Department for Business & Trade

Advanced Manufacturing Plan

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Foreword by the Secretary of State

When I became Business and Trade Secretary, I pledged that my department would be the department for economic growth. Growing the UK economy is closely entwined with growing our manufacturing industry, the sector contributes over £200 billion every year to the economy[1] and creates over 40% of our exports.[2]

The United Kingdom has a proud history of manufacturing. The Steam Engine, invented here, revolutionised the global economy of the 19th Century. Research at the University of Oxford in the 1970s made the lithium-ion battery possible and will revolutionise our car sector in this century. We invented the world's first COVID-19 vaccine. We are also now the 8th largest manufacturing economy in the world.[3]

We have made great progress this year. Tata have announced a £4 billion gigafactory, with up to 4,000 jobs attached.[4] BMW have made a £600 million commitment to the UK automotive sector, which protected 4,000 British jobs.[5] Government has confirmed five Investment Zones - each with an envelope of £160 million over ten years - which will focus on Advanced Manufacturing in South Yorkshire, Greater Manchester, East Midlands, West Midlands and the North East, all of which have secured anchor investment from businesses in advanced manufacturing. Airbus are investing over £100 million into the Welsh economy to increase production at Broughton, creating new jobs.

This week I was delighted that the Prime Minister and I were able to announce a £2 billion investment deal with Nissan to produce two new electric vehicle models in Sunderland.[6] This is all within the context of difficult global headwinds, yet we have still had one of the fastest recoveries in the G7.[7] My plan for advanced manufacturing looks forward and builds on these successes.

There are, however, risks for UK manufacturing as the world transitions to cleaner technology. Other countries have embarked on large tax and spending sprees to claim a share of the global manufacturing market. I have been clear throughout that the UK will not be drawn into a distortive subsidy battle. For those of us who believe in the power of the market, the key to unlocking continued growth in our manufacturing industry is capital investment from the private sector, which sustains jobs and growth for the UK.

No business secretary can pick winners, but Government can help companies succeed by removing obstacles in their way and focus on improving the business environment to ensure the sector is competitive. Government can open markets overseas, with our independent trade policy and it can get out of the way of business at home, with our new regulatory freedoms.

The Advanced Manufacturing Plan **invests in the future of manufacturing, opens markets, and removes obstacles for business. It is supported by £4.5 billion of funding to unlock investment in strategic manufacturing sectors, this includes £3 billion for automotive, including batteries, and aerospace to 2030 - which are developing cutting edge technology and driving our transition to net zero.** It will ensure the UK remains one of the best places in the world to undertake cutting edge research and scale new products to market. For every £1 of

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[1] Office for National Statistics. 'GDP output approach low-level aggregates.' 2023.
[2] Office for National Statistics. 'Trade in Goods: Manufactures.' 2023.
[3] Make UK. 'UK Manufacturing: The Engine of Our Economy.' 2023.
[4] Department for Business and Trade. 'Tata Group to Invest Over £4 billion in UK gigafactory creating thousands of jobs.' 2023.
[5] Department for Business and Trade. 'Major BMW EV announcement to take UK auto investment to over £6bn.' 2023.
[6] Prime Minister's Office and others. 'Nissan triples investment in electric vehicle production in the UK.' 2023.
[7] Office for National Statistics. 'GDP Quarterly National Accounts, UK.' 2023; Organisation for Economic Co-operation and Development. 'Real GDP Forecast.' 2023.

Government investment in the future of manufacturing we are leveraging £5 of additional private sector investment.

I will also extend our successful Made Smarter programme to ensure leading SMEs across the manufacturing sector can benefit from digital technologies.

I will continue to lead trade negotiations to help our manufacturing businesses embrace the opportunities of free and open trade. We must not be naïve and choose protectionism where it appears to suit us. Free and fair trade is an opportunity and creates resilience in our supply chains, which stretch across the world and are critical to our manufacturers. We have secured trade deals with 73 countries plus the EU, partners that accounted for £1.1 trillion of UK bilateral trade in 2022.[8]

I will continue to beat the drum for businesses within Government as well as with my international partners. I know we need to continue to back UK businesses, which is why the Chancellor has delivered the biggest business tax cut in modern British history. We have made sure that energy costs are affordable through the British Industry Supercharger and made our approach to regulation more business friendly. We have also helped deliver 200,000 manufacturing apprenticeship starts in the last decade.[9] The Advanced Manufacturing Plan builds on our heritage to deliver my ambition for the UK to be the best place in the world to grow a business.

[8] Department for International Trade. 'Annual Report and Accounts 2022-2023.' 2023.
[9] Office for National Statistics. 'Apprenticeships and Traineeships: Subjects and Levels.' 2023.

Executive Summary

The UK is a global hub for advanced manufacturing. Our ambition is for the UK to be the best place in the world to start and grow a manufacturing business.

Supply chains and technology are increasingly globally contested. But we won't be drawn into a distortive subsidy battle. Our advanced manufacturing strengths are supported by a strong business environment, a world class network of universities and innovation institutions, and a highly skilled workforce. We will build from these existing strengths to attract investment as we enter major investment cycles in clean and digital manufacturing technologies.

We will build from our existing strengths ensuring the UK continues to lead in the development and deployment of clean and digital technologies.

As part of our Advanced Manufacturing Plan we are prioritising: **a) investing in the long-term future of manufacturing; b) cooperating internationally and building supply chain resilience; and c) reducing costs and removing barriers to boost competitiveness.**

a) We are investing in the long-term future of manufacturing by making available £4.5 billion of funding to support strategic manufacturing sectors over 5 years from 2025. This will build on our existing interventions and successes to continue to take advantage of the transition to net zero and increasing digitalisation. Building on our commitment to the aerospace sector to 2031, we will extend our businesses programmes for the automotive and connected automated mobility (CAM) sectors, to 2030, confirming over £2 billion funding for automotive and £975 million for aerospace and allocating up to £150 million for CAM.

We are supporting life sciences manufacturing with £520 million funding to build resilience for future health emergencies and capitalise on the UK's world-leading research and development. Through the new £960 million Green Industries Growth Accelerator ('the Accelerator'), we are supporting the development of green manufacturing industries, namely carbon capture, utilisation and storage (CCUS), hydrogen, electricity networks and offshore wind. We are establishing a H2 taskforce to assess the manufacturing opportunities provided by hydrogen technologies as a dual multipower option.

We are also extending the Made Smarter Adoption programme, expanding it to more small and medium sized (SME) manufacturers across England in 2025-26, before working with the devolved administrations to explore expanding the programme further from 2026-27.

b) We are cooperating internationally and building supply chain resilience by increasing the opportunities offered by free and open trade for our manufacturing businesses and pursuing the most ambitious programme of trade negotiations in the world. We are working to ensure the security of our vulnerable and critical manufacturing supply chains through pursuing and agreeing partnerships with key allies such as the United States and Japan, as well as boosting our domestic capabilities and strengths. Alongside this plan we are publishing our UK Battery Strategy, as well as our Critical Imports and Supply Chains Strategy in December.

c) We are reducing costs and removing barriers to boost competitiveness by continuing to improve the UK's business environment. This includes making full expensing permanent, a £50 million 2-year apprenticeships pilot to explore ways to stimulate training in growth sectors such as advanced manufacturing and the announcement so far of five new advanced manufacturing Investment Zones. We also published our Connections Action Plan jointly with Ofgem to make it quicker and easier for businesses to connect to the electricity grid, as well as our Transmission Acceleration Action Plan to speed up the building of new transmission network infrastructure. By reducing costs and removing barriers, our plan offers a long-term incentive to attract investment in the sector.

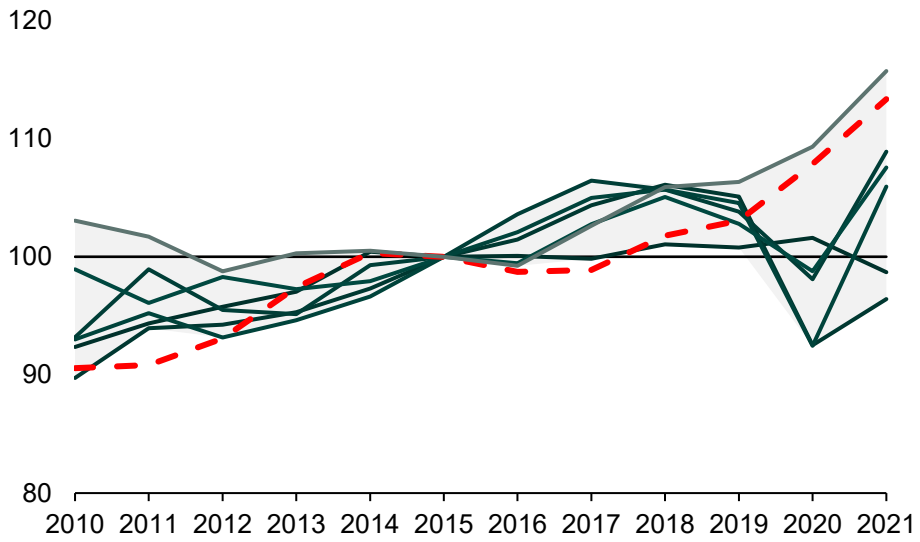
The Advanced Manufacturing Plan is building on the UK's heritage and strengths in manufacturing to deliver on our ambition to be the best place in the world to start and grow a manufacturing business. The Plan is being implemented in collaboration with businesses and other stakeholders.

Part 1: Overview of the UK's Manufacturing Sector

The UK is a global hub for advanced manufacturing, with the fastest manufacturing productivity growth in the G7 between 20010-2021[10] and in 2021 became the world's 8th largest manufacturing nation.[11]

Figure 1: Manufacturing Productivity (Output per Job)

2015 = 100



Productivity Growth (2010-2021)	
UK (ONS Data)	25%
Germany	17%
Italy	14%
USA	12%
Japan	9%
France	7%
Canada	7%

Source: OECD Productivity Data and ONS Output per Worker

Source: OECD Productivity Data and ONS Output per job.

This builds on the UK's long and proud manufacturing history. In the 18th century, inventions like the steam engine and the spinning jenny revolutionised the UK's economy. In the 20th century, the UK produced the first television and research at the University of Oxford in the 1970s made the lithium-ion battery possible. This influence has continued to the 21st century with the UK producing the Oxford/AstraZeneca Covid-19 vaccine in 2020.

Advanced Manufacturing is critical to UK prosperity

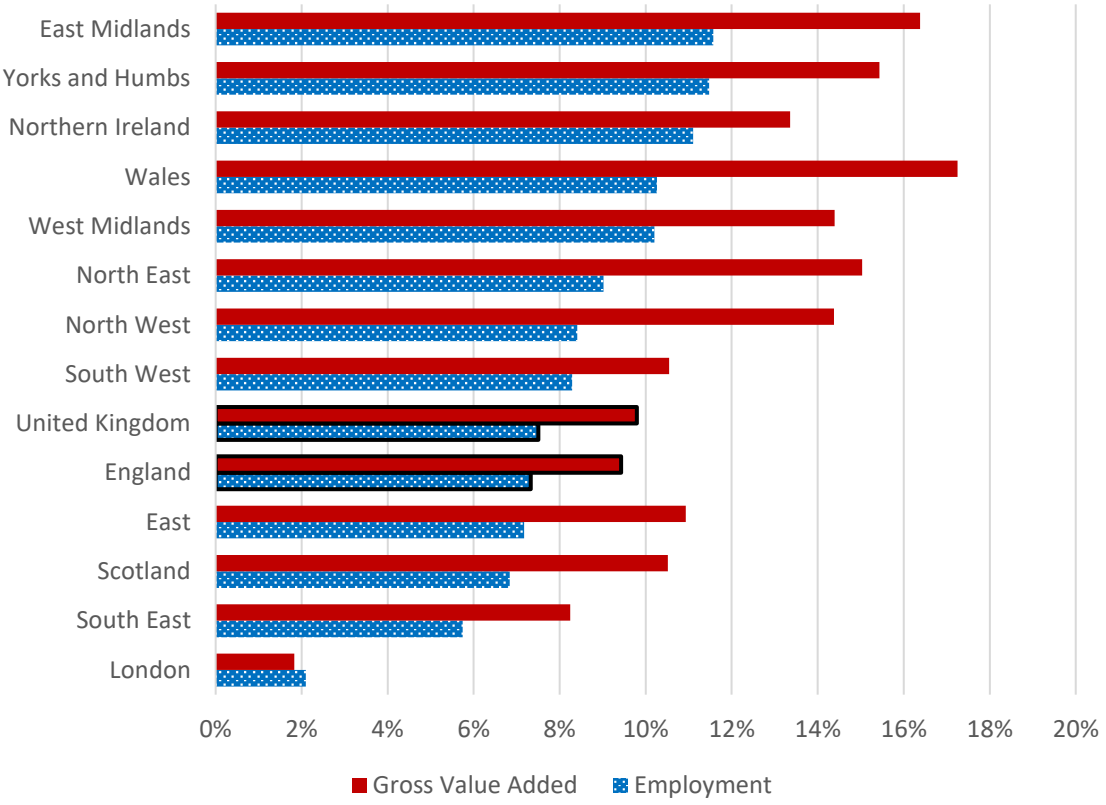
> *We consider **'advanced manufacturing'** to be production processes that integrate advanced science and technology, including digital and automation, to manufacturing.*
>
> *These processes use R&D, innovation, our extensive knowledge network, and our highly skilled population. This helps UK manufacturers create products that are meeting future technological demands and enable the UK to lead on the twin transitions of net zero and digitalisation.*

Manufacturing spreads opportunity right across the country and supports the Government's ambition to level up the whole UK. The majority, at 84%, of manufacturing jobs in the sector lie outside of London and the South East, compared to 69% for the economy as a

[10] Organisation for Economic Co-Operation and Development. 'Productivity and ULC by main economic activity.' 2023; Office for National Statistics. 'Output per Worker, UK.' 2023.
[11] Make UK. 'UK Manufacturing: The Facts.' 2023; United Nations Conference on Trade and Development. 'Gross Domestic Product: GDP by type of expenditure.' 2023.

whole.[12] Regions across the UK have similar manufacturing success stories - from Wales's sizeable technology sector hosting CS Connected, the world's first compound semiconductor cluster; to the growing critical minerals sector in Cornwall; Scotland's strong tradition of shipbuilding around the River Clyde, and Northern Ireland's vibrant and internationally connected aerospace sector.

Figure 2: Manufacturing Gross Value Added and Employment, by nation and region (2023



Source: ONS Business Registers and Employment Survey and ONS Regional GVA by Industry.

As clean energy technologies develop, we are seeing new manufacturing opportunities across the UK which are bringing back investment to areas that experienced manufacturing closures during the 20th century. This includes a world-leading hydrogen hub in Teesside.

Net zero and digital transitions present considerable opportunities for UK manufacturing and investment, and are vital to ensure the UK can deliver on its ambitions and targets. To deliver net zero, we estimate that additional capital investment averaging £50-60 billion per year is needed through the late-2020s and 2030s across the economy.[13] The majority of this investment will come from the private sector. Furthermore, growing international ambition on climate means a growing global market opportunity for UK businesses, potentially worth more than £1 trillion for UK firmsbetween 2021 and 2030.[14]

[12] Office for National Statistics. 'Workforce Jobs by Industry.' 2023.
[13] HM Treasury. 'Net Zero Strategy: Build Back Greener.' 2023.
[14] McKinsey Sustainability. 'Opportunities for UK businesses in the net-zero transition.' 2021.

We are entering a major investment cycle and the UK is well-placed to capitalise on this green growth opportunity. Our manufacturers will play a central role, whilst supporting our energy sector through developing local supply chains. The UK has a strong offer with a track record of decarbonising faster than any other G7 country,[15] a clear plan for reaching net zero, and significant public investment into the green industrial revolution. Additionally, we have strengths in key clean energy sectors from offshore wind, CCUS, and hydrogen to innovative new nuclear technologies and key parts of the supply chains for electricity networks.

Our industrial base plays an important role in our future economic resilience, helping ensure our economy is able to withstand and proactively tackle the challenges of today and the future. UK manufacturers produce many of the essential goods, parts, and components needed to sustain and protect citizens in the UK and across the world, from food to vital medicines and medical equipment. A new cohort of critical minerals are also becoming increasingly important as we seek to bolster our energy security and industrial resilience.

More broadly, manufacturing sectors also play a pivotal role in supporting the UK Export Strategy's ambition to reach £1 trillion exports annually,[16] accounting for 43% of all UK exports**,** creating economic growth and jobs across the UK.[17] That is why the Government announced in the Autumn Statement £4.5 billion of targeted funding to unlock investment in strategic manufacturing sectors – automotive, aerospace, life sciences and clean energy - which are developing cutting edge technology and driving our transition to net zero, and where this support will level up communities across the country with higher-paid jobs, improve the UK's energy security, and help grow the sectors of the future.[18] This funding will be available from 2025 for five years, providing industry with longer term certainty.

[15] Department for Energy Security and Net Zero. 'Powering Up Britain: Net Zero Growth Plan.' 2023.
[16] Department for Business and Trade. 'Export Strategy: Made in the UK, Sold to the World.' 2021.
[17] Office for National Statistics. 'Trade in Goods.' 2023.
[18] HM Treasury. 'Autumn Statement 2023.' 2023.

The UK's strengths are broad-based and built on our world-class innovation expertise.

£4.5 billion announced at Autumn Statement for strategic manufacturing sectors from 2025 for five years

Automotive: *Over £2 billion is being made available for the automotive sector to support the manufacturing and development of zero emission vehicles, their batteries and supply chain.*

Aerospace: *£975 million is being made available for the aerospace sector support the development of energy efficient and zero-carbon aircraft technology.*

Life sciences: *£520 million is being made available for life sciences to build resilience for future health emergencies and capitalise on the UK's R&D strengths.*

Green industries: *£960 million is being made available for a Green Industries Growth Accelerator which will support investments in manufacturing capabilities for the clean energy sectors where the UK can gain the clearest strengths: Carbon Capture Utilisation and Storage (CCUS), hydrogen, offshore wind, electricity networks, and nuclear.*

Source: *HM Treasury.* 'Autumn Statement 2023.' *2023.*

Our **automotive sector** is the second largest in Europe in value added terms;[19] accounting for £15.2 billion of UK manufacturing GVA and £38.3 billion of exports in 2022[20] and has successful hubs in the North East and West Midlands. It is transitioning rapidly to produce more EVs and batteries and there is potential to capitalise on our world-leading position on connected and automated mobility (CAM) to transform how we move people and goods.

Our **aerospace sector** contributed £9.8 billion GVA, generated around £27 billion of turnover in 2022, and around £18.6 billion of exports of UK production (£33.4 billion including re-exports).[21] The South West has one of the largest aerospace sectors in the world[22] and Airbus and Rolls-Royce produce around 50% of the world's large civil aircraft wings and engines in addition to some of the highest value aircraft systems.[23]

Our **life sciences sector** has invested over £5 billion in R&D in 2020 (over 11% of UK total).[24] and we published our Life Sciences Vision in 2021.[25] The industry exported goods worth £24 billion

[19] Eurostat. 'National Accounts Aggregates by Industry.' 2023; Office for National Statistics. 'GDP Output Approach: Low-Level Aggregates.' 2023.
[20] Office for National Statistics. 'GDP Output Approach: Low-Level Aggregates.' 2023.
[21] Office for National Statistics. 'GDP Output Approach: Low-Level Aggregates.' 2023.
[22] Office for National Statistics. 'Business Register and Employment Survey.' 2023; Eurostat. 'National Accounts Aggregates by Industry.' 2023.
[23] DBT analysis based on Cirium data.
[24] Office for National Statistics. 'Business Enterprise Research and Development.' 2022.
[25] Office for Life Sciences and others. 'Life Sciences Vision.' 2021.

in 2021[26] and employs over 115,000 people in Pharmaceutical and MedTech manufacturing, with 75% of wider life sciences employment outside London and the South East.[27]

Our **carbon capture utilisation and storage (CCUS) sector** benefits from the storage potential of the UK Continental Shelf, which makes the UK ideally positioned to lead global development in a sector. It is estimated it could add up to £5 billion GVA by 2050 and capture up to £8 billion of global CCUS turnover, as well as supporting up to 50,000 jobs by the end of the decade.[28]

Our **electricity network sector** benefits from the UK's stable regulatory environment and ambitious plans for transforming the grid, alongside the estimated additional £40-60 billon of investment required in the onshore transmission network to reach net zero by 2050,[29] creates a sizeable market opportunity for the supply chain.

Our **hydrogen sector**, benefits from the UK's natural assets and our technical expertise mean we can be an early mover - both for electrolytic 'green' hydrogen and CCUS-enabled 'blue' hydrogen production. Government analysis suggests the UK hydrogen sector could unlock over 12,000 jobs and up to £11 billion in private investment by 2030 across the UK.[30]

Our **nuclear energy sector** has strong capabilities across the nuclear fuel cycle. This extends from fuel production to decommissioning, as well as to the wider supply chain and expertise for building and operating reactors, including specialised equipment manufacturing. The sector is estimated to have a GVA of £102,300 per FTE (Full Time Equivalent) job.[31] With the UK's ambition to deploy up to 24GW of nuclear capacity by 2050,[32] we expect manufacturing opportunities to increase as we ramp up our new build programme alongside delivery of existing decommissioning requirements.

Our **offshore wind sector** is a world leader with the most installed capacity in Europe.[33] We have significant strengths in Scotland, the North East, and the East of England. The UK offshore wind manufacturing sector is estimated to have an annual turnover of around £570 million in 2021.[34]

Manufacturing productivity growth (output per hour) outperformed the rest of the UK economy, at 3.9% a year compared to 1.1% for the whole economy from 1997 to 2022.[35] The UK has significant strengths to build upon, right across the country. The UK continues to build a positive environment for manufacturing investment via cross-cutting measures such as full expensing and sector-specific initiatives so that our country is the best place to start, grow and invest in a manufacturing business. Examples of further sectors the UK has manufacturing strengths in, include:

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[26] Office for Life Sciences. 'Life Science Competitiveness Indicators (Tables 19, 20)'. 2023; HM Revenue and Customs. 'December 2021 Currency Exchange Rates'.2023.
[27] Office for Life Sciences and others. 'Life Sciences Vision.' 2021.
[28] Department for Energy Security and Net Zero. 'CCUS Net Zero investment roadmap: Capturing carbon and a global opportunity'. 2023.
[29] Department for Business, Energy and Industrial Strategy. 'Electricity Networks Modelling.' 2022.
[30] Department for Energy Security and Net Zero. 'Powering Up Britain.' 2023.
[31] Nuclear Industry Association. 'Delivering Value.' 2023.
[32] Prime Minister's Office and others. 'British Energy Security Strategy.' 2022.
[33] HM Government. 'Offshore Wind Net Zero Investment Roadmap.' 2023.
[34] DBT analysis based on Office for National Statistics. 'Low Carbon and Renewable Energy Economy, UK.'
[35] Office for National Statistics. 'Output Per Hour Worked, UK.' 2023.

Our **chemicals sector**, which is a key foundational industry. At least 96% of all manufactured goods contain chemical industry content.[36] In 2022, it is estimated to have contributed £13.2 billion in GVA to the UK economy.[37] Chemicals and their products can be found in almost every end-consumer market, ranging from automotive to healthcare, technology, food, and green energy markets.

Our **consumer goods sector**, which has a long heritage of producing textiles, clothing, leather goods and furniture. In 2022, the sector was estimated to account for 303,000 direct jobs (0.9% of the UK workforce) and to generate £15.6 billion of GVA in purely manufacturing roles.[38] The vast majority of consumer goods manufacturing is located outside of London and the South East, and is integral to supply chains ranging from retail, automotive, aerospace, and defence, to healthcare, transport, and hospitality.

Our **defence sector**, which is dynamic, sustainable, and globally competitive - the UK has the second largest defence equipment and services market in the world.[39]

Our **food and drink sector**, which is the largest manufacturing sector in the UK and delivers an estimated industry turnover of nearly £128 billion, as well as providing exports valued at over £26 billion.[40] The industry is the largest manufacturing sector in the East Midlands and Yorkshire and the Humber by employment and GVA; and has a vital role in supporting regional economic growth.[41] In 2022, over 11,300 new food and drink products were launched in the UK.[42]

Our **machinery sector**, which is the fourth largest in Europe behind only Germany, Italy, and the Netherlands in value added terms.[43] This includes products from engines and turbines, to highly specialist technical instruments. The sector exported £36.4 billion of products in 2022, representing 8.6% of all UK goods exports and 4.4% of total UK goods and service exports.[44]

Our **shipbuilding and maritime sector**, which is crucial to keeping international trade moving and maintaining our defence capability. This year, we launched the £500 million Shipbuilding Credit Guarantee Scheme.[45] This scheme will support ship buyers and operators to purchase new vessels and mobile offshore installations or refit, retrofit and repair existing ones at UK shipyards.

Our **space sector**, where the UK has expertise in the manufacture of spacecraft, satellites, and complex payloads. The sector employs 48,800 employees across the UK, generating more than

[36] Chemical Industries Association. 'Accelerating Britain's Net Zero Economy.' 2020.
[37] Office for National Statistics. 'GDP Output Approach: Low-Level Aggregates.' 2023.
[38] DBT analysis based on Office for National Statistics. 'GDP Output Approach: Low-Level Aggregates.' 2023; Office for National Statistics 'Annual Business Survey.' 2023; Office for National Statistics. 'Business Registers and Employment Survey.' 2022.
[39] Ministry of Defence. 'UK Defence in Numbers: 2022.' 2023.
[40] Office for National Statistics. 'GDP Output Approach: Low-Level Aggregate.' 2023.
[41] Office for National Statistics. 'Regional GVA by Industry.' 2023; Office for National Statistics. 'Business Registers and Employment Survey.' 2022.
[42] Mintel. 'Global New Products Database (GNPD).' 2023.
[43] Eurostat. 'National Accounts Aggregates by Industry.' 2023; Office for National Statistics. 'GDP Output Approach: Low-Level Aggregates.' 2023.
[44] Office for National Statistics. 'Trade in Goods'. 2023.
[45] Department for Business and Trade. 'Shipbuilding Credit Guarantee Scheme.' 2023.

£17.5 billion in income, with satellite services supporting over £370 billion of UK GDP.[46] The Government is developing a Space Sector Plan, due to be published next year. The plan will seek to improve the way Government and the commercial space industry work together, and set out a range of interventions to boost growth and resilience.

Our **steel and aluminium sectors**, which provide important inputs for the manufacturing sector, including for machinery and equipment, renewable energy generation, and more. The two sectors supported over 37,000 direct jobs in 2022.[47]

Our sector strengths are supported by a **world class network of universities, research institutions, and Catapults.** Together, these institutions support innovations in manufacturing, from the research and development stage to the scale up and commercialisation of new technologies. Institutions are spread across the country, from the National Composites Centre in Bristol, to the Henry Royce Institute in Manchester, and to the Advanced Manufacturing Innovation Centre at Queen's University in Belfast.

Securing the Future of UK Advanced Manufacturing

Advanced manufacturing is being radically transformed by the twin transitions of net zero and digitalisation. These changes will be at the heart of unlocking a reduction in global emissions and improving our manufacturing productivity and efficiency.

Our advanced manufacturing strengths - supported by a strong business environment, a world class network of universities and innovation institutions, and a highly skilled workforce – have led to a number of recent successes. These include the following recent investments:

- **Tata Group** have announced the construction of a new gigafactory that will produce 40GWh of batteries per year and create 4,000 new jobs, as part of the electrification of the Jaguar Land Rover brand.[48]
- **Nissan** is leading up to £2 billion of new investment in Sunderland with two new EV models. This represents another major vote of confidence in the UK, building on the £1 billion investment announced in 2021.[49]
- **BMW** have announced £600 million to produce the next all-electric Mini in Cowley, Oxfordshire from 2026.[50]
- **Boeing** have partnered with others to make the first investment in South Yorkshire's Advanced Manufacturing Investment Zone, worth over £80 million.[51]

[46] UK Space Agency. 'The Size and Health of the UK Space Industry 2022.' 2023.
[47] Office for National Statistics. 'Business Registers and Employment Survey.' 2022.
[48] Department for Business and Trade. 'Tata Group to Invest Over £4 billion in UK gigafactory creating thousands of jobs.' 2023.
[49] Prime Minister's Office and others. 'Nissan triples investment in electric vehicle production in the UK.' 2023.
[50] BMW Group. 'MINI Plant Oxford goes Electric: £600m investment for all-electric MINI production in the UK.' 2023.
[51] HM Treasury. 'South Yorkshire named as first UK Investment Zone.' 2023.

- **Air India** have agreed to purchase around 250 new aircraft from Airbus, supporting the existing high skilled aerospace jobs in Wales and across the UK.[52]

- **Tata Steel** is expected to invest £1.25 billion, including a UK Government grant worth up to £500 million in a new electric arc furnace to support decarbonisation of steel production at Port Talbot, which is currently the UK's largest single carbon emitter.[53]

Through our Advanced Manufacturing Plan, we are building on these strengths and our existing interventions to attract further investments in clean and digital manufacturing technologies. If the UK can continue to build on its strengths and expertise, and continues to lead the transitions in net zero and digitalisation, the benefits are substantial.

[52] Department for Business and Trade. 'Prime Minister welcomes Air India, Airbus and Rolls-Royce deal.' 2023.
[53] Department for Business and Trade. 'Welsh steel's future secured as UK Government and Tata Steel announce Port Talbot green transition proposal.' 2023.

Part 2: The Advanced Manufacturing Plan

Our ambition is to ensure the UK is the best place in the world to start and grow a manufacturing business, building on our existing strengths and successes.

Through our Advanced Manufacturing Plan, we are taking targeted and strategic action aimed at ensuring our business environment and international competitiveness remain strong. We are meeting our ambitions through focusing on the following three priorities:

a) **Investing in the future of manufacturing** by building on our existing programmes and partnerships with businesses to support market-led investment in innovation and research and development.

b) **Cooperating internationally and building supply chain resilience** to boost economic security and ensure our sectors have access to the goods that drive prosperity.

c) **Reducing costs and removing barriers to boost competitiveness** and ensure the UK retains its attractiveness to international investors in the long term.

A: Investing in the Future of Manufacturing

We will continue to invest in the future of manufacturing by extending our successful business programmes, including the support we provide to the automotive and aerospace sectors to 2030. We are also offering to extend and expand Made Smarter, our industrial digitalisation programme, to more regions of England in 2025-26 before working with the devolved administrations to explore expanding the programme further from 2026-27.

Ensuring the continuity in Government support provides longer-term certainty to businesses at this crucial stage of the business investment cycle. It ensures they can continue to take advantage of the opportunities provided by the transition to net zero and the benefits offered by increased digitalisation. The focus of the Advanced Manufacturing Plan is on leveraging private sector investment so the UK remains a globally competitive investment destination. This will ensure manufacturers can continue to innovate their processes and bring world-leading products to market.

Growing emerging, advanced manufacturing sectors:

Zero Emission Vehicles (ZEV)

Over the last decade, a drive to develop new vehicle propulsion technologies has transformed the automotive sector. During this period, Government and industry have jointly invested more than £1.4 billion in R&D funding, laying the foundations for new manufacturing supply chains to emerge.[54] This partnership has been delivered via the Advanced Propulsion Centre (APC) and Innovate UK as part of a ten-year strategy for the sector launched in 2013.

In 2020, as zero emission vehicles moved to mass commercialisation, the Government announced the Automotive Transformation Fund (ATF) to accelerate the UK automotive sector's electrification.

[54] Department for Business and Trade.'£89 million of funding to develop cutting edge new electric vehicle technology.' 2023.

Thanks to ATF support, 52 GWh capacity has been installed or is planned in the UK so far, and we are on our way to reach the 2030 capacity requirements expected by the sector. The UK also remains a globally competitive investment destination and the ATF has secured several strategic supply chain investments.

As well as the earlier referenced Tata gigafactory and the electric Mini investment decisions, other strategic investments include: a £2billion investment deal with Nissan to produce two new electric vehicle models in Sunderland;[55] £380 million by Ford in the production of electric power units at Halewood; [56] Johnson Matthey's £60 million investment in Hertfordshire to develop hydrogen technologies;[57] and Stellantis' £100 million investment that has seen the Vauxhall plant in Ellesmere Port transition to all EV production.[58]

However, the global context has changed, and the pace of this transition continues to accelerate as decarbonisation policies and technological advancements drive global demand. Competition for global investment is intense and the Government remains focused on the long-term success of the sector through targeted and proportionate intervention, leveraging the strengths of our longstanding innovation ecosystem.

This is why, as part of the £4.5 billion funding for strategic manufacturing sectors announced at Autumn Statement, we will make available £2 billion of new capital and R&D funding for the automotive sector via Auto2030, an ambitious programme building on the ATF and the APC R&D programme.[59] This long-term commitment provides certainty to markets and will boost investment in UK manufacturing of zero emission vehicles, batteries and the supply chain. Programmes will include:

- **R&D grants** to support the design and development of zero emission vehicle prototypes, systems, and supply chain inputs, boosting the UK's long-term competitiveness.
- **Scale-up grants** to fast-track the development of near commercial pilots for zero emission vehicle technologies, de-risking future capital investment in their large-scale industrialisation, and strengthening the UK supply chain.
- **Capital grants** to unlock strategic investments in an internationally competitive electric vehicle and battery supply chain, enabling automotive transformation and attracting future investment in the UK manufacturing of zero emission vehicles and batteries.

As part of the government's long-term commitment to automotive and in line with the headline recommendations of the Harrington Review into the Government's approach to attracting foreign direct investment, we will review the process for these automotive capital grants, with a view to simplifying and improving them to be more business-friendly. This comprehensive package of interventions builds on the strengths of our innovation ecosystem to attract strategic investments, secure thousands of jobs across the UK, establish supply chains, and deliver significant global emissions reductions. It will also anchor innovation investment, help achieve the required battery

[55] Prime Minister's Office and others. 'Nissan triples investment in electric vehicle production in the UK.' 2023.
[56] Ford. 'Ford to Increase Investment at Halewood to Scale Up Electric Vehicle Portfolio.' 2022.
[57] Department for Business and Trade. 'Business Secretary visits Aston Martin after announcing £9 million to drive innovation in auto tech industry.' 2023.
[58] Department for Business and Trade. 'Business Secretary visits Aston Martin after announcing £9 million to drive innovation in auto tech industry.' 2023.
[59] HM Treasury. 'Autumn Statement 2023.' 2023.

manufacturing capacity to meet future demand and increase the UK's resilience in the face of global supply shocks.

The Government also recognises the importance of ensuring public money mobilises private investment, particularly across green industries and advanced manufacturing sectors. Blended finance approaches offer an important opportunity to do this, and the government is committed to exploring and expanding the use of these approaches ahead of the next spending review. The government recently announced the Net Zero Blended Finance Project (NZBFP), which will seek to build the capacity and expertise of government to explore and utilise innovative approaches to funding design.

Working with Public Finance Institutions, including the UK Infrastructure Bank (UKIB) and UK Export Finance (UKEF), the Green Finance Institute, and engaging businesses and investors, we will seek to better understand these approaches and help ensure public investment crowds in private finance.

Connected and Automated Mobility

The future of transport is automated and connected. The UK's Centre for Connected and Autonomous Vehicles (CCAV) is working to create an early commercial market and secure first mover advantage in the deployment of self-driving vehicles and services. Broader than just passenger cars and robo-taxis, Connected and Automated Mobility (CAM) includes logistics, mass transit, mining, agriculture, and defence, with economic benefits worth up to £66 billion per year by 2040.[60]

Appropriate regulation and legislation, with public safety at its heart, is crucial for CAM. The Department for Transport is setting out CAM legislation through the Automated Vehicles Bill, announced in the King's Speech earlier this month. CAM is expected to create safer, fairer, more accessible, and cleaner transport for passengers and goods. CAM also offers significant economic value through job creation, trade opportunities, and productivity and efficiency gains across the country. This builds on around £600 million of joint investment with industry in over 100 projects across the UK since 2015.[61] This has led to significant investment across the UK, including:

- Automated vehicle software company**, Oxa (formerly Oxbotica),** announced £115 million of investment this year, including from Ocado, ZF, Wenco and Google.[62]
- Coventry-based self-driving vehicle developer, **Aurrigo,** floated on the AIM (formerly the Alternative Investment Market), with a market capitalisation of £20 million in September 2022; [63] which now has a valuation of £68 million.[64]

[60] The Society of Motor Manufacturers and Traders. 'Connected and Automated Mobility: The UK Economic and Market Opportunities.' 2023.
[61] The Society of Motor Manufacturers and Traders and others. 'Connected and Automated Mobility: The UK Economic and Market Opportunities.' 2023.
[62] Oxa. 'Oxbotica raises US$140 million Series C Investment to deploy its operating system for Universal Autonomy around the world.' 2023.
[63] Aurrigo. 'Aurrigo International PLC.' 2023.
[64] London Stock Exchange. 'Case Study: Aurrigo.' 2023.

- **CAVForth**, the world's most advanced automated bus trial, has carried thousands of passengers across the Forth Road Bridge to Edinburgh, and is led by Fusion Processing with Alexander Dennis, Stagecoach, and Transport Scotland.[65]

Over the course of 2023, CCAV has announced around £60 million of grant funding into 30 projects, involving over 50 organisations to accelerate UK self-driving technologies and services to market, and for export around the world.[66] This includes a £42 million grant for seven CAM Deployments projects.[67]

We want the UK to be the European leader in the transformation of how we move people and goods around the country. **Through our CAM2030 programme, we are extending our current R&D support programme to 2030 with up to £150 million funding to support operational deployments of self-driving services.** This will include on- and off- road logistics and high potential mass transit services, and support key components in the growing, global supply chain, especially in areas where sovereign capabilities (such as in cybersecurity and safety) are strategically desirable. By seizing the opportunities that CAM provides, the UK could generate additional economic benefits of up to £66 billion a year and create 342,000 new jobs by 2040.[68]

We are also considering the need for a Centre of Excellence for UK Connected and Automated Mobility to work with departments and organisations. The Centre would focus on coordination challenges and strengthen the capabilities, skills and public engagement required to support the growing sector and meaningful regional engagement. The Centre will work closely with Government to support SME access to finance, international engagement and exports.

Aurrigo – Self Driving Shuttles and Airport Dollies

Aurrigo, based on the site of the original Humber factory in Coventry, started developing self-driving software and vehicles in 2015 through Government funded programs. The company focuses on new vehicle types for the first and last mile transport of people and goods. Partnerships with Singapore's Changi Airport, global logistics company UPS, and IAG (which owns British Airways) have been announced in recent years for its AutoDolly airside vehicle platform. Aurrigo's most recent Government funded project is to adapt their airside dolly to UPS requirements for cargo operations at the East Midlands airport.

In September 2022, Aurrigo floated on the LSE Alternative Investments Market (AIM), achieving a market capitalisation of £20 million despite challenging global economic conditions. By October 2023, that market cap had risen to £68 million and Aurrigo has more than doubled its staff, from 48 to 101, and has a 65,000 sq ft joint R&D and manufacturing site.

Source: *Aurrigo.* 'Aurrigo International PLC.' *2023; London Stock Exchange. '* Case Study: Aurrigo.*' 2023.*

[65] Transport Scotland. 'Project CAVForth.' 2023.
[66] HM Government. 'Connected & Automated Mobility 2025.' 2022.
[67] Department for Business, Energy and Industrial Strategy. 'UK Government backing helps launch world first self-driving bus.' 2023.
[68] The Society of Motor Manufacturers and Traders. 'Connected and Automated Mobility: The UK Economic and Market Opportunities'. 2023.

Aerospace

In 2022, we set out our support for innovation in more sustainable technologies, stronger manufacturing value chains to industrialise R&D in the UK, and the skilled workforce required to manufacture aircraft for the next era of flight - *Destination: Net Zero, the Aerospace Growth Partnership's strategy for the UK sector.*[69] This was underpinned by £685 million in Government funding for the Aerospace Technology Institute (ATI) to 2025 - an increase of 50% on the previous 3-year period.[70] This builds on the work of the ATI programme, established in 2013 - a joint programme with industry that invested £3.58 billion in world leading UK aerospace R&D across 417 projects involving 438 companies and organisations.[71]

We are committed to supporting innovation that will lead to the next generation of zero-carbon and ultra-low emission aircraft technology. This includes building on our world-leading position in the manufacture of aircraft, particularly for engines, wings, and advanced systems, as well as supporting the supply chain and innovation ecosystem that makes it possible. We remain a global hub for aerospace investment and production.

This year, as part of the £4.5 billion funding for strategic manufacturing sectors announced at Autumn Statement, we have re-affirmed our long-term commitment to these aims with £975 million being made available for the aerospace sector to 2030.[72] This will continue to support the development of energy efficient and zero-carbon aircraft technology. SMEs will be supported through the launch of a new R&D support scheme for small businesses, with up to £10 million available each year through the ATI Programme. This funding complements the government's commitment at Spending Review 2021 to guarantee funding for the ATI to 2031.[73] It will be matched by business and is a vote of confidence in UK industry and will enable us to strengthen the UK's position in the global aerospace market, creating high value jobs around the UK.

[69] Aerospace Growth Partnership. 'Destination Net Zero.' 2023.
[70] Department for Business, Energy and Industrial Strategy and others. 'Green aerospace tech to receive record Government funding.' 2022.
[71] Aerospace Technology Institute. 'Transforming Aerospace Through Technology and Innovation.' 2023.
[72] HM Treasury. 'Autumn Statement 2023.' 2023.
[73] HM Treasury. 'Autumn Budget and Spending Review 2021.' 2021.

ATI Funding for Advanced Manufacturing Innovation

Through the ATI, the UK Government funds groundbreaking aerospace R&D. This keeps the UK at the forefront of cutting-edge, sustainable aerospace technology development, with projects also driving innovation across manufacturing sectors. Five projects with a total project value of £55.4m have recently been awarded funding:

Rolls-Royce-led Safety Critical Harsh Environment Micro-processing Evolution (SCHEME) - £41.7m total project value. This project will develop the next generation of safety critical microprocessors for use in harsh environments for not only Civil and Defence Aerospace applications but additionally other sectors.

Moog Controls Ltd-led Future Engine Technology for the Control of Hydrogen (FETCH) - £5.5m total project value. This project will develop and demonstrate a fuel control system for hydrogen gas turbine engines.

ITP Aero Ltd-led Laser Automation and Design Development for future Engine Requirements (LADDER) - £2.6m total project value. This project will develop and implement an innovative laser beam welding solution to join complex sheet-metal components.

Adaptix Limited led Fast-acquisition, robot-mounted, 3D X-ray inspection, with longitudinal failure-analysis for Digital Twins - £2.1m total project value. This project aims to scale-up capability to image large aerospace parts (such as wings/doors/skins) to check for failures in composite material.

Life Sciences

The UK has one of the strongest life sciences sectors globally and manufacturing is a key driver of this success, making a huge contribution to the health and wealth of the nation. The sector is critical to achieving our strategic national goals and addressing global challenges. It is also vital to the UK's economic growth, providing thousands of high-wage and high-skill jobs, 75% of which are located outside of England's South-East, spreading opportunity across the UK.[74]

The UK is a prime location to research, develop and manufacture pharmaceutical and med-tech products, particularly the cost-effective manufacture of complex medicines. This is supported by the UK's powerful research landscape, high-quality science base and network of manufacturing innovation centres. This capability was demonstrated during the COVID-19 pandemic through our world-leading vaccination programme.

The *Life Sciences Vision*[75] published in 2021 describes our ambition to make the UK an outstanding business environment that can support company growth, innovation, and investment.[76] It also commits us to secure and scale up the UK's life sciences manufacturing capabilities to ensure a robust response to potential future health emergencies. Government works

[74] Office for Life Sciences and others. 'Life Sciences Vision.' 2021.
[75] Office for Life Sciences and others. 'Life Sciences Vision.' 2021.
[76] Office for Life Sciences and others. 'Life Sciences Vision.' 2021.

with industry through the Medicines Manufacturing Industry Partnership to sustain the UK's leading position in medicines manufacturing.

To ensure the UK remains one of the world's most attractive locations for life sciences manufacturing investments, as part of the £4.5 billion funding for strategic manufacturing sectors at Autumn Statement we have made available **£520 million funding for life sciences manufacturing over five years (2025-30).[77] This funding will build resilience for future health emergencies and capitalise on the UK's world-leading research and development capabilities.** Further details on how this new funding will be deployed and how companies can apply will be announced shortly.

This fund will build upon the success of our three recent life sciences capital incentive schemes, which have had a total £118 million of funding committed. To date these have supported investments at eleven manufacturing sites across the UK so far, delivering £416 million public/private investment, while creating and securing over 1,400 jobs.

At Autumn Statement, the Chancellor announced further support for life sciences manufacturing, including investing £10 million, alongside £10 million from Scottish Enterprise, in a Centre of Excellence in Oligonucleotide Manufacturing Innovation in Renfrewshire, Scotland.[78] This partnership of government, academia and industry will tackle global challenges in oligonucleotide therapeutics and establish the UK as a globally recognised location for oligonucleotide manufacturing innovation.

As with other manufacturing sectors, the life sciences sector continues to innovate in areas such as adopting digitisation and automation in production; developing greener supply chains, manufacturing processes, and more sustainable products; and exploring near-to-patient manufacturing or remanufacturing. Alongside a new voluntary medicines pricing agreement, the pharmaceutical sector will invest in capabilities associated with delivering sustainable pharmaceutical manufacturing in line with global commitments to deliver net zero.

Green Industries

Building on the considerable support that the Government has already announced for net zero and green industry sectors, from the *Net Zero Strategy*,[79] *British Energy Security Strategy*[80] and *Powering Up Britain*,[81] **we have announced the £960 million Green Industries Growth Accelerator. This is funding focused on expanding manufacturing capacity and removing supply chain bottlenecks in key green industries such as CCUS, offshore wind and nuclear.**

The **funding will be designed to attract private investment, leveraging the £960 million available to deliver larger investments across the five sub-sectors.** It will form a key part of broader Government support for decarbonising the energy system and reaching net zero. The UK has either strong advantages in these sectors already or can build them with targeted support. They will all be vital for our energy security and the transition to net zero across the economy.

[77] HM Treasury. 'Autumn Statement 2023.' 2023.
[78] HM Treasury. 'Autumn Statement 2023.' 2023.
[79] Department for Energy Security and Net Zero. 'Net Zero Strategy: Build Back Greener.' 2022.
[80] Prime Minister's Office. 'British Energy Security Strategy.' 2022.
[81] Department for Energy Security and Net Zero. 'Powering Up Britain.' 2023.

Government committed £30 billion of domestic investment for the green industrial revolution at Spending Review 2021,[82] including £4.2 billion on net zero research and innovation over the period 2022-2025.[83] Since then Government has announced a further £6 billion for energy efficiency for 2025-28[84] and up to £20 billion for CCUS.[85] The Accelerator is building on the action we have already taken to support the development and growth of resilient clean energy supply chains, including for:

Offshore wind, where we are consulting on a major reform to our flagship renewable energy support scheme, Contracts for Difference, which has already contributed to the UK attracting around £120 billion of new investment into renewables since 2010.[86] Through this consultation we are testing whether offshore wind and floating offshore wind projects could get more revenue support for making investments in the sustainability of their supply chains. Our Floating Offshore Wind Manufacturing Investment Scheme is also providing up to £160 million to kick start investment in port infrastructure projects, acting as an important base for offshore wind manufacturing ahead of the Accelerator.[87]

CCUS, where we have committed up to £20 billion of funding for early deployment and selected four clusters to put us on track to store 20 - 30 million tonnes of CO2 by 2030.[88] Industrial CCUS clusters can be the starting point for a new carbon capture industry with a sizeable export potential and emitters will be able capitalise on new low carbon product markets. **Later this year we will publish a vision for the sector that will set out how we will meet this ambition and provide investors with confidence.**

Nuclear, where the development of new and emerging technologies such as Small Modular Reactors (SMRs) and Advanced Modular Reactors (AMRs) will be crucial to support our ambition to deploy up to 24GW of nuclear capacity by 2050.[89] This year we launched Great British Nuclear, an arms-length body that is responsible for driving the delivery of new nuclear projects, established the Nuclear Skills Taskforce to turbocharge action on skills, and we have up to £385 million through the Advanced Nuclear Fund to support the development of SMRs and AMRs.[90]

The Accelerator also complements support offered by public finance institutions such as the £22 billion UKIB,[91] the British Business Bank (BBB), UK Export Finance (UKEF) and Innovate UK. Alongside other Government levers, these institutions drive business value, enable growth and scale technologies across all sectors, regions, and nations of the UK, playing a key role to unlock the investment needed to develop green industries. **Further detail on the scope and availability of funding will follow, including on market engagement with industry ahead of competition launches.**

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[82] HM Treasury. 'Autumn Budget and Spending Review 2021.' 2021.
[83] House of Commons Committee of Public Accounts. 'Support for Innovation to deliver net zero.' 2023.
[84] Department for Business, Energy and Industrial Strategy. 'Government joins with households to help millions reduce their energy bills.' 2022.
[85] HM Treasury. 'Spring Budget 2023.' 2023.
[86] DBT analysis based on BloombergNEF. 'Energy Transition Investment Trends, 2023.' 2023.
[87] Department for Energy Security and Net Zero. 'Floating Offshore Wind Manufacturing Investment Scheme.' 2023.
[88] HM Treasury. 'Spring Budget 2023.' 2023.
[89] Prime Minister's Office. 'British Energy Security Strategy.' 2022.
[90] Department for Energy Security and Net Zero. 'Advanced Nuclear Technologies.' 2023.
[91] UK Infrastructure Bank. 'UKIB Strategic Plan.' 2022.

Hydrogen is expected to represent a crucial part of the UK's future net zero energy system and is critical to supporting the UK's energy security. The importance and opportunities of hydrogen have been identified in the *Powering up Britain* paper[92] and in the *UK Hydrogen Champion's* recommendations to Government.[93] The Government's *Hydrogen Strategy* sets out ambitions to reach up to 10GW of low carbon hydrogen production capacity by 2030, subject to affordability and value for money, with at least half coming from electrolytic or 'green' hydrogen.[94]

There are over 200 companies working on hydrogen and fuel cell technologies in the UK,[95] and we consistently feature in the top 10 countries globally for hydrogen technology patent rates.[96] A Government commissioned review of the UK supply chain identified significant opportunities for British manufacturers to 2030, [97] including in electrolysis package manufacture, compressors, electrical equipment, and materials for electrolytic hydrogen. Later this year **we will publish a production roadmap setting out our vision for low carbon hydrogen production to 2035. Our hydrogen ambitions will drive investment into the UK and help ensure fair opportunities for UK companies in the supply chain and our skills base, as well as wider economic benefits to all regions of the country.**

Low carbon hydrogen can be used in propulsion technologies, where battery systems are unlikely to deliver the performances required by industry. We want to maximise high value hydrogen propulsion system manufacture in the UK and build on our competitive advantage in this technology.

Government programmes already support the development and deployment of hydrogen solutions across transport. This includes support for investments in hydrogen propulsion systems through capital and R&D programmes delivered via the Advanced Propulsion Centre, the Automotive Transformation Fund, the Aerospace Technology Institute, and Innovate UK. We will build on these programmes, in partnership with industry, to explore attracting further investment across road, maritime, aviation, rail, and non-road mobile machineries.

To further support our ambitions, **we are launching an industry taskforce, which will recommend how Government could maximise investment opportunities for UK manufacturing of hydrogen propulsion systems**. Delivered in partnership with the Hydrogen Innovation Initiative and Innovate UK, and reporting into the Hydrogen Delivery Council, this taskforce will publish recommendations in Spring 2024, considering (a) our manufacturing strengths, (b) the potential of hydrogen propulsion systems across applications and (c) potential technology developments to 2050.

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[92] Department for Energy Security and Net Zero. 'Powering Up Britain.' 2023.
[93] Department for Energy Security and Net Zero. 'Accelerating the Growth of the Hydrogen Sector: UK Hydrogen Champion Recommendations.' 2023.
[94] Department for Energy Security and Net Zero. 'Hydrogen Strategy Update to the Market: August 2023.' 2023.
[95]Department for Energy Security and Net Zero. 'Hydrogen Net Zero Investment Roadmap.' 2023.
[96] International Energy Agency. 'Hydrogen Patents for a Clean Energy Future.' 2023.
[97] Department for Energy Security and Net Zero. 'Supply Chains to Support a UK Hydrogen Economy'. 2022.

We are also exploring how a UK Hydrogen Capability Network[98] could provide an anchor for UK aerospace to adopt liquid hydrogen and accelerate skills development and research.

Cross-Cutting Manufacturing Support:

Made Smarter Adoption Programme

Digital connectivity is unlocking new and previously unimaginable ways of working. In manufacturing, industrial digital technology (IDT)[99] can radically transform every sector. UK manufacturers are already using IDT to drive up their productivity, increase their turnover, and create new high-skilled, well-paid and stimulating jobs. New digital technologies and production processes are allowing them to create more innovative products, tap into new markets globally, reduce faults, and lower costs.

This potential is increased when investment in sensors and software is combined with the application of machine learning and Artificial Intelligence. UK manufacturers will be able to do more with less and create greener products that reduce the sector's dependency on energy inputs and the impact on the environment. Moreover, because IDT can be deployed quickly it will play a crucial early role in the UK's path to net zero. For example, IDT is also opening new possibilities for green and circular business models that will flourish within the UK's business environment.

In partnership with business, we have been supporting the take up of IDTs through the Made Smarter Programme. Through Made Smarter a firm can learn how to capitalise on new digital technologies, reduce carbon emissions, and drive-up productivity. The programme offers manufacturing SMEs access to expert advice, digital road mapping, match-funded grants and leadership training.

Since the programme started in 2018, over 3,100 manufacturing SMEs have registered on the adoption programme and 5.5% of manufacturing SMEs in the regions have been supported.[100] Over 500 IDT projects have been funded (leveraging in over £20 million of private investment by manufacturing SMEs) and over 900 businesses have been provided with digital roadmaps to set out the steps needed to integrate digital technologies in their operations and processes.[101] In addition, over 200 SME businesses leaders have undertaken leadership and management training to support the successful adoption of new technologies.[102]

To support more manufacturing SMEs to use IDT, **we will be expanding the Made Smarter Adoption programme, committing up to £16 million in 2025-26 to offer the scheme to all regions in England before working with the devolved administrations to explore expanding the programme further from 2026-27.** Expansion will also involve re-introducing digital internships - placements for students from relevant courses such as industrial digitalisation and intelligent systems into SME firms.

[98] Aerospace Technology Institute. 'Hydrogen Capability Network.' 2023.
[99] IDTs include AI; robotics and autonomous systems; additive manufacturing; industrial internet of things; virtual reality and data analytics.
[100] Based on DBT analysis of Made Smarter monitoring data and North West Pilot Evaluation Report. 2023.
[101] Based on DBT analysis of Made Smarter monitoring data and North West Pilot Evaluation Report. 2023.
[102] Based on DBT analysis of Made Smarter monitoring data and North West Pilot Evaluation Report. 2023.

Alongside the Made Smarter Programme, **the Government is establishing an Industry Innovation Accelerator, bringing together leading digital companies and manufacturing business leaders**. It will be co-chaired by the Minister for Industry and Economic Security and the Managing Director for Digital Industries at Siemens PLC. The Accelerator will focus on transformative digital solutions for the manufacturing sector, accelerating their adoption and diffusion across all parts of manufacturing.

Made Smarter Adoption: BEP Surface Technologies, Radcliffe, North West

Chill roll manufacturer, BEP Surface Technologies, needed to redesign its factory to expand capacity and match European competitors' ability to undertake larger scale electroplating work.

The firm worked with Made Smarter's expert advisers and completed a digital transformation workshop. This identified how the firm could harness matched grants, and a digital intern from the programme, to employ visualisation and virtual reality technology to enable expansion.

BEP needed to optimise space and production line layout to accommodate larger electroplating tanks. The firm worked with Made Smarter to begin developing a digital twin of the existing production facility to test the viability of the expansion and start training staff in the virtual world.

Expanding to a second site enabled an increase in turnover from £4 million to £6.5 million within four years, and the use of digital technology has helped to reduce the risk associated with their growth strategy whilst improving health and safety, as well as process efficiency.

Source: *Andrew McClusky, Managing Director at BEP Technologies.*

Manufacturing Observatory

Manufacturing supply chains have increased in complexity and the demand for more granular data is increasing as supply chains experience disruption and vulnerabilities. There are increased opportunities to improve our understanding of supply chains and the advanced manufacturing sector from data and other digital tools, to complement official statistics and our ongoing monitoring and evaluation work.

We will explore, including piloting, a Manufacturing Observatory, working with the Institute for Manufacturing and stakeholders. This would aim to build our capability with industry and researchers on manufacturing evidence and analysis. Better evidence and analysis through the Manufacturing Observatory will ensure better informed business decisions and policy making.

High Value Manufacturing Catapult

Our Catapult Network works with manufacturers, technology firms, and academia to commercialise great ideas. They have helped cement the UK's position as a science and technology superpower.

The High Value Manufacturing Catapult (HMVC) is the largest advanced manufacturing research capability in Europe - across 18 sites in England, Scotland, and Wales[103] - helping firms transform their performance and bring new products, processes, and services to market. The HMVC working with researchers and business, has received around £650 million in funding between 2018 and 2023.[104]

Over the last decade, HVMC has worked with nearly 22,000 companies[105]– over half of which are SMEs – and completed over 9,200 commercial and collaborative R&D projects.[106] In the Autumn Statement 2022, funding for the Catapult Network was increased by 35% over the next five years, to £1.6 billion in total, signalling a long-term commitment by Government to the sector.[107]

Horizon Europe and Copernicus

On 7 September 2023, the Prime Minister announced a new UK-EU agreement on the UK's association to Horizon Europe and Copernicus (Earth Observation Programme).[108] This was a significant moment for scientific and space collaboration between the EU and the UK. Horizon association will not only increase cooperation with the EU, but also Norway, New Zealand, and Israel, who are part of the programme.

Horizon Europe provides funding for research and innovation and creates international collaboration opportunities. UK researchers and businesses, including manufacturers, can now participate in the world's largest programme of research cooperation, which is supported by over £80 billion of funding during the programme's lifetime.[109]

Horizon particularly supports the UK's advanced manufacturing sector via "Cluster 4", where there are 18 calls currently open, with an approximate budget of €500 million.[110] These calls cover topics such as "Twin, Green and Digital Transition" and "Resilient Value Chains".

Net Zero Innovation Portfolio

The UK's £1 billion Net Zero Innovation Portfolio (NZIP)[111] aims to accelerate the commercialisation of low carbon technologies, systems and business models in power, buildings, greenhouse gas removals and industry. This forms part of the UK Government's wider £4.2 billion portfolio of net zero research and innovation programmes for 2022-25.[112] This includes investment in key sectors with UK manufacturing opportunities, including hydrogen, nuclear, renewables, CCUS, industrial decarbonisation and automotive and aerospace.

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[103] The Catapult Network. 'Our Catapult Centres.' 2023.
[104] Based on HM Government analysis.
[105] Catapult. 'A Decade of Innovation-driven Transformation: Annual Review 2020/21.' 2021.
[106] Bennett K. 'High Value Manufacturing Catapult Outlines its 2030 Vision.' 2021.
[107] Department for Science, Innovation and Technology. '2023 Update to the Catapult Network Review.' 2023.
[108] Prime Minister's Office. 'Joint Statement by the European Commission and the UK Government on the UK's Association to Horizon Europe and Copernicus.' 2023.
[109] European Commission. 'Horizon Europe: Budget.' 2023.
[110] European Commission. 'Cluster 4: Digital, Industry and Space.' 2023.
[111] Department for Energy Security and Net Zero. 'Net Zero Innovation Portfolio and the Advanced Nuclear Fund: Progress Report.' 2023.
[112] Department for Energy Security and Net Zero. 'Powering Up Britain: Net Zero Growth Plan.' 2023.

Long-term Investment for Technology and Science

To support pension scheme investment into the UK's most innovative companies, the Government will commit £250 million to two successful bidders under the Long-term Investment for Technology and Science (LIFTS) initiative, subject to final contract. This will create new investment vehicles tailored to the needs of pension funds, generating over a billion pounds of investment from pension funds and other sources into UK science and technology companies. Bidders are required to demonstrate that at least 50% of the total size of the investment vehicle be invested in UK based science and technology companies. This can include advanced manufacturing, where 50% nearly of business R&D is currently invested.[113]

B: Cooperating Internationally and Building Supply Chain Resilience

Increased global challenges, geopolitical tensions, and a more fragmented global economy all present risks to the UK's manufacturing sector including the trend from free international trade towards more managed trade. The UK's resilience is increased through an open global economy and a free trading system that increases fair competition. This must be coupled with going further in mitigating the risks of economic coercion and market distorting practices in our high value manufacturing sectors.

Our approach in the Advanced Manufacturing Plan aligns with the Integrated Review Refresh 2023,[114] which sets out how we are stepping up work to protect our economic security while preserving the UK's strengths as a great place to invest. We will continue to advance fair, free and open international trade in manufacturing goods and services for the UK and globally, as well as support UK manufacturers in taking advantage of the international opportunities it provides. We will deepen our collaboration with international partners to increase resilience for our supply chains critical to manufacturing, whilst boosting our UK capabilities and strengths. We will also continue to work with international partners to tackle forced labour and ensure business respect for human rights.

International Cooperation:

Free Trade Agreements and Mutual Recognition Agreements

Our Free Trade Agreements (FTAs) support the development of increased opportunities for manufacturing by reducing tariff barriers, simplifying customs processes, enabling the mobility of skilled workers; providing greater stability, certainty and security for investments; and diversifying the supplies of imports that our businesses depend on.

As well as pursuing the most ambitious programme of trade negotiations in the world, we are also working to ensure that our FTAs remain future proofed to technology development-focused to developments in technology. For instance, our recent agreement with Australia included the first ever innovation chapter, which provides a mechanism for the UK and Australia to collaborate on

[113] Office for National Statistics. 'Business Enterprise Research and Development.' 2022
[114] Cabinet Office. 'Integrated Review Refresh.' 2023.

the impact of innovation in trade, including new developments critical to advanced manufacturing such as Artificial Intelligence or 3D printing.[115]

Following EU Exit, the UK has rolled over stand-alone Mutual Recognition Agreements (MRAs) with Australia, New Zealand, Switzerland, and the USA. Our trade deals with Israel, Canada and Japan also include conformity assessment agreements. These agreements have helped facilitate the trade in manufactured goods, covering £19 billion of bilateral trade in 2021, of which £11 billion was UK exports.[116]

Single Trade Window

We are taking action to ensure British businesses are taking advantage of the opportunities of free trade. This includes transforming our support services and streamlining our processes. Through the UK Single Trade Window we will simplify import and export procedures. The programme is on track to deliver the core functionality by the end of 2024, where UK importers and exporters will be able to register, access integrated guidance, make customs import and export declarations, and manage customs authorisations and licenses through the platform.

Building Resilience in Critical Goods and Sectors:

Batteries

Batteries are essential products in modern, industrialised economies. In recent years, batteries have grown in importance, powering many of the technologies that will enable the transition towards net zero. This includes personal and commercial transportation and grid-scale battery energy storage systems, which allow us to use electricity more flexibly and decarbonise the energy system cost-effectively.

The global demand for batteries is expected to rise dramatically over the coming decades[117] and the UK is uniquely positioned to seize the opportunity thanks to our key areas of comparative advantage:

- **Innovation:** the UK is playing an important global role in R&D into battery chemistry optimisation, underpinned by the strength of our world-class research base. The UK ranks third in the world in terms of research quality into industrial batteries.[118]
- **Start-ups:** the UK has a leading EV battery start-up ecosystem, with the second highest enterprise value in Europe and the fourth worldwide.[119]
- **Automotive manufacturing:** the UK's advanced automotive manufacturing sector has an annual turnover of £70 billion and employs 166,000 people across the country.[120]

[115] Department for Business and Trade. 'UK-Australia Free Trade Agreement.' 2023.
[116] Department for International Trade. 'Annual Report and Accounts 2022-2023.' 2023.
[117] The Faraday Institution. 'The Gigafactory Boom.' Faraday Insights: Issue 2. 2022.
[118] Government Office for Science. 'Rapid Technology Assessment: Novel Batteries.' 2023.
[119] UK Research and Innovation and Dealroom.co. 'Electric Vehicle Battery Tech in the UK'. 2023.
[120] DBT analysis based on Office for National Statistics. 'Monthly Business Survey Turnover in Production Industries.' 2022; 'Employee Jobs by Industry.' 2023; 'Self Employment Jobs by Industry.' 2023.

A successful battery industry could be an important source of jobs and regional economic growth. A battery industry that supports domestic demand for EVs could employ 100,000 people by 2040 (35,000 in cell manufacturing and 65,000 in the battery supply chain).[121] **To support this growth, the Government has published the first UK Battery Strategy to have a globally competitive battery supply chain that supports economic prosperity and the net zero transition.**

Critical Imports and Supply Chain Strategy

The Government is committed to ensuring the UK continues to have access to goods required for our economic security and prosperity, through resilient global supply chains. The Government will shortly publish a Critical Imports and Supply Chains Strategy, the UK's first overarching strategy focused on building resilience across our imports. This strategy will focus on goods critical to the UK's thirteen designated Critical National Infrastructure sectors and five key growth sectors, including advanced manufacturing.

It will set out both an overarching vision for the long-term resilience of our critical supply chains and the actions Government will take, working with business and our international partners, to achieve this vision. These will include the steps to build our supply chain analysis capabilities, continue to provide a reliable and supportive business environment, respond and adapt to shocks, address long-term trends, and expand collaboration between Government and industry on issues of supply chain resilience.

Critical Minerals

'Critical minerals' are minerals with the highest importance to the UK economy and the highest levels of risk to their security of supply. The Critical Minerals Intelligence Centre (CMIC) identified the UK as having 18 critical minerals essential to the development of its supply chain in its first criticality assessment, published in 2022.[122] Criticality is constantly evolving, and this assessment will be updated by Summer 2024. The CMIC is also undertaking a foresight study in the UK's demand for critical minerals across its clean energy industries.

Many of these critical minerals are produced in comparatively small volumes today or as by-products of other mining activities. The production of electric vehicles, aerospace and defence equipment, hydrogen technologies, and compound semiconductors are highly mineral-intensive. The UK's commitments to transition to net zero and develop our advanced manufacturing capability both depend on globally secure sustainable critical mineral supply chains.

The *UK's Critical Mineral Strategy*[123] and *March 2023 Critical Minerals Refresh*[124] set out the Government's plans to accelerate the growth of domestic capabilities, collaborate with international partners, and enhance international markets to make them more responsive, transparent, and responsible.

The Government has a range of critical mineral partnerships with countries including Australia and Canada, and engages in multilateral forums such as the Minerals Security Partnership, the

[121] The Faraday Institution. 'UK Electric Vehicle and Battery Production Potential to 2040.' Faraday Report: Annual Gigafactory Study. 2023.
[122] Critical Minerals Intelligence Centre. 'Resilience for the Future: The United Kingdom's Critical Mineral Strategy.' 2022.
[123] Department for Business and Trade. 'Critical Minerals Strategy.' 2023.
[124] Department for Business and Trade. 'Critical Minerals Refresh.' 2023.

International Energy Agency's Critical Minerals Working Party and critical minerals work at the G7. These partnerships help diversify supply chains, promote sustainable and responsible practices, and increase the UK's security of supply. Each partnership leverages the UK's strengths in mining including services, finance, and R&D, and seeks to embed high environmental, social, and governance standards across critical minerals supply chains. Our international collaboration on critical minerals is central to the strategy. Recent advances include:

- **A Memorandum of Cooperation on Critical Minerals with Japan** during the latest G7 Trade Ministers Meeting.[125]
- **As part of the Atlantic Declaration announced by the Prime Minister and President Biden in June, we launched negotiations on a Critical Minerals Agreement.** Once concluded this enables those minerals extracted or processed in the UK to count toward sourcing requirements for clean vehicles eligible for tax credits under the US Inflation Reduction Act. [126]
- **Funding through the Foreign, Commonwealth and Development Office to the World Bank Group's Resilient and Inclusive Supply-chain Enhancement (RISE) initiative** to support the development of sustainable and responsible supply chains in clean energy products using critical minerals. This will lead to more quality local jobs and economic growth in low and middle income countries.

The UK Government remains committed to eliminating forced and child labour from global supply chains, and is funding a number of initiatives that seek to address these issues where critical minerals are sourced.

The Government is assessing the need for further support for financing in relation to critical minerals and considering options for how any gaps identified might be addressed. This includes assessing the role that UK Export Finance could play where finance is needed and there is a clear link to exports.

Cornish Lithium

Cornish Lithium received a £24 million equity investment from the UK Infrastructure Bank in August 2023, which was accompanied by an additional £30 million in private sector investment, allowing it to progress its Trelavour hard-rock mine project. This is part of a larger funding package of up to an additional £168 million second-stage financing to make progress towards the creation of a domestic supply of lithium for electric vehicle batteries.

Source: *Cornish Lithium.* 'Landmark US$67 million Investment for Cornish Lithium.' *2023.*

[125] Department for Business and Trade. 'UK-Japan Critical Minerals Memorandum of Cooperation.' 2023.
[126] Prime Minister's Office and others. 'The Atlantic Declaration.' 2023.

Chemicals

Chemicals play a vital role in the Government's commitment to reach net zero by 2050. The chemicals sector is key to unlocking decarbonisation pathways for manufacturing sectors. It provides the products needed to grow and expand sustainable technologies such as CCUS, the hydrogen economy, EV supply chains, as well as renewable and circular feedstocks to reduce the carbon footprint of end-consumer products. Government has been exploring options to significantly reduce costs for businesses under the UK's regulatory framework for chemicals (UK REACH), thus creating a better environment for businesses in the UK whilst establishing a more comprehensive picture of where and how chemicals are used in Great Britain.

Flue2Chem

Spearheading innovation in this space, a consortium of businesses, universities and non-Governmental organisations from across the UK has come together to develop the 'Flue2Chem' project. Supported by a £2.7 million grant from UK Research and Innovation (UKRI) Transforming Foundation Industries Challenge, it aims to develop new business models and capabilities that utilise industrial waste gases from a range of manufacturing industries to produce sustainable materials for consumer products.

Source: *United Kingdom Research and Innovation.* 'Projects aim to Reduce Waste and Improve Energy Efficiency.' *2023.*

Semiconductors

The semiconductor industry is crucial to help deliver a resilient UK supply chain for our future green sectors, including automotive and aerospace. In May, the Government published its National Semiconductor Strategy setting out how the UK would build on its strengths in design, research, and compound chip technologies. This includes an up to £1 billion investment to improve infrastructure, power research and develop and facilitate greater cooperation.[127]

This is in addition to extensive funding provided to the sector to date. The Government has provided £539 million in grants for research and £214 million directly to SMEs in the sector over the last 10 years.[128] UK capabilities include the Fraunhofer Centre for Applied Photonics, the Cambridge Centre for Gallium Nitride, and the Compound Semiconductor Applications Catapult based in Newport, Wales.

The Government has taken action to further support the competitiveness of the semiconductor manufacturing sector. We know that some companies struggle to access the finance they need to grow. **As announced at the Autumn Statement, the Government is unlocking new sources of finance for advanced manufacturing. The Chancellor has recently clarified the Government's priorities for the UKIB, to ensure it is able to invest in critical supply chain where the Bank's strategic objectives can be met, including semiconductor manufacturing.** The Bank are actively engaging with the sector and exploring market opportunities.

[127] Department for Science, Innovation and Technology. 'National Semiconductor Strategy.' 2023
[128] Department for Science, Innovation and Technology. 'National Semiconductor Strategy.' 2023

C: Reducing Costs and Removing Barriers

In the long run, business investment in the UK's manufacturing sector will be driven by the UK building on its competitive business environment – through reducing costs and removing the barriers placed on manufacturers. We are doing so through ensuring our business tax regime and energy costs are competitive, minimising regulatory and planning barriers, and reviewing our skills, finance, and tax levers. Through reducing these costs and removing barriers our combined measures in this plan offer a long-term commitment to attracting investment in the sector.

Competitive Tax Environment - Full Expensing

The UK has a highly competitive business tax regime, with an internationally competitive rate and some of the most generous investment incentives among major economies. It has the lowest Corporation Tax rate in the G7 at 25%.[129] At Autumn Statement the chancellor announced that Full Expensing would be made permanent solidifying our position at the top of the rankings of OECD countries plant and machinery capital allowances, and amongst the most competitive capital allowance regimes in the world.

The UK offers attractive venture capital schemes to help small and medium enterprises expand. The Patent Box offers a 10% corporation tax on profits attributable to patents and similar intellectual property.[130]

The Government is committed to internationally competitive R&D tax reliefs. **Following consultation, the current R&D Expenditure Credit (RDEC) and SME schemes will be merged from accounting periods beginning on or after 1 April 2024, simplifying the system and providing greater support for UK companies to drive innovation.**[131] The rate at which loss-making companies are taxed within the merged scheme will be reduced from 25% to 19%. The intensity threshold in the R&D intensives scheme will also be reduced from 40% to 30% for accounting periods that start on or after 1 April 2024. A one year grace period will also be introduced, providing certainty for companies who dip under the 30% threshold that they will continue to receive relief for one year. Taken together these changes will provide £280m of additional relief per year by 2028-29 to help drive innovation in the UK.

Competitive Energy Costs and Connections

We are committed to enhancing our energy security and seizing the economic opportunities of the transition to net zero. To achieve this, we aim to double Britain's electricity generation capacity by the late 2030s and fully decarbonise the power sector by 2035, subject to security of supply.

Industrial energy support: The Government is committed to minimising energy costs for energy intensive industries to help ensure they remain strong and competitive. Between 2013 and 2021 we provided over £2 billion of relief from policy costs passed on by electricity suppliers to over 300

[129] Organisation for Economic Co-Operation and Development. 'Statutory Corporate Income Tax Rates, Combined Tax Rates.' 2023.
[130] HM Revenue and Customs. 'Use the Patent Box to reduce your Corporation Tax on profits.' 2020.
[131] HM Treasury. 'Autumn Statement 2023.' 2023.

businesses across the UK.[132] In Spring 2023, the *British Energy Supercharger*[133] was announced and will provide further support to energy intensive industries.

Grid Connections: As highlighted in the PM's September Speech, ensuring grid connections are not a blocker to investment as we transition to a net zero energy system is a priority for Government. The Government is working with Ofgem and network companies to release network capacity and improve the connections process. Actions underway by network companies are already leading to customers receiving revised earlier connections.

The Connections Action Plan published on 22 November, jointly with Ofgem, builds on this work to go further and faster to reduce connection timescales. [134] Through the actions outlined in the plan, we aim for the vast majority of projects – up from 14% today - to get their requested connection date to the transmission network. We also aim to reduce the average delay a project faces to connect to the transmission network from 5 years to 6 months.

Action taken collectively with Ofgem, the ESO, and network companies will release 100GW of capacity – equivalent to around a quarter of the electricity needed to power our economy in 2050.[135] This will help open up the path to the decarbonisation of key manufacturing sectors, allowing the UK to remain a world-leader in decarbonisation.

Our Connections Action Plan formed part of a wider package of Electricity Network announcements, which collectively will reduce consumer bills, drive local jobs, support economic growth across the UK, and bring forward £90 billion of investment over the next 10 years.[136]

For example, alongside the Connections Action Plan, **the Government published the Transmission Acceleration Action Plan, to set out how we can halve the end-to-end build time of electricity transmission network infrastructure.**[137]

The Government has committed to make it easier for solar panels to be installed on the rooftops of commercial and industrial buildings such as warehouses and factories, as well **as car parks, through changes to permitted development rights.** The Government will also publish a solar roadmap in 2024, setting out a clear step by step deployment trajectory to enable us to meet our target of 70GW of solar power by 2035. We have also established a joint Government and Industry Taskforce, covering both ground mounted and rooftop solar to drive forward the actions needed to make this ambition a reality.[138]

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[132] Department for Business, Energy and Industrial Strategy. 'Government to consider further relief for energy intensive industries.' 2022.
[133] Department for Business and Trade. 'Government action to supercharge competitiveness in key British industries and grow economy.' 2023.

[135] Department for Energy Security and Net Zero. 'Huge boost for UK green industries with £960 million government investment and major reform of power network'. 2023
[136] Department for Energy Security and Net Zero. 'Huge boost for UK green industries with £960 million government investment and major reform of power network'. 2023
[137] Department for Energy Security and Net Zero. 'Transmission Acceleration Action Plan'.
[138] HM Government. 'Solar Taskforce.' 2023.

The net zero transition for energy for heat is being supported by £500 million to develop heat networks.[139] Heat Networks are often the lowest cost, low carbon heating option, particularly in high density urban areas. To better enable a growth in heat connections to around 20% of total heat by 2050, heat network zoning is being introduced in England.

At Autumn Statement 2023, the Government announced it is providing support to help industry transition to a resilient, low-carbon, and competitive future. [140] This includes spending £185 million on the Industrial Energy Transformation Fund (IETF) to support industrial sites with investment in more energy efficient and low-carbon technologies. This grant funding will come from the £6 billion announced at Autumn Statement 2022 to support energy efficiency from 2025,[141] with further allocations set out in due course.

The Government is also providing around £300 million a year in tax relief in exchange for meeting energy efficiency targets under the new six-year Climate Change Agreement Scheme, with associated relief running until 31 March 2033.[142] Manufacturing sectors that meet eligibility requirements but do not currently participate in the Climate Change Agreements Scheme are invited to make a proposal to be added to it.

Pilot Business Energy Advice Service trial in the West Midlands: This offers subsidised energy assessments and grant funding to implement energy efficiency measures to SMEs in the region. Businesses will be able to apply for grants up to £100,000 covering up to 50% of the total project costs.[143]

Regional Support: Freeports and Investment Zones

Freeports are new manufacturing hubs for strategic sectors located in places with strong industrial heritage and excellent connectivity. They create a special, business-friendly environment, offering manufacturers a range of incentives to reduce their costs and support growth. These include generous tax reliefs on new investment, simplified customs processes, dedicated government support for trade and innovation, and a facilitative planning environment. Each Freeport is also backed by up to £26 million Government funding to facilitate the development of targeted sites and will benefit from the reinvestment of locally retained business rates.[144] There are 12 Freeports across the UK: in addition to the eight Freeports operational in England, two new Green Freeports have been announced in Scotland and two Freeports in Wales.[145]

At Spring Budget 2023, the Government launched the refocused Investment Zones programme to catalyse a small number of growth clusters across the UK, including four across Scotland, Wales, and Northern Ireland.[146] The Government has identified advanced manufacturing as one of five

[139] Department for Energy Security and Net Zero and other. 'Energy Security Bill factsheet: Heat Networks Regulation and Zoning.' 2023.
[140] HM Treasury. 'Autumn Statement 2023.' 2023.
[141] HM Treasury. 'Autumn Statement 2022.' 2022.
[142] HM Treasury. 'Chancellor backs business and rewards workers to get Britain growing.' 2023.
[143] Business Growth West Midlands. 'Business Energy Advice Service (BEAS).' 2023.
[144] Department for Levelling Up, Housing and Communities. 'UK Freeports Programme Annual Report 2022.' 2022.
[145] Department for Levelling Up, Housing and Communities. 'UK Freeports Programme Annual Report 2022.' 2022.
[146] HM Treasury. 'Spring Budget 2023.' 2023.

priority sectors around which Investment Zones will be focused. In July 2023, the Government announced that the South Yorkshire region will be home to the UK's first advanced manufacturing Investment Zone. This will help bring an estimated 8,000 new jobs and £1.2 billion in investment to the region by 2030.[147] The Investment Zone will capitalise on the region's existing strengths in the aerospace sector by bringing together the University of Sheffield's Advanced Manufacturing Research Centre and aerospace sector businesses to pursue new innovations and further investment to the region.

At Autumn Statement, the Chancellor announced a further three Advanced Manufacturing focused Investment Zones in the East Midlands, Greater Manchester and the West Midlands:[148]

East Midlands, local partners expect that the Investment Zone will help to bring an estimated 4,200 jobs to the region and help to leverage over £380 million in private investment. The East Midlands Investment Zone will capitalise on the region's existing strengths in the advanced manufacturing and green industries through the investment made by Laing O'Rourke in its Centre of Excellence in Modern Construction near Worksop and Rolls-Royce's contribution to the Nuclear Skills Academy at Infinity Park Derby. The Investment Zone will allow the development of new technologies and products to help support infrastructure, modern methods of construction and nuclear development in the civil and defence spaces.

Greater Manchester, local partners expect that the Investment Zone will help to bring an estimated 32,000 jobs to the region and help to leverage £1.1 billion in private investment. The Investment Zone expands the city region's world class advanced materials cluster, with research facilities and universities at the core, and innovative materials and manufacturing businesses across the wider city region, collaborating to translate R&D and new discoveries into scaled up commercial production. This is attracting further private sector investment, with over 500 companies in Greater Manchester in advanced materials and manufacturing. New investments are anchoring the Investment Zone, ranging from materials science at First Graphene and Hydrograph, to the continued growth of multinational manufacturers, such as Kadant and Werit.

West Midlands, local partners expect that the Investment Zone will help to bring an estimated 30,000 jobs to the region and help to leverage £2 billion in private investment. The Investment Zone will capitalise on the West Midlands' globally renowned strengths in advanced manufacturing and engineering, with all six of the region's universities working with industry leaders to drive innovation in battery technology, green industries, and digital technology.

On 24 November, the Government and the forthcoming North East Mayoral Combined Authority, jointly announced that the North East Investment Zone will focus on Advanced Manufacturing and Green Industries, building on the region's long-standing strengths. The Investment Zone will help leverage significant private funding and help deliver more than 4,000 jobs over the first five years of the programme. The Investment Zone will capitalise on the region's existing strengths, including as a world leader in automotive and advanced manufacturing, electric vehicle production, battery manufacturing, the offshore wind sector, and advanced low-carbon materials, to pursue new innovations and further investment to the region. This will build on a new

[147] South Yorkshire Combined Authority. 'South Yorkshire Investment Zone to Create Thousands of New Jobs.' 2023.
[148] HM Treasury. 'Autumn Statement 2023.' 2023.

Nissan-led investment worth £2 billion into the North East,[149] recent investment from businesses including Equinor and JDR Cables, and the strong support of the region's Universities and Catapult Centres.

Local Authorities and Planning

The Government will strengthen the capacity of the planning system to deliver a better service for businesses, including introducing new premium planning services across England with guaranteed accelerated decision dates for major applications and fee refunds wherever these are not met. The government will also invest £5 million to incentivise greater use of Local Development Orders in England, to end delays for businesses so that key commercial projects secure planning permission faster.[150]

Local authorities have a local leadership and convening role, which means they can work closely with businesses and investors to encourage investment that would not otherwise be obtained, and make it easier for place-based investment models to be developed. Local authorities have a key role to play in delivering net zero but can face a lack of capacity and skills needed to develop commercially viable investment propositions for investors. The UK Government is funding work to address this by providing a range of support – for example, through the Local Net Zero Hubs Programme, which supports local authorities to develop net zero projects that can attract commercial investment and through Net Zero Go, a digital platform launched in 2022, which supports local authorities in developing projects through the sharing of knowledge and best practice.

Harrington Review

Lord Harrington's Review of the government's approach to attracting foreign direct investment has been published alongside the Autumn Statement.[151] **The Government has responded and accepted in principle his headline recommendations. A new Ministerial Investment Group will be established, tasked with driving the government's ambition on investment.** This will be backed by additional resources and an improved toolkit for the Office for Investment, allowing it to deepen its world-class concierge offer to strategically important investors.

Skills for Manufacturing

Modelling carried out by PricewaterhouseCoopers and the World Bank in 2022 suggests upskilling the UK manufacturing sector could deliver 3.2% GDP growth by 2030 through raising productivity. In the automotive sector alone over 60% of current manufacturing roles relating to electric vehicle power technologies will need upskill or reskill.[152]

But the sector currently faces skills challenges. The 2022 Employer Skills Survey indicates 42% of manufacturing vacancies are "skills shortage vacancies" compared to 36% for the economy as a

[149] Prime Minister's Office and others. 'Nissan triples investment in electric vehicle production in the UK.' 2023.
[150] HM Treasury. 'Autumn Statement 2023.' 2023.
[151] HM Treasury. 'The Harrington Review of Foreign Direct Investment.' 2023.
[152] The Catapult Network. 'The Opportunity for A National Electrification Framework and Forum.' 2021.

whole.[153] Make UK believes filling current vacancies could itself contribute close to £7 billion extra annually to UK GDP.[154]

Government supports manufacturing through our flagship Apprenticeship Programme, delivering manufacturing apprenticeships from Aerospace Engineering to Machining. This is bolstered by Institutes of Technology who are working on manufacturing, including advanced manufacturing industry pathfinders and skills bootcamps delivering manufacturing skills in areas such as clean energy, renewable energy, industry and transport.

To help smaller employers benefit from apprenticeships, the Department for Education (DfE) has launched an SME 'Pathfinder', including prioritising manufacturing, in four regions of the North of England to support those that have not had an apprentice in the past two years to do so – from recruitment to accessing funding.

Recent further education reforms have put technical skills at the heart of the Government's Post 16 offer. The Institute for Apprenticeships and Technical Education has worked with industry to produce 378 occupational pathways in Engineering and Manufacturing. We work closely with Made Smarter to identify the key skills needed to enable Industry 4.0.[155]

The government is supporting plans to catalyse the growth sectors including advanced manufacturing by committing £50 million to deliver a 2-year apprenticeships pilot in England to explore ways to stimulate training in these sectors and address barriers to entry in high-value apprenticeships. Further details will be announced in the new year.

In addition, to support the Advanced Manufacturing Plan, **the Department for Business and Trade will partner with the Department for Energy Security and Net Zero's Green Jobs Action Plan to publish an action plan on green skills in 2024.** We will work closely with the DfE and the Department for Environment, Food and Rural Affairs (Defra) to develop a forum with the National Manufacturing Skills Task Force. This will focus on issues that businesses have highlighted to us, including:

- Attracting more new entrants and promoting manufacturing as a life-long career.
- Supporting retraining for the digital and net zero transitions and making the skills system more responsive to future business needs.
- Exploring how we improve choice and availability for workers to find the upskilling courses they want.
- Considering how best to attract global talent for the overall benefit of UK industry.

In Autumn Defra will publish a response to the Independent Review into Labour Shortages in the food supply chain.

[153] HM Government. 'Employer Skills Survey: 2022.' 2023.
[154] Make UK. 'Industrial Strategy: A Manufacturing Ambition.' 2023.
[155] Industry 4.0 technologies include additive manufacturing, sensors, artificial intelligence, big data and analytics, and robotics. This is also called the fourth industrial revolution.

Skills in automotive

Skills requirements in the automotive sector are rapidly changing as production switches from Internal Combustion Engines to Zero Emission Vehicles. Industry-Government engagement on skills is taken forward through the Auto Council Skills Working Group, which works closely with the National Electrification Skills Framework and Forum on the development of the electrification workforce at all levels.

To meet the challenge of upskilling and reskilling the automotive sector, we are working with the Automotive Council to launch a regional upskilling and reskilling pilot matching future skills needs to short modular courses facilitated through an intelligent portal, with the intention of scaling up if the pilot is successful.

Access to Finance

Access to finance is a key enabler of manufacturing competitiveness, transformation, and growth. The UK has existing strengths as both a global financial centre and inward investment destination. As part of our plan to catalyse growth in the UK's manufacturing sector, the Government will deliver a new approach to ensure finance and products are available to unlock private investment for UK manufacturing scale-up. This will build on the UK's comparative advantages in both advanced manufacturing and financial services.

The UK's public finance offer – through UK Research and Innovation, BBB, UKIB and UKEF – is comprehensive and can support companies at all stages of the innovation, growth and export pathway. However, we want to ensure that the UK offer remains internationally competitive and make improvements wherever they are needed. **We will evaluate the existing finance offer available across the whole manufacturing sector. Our longer-term goal is to identify further opportunities to enhance this support in a sustainable and targeted way.**

The Government also recognises the importance of ensuring public money mobilises private investment, particularly across green industries and advanced manufacturing sectors. Blended finance approaches offer an important opportunity to do this, and the Government is committed to exploring the use of these approaches ahead of the next spending review. The Government recently announced the Net Zero Blended Finance Project, which will seek to build the capacity and expertise of Government to explore and utilise innovative approaches to funding design. Working with the UK's public finance institutions, the Green Finance Institute and engaging businesses and investors, we will better understand these approaches and ensure public investment better crowds in private finance.

The Department for Business and Trade will issue a Call for Evidence, and establish an industry forum, on access to finance for manufacturers. This will draw on evidence from the UK's public financial institutions – the BBB, UKIB, and UKEF – to identify the market failures, constraints, and barriers that the sector is facing to unlock additional investment for advanced manufacturing, particularly for scale ups looking to manufacture in the UK. The findings will be reported back by Summer 2024.

UKEF, the UK's export credit agency, plays an important role in helping manufacturers to realise their export ambitions. In 2022-23, UKEF provided £6.5 billion in support for UK exporters (84% of companies supported were SMEs) with 82% of support going to companies based outside of London.[156] Of that support, £3.5 billion went to manufacturing firms, which supported up to 34,000 jobs.[157] UKEF was also recognised as the Best Export Credit Agency by the Global Trade Review Leaders in Trade Award (2023).[158]

UK Export Finance support helps Trifast to scale operations and boost its exports growth

A guarantee from UK Export Finance (UKEF) has helped to secure a £50 million loan for global industrial fastenings group Trifast, a UK listed PLC. This builds on £3.5 billion of new, direct support which UKEF gave to the UK manufacturing sector in 2022-23.

The Export Development Guarantee issued by UKEF backs financing arrangements from HSBC, NatWest, and Citi and will support Trifast in developing its exports business. The UKEF loan guarantee allows Trifast by to developing new product ranges and making targeted investments supporting its export growth. This will include the development of a 75,000 square foot national distribution centre in the Midlands for Trifast's UK subsidiary TR Fastenings.

With headquarters in East Sussex, Trifast employs 500 people in the UK from a total global workforce of over 1,300. Serving more than 5,000 companies over three continents, it supplies to a range of key sectors like light and heavy vehicle production, health & home, energy, technology, infrastructure, and general industry.

Source: *Trifast.* '£50 million UK Export Finance loan guarantee helps Trifast further expand its global reach'*. 2023.*

Pro-Growth Regulatory Environment

Regulation plays a vital role in protecting consumers, the environment, and setting the right frameworks for businesses to thrive. Smarter regulation is about only using regulation where necessary, implementing it decisively, and ensuring its use is proportionate and future-proof.

The Smarter Regulation programme launched in May with the publication of *Smarter regulation to grow the economy.*[159] This set out our vision for regulation and a commitment to a series of regulatory reform announcements across the year to benefit businesses - including manufacturers - and drive innovation and growth. This includes:

Reviewing existing regulation. We have already reformed or revoked over 1,000 pieces of Retained EU Law (REUL) with 1,000 more reforms and revocations underway.[160] We have also

[156] United Kingdom Export Finance. 'Annual Report and Accounts 2022-2023.' 2023
[157] United Kingdom Export Finance. 'Annual Report and Accounts 2022-2023.' 2023
[158] Global Trade Review. 'Global Trade Review Leaders in Trade 2023: The Winners.' 2023.
[159] Department for Business and Trade. 'Smarter Regulation to Grow the Economy.' 2023.
[160] Department for Business and Trade. 'Schedule of Retained EU Law'. 2023.

held consultations on the product safety review[161] and the fire safety of domestic upholstered furniture,[162] as well as announcing the decision to indefinitely extend recognition of the CE mark for around 18 regulations.

Our new Better Regulation Framework,[163] designed to place downward pressure on the flow of new regulation; encourage alternatives to regulating as far as possible and allow for a wider consideration of impacts.

Consultations aimed at improving the outcomes that independent regulation delivers. This includes a Strategic Steer for the Competition and Markets Authority,[164] Strategy and Policy Statement for Energy regulation[165] and we consulted on extending the existing growth duty to Ofgem, Ofcom and Ofwat.[166] A recently announced Call for Evidence on the regulatory landscape is the next step that the Government is taking to ensure that we have a world-leading regulatory system.[167] The Government response to the extension consultation, published as part of the Autumn Statement, confirms our intention to proceed with the extension. By extending the Growth Duty to these regulators, we are building from a position of strength to maximise all opportunities to grow the economy.

At the Autumn Statement, we also launched the Regulating for Growth consultation which includes revised statutory guidance for regulators in scope of the Growth Duty. The consultation also seeks views on proposed measures to increase regulator performance, agility and accountability and is open for responses until 17th January 2024.

At Autumn Statement, the Government also launched a consultation on strengthening the economic regulation of the energy, water, and fixed telecoms sectors as regulated by Ofgem, Ofwat and Ofcom. This consultation seeks views on proposals to improve the economic regulatory environment, increase investment and growth, promote competition, provide support to consumers, and bolster the appeals regime.

Alongside the Better Regulation Programme, **the Government published Professor Dame Angela McLean's Pro-Innovation Regulation of Technologies Review: Advanced Manufacturing**,[168] which focuses on the role that regulation and standards can play in driving innovation and growth in advanced manufacturing, alongside the Government's response.

The Government accepts all 14 recommendations in the report which builds on the UK's role as a global leader in setting industrial standards and sets out how, with the right regulations, advanced manufacturing processes can realise the potential of rapid technological change, enhance safety and support the drive to net zero and a sustainable economy. The recommendations which will boost innovation and growth in UK manufacturing cover the latest generation of automation and

[161] Department for Business and Trade. 'Smarter Regulation: UK Product Safety Review'. 2023.
[162] Department for Business and Trade. 'Smarter Regulation: Fire Safety of Domestic Upholstered Furniture'. 2023.
[163] Department for Business and Trade. 'Better Regulation Framework.' 2023.
[164] Department for Business and Trade. 'Strategic Sheer to the Competition and Markets Authority.' 2023.
[165] Department for Business and Trade. 'Strategy and Policy Statement for Energy Policy in Great Britain.' 2023.
[166] Department for Business and Trade. 'Smarter Regulation: Extending the Growth Duty to Ofgem, Ofwat and Ofcom.' 2023.
[167] Department for Business and Trade. 'Smarter Regulation and the Regulatory Landscape.' 2023.
[168] HM Treasury. 'Pro-Innovation Regulation of Technologies Review: Advanced Manufacturing.' 2023.

robotics, additive manufacturing and digital twins as well as sustainable measures in the circular economy and the opportunity to progress and promote advanced manufacturing technologies through International Standards Organisation (ISO).

Part 3: Next Steps

As outlined throughout this document, the UK has a thriving advanced manufacturing sector. The Government's ambition is for the UK to be the best place in the world to start and grow a manufacturing business, as well as to ensure the sector continues to take advantage of the opportunities presented by the twin transitions of net zero and digitalisation.

This Plan sets out the targeted and strategic steps we are taking to support advanced manufacturing, building on existing programmes, and offering certainty to investors. It also sets out actions we are taking to maintain the competitive business environment necessary for stimulating the sector’s growth, productivity, and boosting its competitiveness.

To meet our ambitions for the sector and attract investment, we will be championing our plan and UK manufacturing over the coming months, both at home and abroad, ensuring as many businesses as possible are aware of the opportunities the UK offers.

The Plan was formulated having listened to investors, manufacturers, trade associations, academics, and stakeholders. We will continue to work with these organisations, as well as devolved administrations and local authorities, to monitor evaluate and implement the Plan, so the UK continues to be a world leader in manufacturing.

Annexes

Annex I: Glossary

Advanced Manufacturing: Production processes that integrate advanced science and technology, including digital and automation, into manufacturing. In the context of the UK, this helps UK manufacturers create products that meet future technological demands and enables the UK to lead on the twin transitions of net zero and digitalisation.

Advanced Modular Reactors: A broad group of advanced nuclear reactors. These reactors use novel and innovative fuels, coolants, and technologies to generate low carbon electricity. They can use modular, off-site manufacturing for flexible deployment. Many designs have the potential for a range of applications beyond low-carbon electricity generation, including: production of hydrogen, direct heat for industrial or domestic use, and nuclear waste management solutions.

Artificial Intelligence: The use of digital technology to create systems capable of performing tasks commonly thought to require intelligence. It is constantly evolving, but typically involves machines using statistics to find patterns in large amounts of data and can perform repetitive tasks with data without the need for constant human guidance.

Battery: Generally taken to mean a battery pack, which usually comprises several connected battery modules made up of a cluster of cells.

Blended Finance: The complementary use of grants (or grant-equivalent instruments) and non-grant financing from private and/or public sources to provide financing on terms that would make projects financially viable and/or financially sustainable.

Carbon Capture, Utilisation and Storage: A set of technologies which can together capture carbon dioxide from waste gases at industrial facilities. This carbon dioxide can either be 'locked up' in offshore geological storage sites, where it can be stored indefinitely (carbon capture storage), or reused in an industrial process (carbon capture utilisation).

Connected and Automated Mobility - refers to the design, development, manufacturing, certification, and deployment of connected and self-driving vehicles (i.e., those which can operate safely without human intervention).

Critical minerals: Minerals of both high economic importance and high risk of supply disruption. For further information on how minerals are evaluated to be “critical,” see the UK criticality assessment of technology critical minerals and metals.[169]

Electrification: Switching from using fuels such as gas or petroleum, to using electricity.

Electric Vehicle: Vehicles which run, either partially or wholly, on electricity stored on board the vehicle in batteries or produced from hydrogen. Some types of EV qualify as zero emission vehicles (ZEVs) or ultra-low emission vehicles (ULEVs), whereas others do not because their emissions are too high.

Gigafactory: A facility to manufacture batteries at scale.

Grid Connection: The connection of power generation equipment to the public electrical supply, with the purpose of providing distributed generation.

Heat Network: the supply of heat from a central source or sources to consumers, via a network of underground pipes carrying hot water. By supplying multiple buildings, they avoid the need for individual

[169] British Geological Survey. ‘UK Criticality Assessment of Technology Critical Minerals and Metals.’ 2022.

boilers or electric heaters in every building. Because of this, in high density areas, they are often the lowest cost, low carbon heating option.

Industry 4.0: Made Smarter define Industry 4.0 as a 'term for the technologies that empower businesses to collect and analyse data through machines and automate and streamline their processes.' [170] Industry 4.0 technologies include additive manufacturing, sensors, artificial intelligence, big data and analytics, and robotics. This is also called the fourth industrial revolution.

Net zero: Net zero refers to a countries' greenhouse gas emissions being equal to, or less than, the emissions they remove from the environment. The UK Government's Net Zero target refers to a commitment made for the UK to reduce its greenhouse gas emissions by (at least) 100% from 1990 levels by 2050.[171]

Semiconductor: These are a class of materials used to create the hardware that underpin electronic devices. They are the basis upon which integrated circuits, or computer chips, are built. Semiconductors underpin our economy, national security, and modern way of life.

Small Modular Reactor - Reactors which are smaller in size than conventional nuclear reactors, and can use modular, off-site manufacturing for flexible deployment.

Supply Chain Resilience: A resilient supply chain is one that can withstand and proactively tackle the challenges of today and the future. These challenges include changes in the global economy, geopolitical environment and climate that have recently increased the frequency and magnitude of both demand and supply shocks to industry globally.

Watt-hour: Unit of electrical power equivalent of the total energy supplied if electrical power of one watt is maintained for one hour. One gigawatt hour is equivalent to 1 billion watt-hours, and 1 terawatt hour is equivalent to 1 trillion watt-hours.

Annex II: Acronyms

AMR – Advanced Modular Reactors

ANF – Advanced Nuclear Fund

APC – Advanced Propulsion Centre

ATF – Automotive Transformation Fund

ATI – Aerospace Technology Institute

CAM – Connected and Automated Mobility

CCAV – Centre for Connected and Autonomous Vehicles

CCUS – Carbon Capture, Usage and Storage

CMIC – Critical Minerals Intelligence Centre

CO2 – Carbon Dioxide

DBT – Department for Business and Trade

[170] Made Smarter. 'What is Industry 4.0?' 2023.
[171] Department for Energy Security and Net Zero and others. 'Net Zero Strategy: Build Back Greener.' 2022.

DC – Defined Contribution

DEFRA – Department for Environment, Food and Rural Affairs

DfE – Department for Education

EVs – Electric Vehicles

FTA – Free Trade Agreement

GDP – Gross Domestic Product

GIGA - Green Industries Growth Accelerator

GVA – Gross Value Added

GW - Gigawatt

GWh - Gigawatt Hour

HMVC – High Value Manufacturing Catapult

IDT – Industrial Digital Technology

IfATE – Institute for Apprenticeships and Technical Education

LIFTS – Long-term Investment for Technology and Science

MRA – Mutual Recognition Agreements

NZIP – Net Zero Innovation Portfolio

R&D – Research and Development

REUL – Retained European Union Legislation

SMEs - Small and Medium-sized Enterprises

SMR – Small Modular Reactors

UKEF – UK Export Finance

UKIB – UK Infrastructure Bank

UKRI – UK Research and Innovation

ZEV – Zero Emission Vehicles

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