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Sage

MAKEuk
The Manufacturers' Organisation

DIGITALISE TO DECARBONISE



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EXECUTIVE SUMMARY

Ground breaking technologies and automation are driving a global digital revolution, delivering the answers to some of society's greatest challenges. For manufacturers, digitalisation holds the key to help solve the issue of global warming and their journey to net zero. Our latest research shows that nearly half of Britain's manufacturers have an active plan to invest in digital technologies which will help decarbonise their businesses, while a quarter have already made that investment.

Some 62% of those who have adopted digital technologies reported making energy cost savings, with half reporting savings of between £10,000 and £100,000 over the past 12 months. A further 46% said the savings came in at under £10,000 but were still significant to their overall balance sheet. The benefits to manufacturers cost savings extend beyond energy, with firms citing real cost savings on labour as well as non-labour elements such as material wastage and water usage.

Almost half (44%) of companies surveyed said that digitalisation has been their firm's top driver of productivity improvements, with production processes streamlined and tightened up. The drive to reduce carbon emissions is now embedded in most companies' business plans with a quarter of Britain's manufacturers believing new digital technologies have already had an impact on decarbonisation and their ability to achieve challenging net zero targets. Just one in ten businesses do not believe that digitalisation will have any impact on their net zero ambitions.

Multiple digital technologies are being deployed. In particular, manufacturers are using new data analytics tools, new data capturing tools and supply

chain management tools to decarbonise. Some 30% of businesses have already invested in supply chain management digital tools as they look to embed resilience from delivery disruptions caused by Brexit trading rules and continued issues from Covid disruption in Asia. 4IR technology is also helpful in optimising supply chains which can help reduce the amount of transportation emissions associated with moving goods.

Data analysis has also proved popular with manufacturers with over a third of companies surveyed highlighting this as being helpful to their business. In particular, manufacturers being able to capture data from different stages of the manufacturing process including production lines, equipment performance and sensors means companies are able to pinpoint any bottlenecks and areas for improvement accurately and thus streamline production. This technology can also be used to perform predictive maintenance audits, pinpointing when a problem is about to occur and intervening before it becomes an issue.

Barriers to digitalisation remain however, with six in ten manufacturers still wary of the upfront cost without being able to accurately predict timings on the return on the investment. Some 46% of companies said that more

evidence on investment return would help drive positive decisions towards the adoption of digital tech as part of their journey towards net zero. Significantly, more than half of manufacturers say that tax incentives to invest in digital decarbonisation technologies would provide a major boost to uptake. Similar to previous years, SMEs found it much harder than larger companies to take the first steps on that digital journey.

Skills shortages are also a barrier with 64% of smaller firms saying they experience skills shortages whilst trying to invest and adopt digital technology. Being able to use purchased equipment to its optimal level is still something many firms struggle with, largely because of a lack of

skilled operators or access to adequate training. Help with upskilling the current workforce is seen as a key incentive by nearly half of companies (45%), who would like this to come in the form of a tax incentive to retrain the dedicated employees they already have. For this reason, Make UK has renewed its call for a Green Skills Tax Incentive to help firms access the skills they need to decarbonise.

Overall, however, this is a positive picture with companies realising in the main the benefits from digitalisation in their decarbonisation journey, and with just a little more help, those who are waiting on the sidelines would get the push they need to begin.

CHAPTER 1: DECARBONISATION THROUGH DIGITALISATION

We are living through a digital revolution. Cutting-edge technologies and automation are transforming the global economy. These technologies can help provide solutions to society's big challenges. For manufacturers, they provide key tools to help the industry's fight against global warming. They can help firms digitalise to decarbonise in the race to net zero carbon emissions.

Manufacturers are digitalising their businesses at an increasing pace and investing more in digital technologies than ever before, reaping multiple benefits, from productivity increases to labour efficiencies to product improvements. The adoption of new technologies is transforming our sector and creating the factories of the future.

But the benefits don't stop there. As this report shows, increased digitalisation can lead to waste reduction and lower energy consumption. Almost half (43%) of manufacturers see the connection between digitalisation and decreasing carbon footprint. Almost a quarter (23%) of manufacturers have already invested in digital technologies while 24% have a plan to do so in a bid to decarbonise their business.

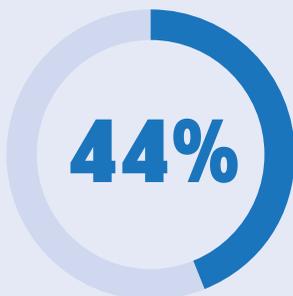
However, despite the clear benefits to business, almost one in five (16%) manufacturers still say they have no plans to invest in digital technologies to help with reducing their carbon footprint. Nearly a third (31%) aren't currently using digital technologies to decarbonise but are considering doing so. Given industrial processes

account for a disproportionate share of the UK's total energy consumption, there is an obvious opportunity to better inform manufacturers of the benefits of digitalising to decarbonise as well as supporting manufacturers in progressing their digitalise to decarbonise transition.

With energy costs soaring and climate change continuing, digitalising to decarbonise is rapidly becoming the fastest way to scale sustainable impact but as this report shows, there is much work still to be done.

Previous Make UK research has shown the benefits of digital technologies in increasing productivity¹. The global pandemic and the massive disruption to supply chains, as well as the UK's exit from the EU, are just some of the external drivers that have swayed larger cohorts of manufacturers to adapt their processes and digitalise their systems.

Make UK report, *Digital adoption, the missing link in productivity growth* provides evidence of the increased productivity gains that firms are now reaping from this transformation.

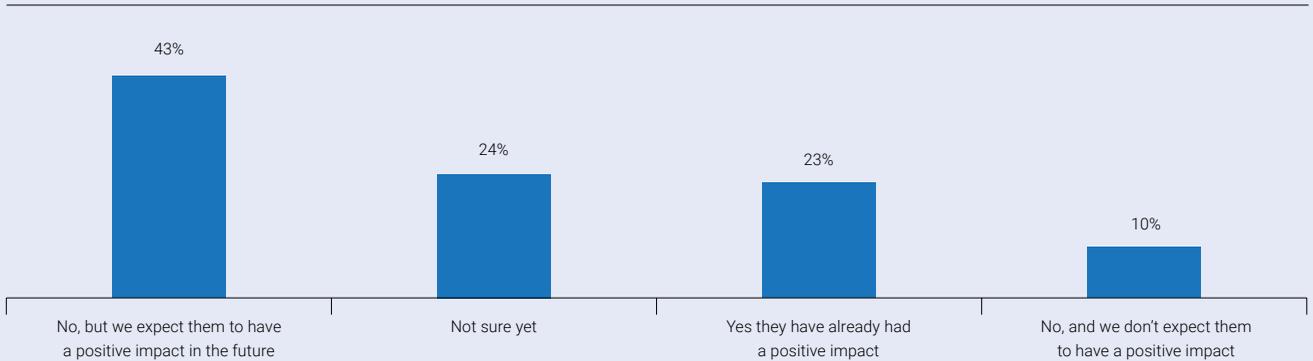


**ALMOST HALF OF MANUFACTURERS
SURVEYED SAY DIGITALISATION HAS
BEEN THEIR FIRM'S TOP DRIVER OF
PRODUCTIVITY IMPROVEMENTS**

¹<https://www.makeuk.org/insights/reports/digital-adoption-the-missing-link-in-productivity-growth>

Chart 1: Increased digitalisation is having positive impacts on the sector’s Net Zero ambitions

% proportion of businesses believe digital technologies have had an impact on their company’s decarbonisation/Net Zero ambitions



Source: Make UK, *Digitalise to Decarbonise*, 2023

Some firms still need convincing.

The UK’s goal of reaching net zero emissions by 2050 is a massive undertaking, and manufacturing is a key area where transformation must happen to succeed. However, manufacturers need the right tools to drive this decarbonisation mission forward, and digitalisation can provide key solutions.

Nearly a quarter of manufacturers believe new digital technologies have had an impact on decarbonisation and their businesses’ ability to achieve net zero carbon emissions. Over two-fifths (43%) expect that these technologies will positively impact decarbonisation in the future, with a quarter still not sure yet. However, despite these positive trends, one in ten (10%) manufacturers don’t believe digital technologies have any impact on their net zero ambitions, showing there is still more work to be done to convince some firms of the benefits of digitalising to decarbonise.

As well as the benefits we have cited, critically almost one in five (18%) manufacturers that invested in and implemented digital technologies have benefitted from reduced carbon emissions. Moreover, 27% of manufacturers saw a reduction in energy consumption, while 26% saw a reduction in raw material and waste efficiencies. Both of these outcomes will

also be contributing to carbon emission reductions, demonstrating once again that these are important drivers of decarbonisation as well as cost reductions².

Moreover, approximately a quarter saw an advancement in the quality of their products (26%), and visibility of their supply chain (24%), which most likely also contributed to improved engagement with their customers and better service delivery (23%).

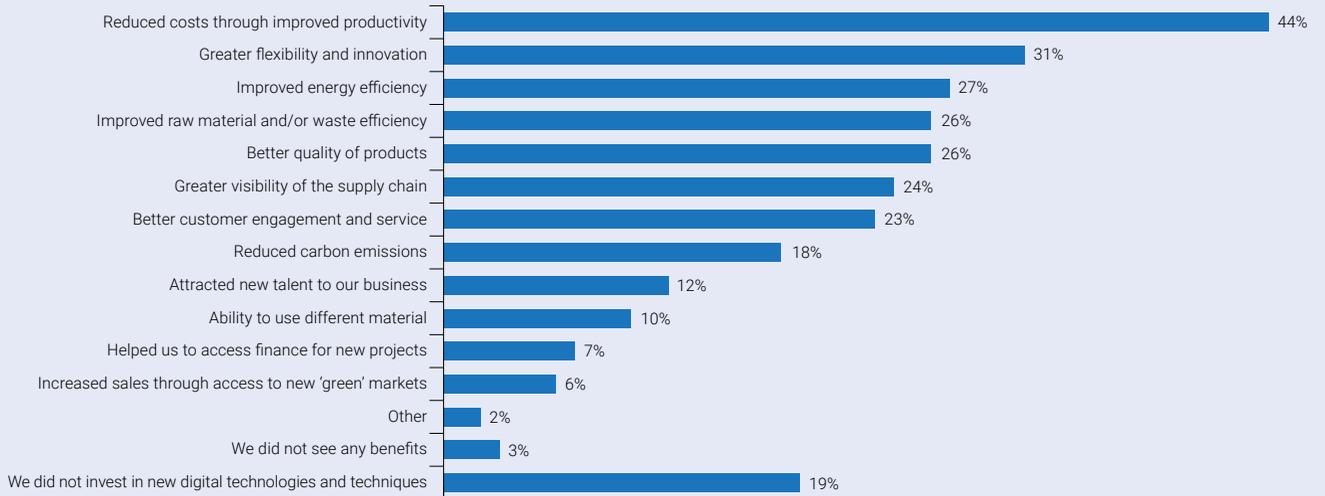
Attracting new talent with digitalisation was not seen as a major benefit with just one-eighth of firms (12%) of firms citing this as a benefit. This is perhaps an indication of why the manufacturing industry is still not seen as an exciting sector to work in and an essential one in the quest to tackle climate change. Commercial benefits were also not seen as a significant advantage, whether for access to finance for new projects (7%) or increased sales through access to new green markets (6%). This perhaps suggests that digital technologies are still viewed as risky, and firms are not convinced yet of their proven benefits.

Reassuringly, only 19% did not invest at all in new digital technologies and techniques and a mere 3% did not see any benefits showing that despite some remaining scepticism, there has been much progress towards digital adoption awareness and understanding in the past few years.

²Decarbonising Manufacturing: Challenges and Opportunities. Make UK and Siemens report, July 2022

Chart 2: Manufacturers are benefiting from digital adoption

% of benefits that manufacturers have experienced after investing in digital tools and technologies



Source: MakeUK/Sage, *Digitalise to Decarbonise*, 2023

CHAPTER 2: THE DIGITAL TOOLS TO ENABLE DECARBONISATION

REAPING THE REWARDS OF GREEN DIGITALISATION

The Fourth Industrial Revolution (4IR) is transforming the way we live, work and interact with the world around us. Characterised by the convergence of digital and physical technologies, 4IR is leading to the development of new products, services, and business models.

4IR technologies such as artificial intelligence (AI), robots, cobots, the Internet of Things (IoT), and 3D printing are transforming the manufacturing sector, increasing the automation of tasks and the exchange of data between machines and systems and leading to new levels of efficiency and productivity.

This revolution is being optimised by the power of data and is having a huge impact on the way manufacturers make and customers use their products.

The Fourth Industrial Revolution can help manufacturers decarbonise in a few ways, including:



Using renewable energy:

4IR technologies can help manufacturers to use renewable energy sources, such as solar and wind power, to power their operations. This can help reduce their reliance on fossil fuels and carbon emissions.



Improving energy efficiency:

4IR technologies can help manufacturers to improve the energy efficiency of their operations. This can be done through the use of smart sensors and data analytics to monitor and optimize energy use.



Reducing waste:

4IR technologies can help manufacturers to reduce the amount of waste they produce. This can be done through the use of 3D printing and additive manufacturing, which can reduce the need for traditional manufacturing methods that produce unnecessary waste.



Optimising supply chains:

4IR technologies can help manufacturers to optimize their supply chains. This can help to reduce the amount of transportation emissions associated with their operations.

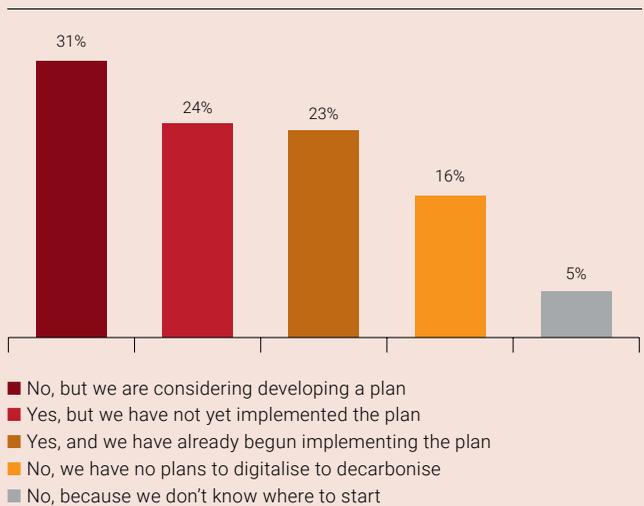


Developing new products and services:

4IR technologies can help manufacturers to develop new products and services that are more sustainable. This can include products that are made from recycled materials or that use less energy to operate.

Chart 3: Manufacturers are taking forward plans to digitalise to decarbonise

% businesses have a plan to invest in digital technologies that will increase their business's energy efficiency and decrease its carbon footprint



Source: Make UK, Digitalise to Decarbonise, 2023

By embracing 4IR, manufacturers can play a key role in the fight against climate change.

WHAT TECHNOLOGIES AND TOOLS DO MANUFACTURERS USE TO DECARBONISE THEIR BUSINESSES?

There are two key ways digitalisation is helping to benefit manufacturing businesses to decarbonise.

Digital process innovation refers to the introduction of a new or improved way of manufacturing an existing product or delivering a service through changes to the production process, the supply chain, or the way that products are marketed and sold leading to improvements in efficiency, quality, or cost. Digital process innovation is helping companies to reduce costs, improve quality, and increase productivity all while reducing their carbon footprint.

Digital product innovation refers to the creation and introduction of a new product or service or a significant improvement to an existing product or service. This can include changes to the product's design, features, or functionality. Product innovation can be driven by a number of factors, including customer demand, technological advances, or competitive pressures.

Process innovation

Our research shows manufacturers are most likely to use new data analytics tools to help them drive energy efficiency and decarbonise their businesses. In fact, these tools are already being used by over a third of manufacturers. They comprise all types of software that analyse the inflow of data and can be used in the office or at the production line. A third (33%) of manufacturers have invested in data collection technologies such as big data hubs, data operation platforms, and other cloud-based technologies designed to process and analyse large, complex data sets.

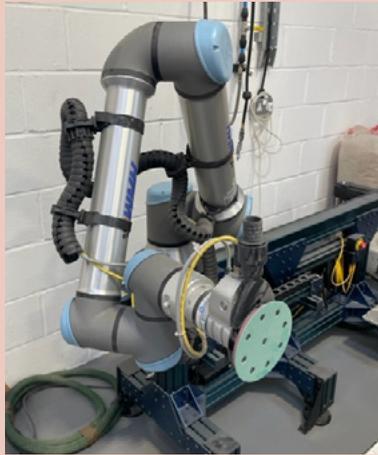
While global supply chains continue to recover from disruption caused by Brexit and the Covid-19 pandemic, manufacturers are looking into building and embedding resilience and adaptability. Three in ten (30%) manufacturers have invested in supply chain management tools, with a further 40% looking at how to introduce digital analysis in this area. This is consistent with wider Make UK research that has highlighted the leading role digital technologies can play in building supply chain resilience. We continuously see that manufacturers are addressing current supply issues and looking for solutions within digital technologies; three in ten manufacturers are using digital tech to improve their supply chain management with a further 40% looking at how to introduce digital analysis in this area.³

Indirect data acquisition tools such as Enterprise Asset Management (EAM) or Enterprise Resource Planning (ERP) systems are being utilised by almost a quarter (23%) of manufacturers. EAM technologies are designed to optimise the quality and utilisation of assets throughout their lifecycle, increase productive uptime, and reduce operational costs. ERP software helps to run entire businesses, supporting automation and processes in finance, human resources, manufacturing, supply chain, services, procurement, and more. Together, they comprise the most embedded integration systems indicating that manufacturers understand the wider value they can bring including energy efficiency and decarbonisation.

EAM and ERP are mature technologies and hence the best known and most understood. They do not require large capital investment compared to additive manufacturing equipment, robots, or cobots, for example, connecting software or machines to the cloud opens new opportunities for easy and secure data storage and instant access to live data and analysis, now usually provided in the form of monthly subscriptions, which doesn't require high cost. They are thus the cheapest and easiest to adopt and implement for manufacturers of all sizes, so it is, therefore, unsurprising that we see these digital tools rank the highest.

Data capturing and analysis offer numerous benefits for manufacturers. These benefits collectively contribute to increased operational efficiency, reduced costs and a better understanding and visibility of different manufacturing processes which has an impact on waste management as well as energy efficiency.

³Make UK, Digital Adoption, the missing link in productivity growth, 2022 www.makeuk.org/insights/reports/digital-adoption-the-missing-link-in-productivity-growth



CASE STUDY – INCREASED EFFICIENCY

JCM is a small business based in the West Midlands that specialises in high quality custom fine joinery. One of their core processes is sanding, which is a very repetitive process and to improve efficiency the company recently purchased a cobot, nicknamed 'Sid' (Sanding innovation device!). Sid is an automated arm with a custom sanding head and has such strength and precision that it only needs one sanding pass instead of the multiple passes required when using a handheld orbital sander. The staff whose job was replaced by Sid's repetitive work are now freed up to work on higher value and more engaging processes, making full use of their skills.

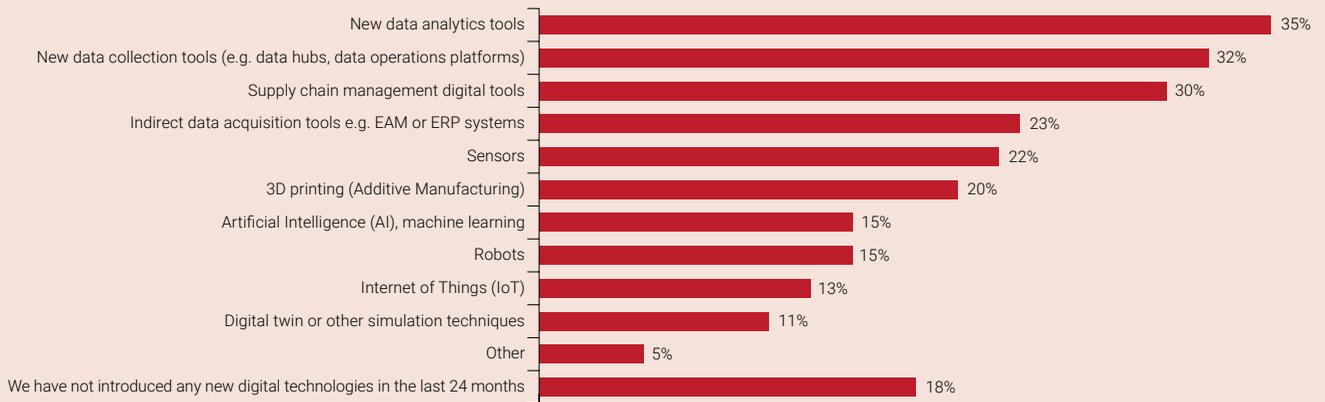
JCM has been able to offer a career path into manufacturing by hiring non-skilled production staff, thanks to the inclusion of the robot into the finishing process. Of note, younger and less skilled workers who are particularly familiar with handheld technology, find the iPad-style interface incredibly easy to use and have adapted very well to running the robot in the workshop

The experience has been so successful that despite the expense of £60,000, the return on investment was achieved within a year owing to increased productivity and throughput.

JCM has also connected some of their equipment to the cloud, allowing them to conduct remote diagnoses when things go wrong, avoiding the need to call engineers in to visit the site and instead being able to diagnose issues and offer fixes that onsite staff are capable of doing.

Chart 4: Technologies used by manufacturers to decarbonise their factories

% companies citing which digital tools they are using



Source: MakeUK/Sage, *Digitalise to Decarbonise*, 2023

Process Optimisation: By capturing data from different stages of the manufacturing process, such as production lines, equipment, and sensors, companies can analyse the data to identify inefficiencies, bottlenecks, and areas for improvement. This allows them to optimise processes, reduce waste, improve productivity, and ultimately enhance overall operational efficiency.

Quality Control: Data analysis helps in monitoring and controlling product quality throughout the manufacturing process. By capturing and analysing data at different stages, manufacturers can detect faults in the product early on.

Predictive Maintenance: Data capturing, and analysis can be used to perform predictive maintenance activities. By monitoring equipment and machinery in real-time and analysing data patterns, manufacturers can predict when maintenance is required, identify potential failures before they occur, and schedule maintenance activities accordingly. This minimises unplanned downtime and reduces repair costs.

Supply Chain Optimisation: Capturing and analysing data across the supply chain provides valuable insights into inventory levels, demand patterns, supplier performance, and transportation efficiency. This information can help manufacturers improve the management of their stock, reduce lead times and streamline logistics, leading to cost savings and improved customer satisfaction.

Product innovation

Manufacturers are also investing in Industrial Digital Technologies such as Additive Manufacturing (20%).

Some 15% of manufacturers have invested in Robots with 13% investing in the Internet of Things (IoT). Just a handful (11%) of companies have invested in digital twin and simulation technologies to reduce their carbon emissions.

Here are some specific examples of how 4IR technologies are being used to decarbonise manufacturing:

Siemens is using artificial intelligence (AI) to optimise the energy efficiency of its factories. The company's AI-powered software can monitor and analyse energy use data in real time, identify areas where energy can be saved, and allow the firm to implement changes to improve efficiency.

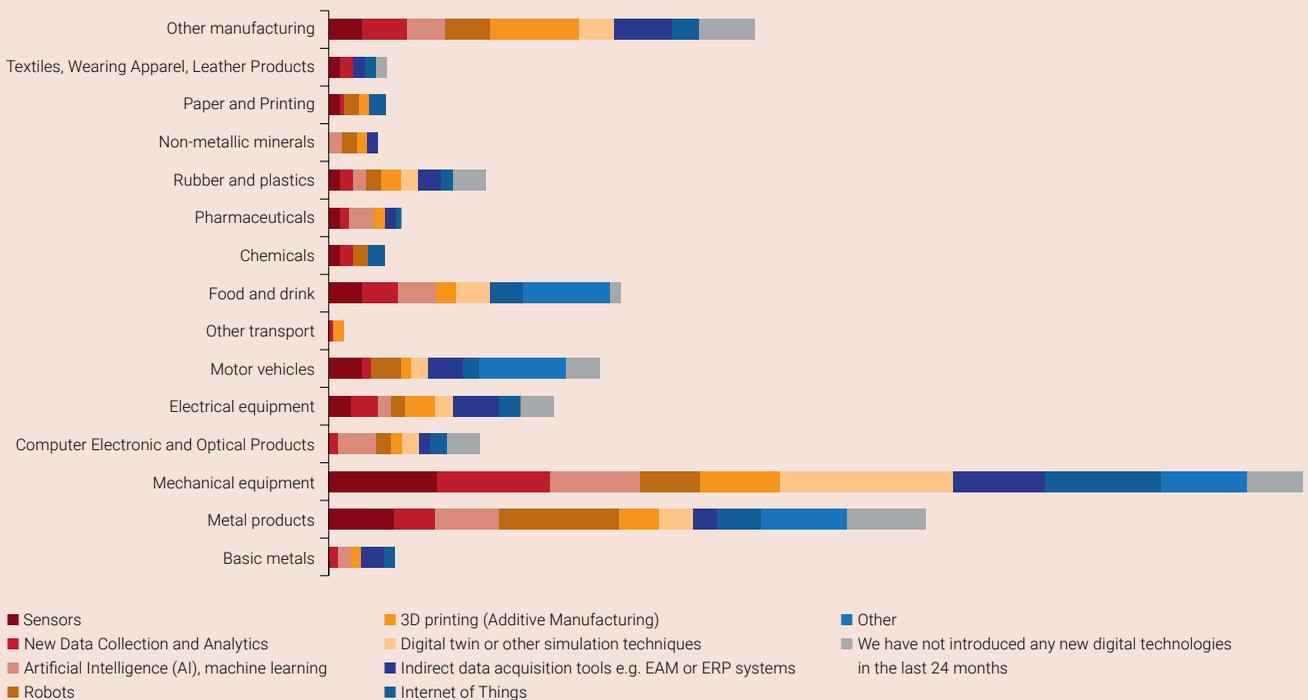
GE is using Additive Manufacturing to reduce the amount of waste it produces. The company has adopted 3D printing to create moulds and develop prototypes that are helping it to reduce the need for traditional manufacturing methods that produce excess waste.

Unilever is using Internet of Things (IoT) blockchain technologies to track the environmental impact of its food product supply chain. The company has deployed digital blockchain software to track the environmental impact of its raw materials, manufacturing processes, and transportation. This data is used to identify areas where Unilever and its customers, including UK supermarkets, can reduce their environmental impact such as by devising more efficient routes for delivery which can also reduce warehouse storage costs and energy consumption.

Rolls-Royce is using digital twins to simulate the performance of its aircraft engines, which can help to identify areas where efficiency can be improved, without using energy to costly construct prototypes, allowing the firm to develop new products and services in a more sustainable way.

Chart 5: Use of 4IR technologies across different manufacturing sectors

% of technologies implemented by different types of manufacturing companies by sector



Source: MakeUK/Sage, Digitalise to Decarbonise, 2023

CHAPTER 3: THE RETURN ON INVESTMENT

New digital technologies are helping many manufacturers to reduce their risk, of which climate change is perhaps the greatest of all.

As awareness of global warming grows, the pressure from the supply chain, customers and employees are increasingly demanding sustainable products and services. By digitalising to decarbonise, manufacturers can produce more sustainable products and services, which can help them slowly increase their market share and improve staff recruitment and retention. As recent events have shown, traditional energy sources and manufacturing supply chains can be vulnerable to exogenous and unexpected geopolitical and environmental shocks.

The return on investment (ROI) for green technologies can, of course, vary depending on the specific technology and the manufacturer's operations. However, in general, the ROI for green digitalisation technologies is positive.

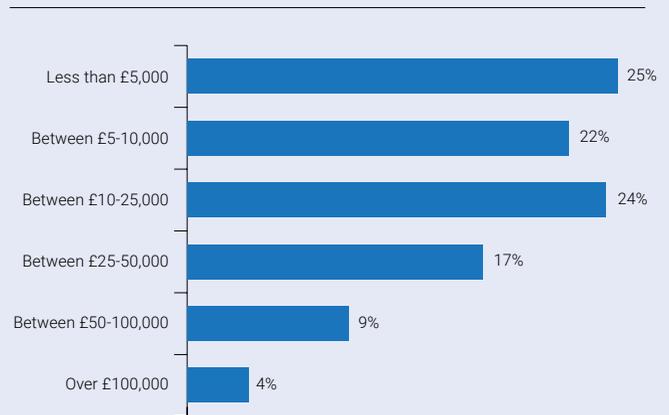
MOST (62%) OF THE MANUFACTURERS WE SURVEYED WHO HAD ADOPTED DIGITAL TECHNOLOGIES IN THE PAST 12 MONTHS REPORTED MAKING ENERGY COST SAVINGS

Half of the companies cited energy cost savings of a monetary value between £10,000 and up to £100,00 over the past 12 months, while another 47% of companies' savings were below £10,000.

Manufacturers have made specific electricity and gas cost savings too. Over two-fifths of firms (42%) have saved between 2-19% on electricity as a proportion of total business costs. A slightly smaller number of companies (34% of those surveyed) have saved this on gas also.

Chart 6: Manufacturers have made real cost savings on energy expenditure through increased digitalisation

% companies citing energy bill savings because of using digital technologies



Source: MakeUK/Sage, Digitalise to Decarbonise, 2023

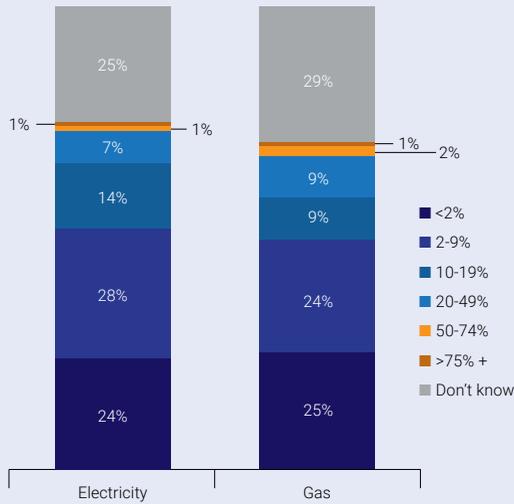
The savings don't end there. Companies cited real cost saving benefits on labour as well as non-labour costs such as materials and water.

Take for example labour. The manufacturing industry is currently suffering from acute labour shortage with 74,000

live vacancies in the sector. Automation and digitalisation can to some extent solve the labour shortage, or at least alleviate it by replacing manual tasks with automation. Nearly two thirds (61%) made cost savings up to 19% of their total cost on labour efficiency as a result of adopting digital technologies.

Chart 7: Real cost savings are being made on electricity and gas

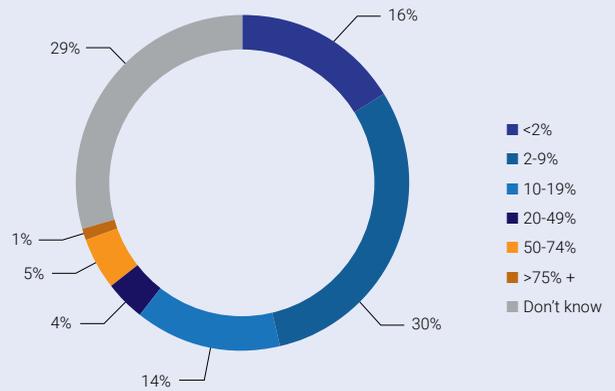
% of companies citing cost-saving benefits on electricity and gas



Source: MakeUK/Sage, Digitalise to Decarbonise, 2023

Chart 8: Manufacturers have made cost savings on labour through digital adoption

% companies citing the labour cost saving that has been made as a proportion of the total business cost



Source: MakeUK/Sage, Digitalise to Decarbonise, 2023

CASE STUDY – ENERGY CONSUMPTION AND COST SAVING

Crystal Doors, a small Rochdale-based manufacturer of foil-wrapped doors for kitchens and bedrooms - who employ 34 people - has great ambitions. It started to decarbonise in 2015 through the introduction of a 27-point plan which has helped them decarbonise, and reduce their energy usage by 78%. They then decided to focus on seeking a 100% reduction.

The company decided to do a more granular analysis of their energy usage. With the help of a consultant, they conducted a site survey and installed sensors to identify areas of energy wastage, starting with one equipment line, the packing area, a compressor, an oven, two Computer Numerical Controls (CNC), the dust control system, and two EV chargers.

This enabled them to classify their assets' energy use importance and performance (energy consumed per runtime), and analyse energy leakage, operating hours consumption, consumption anomalies and many more metrics.

The data collected showed that 40% of their energy was unmeasured at the site, 42 cases of abnormal energy consumption were detected, and 32% of consumption was wasted during non-operating hours. The highest-consuming equipment during non-operating hours were the two CNCs which control the machining tools, routers and 3D printers.

Weekly fluctuations were above the ideal threshold of +/- 5%, suggesting inconsistent load, which, if kept consistent, would result in higher energy savings. High variability was also observed for the dust control system and the compressor across all hours, meaning further monitoring and optimisation was required.

The annual savings through manual interventions & automation (smart plugs and automated timers) was £26000, with a return on investment of less than one year. Installing a new voltage optimiser would enable £4800 of annual savings with an ROI of three to four years.

Overall, the savings opportunity was 25-35% of energy (over 90Mwh), £30,000 and 23 tonnes of CO₂. Moreover, they were able to calculate that the savings opportunity missed each day action was delayed was £86!

Following these incredible results from just being able to visualise their energy use through digitalisation, Crystal Doors is now looking to further invest for example in further smart control which would potentially allow them another 5-15% annual saving with a ROI of just over 2 years.

CHAPTER 4: SURMOUNTING BARRIERS AND MOTIVATING MANUFACTURERS TO INVEST

The UK has the opportunity to become a green technology leader globally. The evidence suggests that increased digitalisation not only drives energy efficiency and wider benefits but also offers significant real returns on investment. Yet there remains a range of barriers manufacturers can face when thinking of implementing plans to digitalise to decarbonise their factories including costs, a lack of awareness and relevant expertise, and a lack of government support.

The top barrier cited by manufacturers is the cost of investment which does not only include the cost of the equipment but also the whole process of implementation, adjusting production, machinery, training and so on.

Six in ten (61%) manufacturers are wary of the upfront cost without being able to accurately predict the likely return on investment in advance, while 46% of manufacturers say more evidence on the return on investment in digitalise to decarbonise technologies would help them to make a decision on whether and in what technologies to invest.

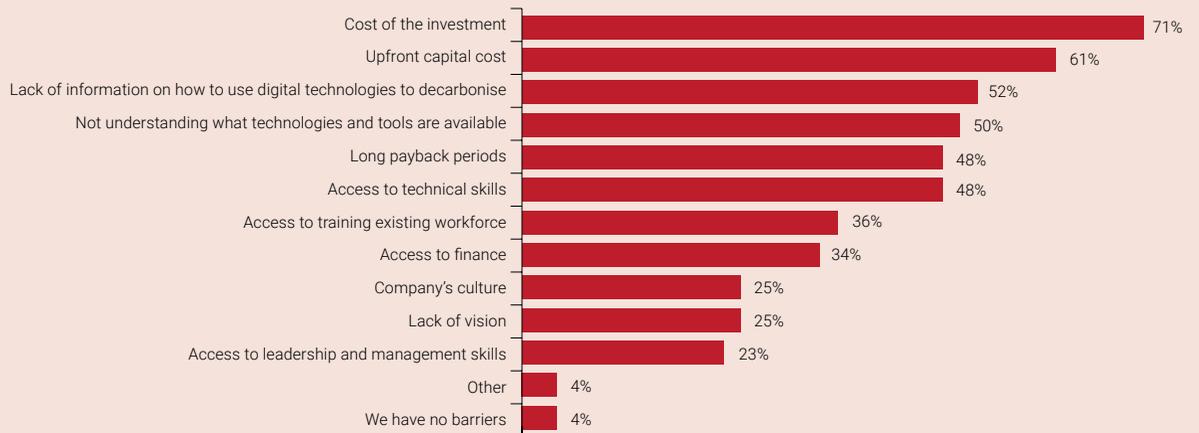
The fear of potentially prohibitive costs and the lack of access to finance mostly affects micro and SME companies with fewer than 249 employees. Seven in ten SMEs surveyed said they had experienced such difficulties when adopting digital technologies. While only around 10%

of medium and larger companies said they experienced the barrier of capital constraints. Significantly, over 50% of manufacturers say tax incentives to invest in digital technologies that help them to decarbonise would help them to make that decision by helping to overcome the barrier of accessing finance.

When it comes to skills, however, this barrier is experienced not just by micro and SME firms but by large manufacturers too. Access to the requisite leadership and management skills are more evenly spread across manufacturing than access to finance barriers and so can be felt by firms of all sizes. However, skills shortages as a barrier to technological adoption is something smaller firms are more likely to suffer from. 64% of SMEs said they experience skills shortages when trying to invest in and adopt new digitalise to decarbonise technologies compared to just 36% of large manufacturers.

Chart 9: What are the barriers stopping or slowing down manufacturers investing in digital tools or technologies to help decarbonise their businesses?

% of barriers which companies cited slow down investment



Source: MakeUK/Sage, Digitalise to Decarbonise, 2023



OF MANUFACTURERS EXPECT A RETURN ON INVESTMENT BETWEEN 1-2 YEARS WHILE AFTERWARDS, THEY EXPECT AN INCREASE IN PRODUCTIVITY BY 20%⁴

⁴<https://www.makeuk.org/insights/reports/digital-adoption-the-missing-link-in-productivity-growth>



A SPOTLIGHT ON SKILLS: THE SKILLS CONFIDENCE GAP

Manufacturers have identified skills as a significant challenge in digitalisation and reducing emissions. With some 74,000 live vacancies across the sector and many employers struggling to recruit, manufacturers are facing unprecedented labour shortages. Where companies are looking to automation to address some of these shortages, this is creating new challenges in terms of access to skills which will be accentuated by the need to decarbonise through digitalisation.

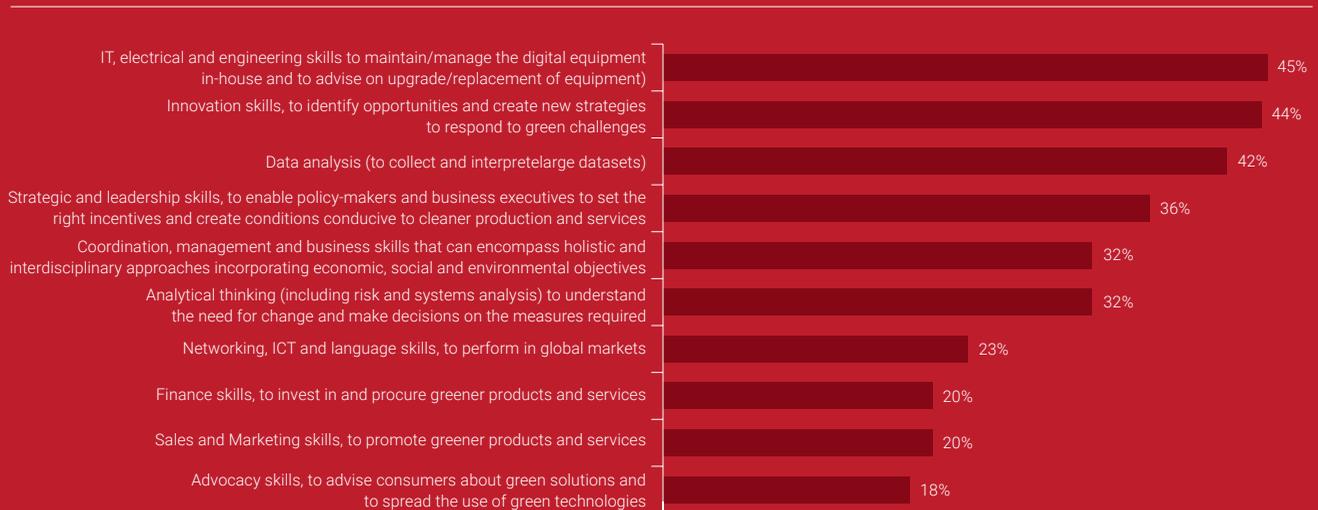
There is a growing need for engineers, experts and specialists who will be designing, operating and fixing the new cutting-edge technologies (45%), the sector will need innovators and visionaries who will be able to spot opportunities and find solutions through digitalisation to address green technologies (44%).

Despite access to technical skills and the right training options being highlighted as a potential barrier to progress on decarbonisation by manufacturers, many remain at least somewhat confident of securing the skills they need.

This reflects findings from Make UK and Sage’s report ‘Unlocking the skills needed for a digital and green future’, where although a majority of manufacturers felt that their current workforce was equipped with the right skills to produce goods in a more sustainable way, more than 60% were also looking to change their workforce strategies to continue to access and develop those skills over time.⁵ In many cases, manufacturers may feel that they have a sufficiently skilled workforce to begin the process of implementing the digital technologies they need to decarbonise, but acknowledge that demand for different skills is likely to change as the technology evolves.

Chart 10: The skill sets needed to successfully deploy digital technologies to decarbonise

% companies citing various skills-sets needed



Source: MakeUK/Sage, *Digitalise to Decarbonise, 2023*

⁵<https://www.makeuk.org/insights/reports/unlocking-the-skills-needed-for-a-digital-and-green-future>

The demand for skills varies between the practical need to maintain and manage new pieces of equipment; leadership and management; innovation; critical and analytical thinking; and aspects of digital skills such as data analysis. This shows the growing importance of access to cognitive and emotional skills for businesses as the nature of manufacturing workplaces changes in response to digitalisation and decarbonisation.

Access to technical skills is typically seen as the priority, and previous surveys of Make UK members have found that digitalisation and decarbonisation are two of the main drivers behind a shift in the technical skills required by manufacturers⁶. By 2030, there is expected to be an increasing demand for higher-level technical skills as a result of these trends. This is reflected not just in the 48% of manufacturers who identified access to technical skills as a barrier to investment in digital tools or technologies to decarbonise, but the more than one in three (36%) manufacturers who highlighted the challenge of training the existing workforce.

Upskilling and retraining options for the existing workforce are also of particular importance given the timeframe for achieving Net Zero emissions. Much of the current workforce across the sector will still be in work in the next 15-20 years – and new talent entering the sector will be working well beyond 2050 – so enabling all employees to continue to develop their skills is vital to keep pace with how manufacturing workplaces will change during this time.

While interventions such as the apprenticeship levy have, to an extent, sought to use the tax system to encourage large businesses to increase investment in skills training, this system does not work well for many employers, and wider access to and understanding of funded skills programmes is often poor. Targeted support for investment in digital and green skills would make a significant contribution to manufacturers' confidence and ability to access and develop the skills they need.

⁶<https://www.makeuk.org/insights/reports/2030-skills-closing-the-gap>



MOTIVATING MANUFACTURERS TO INVEST

In today's rapidly evolving business landscape, staying ahead requires embracing digital technologies. Manufacturers are aware of the benefits that 4IR technologies can bring to their factories. However, to unlock these opportunities a set of support is needed, especially for SMEs.

SUPPORT WITH ACCESSING CAPITAL

Incentives to help overcome the issue of the upfront cost of capital are needed if we are to truly help manufacturers digitalise to decarbonise and reap the business and wider economic benefits. The current funding support ecosystem can be confusing and complex, especially for SMEs who do not have the resources or expertise to see where the opportunities lay. More than half (52%) of manufacturers believe tax incentives to decarbonise would entice them to invest. The R&D tax credit is one of the top cash incentive schemes (albeit is less generous since recent changes to the R&D tax relief scheme for SMEs). Manufacturers are familiar with it and see the benefits. It has the potential to support manufacturers further and therefore should be expanded to include green digital technologies and processes to enable industrial decarbonisation.

More generally, easier access to funding for digital adoption is seen as a motivator for two in five companies. Current schemes provided by the government are too complex and often out of reach for small or medium size businesses. Others, such as Help to Grow Digital, have started and failed, and it is critical that we learn lessons from these when exploring potential new funding options, or looking at improving those still in existence.

A regionally focused funding body that would provide comprehensive help from advice to funding is seen as a great support for 28% of manufacturers. This clearly suggests that models such as Made Smarter which combine funding options with hands on, expert advice are most beneficial to businesses.

Finally, access to more affordable cyber security systems is seen by 20% of companies as important on their way to digitalising to decarbonise. We know that the threat of cyber attacks can be a blocker for manufacturers investing in digital technology. Helping them to overcome this with a cost-effective means of preventing cyber attacks would be welcomed by industry.

SUPPORT WITH ACCESSING SKILLS, KNOWLEDGE AND EXPERTISE

As we have stated previously, access to skills is a major barrier for manufacturers to grow and innovate. An incentive, and importantly a tax incentive, that would help with upskilling the current workforce - which is crucial in adopting new digital technologies that help to decarbonise is seen by 45% of businesses as a motivator to invest. It is for this reason Make UK has and continues to call for a Green Skills Tax Incentive to help firms access the training it needs to help them decarbonise.

But it's not just technical skills that are needed. The acceleration of digital technologies is taking over businesses around the globe. The market is vast and can be confusing. Not all solutions will fit every business and it is difficult for businesses to navigate what is right for them. Support around where to start and what is needed and what technologies might not be appropriate for some businesses is crucial and cited by 30% of survey respondents as a way to encourage manufacturers to invest in digital technologies to help them decarbonise. Manufacturers are very pragmatic types of businesses: before they invest, 46% of them would like to see what the return on investment for these types of new digital technologies is.

A peer-to-peer programme would be valued by manufacturers (cited by 24% of respondents). It's a perfect way to pass on the knowledge, expertise and lessons to be learned by key leaders in the sector and allows for a more tailored approach which is often needed when looking at this challenge on a sectoral basis.

SUPPORT WITH CULTURE CHANGE

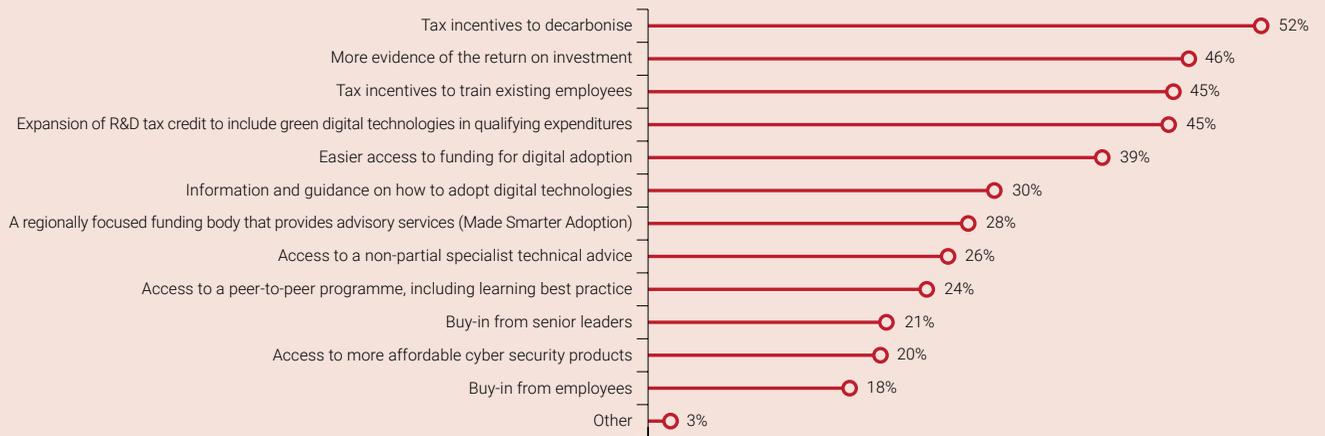
People fear the unknown and the company's culture around change plays a crucial part in innovation when there is a lot of uncertainty. Buy-in from senior leaders is seen by 21% of the manufacturers as a key factor to start the digital journey. Almost one in five (18%) of respondents said buy-in from employees on board is important which

means there is a need for helping businesses to create good change culture from the shop floor to the boardroom.

A business is only as good as it's people and employers need to take their employees on this journey to secure its success.

Chart 11: How to encourage manufacturers to invest in/adopt digital technologies and accelerate their company's plans to decarbonise?

% companies citing incentives for investment in digital technologies and plans to decarbonise



Source: MakeUK/Sage, *Digitalise to Decarbonise*, 2023

CHAPTER 5: CONCLUSIONS AND RECOMMENDATIONS

The UK is a world leader in the fight against climate change. In 2019 we became the first major economy in the world to pass laws to end our contribution to global warming by 2050. Reaching this target will require extensive, systematic change across all sectors, including industry. We must get this change right as the products made by industry are vital to life in the UK, and the sector supports local economies across the country. The following section lists a number of policy recommendations the government can introduce to help manufacturers hit the net zero target.

PUBLIC POLICY RECOMMENDATIONS:

- 1. Commit to Made Smarter across the UK and expand its remit:** There remains untapped potential to digitalise factories across the country that could help to stimulate economic growth. Made Smarter is a proven concept that has brought great benefit to those companies that have engaged in the progress. It provides a non partial advise for manufacturers and support with funding. The government should commit to the full roll out of Made Smarter which has proven to support the adoption of new technology in manufacturing businesses. It should also extend the remit of Made Smarter to include industrial decarbonisation to help support manufacturers become more energy efficient and transition to net zero.
- 2. Expand the R&D tax relief to include capital equipment relating to industrial decarbonisation:** The cost of upgrading capital equipment is cited as the biggest barrier to manufacturers decarbonising their processes. The government should build on the most recent qualifying extensions of the R&D tax relief to include capital equipment for green processing and industrial decarbonisation.
- 3. Introduce a Help to Grow Green scheme:** Existing funds such as the Industrial Energy Transformation Fund (IETF) should be extended, increased and reshaped into a more accessible fund. The current IETF does not reach manufacturers of all sizes, with the criteria pushing some companies out of being able to access the funds, as well as complexities of accessing the fund meaning small businesses are needing to access external advice if they want to attempt to use it. A revamp of the fund into a Help to Grow Green scheme would provide smaller funding (e.g., £20k) to companies with advisory services (using existing expertise from legacy ERDF staff) such as energy audit, sub-metering, and help with accessing the right finance, allowing them to take their first implementation steps.

- 4. Introduce a green skills tax credit:** Focused support for investment in green skills through a dedicated tax credit would incentivise businesses to begin the transition to developing green skills, and reward those who are taking active steps to ensure that they can produce goods more sustainably with a suitably skilled workforce.
- 5. Introduce employer incentives for digital and green apprenticeships:** The Government has previously used employer incentive payments for apprenticeships to great effect, most notably during the pandemic. In order to address concerns about skills shortages and support more effective employer investment in apprenticeships, employers should benefit from incentive payments for apprenticeship standards that relate to green skills and jobs. These should be identified primarily by the Government's Unit for Future Skills and may also draw upon the work done by the Institute for Apprenticeships and Technical Education to map green apprenticeships.
- 6. Enable employers to invest in upskilling and retraining through a reformed apprenticeship levy:** Allowing greater flexibility in the use of apprenticeship levy funds has long been a key demand of manufacturers. Creating an Employer Training Fund to give businesses the potential to invest a portion of funding in non-apprenticeship technical training or areas such as leadership and management would help to improve the effectiveness of employer investment and again target it at the specific digital and green skills needs of their workforce.
- 7. Renew the Industrial Decarbonisation Challenge (IDC) support for the development of low-carbon technologies and infrastructure beyond its current expiry date of 2024:** The £210m Industrial Decarbonisation Challenge (IDC) is contributing to the UK's drive for clean growth by supporting the UK's six largest industrial clusters in their mission to decarbonise at scale.
- 8. Improve micro and SME engagement and collaboration with the Digital and Energy Systems Catapult Centres:** The UK's Catapult Centre system is truly-world leading, providing invaluable support for innovation in manufacturing. Yet, despite offering an unparalleled asset to industry many smaller firms fail to engage with Catapult Centres and thus benefit from the potential of collaboration, insights and innovation. The government should work with industry bodies, including Make UK, and subsector specific groups to help encourage increased engagement from smaller firms.
- 9. Set the long-term direction and boost incentives for industrial energy efficiency:** the government can incentivise increased investment in and adoption of digitalise to decarbonise technologies through policy, procurement practices, and precedent. This could include establishing industry coalitions and designing sector and place-based plans for energy efficiency, using procurement levers to drive adoption, and leading by example through the dissemination of best practice and insights information gathered from publicly run institutions including the NHS.

PRIVATE INDUSTRY RECOMMENDATIONS:

- 1. Adopt a digital mindset:** Manufacturers need to adopt a digital mindset and embrace the opportunities that digitalise to decarbonise technologies can offer. This will help firms to improve efficiency, reduce emissions, and create new products and services.
- 2. Invest in digital technologies:** There are clear benefits for firms that invest in digital technologies, such as artificial intelligence (AI), machine learning (ML), and the Internet of Things (IoT). These technologies can help businesses to improve their efficiency, reduce their emissions, and create new products and services. Firms should explore which types of digitalise to decarbonise technologies would be most beneficial to them and invest in the skills required to implement and optimise that investment.
- 3. Measure and track progress:** Once new technologies have been adopted manufacturers need also to measure and track their progress in digitalising their manufacturing and reducing their carbon emissions. This will help them to identify areas where they can improve and make sure that they are on track to meet their growth goals.
- 4. Share best practices:** Firms should share best practices with other manufacturers to help accelerate the adoption of digital technologies and reduce carbon emissions across the sector. It is in everyone's interest to tackle climate change together.

By taking the above steps, manufacturers can digitalise their production processes and reduce their carbon emissions. This will help them to improve their competitiveness, create new jobs, and ultimately contribute to a more sustainable future.

VIEWPOINT



Despite a challenging economic landscape with soaring costs, inflation and energy bills, many UK manufacturers have another key challenge to focus on: being truly sustainable. The good news, as you've read in this report, is that UK manufacturers are already seeing a return on this investment by leveraging technology in their journey to decarbonisation.

Manufacturers that embrace sustainability won't just survive, they'll thrive, with three key areas creating the most opportunity:

- **Cutting carbon and costs:** Creating a truly green supply chain involves removing waste and inefficiencies across the board. Successful manufacturers will need to prioritise measures that add up financially for their firm.
- **Attracting new business:** A sustainable mindset can help you create and explore new business opportunities and find competitive advantage through emerging lower carbon technologies, innovations and materials.
- **Brand Recognition:** Leading with green credentials can help you stand out in a competitive marketplace. A true commitment to sustainability is something you should quite rightly shout about in front of industry peers, influencers and customers.

It's best to approach sustainability in a strategic and methodical way. That means balancing cost and capital, quality and service, and then deciding how to transform your supply chain.

In Sage's recent research on the [*State of the Circular Economy*](#), we found that digitalising manufacturing processes to support the circular economy could make your business more robust, resilient and profitable in the long term. Sustainable business practices are now a critical concern for customers, employees, shareholders and supply chain partners who want to take responsibility and action around sustainability. Not only that, but customers will expect your business to conscientiously control and limit your damage to the planet; creating and implementing an environment, social and governance (ESG) strategy will help that become a reality.

If you can combine developing efficient processes and products, a robust and resilient supply chain and lessons learned from other manufacturers, you'll be better placed to ensure that your manufacturing firm can run in an environmentally sustainable manner, while also realising maximum value and return on your investment.

In Sage's [*Sustainability and Society strategy*](#), we are leading by example with ambitious yet realistic targets of our own:

- Cutting our own carbon emissions by 50% by 2030
- Reaching net-zero by 2040 (across scope 1, 2 and 3)
- Committing to the SBTi (science-based target initiative)
- Committing to the UN climate change Race to Zero to support CoP26
- Signing up to the UN Global Compact Business Ambition for 1.5°C Pathway

We believe digital transformation can be a key enabler of progress towards net-zero and setting your broader sustainability strategy. By gaining crucial visibility of your supply chain and operational data, automating manual processes and improving the utilisation of your production resources you can drive efficiencies that will not only help you decarbonise but also boost your profitability.

With UK manufacturers already realising the benefits of digitalising to decarbonise, now is the time to consider how you can get started.



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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Sage offers digital solutions to run your entire manufacturing business, helping many types of manufacturers to thrive, from food & beverage manufacturing through to industrial machinery manufacturing and FMCG distribution. Sage supports the entire value chain from seed to sale or farm to fork with enterprise-level software solutions.

Find out more about how Sage Distribution and Manufacturing Operations, Sage 200, and Sage X3 solutions can help your manufacturing business adapt, grow, and transform.

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