflation and a local labour shortage.”*

*Make UK member*

Chart 11: The right policy levers and support to upgrading equipment key to cutting emissions further

% companies reporting what would accelerate plans to decarbonise



Source: Make UK, Decarbonising Manufacturing Survey (2022)

More than one-third (37%) said they need help to measure their business' carbon footprint and setting up a decarbonisation plan. While Government support has focused on detailed strategies and grants, what is missing is help with those first few steps. This does not need to be a Government intervention but could take the form of support from trade associations and industry peers who can demonstrate best practice.

One in five (20%) want basic awareness training on what decarbonisation is and why it is important. There is, then, a need for an education and awareness-raising campaign so that companies of all sizes and all sectors can have the confidence to start decarbonising their businesses and taking advantage of the commercial opportunities that this transition can bring.

## **JUST 1 IN 10 FIRMS SAID THEY DON'T NEED ANY SUPPORT TO REDUCE EMISSIONS**

There is some good news, however, although still timid. Self-generated electricity for industrial users has just become a much more palatable solution, as the Government has recently brought forward to April 2022 business rate exemptions until 31 March 2035 for eligible plant and machinery used in on-site renewable energy generation to support the decarbonisation of non-domestic buildings.

It is clear that much wider measures are needed to enable the sector to invest than the announced business rate reliefs. The newly announced Tax Plan will be aiming to improve the overall tax treatment provided for capital investment. To achieve this, it will be important to adapt qualifying criteria for manufacturers to be able to participate. These will have to differ from the current ones, including the super-deduction which is limited as it excluded second-hand and leased assets. As mentioned above, energy efficiency or fuel switching investments can involve just the upgrade of existing equipment rather than the purchase of new machines. And often, expensive Industrial Digital Technologies (e.g., robots) are leased rather than purchased. Excluding these would hinder many manufacturers from introducing more efficient and/or green plant equipment and machinery in their businesses.

All these measures will be crucial to enable manufacturers to fully embrace the nascent opportunities from green finance as it gains momentum. As lenders and investors seek to protect their assets, they will put more pressure on manufacturing businesses to demonstrate that they are proactively managing their risks. In the UK, the British Business Bank and many high-street lenders are already adopting their own net zero targets and thinking about how they can make sustainability credential requirements from their customers mainstream. Not enabling manufacturers to progress their emission reductions could deter many to invest elsewhere.



# TOP TIPS FOR *SME* MANUFACTURERS' TAKING THE FIRST STEPS TO DECARBONISE

|   |   |
|---|---|
|    | <p>The <b>first step</b> that any company should take is to measure your carbon footprint based on your energy use.</p>   |
|    | <p><b>Establish a plan first</b> – when things get complex, get help! Invest your time and money in sound advice. Working with the right specialist partners is key for dealing with the lack of internal skills and knowledge on digitalisation, decarbonisation methods and access to finance. Get clarity on where and how to start. If you already have a strategy or some projects, review them in the light of the new energy prices. You may find that the payback time has reduced sufficiently to make some projects commercially viable.</p>  |
|  | <p><b>Start by executing the short-term quick wins</b> and monitor your energy usage to hunt energy and resources waste out of the system. Install a smart-meter – set it so you don't heat or cool between 20°C and 24°C, move your smartmeters away from heat/cool sources, sub-meter high usage activities/equipment, LEDs, light sensors (start with main areas), draught-proof doors/windows. Check compressors, motors are running properly (install ultrasonic leak sensors on compressors, turn off engines when not used and reducing speed where possible (20% reduction will save 70% of energy). Improve refrigeration efficiency (relocate away from heat sources, check seals).</p> |
|  | <p><b>Insulate</b> pipes, roof and walls.</p>   |
|  | <p><b>Explore the option to generate your own electricity</b> and space heat as much as you can – you will have everything to gain from it. This can be done through solar photovoltaic and/or wind and by installing a heat pump, which will work in many buildings, including older ones.</p>   |
|  | <p><b>Find funding schemes and grants</b> for renewable energy generation and storage – check with your accountant for fiscal reliefs, compensations/exemptions (on business rates /VAT).</p>   |

# TOP TIPS FOR LARGER MANUFACTURERS' FIRST STEPS TO DECARBONISE

|   |  |
|---|--|
|    | <p><b>Measure</b> your carbon footprint.</p>   |
|    | <p><b>Get your Board management trained up</b> on Net Zero so that the leadership on the project is strong and set up a team of volunteers dedicated to putting in place your decarbonisation or net zero strategy and plan.</p>                             |
|   | <p><b>Install an Energy Management System</b> to measure and analyse your energy consumption. This will allow you to identify the points of waste or inefficiencies and control these. Install in new equipment with variable speed and frequency drives</p> |
|  | <p><b>Similarly for your building</b>, introduce a Building Management System (BMS). Install automatic door closures to contain the warm/cool air, light sensors.</p>  |
|  | <p><b>Interconnecting your machines with Artificial Intelligence</b> will enable machine learning and improve the efficiency of the entire process. Partner up with digital technology specialists who will help you with this.</p>                          |
|  | <p><b>If your electricity- or trade intensity is high</b>, check whether you might qualify for any of the EIs compensation package, or CCAs, or other exemptions from carbon taxes to minimise your energy costs.</p>  |

# SIEMENS CONGLETON CASE STUDY



Siemens Congleton produces variable speed drives, which it exports to customers in sectors ranging from logistics to aviation.

Its transformation began in 1990 when demand for bespoke products spurred a need to embrace lean manufacturing methods. The site is bounded by industrial units and housing estates, so doing more with less became part of the ongoing ethos for its evolution, and is now driving its sustainability journey.

To reduce waste and enhance efficiency, the site embraces a wide range of advanced manufacturing methods including Virtual Reality, Digital Twin, Internet of Things, Advanced Robotics, Cloud Technology, and Additive Manufacturing. It has also created a 'Virtual' CAVE (Computer Aided Visual Environment) to de-risk prototyping from small components and production lines, and model machine building.

The factory has also worked with Siemens' Energy and Performance Services (EPS) business to create a roadmap to net zero.

This includes power generated from the nearby Havannah Weir Hydro project – a collaboration with the local community where water flows through an Archimedes screw. The factory's building management system monitors energy use and automatically optimises efficiency. Meanwhile, an on-site bio gas engine alongside upgrades to the building – LED lighting, modern windows and carbon-neutral EV charge points for employees – have also significantly enhanced its sustainability credentials and as a result the site is now 80% energy independent.

Through a process of discovery, action, and measurement, coupled with employee engagement, Congleton has emerged as a leader of sustainable manufacturing in the UK and will be carbon neutral by 2022, eight years ahead of plan.



# PART 5: WHY WE CAN'T IGNORE THE RISING COST OF ENERGY

With rising energy costs being the dominant driver behind manufacturers' plans to decarbonise, we took a deeper dive into the practical conditions and pressures related to energy.

## THE COST OF ENERGY HAS RISEN SIGNIFICANTLY

It will come as no surprise that our survey found that the costs of energy have increased significantly in the past 12 months. In fact, more than one-third of companies (36%) have seen an increase of more than 50% in the past 12 months and 34% have experienced increases of more than 50% to gas/fossil fuels.

Demonstrating the severity of the issues, fossil fuel prices have increased between 50% and 100% for 17% of manufacturers and electricity costs have increased between 50% and 100% for a quarter of manufacturers. One in ten have already experienced more than a doubling of their costs for both electricity (8.2%) and gas (11.2%), and another 20% of businesses expect to in the next year (19.7% for electricity and 18.2% for gas).

For the perhaps 'lucky' 27% of manufacturers, electricity prices have remained the same, and for 23% of companies gas costs have also remained the same. Only a handful of companies have seen decreases in price. However, it may be the case that these companies have yet to renew their contracts, whereas many renewed contracts in the spring and saw major increases in their energy bills.

Chart 12: Energy costs continue to rise

% companies reporting changes to gas and electricity prices

|                               | Gas/<br>fossil fuel<br>(past 12<br>months) | Electricity<br>(past 12<br>months) | Gas/<br>fossil fuel<br>(next 12<br>months) | Electricity<br>(next 12<br>months) |
|-------------------------------|--|------------------------------------|--|------------------------------------|
| Significant decreases (>100%) | 1%   | 1%                                 | 2%   | 2%                                 |
| Moderate decreases (51-100%)  | 1%   | 0%                                 | 1%   | 0%                                 |
| Slight decreases (up to 50%)  | 4%   | 2%                                 | 5%   | 5%                                 |
| Remained the same             | 23%  | 27%                                | 17%  | 13%                                |
| Slight increases (up to 50%)  | 36%  | 34%                                | 21%  | 25%                                |
| Moderate increases (51-100%)  | 17%  | 25%                                | 30%  | 33%                                |
| Significant increases (>100%) | 11%  | 8%                                 | 18%  | 20%                                |
| Don't know                    | 7%   | 4%                                 | 7%   | 4%                                 |

*"We are a family business of Brazing Alloy Manufacturers, and we are classified under the HMRC energy sector banding as Small/Medium for Electricity and Small for Gas. Although we are energy intensive, just like other metal producers, there are unfortunately no adequate Government support schemes for EILs that we qualify for simply because our raw materials are precious metals. We were under no illusion that our energy costs were going to increase significantly, potentially double. We are truly shocked to discover that our electricity costs will increase almost three-fold even on a three-year contract. The gas is even worse, increasing by more than 400% to a staggering £259K."*

Make UK member

Source: Make UK Decarbonising Manufacturing Survey (2022)

## THE WORSE MIGHT BE YET TO COME

The increases observed are significant, and we know that the situation has worsened in the last few weeks since our survey for this report closed, and in the context of global politics having an impact on the energy market it is more than likely to persist over the next 12 months and potentially beyond.

## 70% OF MANUFACTURERS EXPECT HIGHER ENERGY COSTS IN THE NEXT 12 MONTHS

Even with mitigating pressures in place and plans for energy efficiencies, seven in ten manufacturers expect their energy costs to increase over the next 12 months. Moreover, one-third predict an increase of their gas and electricity bills between 51% and 100%, and another 20% a doubling of their energy costs.

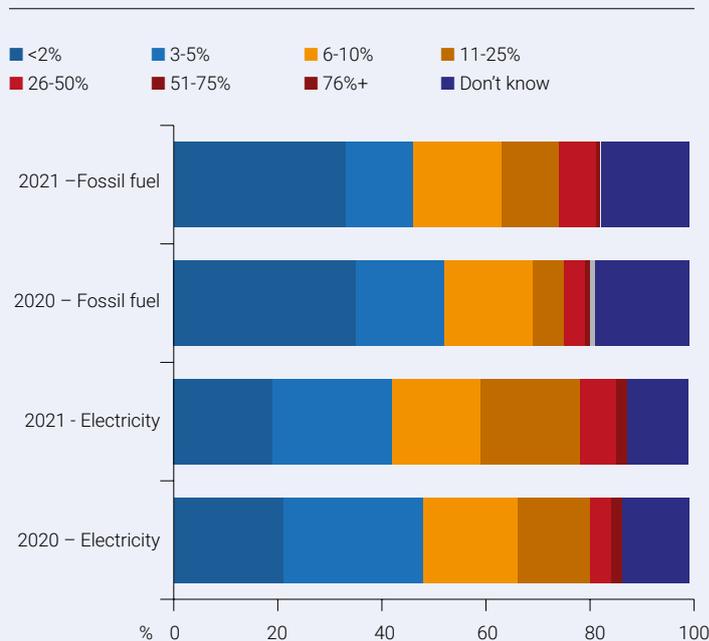
## THE BURDEN OF ENERGY COSTS ON MANUFACTURING BUSINESSES IS INCREASING, BUT THEY ARE NOT GETTING ANY RELIEFS

Energy Intensive Industries<sup>7</sup> (EII) are naturally particularly affected by the soaring energy costs. Their energy usage makes up a significant part of their overall costs<sup>8</sup>, so they benefit from Government schemes and climate change levy reliefs specifically designed for them.<sup>9</sup> But for the remainder of manufacturing, more and more businesses are tipping into categories of higher energy intensity and acutely feeling the pain of energy costs and don't benefit from any of the reliefs offered to the EIIs. Those reaching 20% of electricity intensity and in one of the sectors in scope can benefit from EII carbon levies and should investigate this option.

In fact, in just in the year from 2020 to 2021, the proportion of manufacturers in the categories of 11-25% and 26-59% energy intensity has doubled, reaching a quarter (25-26%) for both fossil fuels and electricity. Measures catering for this growing group (25%) of manufacturers (e.g. the expansion of eligibility criteria to more or all manufacturing facilities hitting the 20% electricity intensity criteria) are now urgently needed.

Chart 13: Energy costs as a proportion of total business costs on the up

% companies reporting energy costs as proportion of total costs



Source: Make UK Decarbonising Manufacturing Survey (2022)

## OVERALL TREND FOR ENERGY CONSUMPTION IS FLATLINING, AS MANUFACTURERS SEEK TO REDUCE COSTS

Energy consumption among manufacturers has typically remained stable in the past 12 months, with less than 10% variation for around three-quarters of companies both for electricity and for gas/fossil fuels.

Just under one in five (17%) companies moderately increased their energy consumption by 11-30%, and fewer than 5% saw an increase in consumption of more than 30%.

Gas (and other fossil fuels) and electricity consumption evolved overall in the same way. This could be owing to a number of factors, for example changes to production levels or improved energy efficiency as well as wider factors stemming from the pandemic such as workforce availability and supply chain strategies.

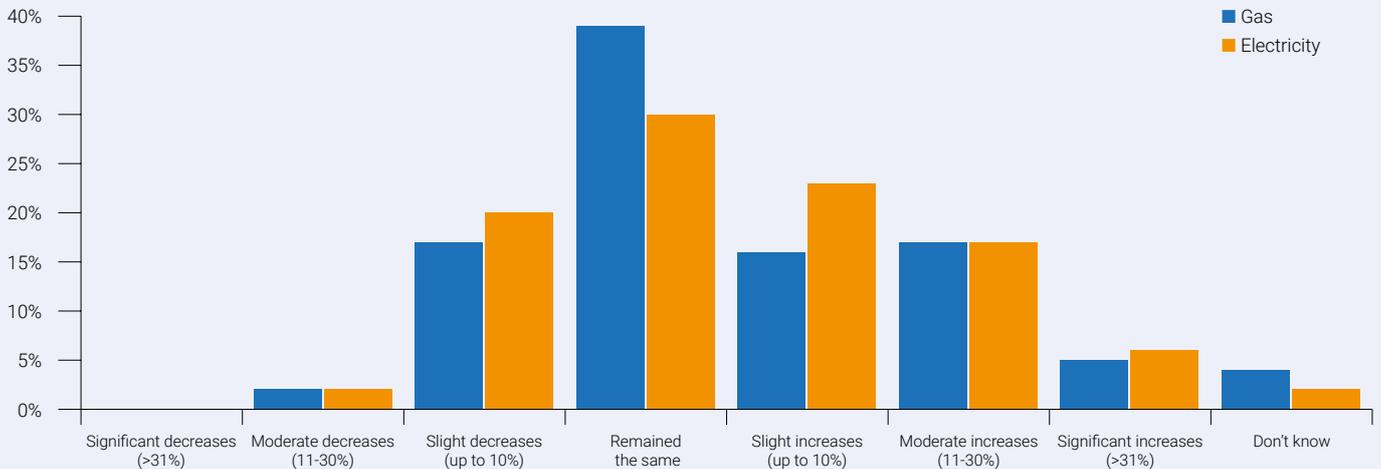
<sup>7</sup>Energy intensity is expressed as the energy costs as a proportion of total production costs.

<sup>8</sup>There are no set criteria for defining Energy Intensive Industries – the various energy reliefs and schemes will define the level of energy intensity at different levels, and other qualifying criteria (e.g. trade intensity) may also be combined with it.

<sup>9</sup>For example, the recently extended EII compensation package and climate change levy reliefs such as the Min-Met exemption, Climate Change Agreements (CCAs) or the UK-Emissions Trading Scheme (UK-ETS).

**Chart 14: Energy consumption is flatlining**

% of manufacturers citing changes to consumption



Source: Make UK Decarbonising Manufacturing Survey (2022)

What can be said, then, is that there is a growing gap between the trend of decreasing consumption of the sector as a whole and the increasing burden of cost from which it is suffering.

Some companies have tapped into the more energy intensive category but without the reliefs to cope with the high energy costs. This often leaves them with little choice on action and having to take some radical decisions. For example, some have deliberately reduced the operating

time of heavy equipment (e.g., turbines), leading to reduced production and staffing costs. In these challenging times, businesses are preferring a tenable balance between lower production costs and less output. This may have improved their resilience, but it is at the cost of growth.

There is a real need then for Government to intervene and support businesses, else we risk the productivity challenging worsening, not just within manufacturing, but the wider economy.

*"We have actively considered carbon reduction and energy efficiency when making restructuring decisions in 2021. By deciding to swap to five days' production we have been able to reduce turbine operating hours (and therefore emissions) and increase efficiency during operating periods. Interlocks have been installed to ensure heat requirement does not exceed a pre-set amount that would trigger higher gas usage."*

Make UK member

## ELECTRIFICATION OF THE SECTOR UNDERWAY BUT FIRMS NEED MORE GREEN ELECTRICITY

Electrification of the sector is already being achieved to a large extent as supplied grid electricity generally is the primary source of energy for both processes (excluding transport) and operations for the majority of manufacturing businesses (61% and 66% respectively).

One in five manufacturers rely on fossil fuels (mainly natural gas and a little coal/other solids and oil/other liquids) as the main source of energy for processes (excluding transport) and operations.

But although grid-supplied electricity is the primary source of energy for the majority, not all of it is generated from clean or renewable sources. Becoming as independent as possible from the unpredictable fluctuations of international markets

is essential for the country's energy security. While new domestic oil and gas production will provide relief, they should only be considered breathing space while the country embraces the real opportunity, the transition to net zero and all the economic benefits and resilience that go with it. Greening electricity rapidly is a key necessity to allow the majority of the manufacturing sector to reduce emissions at pace.

As the electricity grid itself has decarbonised over time, so the proportion of green grid energy supplied to industrial users has significantly increased in the last few years, but there is not enough supply for all. At the moment, only 6-7% of manufacturing businesses use renewable energy sources (solar, wind, hydrological, geothermal, wood, biofuels, biowaste) as the primary source of energy for their processes and operations. Of those, 5% (all sources combined except hydrogen) are used for on-site generation.

With gas prices skyrocketing since the beginning of the Russian war, electricity prices have climbed alongside gas, exceeding gas prices for the first time in a decade. In the past 12 months, 50% on average of total electricity costs came from manufacturing processes, in addition to the 10% on average from space heating.

Self-generation could therefore present an excellent opportunity for manufacturers and would work particularly well for space and water heating, as they generally require less electrical power and a smaller amount of electricity, even though they represent the smaller portion of the overall energy costs (and consumption) of the business.

Self-generation or direct wiring from a wind/solar farm is still more expensive than just getting electricity from the Grid. Just switching to a green electricity tariff is no longer more expensive than using 'brown' electricity and could be the simplest solution even for those whose budget is stretched. It doesn't resolve however, the renewable energy supply issue as the demand for renewable electricity, particularly when used for industrial processes (as opposed to space heating) will increase enormously as a result.

Why, then, is all of this important to decarbonisation?  
In summary:

- The burden on the manufacturing sector is increasing as the trend of consumption has flatlined and energy costs have significantly increased, and the worst is yet to come. Some 25% of manufacturing businesses have tipped into higher energy intensiveness categories, without any relief, leaving some with little choice other than to take radical decisions to produce less to reduce costs. This may have improved their resilience, but it is at the cost of growth.
- Electrification of the sector is already being achieved to a large extent for both processes (excluding transport) and operations, and only one in five manufacturers relies on fossil fuels, but firms will need much more green electricity to replace brown electricity and fossil fuels.
- Cost of renewable electricity is no longer higher than brown electricity, so the switch, should make financial sense. But the issue is supply, so self-generation for space heating is encouraged as pay-back periods shrink with the rising energy prices.



# PART 6: SETTING A BOLD VISION FOR A GREEN FUTURE

The UK Government has published a range of strategies since the Prime Minister's Ten Point Plan. Of particular relevance to decarbonising manufacturing are the Industrial Decarbonisation Strategy, the Net Zero Strategy and the Heat and Buildings Strategy. Within these documents, a range of actions have been committed, however have they been taken forward?

If manufacturers are to cut emissions further and be net zero by 2050, it is fundamental that words turn into action. As part of our research, we explored these key strategies and have tracked the progress of commitments made to date using a RAG (red, amber, green) indicator (see Appendix B). What it reveals is that progress has been limited, at best. While we have seen positive moves around green finance and innovation for example, we are some way behind on fuel switching and energy efficiency and even more so on electrification.

While all aspects are priorities for manufacturers it is fundamental that Government puts its foot on the pedal and accelerates progress on:

- a) **The cost of energy:** including reviewing the pricing structure of electricity.
- b) **Energy efficiency:** including help with Energy Management Systems and digitalization.
- c) **Electrification:** including increasing funding for and extending the Industrial Energy Transformation Fund (IETF).

*“With the added costs of raw materials, consumables and National Insurance, our competitive edge is seriously compromised, and we absolutely need the Government to support policy schemes that will adequately support manufacturers.”*

*“My business needs clarity over infrastructure resilience and supply chain/technology to enable long-term investment and confidence in transition from established production methods and energy sources.”*

*Make UK members*

Britain's manufacturers are leading the charge towards decarbonising and progressing further and further towards net zero. Manufacturers have long shown that they are at the forefront of innovation globally and they have already gone a long way to improve their processes and production in the quest to reach net zero. But what is lacking is a bold vision from the Government for the industry to transition to a net zero future.

The Government has published a range of strategies in a bid to transition to a net zero economy. Of most relevance for manufacturers has been the Industrial Decarbonisation strategy which set out ambitions for the industry to reduce carbon emissions by at least 67% in 2035 and by at least 90% by 2050.

If we are to decarbonise manufacturing, a combination of measures is needed. While energy efficiency is largely straightforward, the transformation of industrial processes is less so, yet this will be critical within the next decade. Therefore, Government must take bolder action. It must hold itself to account on its Industrial Decarbonisation strategy by providing regular updates on progress in order to help business understand the Government's overall intentions and make investment decisions accordingly. More than 80% of manufacturers agree that the Government is not focused enough on supporting the manufacturing sector, preventing it from taking advantage of these opportunities. The time for a bold ambition is now.

**In addition to this, Government should take the following priority actions:**

1. **Incentivise investment in industrial decarbonisation technologies through capital allowances and take reliefs:**  
This should include expanding the R&D tax credit relief scheme to include green capital expenditure relating to industrial decarbonisation within qualifying expenditure and permanent full expensing of all assets relating to industrial decarbonisation.

**2. Introduce a Help to Grow Green programme:**

Modelled on Help to Grow, encompassing vouchers for businesses to spend on products and services to make their firms greener and support to train leaders and managers in industrial decarbonisation.

**3. Incentivise on-site generation to service businesses and recirculate surpluses back to the grid:**

Government should offer grants to businesses for on-site generation, for example 50:50 funding. Surplus energy produce could also be added to the national grid to increase the UK's energy security.

**4. Take forward plans with the Net Zero Review on UK carbon prices and electricity price structure:**

While the Government has begun work on the demand side aspects e.g. a carbon border adjustment mechanism (CBAM), more needs to be done on UK carbon prices. The Government should look to work with industry to explore a broader carbon tax mechanism. The UK ETS should be extended to other sectors and linked it to wider ETS schemes to increase the market size. In addition, the Government must look at electricity network charges and policy costs in a bid to decrease costs, including exploring compensation and exemptions to current schemes.



# SUPPORT TO HELP MANUFACTURERS DECARBONISE

| SCHEME   | TARGET  | PRIMARY PURPOSE  | ELIGIBILITY CRITERIA  |
|--|---|--|---|
| <b>TO SUPPORT REDUCING ELECTRICITY COSTS</b>                                     |   |  |   |
| <b>The Energy-Intensive Industries (EIs) exemption scheme</b>                    | EIs <sup>10</sup> compensation package aims to help big energy users stay competitive in a global market.                       | Exemption from the indirect costs of funding renewable energy generation, including Contracts for Difference (CfD), the Renewables Obligation (RO) and the small scale Feed-in Tariff (FIT) to help EIs stay competitive as our economy transitions to zero carbon.                    | The scheme's relief is up to 85% of the indirect costs, depending on the eligibility which is based on: <ul style="list-style-type: none"> <li>- The business must manufacture a product in the UK within an eligible sector – the "sector level test".</li> <li>- The business must pass a 20% electricity intensity test – the "business level test".</li> <li>- The business must not be an Undertaking in Difficulty (UID) – the UID guidelines explain that "an undertaking is considered to be in difficulty when, without intervention by the State, it will almost certainly be condemned to going out of business in the short or medium term."</li> <li>- The business must have at least two quarters of financial data.</li> <li>- The application must contain evidence of the proportion of electricity used to manufacture the product for a period of at least three months.</li> </ul> |
| <b>Contracts for Difference (CfD) scheme</b>                                     | For businesses that generate a surplus of low-carbon electricity to sell back to the Grid and for developers of RE technologies | CfDs incentivise investment in renewable energy by providing developers of projects with high upfront costs and long lifetimes with direct protection from volatile wholesale prices, and they protect consumers from paying increased support costs when electricity prices are high. | <ul style="list-style-type: none"> <li>- CfDs are awarded in each of the allocation rounds to developers of specific technologies varying from nuclear to wind, wave, anaerobic digestion, landfill and gas.</li> <li>- Developers are paid a flat (indexed) rate for the electricity they produce over a 15-year period; the difference between the 'strike price' (a price for electricity reflecting the cost of investing in a particular low carbon technology) and the 'reference price' (a measure of the average market price for electricity in the GB market).</li> </ul>   |
| <b>Carbon Price Support (CPS) compensation scheme and UK-ETS free allowances</b> | The UK ETS and CPS mechanism are designed to reduce emissions.  | To compensate those EIs deemed to be exposed to a significant risk of carbon leakage due to the indirect emission costs of the UK ETS and CPS.   | There are 2 steps to assessing whether a business is eligible to claim compensation for the indirect costs of the UK ETS/CPS: <ul style="list-style-type: none"> <li>- The business must manufacture a product in the UK within an eligible sector (determined by reference to the 4-digit SIC code).</li> <li>- The business must pass a 5% filter test</li> <li>- The legal entity manufacturing a product in GB, and this will typically be a business registered at Companies House.</li> </ul>   |

<sup>10</sup>Sectors count as energy intensive if they carry out certain specified activities. The list of eligible activities specified in the government guidance is extensive and includes aluminium production, leather tanning and glass manufacturing. It also includes the manufacture of things as diverse as wallpaper, tyres and electronic components. See CFD – RO- FIT Exemption Guidance Government guidance

| SCHEME  | TARGET   | PRIMARY PURPOSE   | ELIGIBILITY CRITERIA   |
|---|--|---|--|
| <b>TO SUPPORT REDUCING ELECTRICITY COSTS</b>                |  |   |  |
| <b>Climate Change Agreements (CCAs)</b>                     | CCAs are available for a wide range of industry sectors, but generally those that are EIs. | Climate change agreements are voluntary agreements made between UK industry and the Environment Agency to reduce energy use and carbon dioxide (CO <sub>2</sub> ) emissions. In return, operators receive a discount on the CCL, a tax added to electricity and fuel bills.                                     | Exact criteria for eligibility can be found here <sup>11</sup> , but in general: <ul style="list-style-type: none"> <li>– An operator that has a CCA must measure and report its energy use and carbon emissions against agreed targets over 2-year target periods up to the end of 2022.</li> <li>– If an operator has more than one eligible facility in the same sector it can hold an individual CCA for each facility, or choose to group them together under one CCA. Where facilities are grouped under one CCA the target is then shared across the grouped facilities.</li> <li>– Once a facility, or group of facilities, is included in a CCA, it is referred to as a target unit.</li> <li>– If the operator's target unit meets its targets at the end of each reporting period, the facilities continue to be eligible for the discount on the CCL.</li> </ul> |
| <b>Mineralogical and metallurgical processes exemptions</b> | Businesses carrying out metallurgical and mineralogical processes.                         | Taxable commodities used in mineralogical or metallurgical processes are exempt from the main rates of climate change levy. The exemptions ensure the UK tax treatment of highly energy intensive processes is in line with tax treatments elsewhere in the EU, thereby reducing any distortion of competition. | <ul style="list-style-type: none"> <li>– Applies to those with energy used in metallurgical and mineralogical products, and their eligible processes is therefore 100% exempt from the Climate Change Levy.</li> <li>– Under the scheme, in return for meeting energy efficiency or carbon reduction targets energy intensive industries conducting eligible processes could claim reduced rates of CCL. The reduced rates are currently 10 per cent of the full rate for electricity and 35 per cent of the full rates for other taxable commodities.</li> </ul>  |
| <b>OTHER GREEN FISCAL RELIEFS SCHEMES</b>                   |  |   |  |
| <b>Enhanced Capital Allowance (ECA) scheme</b>              | Open to all businesses.  | Allows 100% of the cost of an investment in qualifying plant and machinery to be written off against the taxable income of the period in which the investment is made, improving cash flow for businesses.  | The various eligible energy efficient and environmentally beneficial technologies and products eligible are: <ul style="list-style-type: none"> <li>– electric cars and cars with zero CO<sub>2</sub> emissions</li> <li>– plant and machinery for gas refuelling stations, for example storage tanks, pumps</li> <li>– gas, biogas and hydrogen refuelling equipment</li> <li>– zero-emission goods vehicles</li> <li>– equipment for electric vehicle charging points</li> <li>– plant and machinery for use in a freeport tax site</li> </ul>   |

<sup>11</sup>[www.gov.uk/guidance/climate-change-agreements--2](http://www.gov.uk/guidance/climate-change-agreements--2)

| SCHEME   | TARGET   | PRIMARY PURPOSE   | ELIGIBILITY CRITERIA  |
|--|--|---|---|
| <b>FUNDS FOR LOW CARBON AND ENERGY EFFICIENCY TECHNOLOGIES</b> |  |   |   |
| <b>Industrial Energy Transformation Fund (IETF)</b>            | Open to all businesses.  | The Industrial Energy Transformation Fund (IETF) is designed to help businesses with high energy use to cut their energy bills and carbon emissions through investing in energy efficiency and low carbon technologies. The Government announced £315 million of funding in the 2018 Budget, available up until 2025. | <ul style="list-style-type: none"> <li>– There is a minimum grant of 100K per application available, and the project must start by 1/2/24 and complete by 31/3/25.</li> <li>– However there are exclusions, including projects that upgrade systems in buildings that are not integral to the industrial process itself, as well as the cost of installation, operation or maintenance of equipment.</li> </ul>   |
| <b>Net Zero Innovation Portfolio (NZIP)</b>                    | Funding is being made available for projects nationally via competitive application.           | The Net Zero Innovation Portfolio is a £1 billion fund, to accelerate the commercialisation of low-carbon technologies, systems and business models in power, buildings, and industry.  | <p>Development of innovative technology deployment across industry, with funding dedicated towards key areas of industrial decarbonisation, including:</p> <ul style="list-style-type: none"> <li>– Hydrogen, CCUS, bioenergy and disruptive technologies such as artificial intelligence for energy management.</li> <li>– The Net Zero Innovation Portfolio succeeds the BEIS Energy Innovation Programme (EIP) which ran from 2015 to 2021.</li> </ul>   |
| <b>Industrial Energy Efficiency Accelerator (IEEA)</b>         | Innovative companies in the Manufacturing and Waste sectors, as well as technology developers. | The IEEA programme aims to increase the number of technologies available to industry to help reduce energy consumption, maximise resource efficiency and cut carbon emissions.  | <p>The scheme applies to novel industrial process technologies with the potential to cut carbon emissions through reduced energy consumption and/or improved resource efficiency:</p> <ul style="list-style-type: none"> <li>– Phase 1: Projects were selected on their energy saving potential and scalability, with particular focus on technologies that can be deployed across multiple industrial sectors.</li> <li>– Phase 2: Technology developers and industrial companies applied to the IEEA with a combined submission.</li> <li>– Phase 3 and 4: Programme provide around £8 million in funding for the development and demonstration of technologies that could reduce energy consumption, maximise resource efficiency, or cut carbon emissions.</li> </ul> |
| <b>Energy Entrepreneurs (EEF) Fund</b>                         | All sizes, but particularly aims to assist SMEs, and start-ups.                                | The Energy Entrepreneurs Fund is a competitive funding scheme to support the development and demonstration of state of the art technologies, products and processes in the areas of energy efficiency, power generation and heat and electricity storage.   | <ul style="list-style-type: none"> <li>– The scheme will only fund innovations that are Technology Readiness Level (TRL) 3 up to TR 8.</li> <li>– Projects must fall within the definitions of industrial research, feasibility study or experimental development.</li> </ul>   |

| SCHEME   | TARGET   | PRIMARY PURPOSE   | ELIGIBILITY CRITERIA  |
|--|--|---|---|
| <b>FUNDS FOR LOW CARBON AND ENERGY EFFICIENCY TECHNOLOGIES</b> |  |   |   |
| <b>UKRI Industrial Decarbonisation Challenge</b>               | Business across the six industrial cluster across the UK <sup>12</sup> . | To directly support the facilitation of four low-carbon industrial clusters by 2030 and at least one net zero cluster by 2040, by supporting the development of low carbon technologies such as CCUS and hydrogen at scale.                                     | <p>The Industrial Decarbonisation Challenge is split into three workstreams:</p> <ul style="list-style-type: none"> <li>– Deployment of core infrastructure</li> <li>– Cluster plans (engineering and business)</li> <li>– Industrial decarbonisation research and innovation centre (demonstration of cost-effective technologies and processes)</li> </ul> <p>And will cut across:</p> <ul style="list-style-type: none"> <li>– Tees Valley</li> <li>– Scotland</li> <li>– Humber</li> <li>– North West</li> <li>– South Wales</li> <li>– Black Country</li> </ul>  |
| <b>UKRI Transforming Foundation Industries</b>                 | Foundation industries <sup>13</sup> .                                    | The challenge aims to transform the UK's foundation industries by making them internationally competitive securing more jobs throughout the UK growing the sector by 2024 in an environmentally sustainable way.  | <ul style="list-style-type: none"> <li>– Funds will be applied on a crosssector basis and designed to improve collaboration and research aimed at improving the productivity and competitiveness of the sectors' companies and supply chains.</li> </ul>  |
| <b>Biomass Feedstocks Innovation Programme</b>                 | Those in breeding, planting, cultivating and harvesting <sup>14</sup> .  | To produce innovations that address some of the barriers to feedstock production, helping to scale up the supply of UK sustainable biomass.   | <p>Competition programme split into two:</p> <ul style="list-style-type: none"> <li>– Phase 1: project plans for technology innovations to develop strong proposals that will deliver commercially viable innovations in biomass production.</li> <li>– Phase 2: enaction of phase 1 projects (constructing, operating, testing, refining and evaluating, with a clear commercialisation route for deployment).</li> </ul>  |
| <b>Net Zero Hydrogen Fund</b>                                  | Businesses intending to undertake a hydrogen production project(s).      | To support the commercial deployment of new low carbon hydrogen production projects during the 2020s to de-risk investment and reduce lifetime costs.   | <ul style="list-style-type: none"> <li>– The project must meet the Draft Low Carbon Hydrogen Standards.</li> <li>– Must use technology tested in a commercial environment at a Technology Readiness Level (TRL) 7 or above.</li> <li>– The project must be at least 6 months long, ending by March 2025.</li> </ul>   |
| <b>Carbon Capture and Storage Infrastructure Fund</b>          | Energy Intensive Industries.   | The fund aims to support the development of business models and enable the deployment of Carbon Capture Usage and Storage (CCUS) across energy-intensive industries to enable organisations to remain economically competitive while reducing carbon emissions. | <ul style="list-style-type: none"> <li>– Phase 1: An eligible cluster must involve a transport and storage network – for example pipelines and an offshore storage facility – capable of safely transporting and storing carbon dioxide (CO<sub>2</sub>), together with at least two CO<sub>2</sub> capture projects. It must also be located in the UK, and be able to credibly demonstrate that it can be operational by 2030.</li> <li>– Phase 2 is for industry, power and hydrogen focused capture projects. Although there are specific criteria for each category, all capture projects must be located in the UK, have access to CO<sub>2</sub> transportation and storage and able to demonstrate they can be operational before the end of 2027.</li> </ul> |

<sup>12</sup>Industrial decarbonisation challenge – UKRI<sup>13</sup>Foundation industries produce 75% of all the materials in the UK economy and account for approximately 10% of the UK's total carbon emissions (UKRI, 2020).<sup>14</sup>Biomass Feedstocks Innovation Programme - GOV.UK (www.gov.uk)

| SCHEME   | TARGET   | PRIMARY PURPOSE   | ELIGIBILITY CRITERIA   |
|--|--|---|--|
| <b>OTHER FISCAL SUPPORT SCHEMES AND FUNDS</b>  |  |   |  |
| <b>Super-deduction</b>                         | For all UK businesses.                                   | The super-deduction will allow companies to cut their tax bill by up to 25p for every £1 they invest, on qualifying main rate plant and machinery investments, to encourage firms to invest in productivity-enhancing plant and machinery assets that will help them grow and recover from the Covid-19 pandemic.   | The eligible plant and machinery that can be deducted are: <ul style="list-style-type: none"> <li>– Computer equipment and servers</li> <li>– Tractors, lorries, vans</li> <li>– Ladders, drills, cranes</li> <li>– Office chairs and desks,</li> <li>– Electric vehicle charge points</li> <li>– Refrigeration units</li> <li>– Compressors</li> <li>– Foundry equipment</li> </ul>   |
| <b>Enhanced Capital Allowances</b>             | Companies, individuals and partnerships within Freeport. | The ECA scheme lets your business claim 100 per cent first-year tax relief on investments in qualifying technologies and products. This means you can write off (deduct) the whole cost, or up to the published claim value, of buying the energy-saving product against your taxable profits in the year of purchase.  | <ul style="list-style-type: none"> <li>– You can only make claims for tax allowances under the Enhanced Capital Allowance (ECA) energy scheme for certain technologies. Qualifying products within these technologies must meet certain eligibility criteria specified on the Energy Technology List (ETL).</li> </ul>   |
| <b>OTHER FISCAL SUPPORT SCHEMES AND FUNDS</b>  |  |   |  |
| <b>Annual Investment Allowance (AIA)</b>       | For all UK businesses.                                   | A 100% relief on eligible plant and machinery used by businesses – The amount varies and is currently £1m for the period ending March 2023  | Eligible plant and machinery includes: <ul style="list-style-type: none"> <li>– items that you keep to use in your business, including cars</li> <li>– costs of demolishing plant and machinery</li> <li>– parts of a building considered integral, known as ‘integral features’</li> <li>– some fixtures, for example fitted kitchens or bathroom suites</li> <li>– alterations to a building to install other plant and machinery - this does not include repairs</li> </ul> |
| <b>Business rate relief – Green Technology</b> | Businesses in England only.                              | This supports the decarbonisation of non-domestic buildings <sup>15</sup> . The business rates review announced that eligible plant and machinery used in onsite renewable energy generation and electricity storage, such as rooftop solar panels, wind turbines, and battery storage, plus electricity storage from any source where it is being used for electric vehicle charging points (EVCPs) will be exempt from business rates from April 2023 until 2035. | <ul style="list-style-type: none"> <li>– Making green technology, including solar panels and heat pumps, exempt from business rates from April 2022 will save businesses an extra £35 million in 2022-23, and is expected to be worth around £170m over the next five years to support the decarbonisation of buildings</li> <li>– A 100% relief for eligible low-carbon heat networks which have their own rates bill will also be available.</li> </ul>                      |

<sup>15</sup>[www.gov.uk/government/publications/spring-statement-2022-business-support-factsheet/spring-statement-2022-business-support-factsheet](https://www.gov.uk/government/publications/spring-statement-2022-business-support-factsheet/spring-statement-2022-business-support-factsheet)

| SCHEME                            | TARGET                           | PRIMARY PURPOSE  | ELIGIBILITY CRITERIA  |
|-----------------------------------|----------------------------------|--|---|
| <p><b>R&amp;D Tax credits</b></p> | <p>Large companies and SMEs.</p> | <p>To support companies that spend money developing new products, processes or services; or enhancing existing ones. SMEs are able to claim up to 33p for every £1 spent, Large companies are able to claim up to 11p.</p> | <p>To be eligible the business must:</p> <ul style="list-style-type: none"> <li>- Be a limited company in the UK that is subject to Corporation Tax.</li> <li>- Have carried out qualifying research and development activities.</li> <li>- Have spent money on these projects.</li> </ul> <p>If you are classed as an SME for R&amp;D tax credit purposes, your next step will be to make a claim via the SME R&amp;D tax incentive. And if you are a large company, via the Research and Development Expenditure Credit (RDEC).</p> |



# PROGRESS OF GOVERNMENT STRATEGIES ON DECARBONISATION AND NET ZERO

| Commitment   | Detail and commentary   | Progress (RAG) |
|--|---|----------------|
| <p>1. Fuel Switching</p>   | <p>The Government committed to review during 2021 the existing policy landscape and assess the impact that barriers have on business decisions about investing in electrification and biomass (primarily with CCUS) technologies.</p>   |                |
| <p>1.1 Low carbon hydrogen</p> <p>Proposals within the strategies includes:</p> <ul style="list-style-type: none"> <li>- Driving demand is needed to achieve the economies of scale required for hydrogen to be available at an affordable price.</li> <li>- Establishing the right policy framework to ensure the uptake of fuel switching.</li> <li>- Putting in place funding mechanisms to support low carbon hydrogen and CCUS.</li> <li>- Support to increase the amounts of fuel switching to low-carbon fuels during the 2020s (within both the Hydrogen and Bioenergy Strategies).</li> <li>- Working with industry to understand what is require to make sites ready for retrofit.</li> <li>- The deployment of commercialised CCUS in industrial clusters and super places, where installation of infrastructure will be needed.</li> <li>- Reviewing policies to address barriers faced by less energy-intensive dispersed sites.</li> </ul> | <p><b>Hydrogen:</b> The Government has recently doubled its production of hydrogen targets to 10MWh by 2035 and accelerated pilot schemes for hydrogen production and use. However, the concern for manufacturers is the supply, which would only satisfy 35% of the UK’s electricity demand in 2050. The current plans are not sufficiently clear to provide the confidence to invest in this technology, which explains why the plans involving hydrogen are only burgeoning them are not insignificant. A consultation on hydrogen-ready equipment took place in 2022 and results are awaited.</p> <p><b>Carbon capture:</b> Carbon Capture Usage and Storage (CCUS) will be crucial to meeting the net zero target. The CCUS Council is in place, and a sub-group on the role and opportunities for the UK supply in this technology. However, a funding mechanism for development of parts and infrastructure components has not yet been settled.</p> <p><b>Less energy-intensive, dispersed users:</b> The Department for Business, Energy and Industrial Strategy has created a team working on dispersed sites and is starting to engage with less-energy-intensive, dispersed sites. Make UK is also collaborating with this unit to see how to engage more closely with manufacturing businesses. Overall, this is welcome, but progress remains slow.</p> |                |

| Commitment   | Detail and commentary   | Progress (RAG) |
|--|---|----------------|
| <p><b>1.2 Demand-side measures</b></p> <p>Proposals within the strategies includes:</p> <ul style="list-style-type: none"> <li>- Carbon pricing to send a clear market signal providing certainty over the UK's net zero ambitions for industrial sectors</li> <li>- Establishing a targeted approach to mitigate carbon leakage</li> <li>- Work with stakeholders to understand how an EU Carbon Border Adjustment Mechanism (EU-CBAM) could affect the UK</li> <li>- Exploring opportunities for faster decarbonisation in dispersed sites in the 2020s.</li> <li>- Develop proposals for new product standards</li> <li>- Use public procurement to drive change</li> <li>- Support businesses to make green choices</li> </ul> | <p><b>Signaling to industry and customers remains weak:</b> The UK ETS design is under review. The Government has committed to align, and therefore increase, the cap on carbon allowances to net zero by 2024 and is currently consulting with industry on its proposal. The cap on carbon allowances is very stringent, resulting in a path for industry to decarbonise which is not aligned with the CCC recommendations and that industry itself has generally committed to. These risks thwarting the essential long-term capital investments in new equipment and technologies required for industry to decarbonize its processes. Industry has also been calling for a linkage to the UK ETS with wider ETS schemes which would increase the market size and dynamics. This is embedded in the Trade and Cooperation Agreement (TCA) following the exit from the EU, but further discussions have been hindered in the current political context. In addition, the impact assessment of an EU-CBAM concluded that it would be better for the UK to have a mirroring UK-CBAM. However, the proposal for a UK scheme is still awaited.</p> <p><b>Lack of focus for non-energy-intensive industries (EII):</b> The focus until now has been almost exclusively on the Energy Intensive Industries (EIIs). Urgent attention is needed on less energy-intensive, most of which will be smaller, dispersed sites, which collectively emit half of the industrial greenhouse gases (GHG). We welcome the formation of the Dispersed Sites team within the Industrial Decarbonisation Unit at BEIS, but progress on this front must be accelerated. These are the companies that have the least support and need the most guidance, and who will respond much better to incentivization for green investments than to penalizing legislation.</p> <p><b>Maximizing self-generation:</b> The Targeted Charging Review (TCR) has undergone a pricing change effective from April 2022, for suppliers to recoup the costs for transmission and distribution charges. However, many manufacturers who have self-generation installations, or who don't use all their energy during certain periods, have told us they are restricted or unable to feed their surplus energy back, or that they could use more surplus energy generated on very windy days instead of the turbines being shut down at cost. Maximizing the self-generation potential and the increasing the flexibility of the energy network to enable the seamless flow of renewable energy from generators and to users/storage could unlock much more energy and go some way to meeting the needs of a clean manufacturing sector.</p> <p><b>Low emissions industrial product standards:</b> A consultation on low-emissions industrial product standards was held and results are awaited. It is a very complex area and important striking the right policy landscape balance to ensure the demand for such products, and a level-playing field between emissions from domestic production and from imports.</p> <p><b>Public procurement policy:</b> A public procurement policy has been put in place with suppliers to contracts over £5m having to provide a net zero plan. (PPN 05/21 and 06/21).</p> <p><b>Buyers' alliances:</b> The Government plans to engage with businesses to understand how government can support changes in procurement activities and encourage consolidated demand via buyers alliances – this is still very much in progress.</p> |                |

| Commitment   | Detail and commentary   | Progress (RAG)                       |
|--|---|--------------------------------------|
| <p><b>1.3 Electrification</b></p> <p>Proposals within the strategies includes:</p> <ul style="list-style-type: none"> <li>- Exploring opportunities for faster decarbonisation in dispersed sites in the 2020s</li> <li>- Ensuring electrification technologies are in supply as demand increases</li> <li>- The development of mini-industrial decarbonisation plans</li> </ul> | <p><b>Electrification:</b> In 2021, the Government committed to review the existing policy landscape and assess the impact that barriers have on business decisions about investing in electrification and biomass (primarily with CCUS) technologies. Electrification is expected to play a more significant role in dispersed sites and our report shows that the potential for electrification is high, not only for low-temperature processes but also even for high temperature ones. The technology for these is not mature yet and there is still a general lack of knowledge of which processes exactly would solely rely on high heat, and which, amongst these would still need the combustion of a gas to achieve these high temperatures. The Government has said it will identify opportunities for rapid decarbonization e.g., heat pumps for low temperature processes, and electrification of off-gas grid sites. However, the focus for heat pumps is on domestic uses, and the non-domestic Renewable Heat Incentive (RHI) which helped businesses meet the cost of installing renewable heat technologies e.g., heat pumps and biomass has now closed.</p> <p>The Government has put in place the Industrial Energy Transformation Fund (EITF) which is the main fund supporting industry in advanced projects (at Technical Readiness Level 7-9 and commercialization). However, the size of the EITF fund is small (less than £500m) compared to the levels required to create a significant push on industry. Moreover, it is competition-based, and eligibility is relatively narrow although it has improved following feedback from industry. Its amount and scope should be extended to meet the needs of industry.</p> <p><b>Mini-industrial decarbonization plans:</b> Planning the mini-cluster industrial decarbonization in the early 2020s would help Again this ambitious program would be funded by the IETF... which is very insufficient to cover all these aspects. As the program would only start when infrastructure decisions on the future of hydrogen in the gas grid in 2026... the timing does not seem realistic.</p> <p><b>Cost of energy:</b> Once condition for electrification and fuel switching is that the alternative energy source must be at reasonable cost and adequate supply. The UK's industrial electricity costs are currently higher than those of many of our close competitors, which is due to the green levies applied to electricity. For the benefit of businesses of all sizes, a review of the cost structure of electricity is urgently needed to reduce the price of electricity, as is the re-balancing of gas and electricity prices to disincentivize the use of gas. The review of the network charges and of the Capacity Market Levy has been announced for September and the Renewables Exemption will undergo consultation this summer.</p> | <p style="text-align: center;">R</p> |
| <p><b>2. Energy efficiency</b></p>   | <p>Energy efficiency has a key role in increasing security of supply which is critical in the present political and economic context of soaring oil and gas prices. The cost of electricity and gas has been identified as the top driver for industry to decarbonize and energy efficiency is the most common pathway for decarbonizing manufacturing.</p>   | <p style="text-align: center;">R</p> |
| <p><b>2.1 Digital Technologies</b></p> <p>Proposals within the strategies include:</p> <ul style="list-style-type: none"> <li>- Consideration of digital tools, including the Energy Management Systems (EMS) as a technology neutral, minimal burden, regulatory options.</li> <li>- Enhancing and expanding Climate Change Agreements.</li> </ul>                              | <p><b>Utilising digital tools:</b> The cheapest and quickest way of getting there is using the energy that's already on the system Smart technologies and digitalization to connect all the low-carbon technologies and create a flexible energy system. The Government has committed to assess how industry can make use of smart technologies, such as storage and demand side response, to provide flexibility to the system, helping industrial consumers use energy when it is cheapest and cleanest.</p> <p><b>Climate Change Agreements:</b> CCAs are currently limited to sectors conducting energy intensive activities, and excluded common manufacturing processes (e.g., machining and tool cutting) which, if included, could benefit many more manufacturing businesses.</p> <p>A review of their scope is therefore welcome.</p>   | <p style="text-align: center;">R</p> |

| Commitment  | Detail and commentary  | Progress (RAG)                             |
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| <p><b>2.2 Buildings</b></p> <p>Proposals within the strategies (predominantly the Heating &amp; Buildings Strategy) include:</p> <ul style="list-style-type: none"> <li>– Regulatory requirements for large buildings to obtain performance-based energy ratings.</li> <li>– Increasing understanding of energy performance for small businesses.</li> <li>– Business rates relief for building improvements (HMT)</li> </ul> | <p><b>Building requirements for large and small businesses:</b> The government proposed regulatory requirements for larger buildings over 1,000m<sup>2</sup> to obtain a performance-based energy rating to ensure users are aware of energy use and how to make it more. The government stated it will publish details and a later date, but we are yet to see these. For smaller commercial buildings, the government said it would focus on ensuring owners and businesses understood and optimized their energy performance, but, as these are far less intensive than those larger buildings, the government will not regulate this. Once again, we are awaiting details on this. It is clear from our report that manufacturers recognise the benefits of increasing energy efficiency and are already making substantial investment in this area. But the government’s strategy for commercial buildings seems to offer little in the way of financial support and its promise to assist SMEs has so far not been realised.</p> <p><b>Business rates reliefs for building improvements:</b> There have been recent timid improvements with the announcements by the Treasury of the new annual Business rate relief (100%) for eligible plant and machinery used in onsite renewable energy generation in commercial buildings (put forward to this April 2022). This area is a no-brainer and self-generation should be accelerated to cover space heating and possibly low-temperature processes. There are not enough incentives for businesses, and there is a shortage of suppliers (e.g., for solar PV following the end of the domestic Feed-in Tariff).</p> | <p style="background-color: #f4a460;"></p> |
| <p><b>3. Resource efficiency</b></p> <p>Proposals within the strategies include:</p> <ul style="list-style-type: none"> <li>– Driving towards a circular economy model (reuse, repair, remanufacturer)</li> </ul>   | <p><b>Waste Prevention Programme:</b> The results of the consultation (in 2021) on the proposed Waste Prevention Programme are awaited (delayed). Waste efficiency is in the top three paths of choice for manufacturers to decarbonise.</p>   | <p style="background-color: #c0392b;"></p> |
| <p><b>4. Skills and knowledge</b></p> <p>Proposals within the strategies include:</p> <ul style="list-style-type: none"> <li>– Support the skills transition including through the Green Jobs Taskforce recommendations.</li> <li>– The adoption of technologies available in the market with low payback times and awareness-building of existing support for energy efficiency</li> </ul>                                   | <p><b>Skills and knowledge to decarbonise manufacturing:</b> There are plans to develop more advanced digitalization technology through T-levels and apprenticeships. Regarding green skills, there is still a lack of knowledge/ definition of what exactly they might be. The Green Jobs Task Force was formed in 2021 and drew some recommendations. Since then, the Government has established the Green Jobs Delivery Board to take forward these recommendations. Make UK sits on this Board. Currently, manufacturers are forced to actively take steps to acquire the skills they need to manufacture their goods and products, as well as operate more sustainably. They should be rewarded through a green skills tax credit or be able to use their Apprenticeship Levy funds to do so. We are also recommending that Government introduces a Help to Grow Green scheme which would include support to train leaders and managers in sustainability. The Government has set out its intention to review how sites can obtain directly or get financial support for expert advice, audits, and training (for SMEs) on energy efficiency solutions and on best practice, behaviour change and digital solutions. We are suggesting that Government explores expanding the remit of Made Smarter to include Industrial Decarbonisation.</p>  | <p style="background-color: #f4a460;"></p> |

| Commitment  | Detail and commentary  | Progress (RAG) |
|---|--|----------------|
| <p><b>5. Innovation</b></p> <p>Proposals within the strategies include:</p> <ul style="list-style-type: none"> <li>- A review of the R&amp;D tax relief scheme</li> </ul>   | <p><b>Review of the R&amp;D tax relief scheme:</b> Many funding programs focus on innovation so long-terms solutions rather than short-term relief. In addition, many of these programs have ended/ are ending. Awareness of them amongst SMEs is low. A central platform for national funds signposting to local/regional funds is urgently needed to help SMEs in particular find funding sources. The HMT is currently consulting on the R&amp;D tax relief scheme including looking at expanding qualifying expenditure. Make UK has been heavily engaged with this. We are calling on Government to allow capital expenditure related to decarbonising to be including with qualifying expenditure.</p> | <p>Green</p>   |
| <p><b>6. Green Finance</b></p> <p>Proposals within the strategies include:</p> <ul style="list-style-type: none"> <li>- Catalysing market-led action by enhancing nature-related financial disclosures</li> <li>- Determining the steps necessary for businesses to understand and potentially disclose operational energy</li> </ul> | <p><b>Green Finance:</b> The Green Finance Institute and the Infrastructure Bank have been created. The TFCF extended to all large non-listed companies and LLPs in 2021. Taxonomy has to be defined still. The ESOS is being reviewed to be enhanced (recommendations potentially being made mandatory). The HMT Net Zero review took place, and the Green Finance Strategy is being reviewed and under consultation. Still a lot of progress to make but a very encouraging start.</p>   | <p>Green</p>   |



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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