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Making the Industrial Strategy work

A response to the Green Paper from the Clean Growth Commission

CONTENTS

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Acknowledgements

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Summary

The government must prove the success of its new industrial strategy on two fronts. First, it must demonstrate that its planned sectoral approach will be meaningfully different and more economically successful than the one launched by Theresa May in 2017, whether measured in economic growth, increased productivity, greater investment, or jobs created. Second and relatedly, it must succeed politically. The political failure of Bidenomics, despite its success in attracting investment to the US, risks its unpicking in the coming years: the Labour government must ensure that the economic success of its strategy translates to political support, in turn allowing for a sustained period of policy certainty.

The industrial strategy green paper has already defined its success beyond economic growth: reaching net zero, accelerating regional growth and improving economic resilience. The achievement of these goals, and the investment to reach them, must be visible to the public and businesses. That means that its effect must be felt outside London and the South East. As things stand, the UK is the only Western G7 nation where knowledge-intensive jobs have become more concentrated in the dominant region (London and the South East) over the last decade.[1]

The view of this paper is that for the government to succeed in these aims, clean energy - and the parts of advanced manufacturing that support clean energy - should be its first priority and the central focus of the industrial strategy. These sectors meet the goals set out by the government more effectively than any other set out in the green paper. We offer policy recommendations to target the common problems facing both sectors, and then provide specific recommendations to support the expansion of key technologies within clean energy, notably offshore wind, hydrogen and carbon capture utilisation and storage (CCUS).

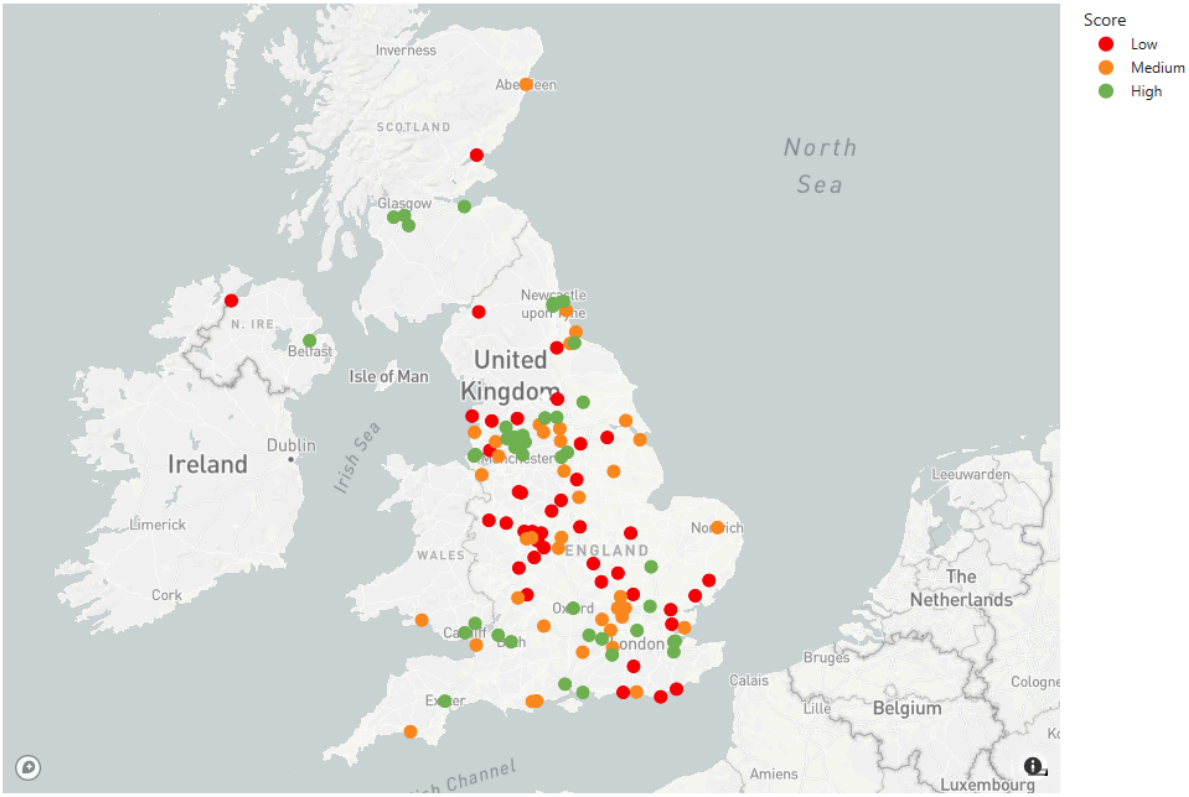
One reason for picking out clean energy is obvious - if the government wants to reach net zero through its industrial strategy - it must focus on the sector that is most directly related. But in our analysis we also identified two core reasons to focus on clean energy, as well as on advanced manufacturing more broadly:

1. **Location**. To inform this paper we created a new towns and cities index indicating future opportunities for advanced manufacturing and the clean energy supply chain. Our analysis finds that the conditions for both sectors are disproportionately favourable outside London and the South East, particularly in the North West with powerful implications for **regional growth potential,** alongside existing clusters of activity in areas such as Hull and Teesside. The two sectors also have a **degree of geographical overlap** allowing the government's industrial strategy to make fewer interventions but with greater impact.

[1] Financial Times, *The London Problem is holding young Brits back*

2. **Comparative Advantage.** We conducted an analysis of comparative advantage for the UK, finding that we have **existing strength in several areas** under clean energy, and **we have the potential for many more** - particularly if we improve technological sophistication. These fall under the subsectors of offshore wind, CCS, and hydrogen, and include technologies such as pipes for CCS, tower and lattice masts and blades for wind turbines, and green transport equipment.

Both clean energy and advanced manufacturing encompass several of the government's **other high-profile targets,** notably Clean Power 2030 and investment for growth, while boosting economic resilience by reducing reliance on global supply chains that have, in recent years, proved to be volatile and damaging to the UK economy. The industrial strategy therefore offers an opportunity to bring coherence to a wider variety of government actions, clarifying future decision-making to both businesses and voters.



REGIONS OF THE UK MOST SUITED TO CLEAN ENERGY TECHNOLOGY

Public First analysis maps areas suitable for clean energy technology in the UK based on a number of factors. Green spots indicate areas of high suitability, yellow medium, and red low suitability.

Focussing on the right subsectors is key to the strategy's success

The UK is unquestionably a service-based economy, and a strategy prioritising subsectors within the clean energy sector must recognise that services should be a focus. But it cannot be the only focus if economic resilience is a goal. In the areas of goods production where we have a comparative advantage, we score very highly. Using international measures of 'revealed comparative advantage' (RCA) - a measure of relative strengths and weaknesses in exports - we can see that across all goods product categories (for example chemicals or manufactured goods), the UK had the highest average RCA of G7 countries in 2023, up from third in 2013, though its advantage is concentrated amongst the fewest products.[2]

In green products specifically, there are both threats and opportunities. Our overall comparative advantage has been static for the last 20 years and, along with other G7 countries, the sophistication of our products has declined. So has market share. Both are driven by the ascendancy of China, a trend unlikely to abate.

But when we assess the areas where we already score highly against future demand (where current supply of wind, electrified heat, and other technologies are projected to fall well short of a net zero scenario), we see that current and potential strengths in subsectors align well to probable market growth. We go into specific subsectors in the paper, but we identify 17 areas of advantage under the broad headings of **Hydrogen; CCS; and Offshore Wind.** These come from a mix of manufacturing and services. Of these, offshore wind represents the most mature and therefore most immediate and significant opportunity for the UK, with extensive work elsewhere pointing to the vital role it will play for energy security, regional growth, economy-wide decarbonisation, and if industrial strategy is effective, supply chain resilience. It is already one of the UK's most significant economic success stories, but more needs to be done under both an industrial strategy and the wider work of DESNZ to capitalise on the industrial opportunity the sector offers. This includes the renewal of recently curtailed grant funding under the Green Industries Growth Accelerator: the UK is on the precipice of a significant economic opportunity in this sector, but must act to ensure it keeps pace with fierce international competition for capital. Similarly, Hydrogen and CCS are key opportunities of the future, and areas where the UK can take advantage of less mature technologies to grow its market share globally, but action is required to ensure the investment opportunity is not missed, and industrial strategy has a pivotal role to play. Each of these subsectors has different needs, and the strategy must coordinate policy and funding appropriate to each.

If, then, we see major regional opportunities in clean energy subsectors, and significant current and potential technological and manufacturing advantages, how does an industrial strategy help?

[2] UNCTAD Comparative Advantage Index

Fundamentally, to achieve its goals, industrial strategy needs to support the expanded manufacturing of more technologically advanced products, in the right places. This is how it will achieve regional growth, net zero, and economic resilience to external shocks.

Our analysis shows that whilst some regions are comparatively strong within the UK for development of clean energy, we still have core weaknesses that are impeding growth. The North-West in particular may perform well in comparison to other regions in the UK, but compared to international competitors like the Netherlands, the UK lags behind its peers.

We therefore offer a series of fundamental policy recommendations built around three core problems:

- **Land**. Expanding sites in the UK is expensive. Reducing the cost of industrial rent is fundamental to manufacturing strength, but at present too many areas are priced out of building new sites, or growing their existing ones. This is due to the complex and arbitrary nature of the UK's planning system, preventing building and impeding investment. New facilities need access to low-carbon power infrastructure, be it hydrogen, CCS, or electricity.
- **Skills.** Making technologically complex products requires a highly skilled workforce. Yet provision of in-work training and the uptake of apprenticeships is insufficient to equip workers for the future. The state needs to bring more coherence between its skills policy and the objectives of its industrial strategy, starting with a clear focus on understanding the labour market and its needs.
- **Capital**. New technologies are risky for investors. This is especially the case in clean energy where even mature technologies are often large, physical and expensive, but require access to capital. The state needs to use its new institutions to support financing of first-of-a-kind clean energy projects through grants, guarantees, and equity, as well as the bridge funding required for UK start-ups to scale and grow here, not abroad. It must accompany this with a policy environment which enables low-cost financing without loading unnecessary risk onto developers.

Headline Foundational Policy Recommendations

1	**Land**
	Assign 'growth areas' under Local Growth Plans and the Strategic Spatial Energy Plan adopting a similar approach to Germany, who are accelerating infrastructure deployment by shortening approval times in pre-approved 'acceleration areas' with presumed consent.
	Introduce an 'innovation' use class in the National Planning Policy Framework to accelerate the delivery of lab space, data centres, and first-of-a-kind technologies.
	Invest to increase capacity in local planning authorities, Planning Inspectorate and regulatory authorities (such as the Environment Agency), providing incentives for progression that could boost staff retention.
2	**Labour**
	Ensure Skills England gathers Labour Market Intelligence (such as annual workforce-need surveys and forecasts) , and identifies trends and skills shortages across sectors to provide actionable recommendations to policymakers.
	Dedicate 50% of Skills Levy funding to apprenticeships or non-apprenticeship training programmes in areas with identified shortages.
	Create tax reliefs for businesses investing in training, and enhanced incentives for SMEs to train new and existing staff.
3	**Capital**
	Address the gap between the largest ticket available under the British Business Bank (BBB) and the smallest under the National Wealth Fund (NWF) by expanding their remits. Simultaneously, further develop the British Growth Partnership by emulating the success of the French 'Tibi' Scheme.
	Demonstrate the effectiveness of industrial strategy by establishing a workstream under the NWF for high-risk or first-of-a-kind cleantech.
	Assess whether the NWF's risk appetite is effective in reaching the government's goals. Cleantech is inherently high-risk, but UKIB's required portfolio-level return on equity is 2.5-4%. Ensure capital expenditure on plant, machinery, and equipment is within scope of qualifying costs for R&D tax credits, bringing the UK in line with nations such as France.

There are also unique barriers holding back the deployment of specific clean technologies, and the growth of their market opportunities domestically. It is critical the industrial strategy uses the UK's own market - supporting the shift of industrial decarbonisation to support electrification, expanded carbon capture and green hydrogen.

Headline Priority Sector Policy Recommendations

1	**Industrial Decarbonisation**
	Outline the economic justification in the Industrial Decarbonisation Strategy for sectoral funding settlements, ensuring a level playing field that provides sufficient support for all energy-intensive industries.
	Consolidate, extend and increase funds such as the Industrial Energy Transformation Fund and the British Supercharger, which support supports clean energy investments and mitigate the policy and network costs impacting energy-intensive industries respectively.
	Combine the Net Zero Innovation Portfolio with the Green Industries Growth Accelerator, including a GDP-based R&D intensity target, repackaging it as an Industrial Innovation Fund to support supply chain opportunities.
2	**Electrification**
	Lay out a CfD pipeline under a 10-year, volume allocation schedule to encourage electrification and extend contracts beyond 15 years to reflect longer project lives and unlock lower cost of capital.
	Compensate industry for 90% of network charges, matching French and German electrification support.
	Underwrite Power Purchase Agreements (PPA), by providing a credit wrap to shield developers from customers' credit risk, which supports electrification by reducing risk to developers.
3	**Carbon Capture, Utilisation and Storage (CCUS) & Hydrogen**
	Work with the National Energy System Operator (NESO) to plan H2 and CO2 pipeline infrastructure in the same way as electricity networks to ensure fuel switching is complemented by the development of transport and storage infrastructure.
	Support projects under Hydrogen Allocation Round 1 to ensure they progress to final investment decisions (FID) as soon as possible.
	Provide clarity on next steps for expansion of the Track 1 and Track 2 CCUS Cluster Sequencing Programmes, which facilitate the identification and sequencing of CCUS, as well as the future revenue support envelope for UK cluster deployment and a vision for dispersed sites.

CHAPTER ONE:

Introduction

The new government has launched a Green Paper consulting on the design and focus of an industrial strategy. Its stated goal is investment in eight 'high-growth sectors' that boost net zero, regional growth, and economic resilience. This is an expansion from the four sectors Labour promised in opposition.

The government needs to prove the effectiveness of its industrial strategy in the face of scepticism on two fronts. The first is that the UK government has been here before. The Green Paper's approach is akin to the 2017 strategy launched by Theresa May's Conservative government. Many referred to it as too wide-ranging without a recognition of what challenges industrial policy could solve.[3] Businesses are understandably wary of trying the same thing again, only for it to be gone again in a few years time.

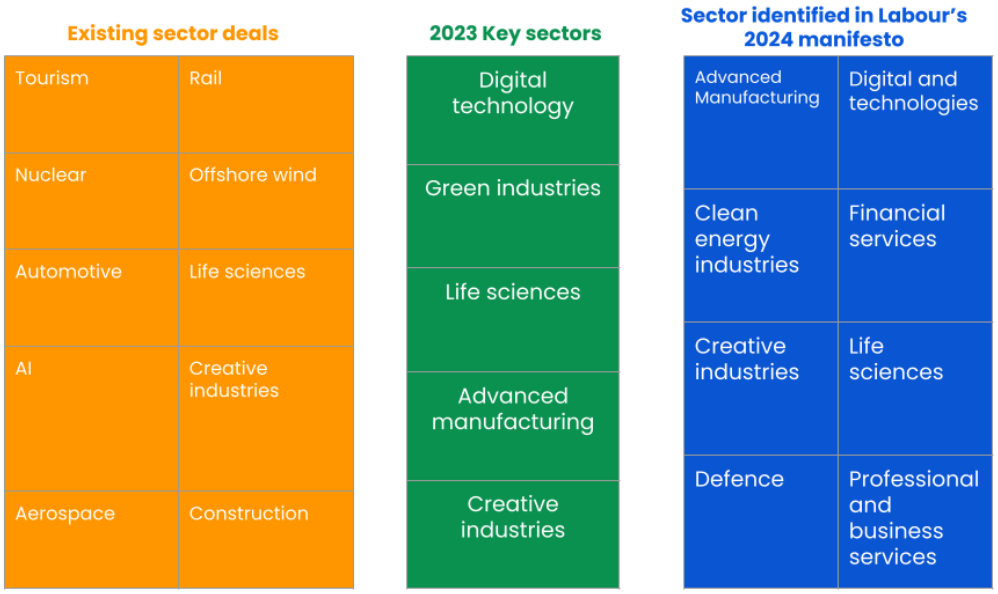


Fig 1: The overlap between existing sector deals, the previous government's target sectors, and Labour's target sectors listed in its 2024 manifesto

The second is that it may fail politically, undermining the certainty and consistency that businesses have been asking the government for for years. Many UK commentators have taken cues from the Biden White House's industrial strategy. While the economic impact of Bidenomics has been profound, with a revival of US manufacturing, particularly in those areas that had suffered from de-industrialisation, many think its political benefits were insufficient.[4]

[3] Laying the (right) foundations: four problems with the Industrial Strategy Commission's report
[4] Department of Commerce, October 2024

In short, Labour needs to prove that industrial strategy can succeed, and on two measures: one, increasing investment in priority sectors; and two, proving that industrial strategy is politically beneficial, i.e., that voters recognise and appreciate its impact. Public First has written extensively on the increased levels of cynicism in the electorate. The government needs to ensure the policy interventions it makes are tangible.

The industrial strategy green paper has already highlighted three goals that it will try to achieve through growth of its priority sectors: reaching net zero, accelerating regional growth and improving economic resilience. What is needed is for these goals, and the accompanying sectoral investment, to be visible to the public, and for both them and the businesses involved to notice the change that comes from achieving them. That requires an understanding of the places that industrial strategy will manifest, and the impact of industrial policy on those places.

The focus of this report, then, is on enabling the government's current industrial strategy to succeed both practically and politically. To do that we will:

- Look at the potential for clean energy and advanced manufacturing, how it supports the government's broader industrial strategy goals, and where in the country an industrial strategy might focus;
- Analyse the specific comparative advantage we have in these sectors, looking at areas of current strength and potential;
- Set out the foundational policy interventions that will support growth across these sectors and others;
- Identify specific priority policies for clean energy and the areas of advanced manufacturing associated with clean energy.

Our core recommendation is that the government will need to walk before it tries to run. To overcome cynicism in businesses, voters and the media will require proof of concept for industrial strategy. They should concentrate where visible improvements can be made, quickly - whilst bringing coherence and therefore predictability to a broader range of government's goals.

CHAPTER TWO:

Where to focus: our town & city index

Different places lend themselves to different industries. This can be because of proximity to a resource (e.g., a CCS storage site), infrastructure (a port), or a trained workforce (industrial towns). A sectoral approach to industrial strategy cannot therefore work without understanding the *where* behind those sectors.

This government clearly cares about *place*, and in particular the development of areas outside London and the South East. There is a throughline from the Brown Commission to the Green Paper on local places and their connection to growth. In conversation with the mayoralities, industrial strategy should provide regions, who have received increased powers and devolved funding, with clarity on what they should focus on and what they need to ask of the central government. Not only will local areas be instrumental in delivering many aspects of industrial strategy, they will also be frontline of its reception amongst the public and local businesses.

In this report, we focus specifically on clean energy and advanced manufacturing, which will have a disproportionate impact on the potential for Labour's industrial strategy both to succeed in its stated goals and in making that change visible to local businesses and voters.

Both sectors offer disproportionate impact on regional growth potential, as well as the other goals of the Industrial Strategy, notably net zero. They have a high degree of overlap allowing the government's industrial strategy to make fewer interventions but with greater impact. They crucially encompass several of the government's other high-profile targets, notably Clean Power 2030. The industrial strategy therefore offers an opportunity to bring coherence to a wider variety of government actions, clarifying future decision-making to both businesses and voters.

The government is not currently set up to deliver industrial strategy. Focusing on two specific sectors will give the government the time it needs to build the right structures, build the internal understanding of the private sector, and develop the right policies to intervene. The delivery of clean energy and advanced manufacturing will also force the government to build the internal processes required for other priority sectors - and prove that industrial strategy can succeed.

Clean Energy. Clean energy is a broad sector, and is also referred to as clean technologies. It covers not just the construction and installation of energy infrastructure but, crucially, the manufacturing and services that will provide the components and expertise to decarbonise both the energy sector and the broader economy. This includes, for example, the manufacturing of electric-arc furnaces to produce clean steel, electrolysers to produce clean hydrogen, or transistors to transport electricity across the country.

Our analysis covers five broad categories of industry:

- **Cleaner or More Resource Efficient Technologies and Products**, which covers a broad range of transport technologies;
- **Energy Efficiency** such as insulation or energy efficient bulbs;
- **Efficient Consumption of Energy Technologies and Carbon Capture and Storage**, including piping, condensing, turbines, or transformers;
- **Heat and Energy Management**, such as heat exchange units, thermostats, or smart meters;
- **Renewable Energy**, including components of generating technology, its installation, and related services such as engineering or legal.

We have not included categories related to environmental or natural resource management - for example air pollution or waste control.

Advanced Manufacturing, also referred to as high-value manufacturing. It is defined here as manufacturing techniques using advanced technologies, often including high levels of digitalisation and automation. Advanced manufacturing is required to make the more technologically complex future clean energy technologies we describe below. Its use is widespread in, for example, the production of pharmaceuticals, aerospace, and, most relevant to this paper, green manufacturing.[5] [6] For the purposes of this report, we are focused on advanced forms of manufacturing that support the wider clean energy industry.

We have therefore set out to understand where in the UK has the most supportive conditions for potential growth in the clean energy and advanced manufacturing industries. We created an index of UK major towns and cities using a range of factors to determine the suitability of different locations for advanced manufacturing and clean energy, driven by analysis of the factors which drive growth.

For our potential growth index, we consider industrial or office rents, size of the workforce in the Travel to Work Area (TTWA) with relevant skills, size of the established industry in the TTWA, distance and quality of nearby research institutions, investment

[5] https://www.civitas.org.uk/reports_articles/picking-winners-how-uk-industrial-policy-ensured-the-success-of-the-aerospace-and-automobile-industries/

[6] https://economy2030.resolutionfoundation.org/reports/growing-clean/

into the area, the business environment, recent industry growth, and the quality of transport infrastructure in different locations. We assign a score to each major town or city for each metric based on a percentile ranking and equally weight each metric. A full methodology can be found in the annex, and an interactive version of our index is here.

Our index emphasises the role of sector-specific skilled labour and the existence of relevant industry experience driving the growth of particular sectors in certain regions. The academic literature on industrial policy is clear on the benefits of having spatially concentrated pools of labour. There is strong evidence that having high concentrations of relevant skilled labour in strategic locations results in productivity benefits both through external and internal learning-by-doing externalities, reflected in statistically significant productivity gains across plants[7][8][9]. These results are complemented by case study evidence of the positive effects of pools of skilled labour in areas like Glasgow, Newcastle and Belfast on British shipbuilding, where even after the discovery of US iron reserves completely eliminated any cost advantage, British dominance in ship-building persisted. To operationalise sector specific skilled labour in our index, we specifically use data on the number of people in each travel to work area (TTWA) in specific professions relevant to different sectors, and the number of businesses in particular professions.

Regional Growth Potential

London and the South East are naturally well positioned across many of the government's priority sectors, particularly those most related to services, such as financial services. It is regions outside the South-East which rank highest for clean energy and advanced manufacturing, vital to achieving the government's goal of regional growth. Our index looks at geographies which already perform well in these sectors to identify *existing* strengths, looking at the absolute size of each industry and how specialised each place is for clean energy and advanced manufacturing. We then look at existing strengths *and* growth factors, using a range of metrics to differentiate between areas that are already performing well and those that represent an opportunity for growth and investment under an industrial strategy.

Contrasting existing strengths with areas of future opportunity indicates a number of themes. First, and most obviously, London scores very highly for existing industry across all of the government's sectors as a result of its diverse and sizable workforce; this is true for sectors that would not typically be deemed London-centric such as clean energy and advanced manufacturing. For example, London has nearly 200,000 people employed in sectors relevant to the clean energy industry, whereas Kingston upon Hull has around 5,000 and Aberdeen around 15,000. It maintains its high-standing even when future growth factors are considered thanks again to its large and diverse

[7] https://academic.oup.com/qje/advance-article/doi/10.1093/qje/qjae036/7849762
[8] https://academic.oup.com/jeea/article-abstract/18/6/3173/5673194?redirectedFrom=fulltext
[9] https://www.aeaweb.org/articles?id=10.1257/aer.91.5.1350

workforce as well as high levels of investment and a positive business environment. Similarly, for clean energy, Scotland scores highly for both existing strengths and future opportunities in clean energy.

This highlights the challenge the government faces in concentrating investment and economic activity outside of the capital, key to its political and economic ambitions.

However, for both the clean energy supply chain and advanced manufacturing, the big winner on aggregate in our index is the North West. While the region performs relatively poorly for *existing* strengths across clean energy and advanced manufacturing, its rating jumps significantly when we take into account indicators of future opportunity. The region ranks highly across almost all the factors we identified as important to investment in the growth of clean energy and advanced manufacturing. It benefits from a highly skilled workforce and research capacity (due to its proximity to leading universities and research institutions), transport infrastructure, and finally and crucially, cheap industrial rents, where the average rateable value for industrial property is £22,000, compared with an average port area such as Thurrock where the average rateable value on industrial property is £80,000. Individual areas such as Bristol and Newcastle-upon-Tyne score well, and will be important places to focus given the breadth of sub-sectors covered under clean energy and advanced manufacturing, but at a regional level, it is the North West which represents the greatest opportunity. Manchester's Travel to Work Area (TTWA) is one of the largest TTWAs in the UK. It not only has ten times more science, research, engineering and technology professionals than the national average but, in particular, has a deep pool of skilled labour with exactly the kinds of skills needed for clean energy and advanced manufacturing. There are more than seventeen times the number of workers employed in the manufacture of electronic components and boards in the Manchester TTWA than the average TTWA. There is also significant geographical overlap between areas of opportunity for both clean energy and advanced manufacturing, allowing for fewer, more targeted interventions to have a greater impact. To unlock this opportunity, policy intervention will be required, which we explore below.

There are, of course, existing clusters of activity not identified by our index, which takes into account a range of factors that aggregate strengths pointing to future opportunities for investment, including absolute number of employees in certain industries, proximity to research institutions, and the rateable value of industrial properties. Importantly, the focus here is towns and cities. Some industries are not in the towns and cities index because they are inherently non-urban, such as the Peak Cluster in Derbyshire, Staffordshire, and Cheshire, which has significant potential for investment in CCS and the decarbonisation of cement and lime, but is not captured in our index given its specificity. Its position just outside the Manchester TTWA lends further weight to our focus on the North West. Similarly, wind, as one of the strongest areas of opportunity for the UK, wind has a significant footprint outside major urban areas, such as in Grimsby, which, despite its lack of proximity to a major city (and the indicators associated with cities such as TTWAs or research institutions), represents a major hub for UK investment (see below). Similarly, Hull, whose strong foundation of

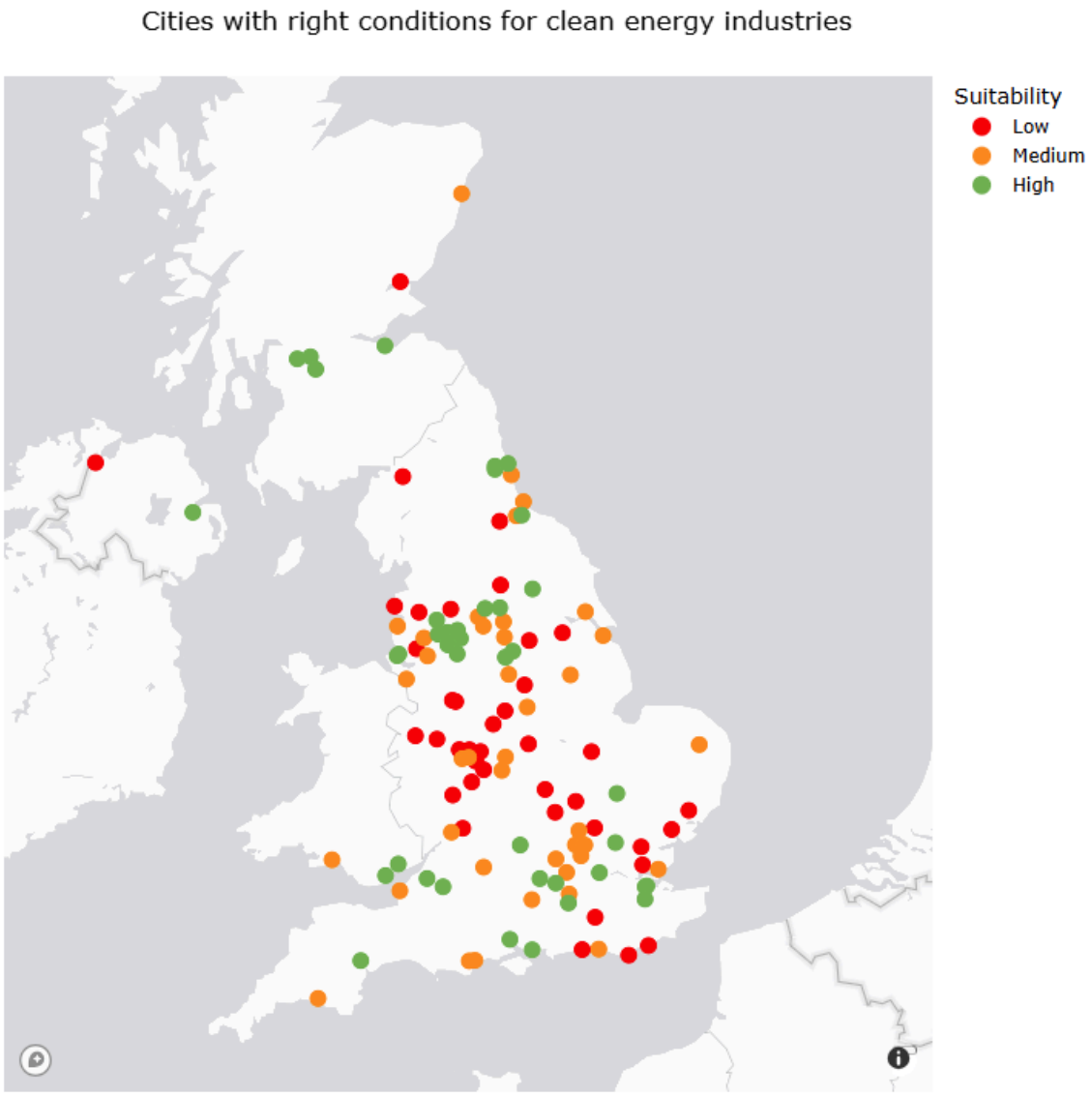
skilled employees and existing factories and infrastructure provide a basis for future growth and will remain a strategic area for future investment. As such, our analysis should be seen alongside sector-specific analysis of clusters outside of major urban areas.

Obviously, indices can be tweaked and different metrics can be added or given additional weighting. We are not arguing this index is the only answer to driving industry to a particular place. However, we do think the potential for the North West is real and significant - with the right policies to back it up. The full findings of our towns and cities index can be found in the annex.

The Kasbah, Grimsby

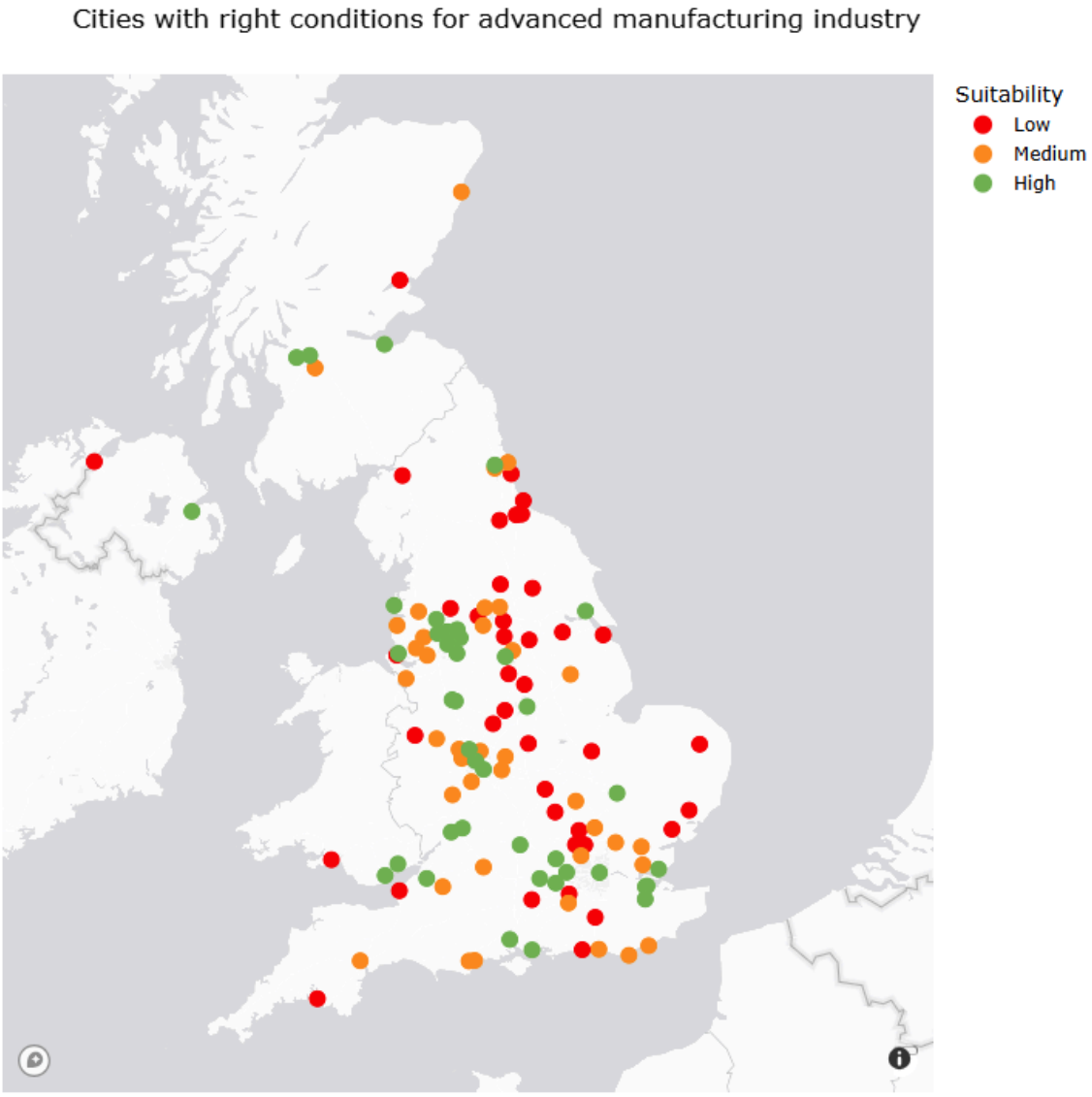
A partnership between Associated British Ports, North East Lincolnshire Council, and Historic England, the Kasbah is a major cluster of activity in the wind sector, despite relative distance from an urban centre.

- **O&M and training headquarters:** It homes the largest offshore wind operations and maintenance centre in the world, Orsted's East Coast Hub. It also hosts CWind's training facility.
- **A major employer:** The renewables sector already employs 2,000 people locally, with the Hornsea and Sofia offshore farms providing the bulk of that number.
- **A research hub:** The cluster also homes the ORE Catapult, strengthening the supply chain for local offshore wind farms while supporting the over 1000 SMEs with technology development to accelerate the growth of the UK renewable energy industry.



REGIONS OF THE UK MOST SUITED TO CLEAN ENERGY INDUSTRIES

Public First analysis maps areas suitable for clean technology in the UK based on a number of factors. Green spots indicate areas of high suitability, yellow medium, and red low suitability. An interactive version of the map can be found here.



REGIONS OF THE UK MOST SUITED TO ADVANCED MANUFACTURING

Public First analysis maps areas suitable for advanced manufacturing in the UK based on a number of factors. Green spots indicate areas of high suitability, yellow medium, and red low suitability. An interactive version of the map can be found here.

Our analysis is supported by evidence found elsewhere, particularly on co-location with innovation universities. According to Cleantech for UK, there is cleantech clustering around six UK universities (in Manchester, Bristol, Oxford, Cambridge, Edinburgh, and London). Manchester University is particularly strong, as is the concentration around the 'golden triangle' in the South East.[10] Research centres are also vital to advanced manufacturing with the Advanced Manufacturing Research Centre in Sheffield underpinning local supply chains and skills within Sheffield (based around steel and metals), and the University of Sheffield's research capabilities. This is not unique to

[10] Cleantech for UK, Building the next generation of cleantech champions

Sheffield. The University of Birmingham also has a strategic partnership with the Advanced Manufacturing Technology Centre, which focuses on high value manufacturing and associated knowledge based technologies.

CHAPTER THREE:

The UK's comparative advantages

As we outline above, there are multiple reasons why the clean energy supply chain and advanced manufacturing should be the initial focus of the government's industrial strategy. Our index suggests that the North West and North East, in particular, should be prioritised for those sectors.

The government has also indicated in its Green Paper that it wishes to narrow the focus of its Industrial Strategy to sub-sectors within the wider eight sectors identified. Here we look at sub-sectors where the UK already has advantage, specifically within clean technologies.Context

Across the whole economy, the UK has maintained a relatively diverse export portfolio of goods over the last decade. This diversity helps the UK's economic resilience but also provides opportunities to specialise as technologies compete. The UK is currently ranked 9th in terms of the largest exporters of all green products with 2.5% of the total global market share (though this has fallen recently).

However, using industrial strategy to develop clean energy and advanced manufacturing does not mean only focusing on building things. The UK is the second largest services exporter in the world. Global services exports will grow from 25% to 28% of total exports by 2035.[11] Public First analysis of global trading data finds that the top 13 sub-sectors in services relevant to the government's industrial strategy sectors (for which data is available) were worth £636 billion in exports in 2023.

[11] DBT, Global Trade Outlook

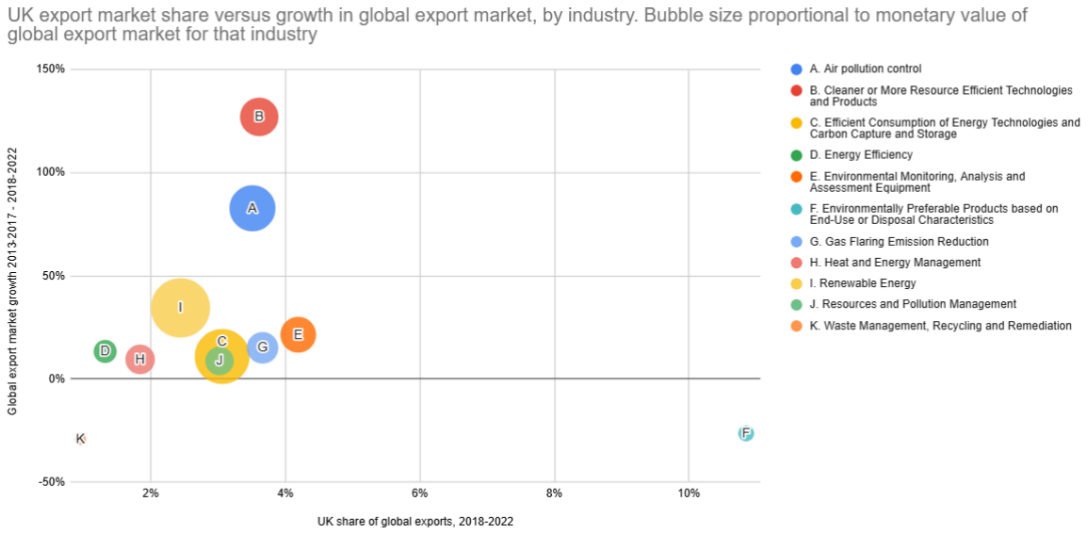
Sub-sectors	UK Share of Global Services Exports	IS sector
Insurance and pension services	16.7%	Financial services
Information services	15.2%	Digital technologies
Financial services	14.1%	Financial services
Other business services	11.8%	Business services
Professional and management consulting services	11.2%	Business services
Telecommunications services	10.7%	Digital technologies
Research and development (R&D)	10.3%	Life sciences
Audiovisual and related services	7.1%	Creative industries
Charges for the use of intellectual property n.i.e.	6.7%	Business services
Personal, cultural, and recreational services	6.5%	Creative industries
Other personal, cultural, and recreational services (other than audiovisual and related)	5.8%	Creative industries
Telecommunications, computer, and information services	4.6%	Digital technologies
Computer services	3.1%	Digital technologies

Fig 2: The UK's share of global exports in subsectors of government's identified growth sectors. Source: PF Analysis/UNCTAD Trade data

To capture the growth opportunity we set out, the UK will also need to build on its advantage in services - notably in the government's priority sectors. As we cover below, energy and manufacturing requires more widespread and innovative access to finance, from which the UK's financial sector can benefit. Similarly, exporting clean products leans heavily on the UK's well-established legal and professional services, as well as its creative industries in marketing. Concentrating early efforts on Clean Energy and Advanced Manufacturing will also support the government's identified services sectors.

Sub-Sectors

Within clean energy and the relevant supply chains, our analysis looked at the UK's current market share compared to the growth of the global export market to determine sub-sectors where the UK has advantage.



Our analysis finds specific products within these subsectors where the UK has current comparative advantage, including:

- AC generators used in large-scale electricity generation;
- Fuel cells with applications in surface transport, shipping, buildings, power generation, and aviation;
- Hydraulic and pneumatic power engines and turbines for wind turbine blades and hubs;
- Electrical control and distribution boards used in the functioning of PV systems;
- Electric transformers for CCS;
- Clutches, shaft couplings, and universal joins used for assembly and maintenance in wind energy;
- Air conditioners with reverse cycle refrigeration.

Renewable UK has found similar expertise in its industrial growth plan, highlighting, for example, advanced wind turbines, electrical cables and smart energy services as key strengths.[12] These findings point to **wind, hydrogen, and CCS** as the clearest subsectors of advantage on which the industrial strategy should focus its efforts.

Our analysis also suggests that the UK had revealed comparative advantage (RCA) in 56 export products over nine product categories in 2013, and maintains advantage in 57 products over eight categories in 2023. Advantage has shifted slightly towards commodities, transactions, and transport equipment. Of G7 nations, the UK, Canada, France, and Italy have increased the number of products with advantage, with the US, Germany, and Japan contracting in that time.[13]

A range of technologies is required in order to meet net zero, and not all are progressing at the same rate. Some are on course to meet the target, some to exceed

[12] *https://www.renewableuk.com/media/rqvlqzu0/offshore-wind-industrial-growth-plan.pdf*
[13] UNCTAD Comparative Advantage Index

it, and some are lagging behind. An analysis of International Energy Agency (IEA) data finds that while Solar PV is on course to exceed its net zero requirements, wind energy, heat pumps, and electrolysers are projected to fall well short of requirements for a net zero scenario, and batteries projecting to fall just short. [14]

- Carbon Capture and Storage globally is currently capturing 50 million tonnes of carbon per year, however this is far short of the 1 gigatonne required for the IEA's net zero scenario[15].
- Energy efficiency technology likewise needs to expand rapidly. Currently, energy intensity is falling at less than 2% a year, it needs to fall at over 4% a year to reach net zero.

The general trend across G7 economies in the last 20 years is a decline in technological sophistication and complexity just as China's capabilities have grown. The UK remains mid-ranked, with higher average technological sophistication in green products than Canada, France, Italy, and the USA, but lower than Germany and Japan. While this has not led to a general decline in comparative advantage in clean products, to compete in the future over new technologies the G7 will need to increase its technological sophistication. Product complexity here refers to the complexity of capabilities required to export a product competitively.

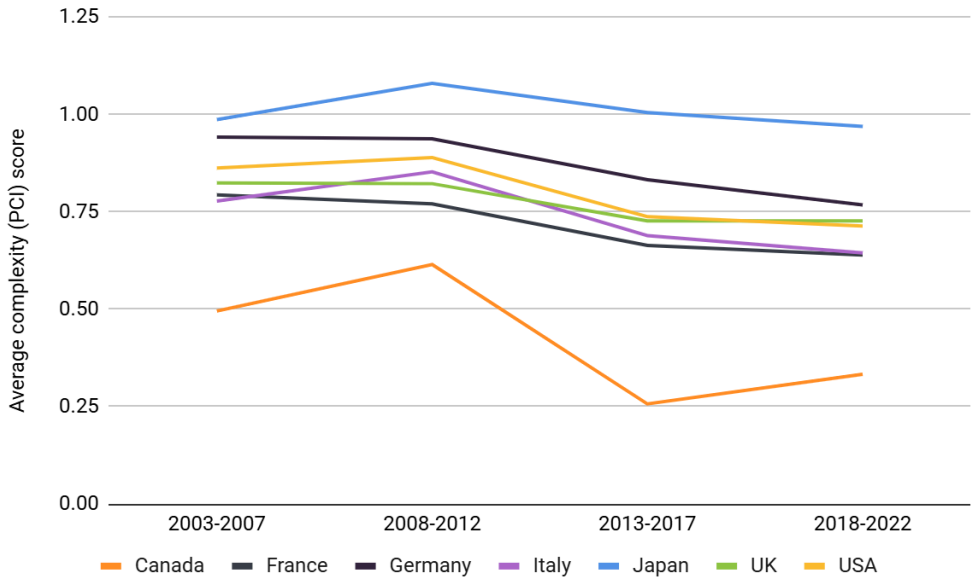


Fig 3: Average complexity of G7 exports over time. Source: Green Transition Navigator

This points to why the overlap between clean energy and advanced manufacturing is important. While the UK has a current advantage, as clean technologies develop, to maintain its advantage the UK will require the greater sophistication and greater manufacturing standards that advanced techniques provide. Previous work by

[14] All taken from International Energy Agency
[15] https://www.iea.org/reports/ccus

Renewable UK estimates a prize of £25 billion in GVA over the next 10 years if the industrial strategy can result in higher levels of investment in technological development, tripling UK manufacturing capacity.[16]

The following are areas where our analysis suggests the UK has advantage. An RCA score greater than 1 indicates a product considered as having export advantage, but 0.75-1 refers to 'high potential', and 0.5-0.75 refers to 'moderate potential'.

- Heat and Energy Management related to energy efficiency (RCA = 0.59 average, 0.97 maximum)
    - Parts for solar water heaters
    - Calibration meters (gas supply and water supply)
- Efficient Consumption of Energy Technologies and Carbon Capture and Storage (RCA = 0.53 average, 0.97 max)
    - Pipes for CCS
    - Generator parts
    - Hydraulic controls
- Renewable Energy (0.45 average, 0.95 max)
    - Parts for heat exchange, solar water heaters, heat pump equipment
    - Parts for static convertors and generators
    - Tower and lattice masts to elevate and support wind turbines
- Cleaner or More Resource Efficient Technologies and Products (0.34 average, 0.97 max)
    - Green transport equipment - railway/tramway parts, airbrakes

[16] Renewable UK, Industrial Growth Plan

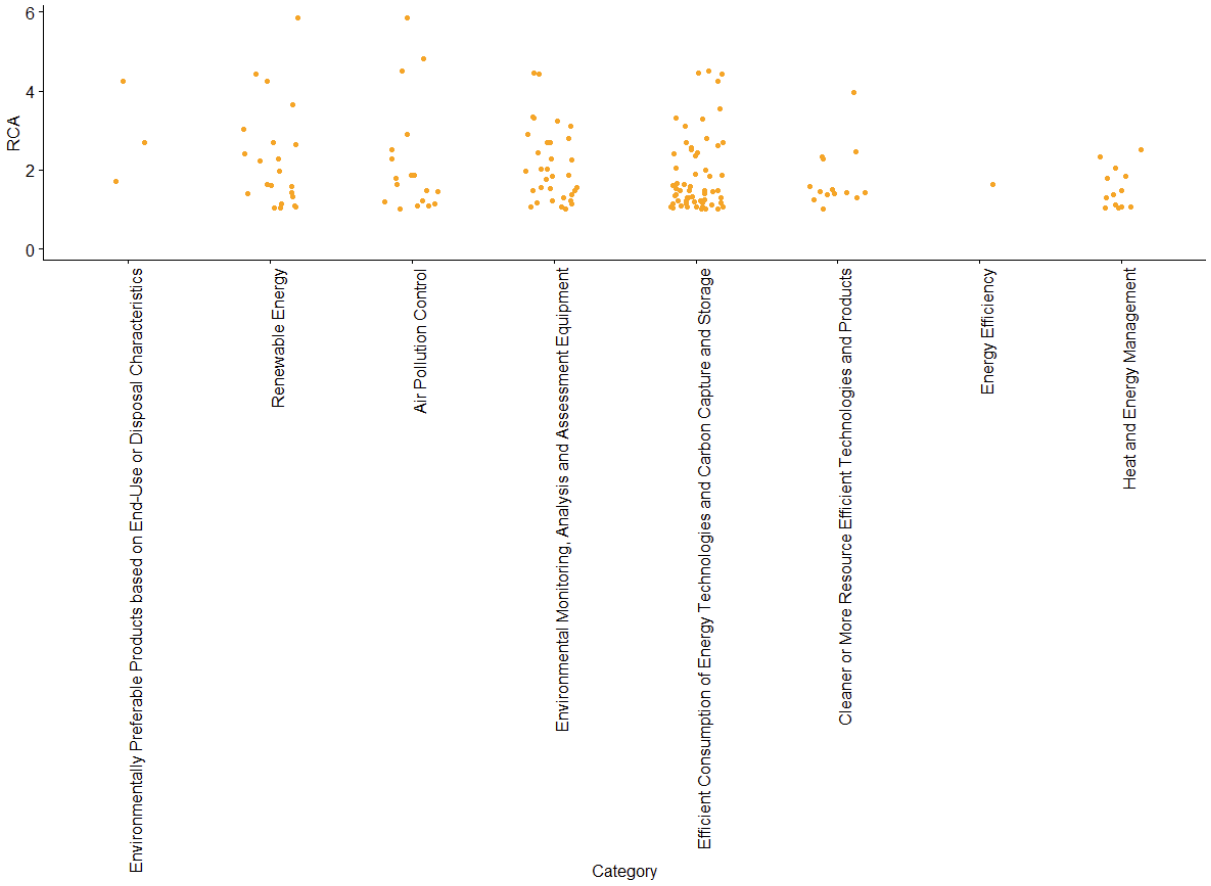


Fig 5: UK current comparative advantage of products in clean tech sectors. Source: Public First analysis of Green Transition Navigator

Subsector strengths reflect regional strengths, with wind leading the way

Industry has already begun to recognise the growth opportunities that exist in the clean energy and manufacturing hotspots highlighted in our index of UK towns and cities. This is particularly noticeable in the key strength sub-sectors we have identified within clean energy. Leading companies in these sub-sectors are developing their productive capacity in the North-West and North-East.

In the North-West, Siemens and Bosch have made dedicated investments in low voltage electrical equipment and hydraulic system design, boosting industrial capacity:

Siemens, Low Voltage Electrical Equipment, Wythenshawe

- **Specialised Electrical Solutions:** Siemens Wythenshawe specialises in low-voltage electrical equipment for commercial, industrial, and multi-residential applications, playing a critical role in supporting photovoltaic (PV) systems.
- **Cutting-Edge Facilities:** The site features in-house design, engineering, testing, and verification capabilities, including an ASTA-accredited lab.
- **A Legacy of Innovation in the North-West:** With over 80 years of history, starting as the 'Wylex Works,' the Wythenshawe site is a cornerstone of North West's electrical engineering expertise.

Bosch, Hydraulic System Design, Wakefield

- **Centralised Northern Hub:** Bosch's £1.2 million state-of-the-art facility in Wakefield consolidates three northern sites into a single location.
- **Advanced Hydraulic and Training Capabilities:** The Wakefield site features a 21,150 sq ft workshop for hydraulic system design, manufacturing, and repairs, as well as a 9,300 sq ft training area offering courses for mechanical engineers, installers, and apprentices.
- **Sustainability at its Core:** Built to BREEAM standards, the facility incorporates energy-efficient systems, such as thermal-loss prevention, low-energy lighting, and water-saving fixtures, aligning with Bosch's commitment to environmental responsibility.

In the North-East, SeAH Wind are spearheading offshore wind innovation turbine blade and monopile manufacturing:

Seah Wind UK, Wind Turbine Parts

- **A Global Offshore Wind Powerhouse**: SeAH Wind's £900m monopile manufacturing facility in Teesside is one of the largest factories in the global offshore wind sector.
- **Strategic Expansion**: Supported by £225m in additional financing from UK Export Finance and Korean Trade Insurance Corporation, the factory will expand its capabilities to produce larger monopiles and a broader range of wind turbine components.
- **Economic and Job Growth in North-East England**: The project is set to create up to 750 jobs by 2027 while driving £100m in contracts for UK firms like British Steel.

Finally, the South-East, whilst generally ranking lower on our index, has pockets of innovation like the Vestas wind turbine plant.

Siemens Gamesa - Advanced Wind Turbine Blade Production, Hull

- **Collaboration with existing port infrastructure:** The plant is the largest offshore wind manufacturing facility in the UK, and has produced over 2,000 turbine blades.
- **Growing Source of Jobs:** The plant has created 1,000 job opportunities, with 98% of the workforce drawn from within a 30-mile radius of the facility.
- **Major inward investment:** The facility launched in 2014 with a £310m investment from Siemens, followed by a £186m expansion in 2023.

As these case studies show, the relative maturity of offshore wind marks it out as perhaps the most significant area of opportunity for the UK given its existing footprint across the UK. CCUS and Hydrogen represent a major opportunity in the coming years, with investment decisions being made in the near future, whereas offshore wind represents an existing and longstanding strength. This difference matters because differing maturity necessitates different policy and fiscal support.

In terms of offshore wind capacity, the UK is second in the world only to China, but in the next seven years, it must triple its amount of offshore wind compared to the last 14 years. The UK already has many of the features of an industrial strategy in place for the wind sector, including a world-leading Contracts for Difference (CfD) programme, an offshore wind sector deal, and fiscal support across other areas such as R&D. However, to capture the supply chain investment opportunities we and others have identified, more is needed from government by way of policy and fiscal support, which we explore below.

The Offshore Wind Sector's Industrial Growth Plan

A collaboration between the Offshore Wind Industry Council, The Crown Estate, Crown Estate Scotland, and Renewable UK, the IGP finds:

- **5 growth opportunities across manufacturing and services:** advanced turbine technology, industrialised foundations and substructures, future electrical systems and cables, next generation operations and maintenance, and smart environmental services.
- **Major GVA benefit:** The Plan projects £25 billion in additional GVA in the next ten years, if enacted.
- **Job growth** of 10,000 following investment, dispersed across the UK.

The Industrial Strategy Council should own this focus

A series of governments have recognised that clean energy and advanced manufacturing are areas of UK advantage that could deliver regional growth and economic resilience. However, a patchwork of policies, a lack of central control and the vagaries of the political cycle have all undermined private sector confidence that the government can actually incentivise its growth.

To tackle this, the government has resurrected the Industrial Strategy Council (ISC). The UK is something of a rarity in not having a growth-focused institution embedded into the machinery of government, with around 20 such bodies operating across OECD economies. There are key lessons here:

- Taking authority and direction from the executive gives the institution political legitimacy.
- Acting as the interface between businesses and government allows information exchange.

- Consulting stakeholders across business, academia, research, and civil society is essential.
- In-house research and analysis expertise is vital in developing recommendations.

A new ISC secretariat should have a clear remit:

- Analysis of areas of technological opportunity and barriers to commercialisation.
- Setting out the scale of public and private investment requirements into key technologies.
- Making recommendations on policy, not just evaluation of progress.
- Acting as the 'concierge' between government and investors in nominated sectors.
- Conduct enquiries with the business community according to priorities set by government, as the National Infrastructure Commission does now on infrastructure challenges.
- Monitoring and evaluation of measures implemented by government.

The most basic function of the ISC should be to act as a conduit connecting businesses to relevant parts of government, facilitating relationships where necessary and ensuring that policy horizontals and verticals outlined above or in the Green Paper are progressing in a coordinated way. The ISC can be a focal point for delivery and knowledge exchange. In this way, it can avoid duplicating work being done elsewhere, and ensure that industrial strategy is given the best chance of success.

How do we develop from here?

It is the action and implementation of a strategy that turns it into the outcomes that business, investors and ultimately the public will judge the government on. What actions the government takes, where, when and how will define whether its industrial strategy is a success against their objectives, not the document itself.

Our analysis points to two categories of interventions that will ensure the government succeeds in its ambition. The first is that across all sectors we analysed, there are a series of recurrent constraints on growth - issues such as affordability of rent and energy, access to finance, or the provision of skilled workers. As Keir Starmer likes to say, it is necessary to fix the foundations first before building.

At present, despite strong performance in the World Bank's Ease of Doing Business rankings, the businesses we spoke to report that a challenging policy environment is causing low investment and low productivity.[17] [18] There is a long way to go.

[17] World Bank, Ease of doing business index

[18] Chronic under-investment has led to productivity slowdown in the UK

The second is those constraints that are particular to a given growth sector. Here, given the priority behind clean energy and advanced manufacturing that we set out above, we focus on those public policy interventions that will shape and grow the market for those sectors.

The goal of these policy interventions is to help both the sectors and the places they are in grow, and at the same time therefore prove that the state's role in economic development is effective.

CHAPTER FOUR

Fixing the foundations

The government wants to successfully grow clean energy and advanced manufacturing, proving the viability of its industrial strategy. Our index shows that the North West and North East are most suited to advanced manufacturing and clean energy, yet even these locations need foundational interventions to ensure they can better compete against regions abroad. Both sectors and the places that host them, are held back by three core economic failings:

- The cost of rent and land, holding back the ability to expand or move sites.
- The provision of skilled labour in the right places to work in those sites.
- Access to the finance which allows businesses to innovate, replace technology, expand sites and hire workers.

However, as we show above, interventions here will not only support clean energy but also support the other sectors the government wants to grow - even if its initial focus is not on those sectors. Though they will disproportionately support clean energy, horizontal policies like these make doing business in the UK easier generally and therefore boost goods and services alike.

Land

The cost of building is a major factor holding back the growth of UK manufacturing. The areas that score highest on our index possess similar characteristics to the industrial heartlands of Germany and Sweden, most obviously cheaper land and development rights (both for industry and housing); however, they are not immune to the underlying problems which make building so difficult in the UK. The complexity and arbitrary nature of the planning system makes expanding or moving sites risky for businesses. This raises the cost of existing developments as supply remains too low. This is a problem across every part of the UK. Aligning the planning system to cut delays and accelerate investment is essential.

Offshore wind farms, for example, can take up to four years to get through the planning process.[19] 63% of applications to build renewable energy projects in Britain failed to get through the planning stage between 2018 and 2023. No region saw more than 20% of project applications granted planning permission in that time.[20]

[19] Lichfields, Planning matters
[20] *Ibid*

This challenge is not unique to energy infrastructure. A recent proposal for the £750 million Marlow Film Studios, was refused planning permission by the local council, citing concerns over greenbelt land and impacts on local roads.[21] Marlow also refused a £2.5 billion data centre, while another £1 billion data centre near Watford was blocked over similar issues.[22] [23]

Planning is vital not just for the infrastructure itself but to allow the related developments in housing, transport and services that allow for a skilled workforce to live near growth industries. Even in the North West or Yorkshire and the Humber, where the cost of building infrastructure is lower relative to other regions within the UK, the cost of building still dwarfs those in European counterparts. Transport is an obvious example. Leeds, with a population of almost 800,000, is the largest city in Europe without mass transit[24]. Proposals for the reinstatement of tramway in Leeds have been on-going since the 1970s. Whilst in the last 25 years, France has built 21 tramways, including in cities with populations of just 150,000. Nationally, it costs 2.5x more to build a tram in the UK than France, symptomatic of a wider malaise in the British planning system.

[21] BBC News, Hollywood-backed film studio is refused permission
[22] CityAM, Government blocks data centre build next to M25 – in case it ruins the green belt
[23] £1 billion Abbots Langley data centre recommended for refusal
[24] https://assets.nationbuilder.com/britainremade/pages/1451/attachments/original/1723813389/BRM7607_Tram_Report_Digital-Single-Pages_AWK.pdf?1723813389

Building the infrastructure for clustering in the Holland Metropole

The Holland Metropole is an alliance between Amsterdam, Rotterdam, The Hague, Utrecht, and Eindhoven. The region is densely populated, with excellent transport links meaning that each city is within 90 minutes of the rest by rail, pooling the labour market. This comes alongside strategic planning, building houses around stations, increasing the commutable housing for all cities in the Metropole, alongside extensive green space to ensure they are attractive places to live.

Commuting times in all 5 cities are significantly lower than in Oxford or Cambridge, 99% of residents are able to access 100mbs wifi, and two of the cities rank in the top 20 in the world for quality of life.[25] The result of this investment in infrastructure and livability is that the region has a high number of accelerators, including world leading accelerators such as YES!Delft and UtrechtInc, contributing to a successful innovation ecosystem (14 startup accelerators per capita). This focus on infrastructure has been matched by policy, including a 30% 2-year tax rate for foreign workers earning above a certain threshold, or 5% corporation tax for companies involved in innovation.

There are two areas where the government can take immediate action: resourcing and bureaucracy.

The government's plan to hire 300 planning officers will only replace one tenth of those who left the sector between 2010-2020.[26] 83% of county councils and 58% of all councils struggle to recruit planning officers.[27] Recruiting and retaining planners in local authorities are particular challenges: developers frequently cite a lack of staff affecting project delivery.

[25] Economist Intelligence Unit, The Global Livability Index 2024
[26] RTPI, Local authorities struggle as over a quarter of planners depart
[27] LGA, Local government workforce survey 2022

Developers are required to provide lengthy environmental impact assessments, which in extreme cases have run to 44,000 pages (Sizewell C), or 63,000 pages (the Lower Thames Crossing), both coming at a cost in the hundreds of millions.[28] [29] The new Environmental Outcome Report regime is an attempt to rectify this, but government will need to ensure that it continues work on reducing this bureaucracy, particularly given its intention to expand the DCO regime and use call-in powers more expansively.

However, existing capacity is not only currently stretched in planning authorities. There is also a clear lack of capacity in key regulators, such as the Environment Agency. If the government wants to stop the damaging cycle of delayed applications slowing progress, it needs to rapidly assess the capacity and skills of key regulators, and increase resourcing in areas where need is most acute.

RECOMMENDATIONS

- Invest to boost capacity in local planning authorities, the Planning Inspectorate and key regulators, providing incentives for progression that could boost staff retention, building on the Planning Skills Delivery Fund.
- Use National Development Management Policies to standardise the planning system across England, establishing a national policy for critical infrastructure which supports the stated goals of the industrial strategy.
- Assign 'growth areas' under the Local Growth Plan adopting a similar approach to Germany, who are accelerating infrastructure deployment by shortening approval times in pre-approved 'acceleration areas' with presumed consent.[30]
- Introduce an 'innovation' use class in the NPPF to accelerate the delivery of lab space, data centres, and first-of-a-kind technologies. To incentivise this, local authorities should be allowed to retain more of the revenues they generate.

[28] BDB Pitmans, Fix planning and set Britain free to build again

[29] New Civil Engineer, Lower Thames Crossing application's £267m cost highlights complexity of planning system

[30] German government, Federal government accelerates approval procedures for onshore wind energy and solar energy

Skills

Increasing access to skills is vital to success. As technologies get more complex, and the UK produces a broader range of clean energy technologies, workers will need to be upskilled to develop them. As we note above, clusters of high-value manufacturing and clean energy are already developing around research institutions where the labour spillovers are high. However, there are still significant labour constraints around the country, both in its provision generally and the ability to get the right workers in the right places.

Despite a rapid increase in university graduate numbers across the UK over recent decades, the persistence of regional differences often results in policy prescriptions which seek to reverse the "graduate drain" (discouraging graduates from moving to London or the South-East). However, a major binding constraint on the growth of clean energy and advanced manufacturing in strategic regions like the North West is not a general lack of education or skills - but a lack of workers with the specific skills required for particular sub-sectors.

For regions like the North West to unlock their potential, ensuring that the UK has a pipeline of talent to deliver an industrial strategy in strategic locations should be a top priority. Regional success will only be realised through coordinated action at a national level. We recommend Skills England therefore takes a more active role in identifying shortages across strategic sectors and regions, and the government more widely ensures funding (through the Skills Levy) is both, better targeted at areas with identified shortages, and ensures more flexibility in the areas where the levy can be used.

The challenge the UK faces is currently spread across all aspects of the labour market.

- At the age of 15, British students achieve equal standards of numeracy and literacy to their French and German counterparts, but have fallen well behind at the bottom end by the age of 24.[31]
- Applications for apprenticeships exceed supply by three to one, meaning that over a third of 18-year-olds are in no form of training, far more than in similar-sized economies.[32]
- High-skilled migration has fallen significantly.
- Decarbonisation and digitalisation are changing skills requirements of existing workers and the structure and size of the sectors they work in. Decarbonisation will rely on technical skills, but only 10% of England's workforce has a higher technical qualification, compared with 16% in the USA and 19% in Germany.[33]

[31] Resolution Foundation, Applying the Robbins Principle to Further Education and Apprenticeships
[32] Financial Times, The UK Skills crisis holding back growth
[33] Education Policy Institute, An international comparison of technical education funding systems: What can England learn from successful countries?

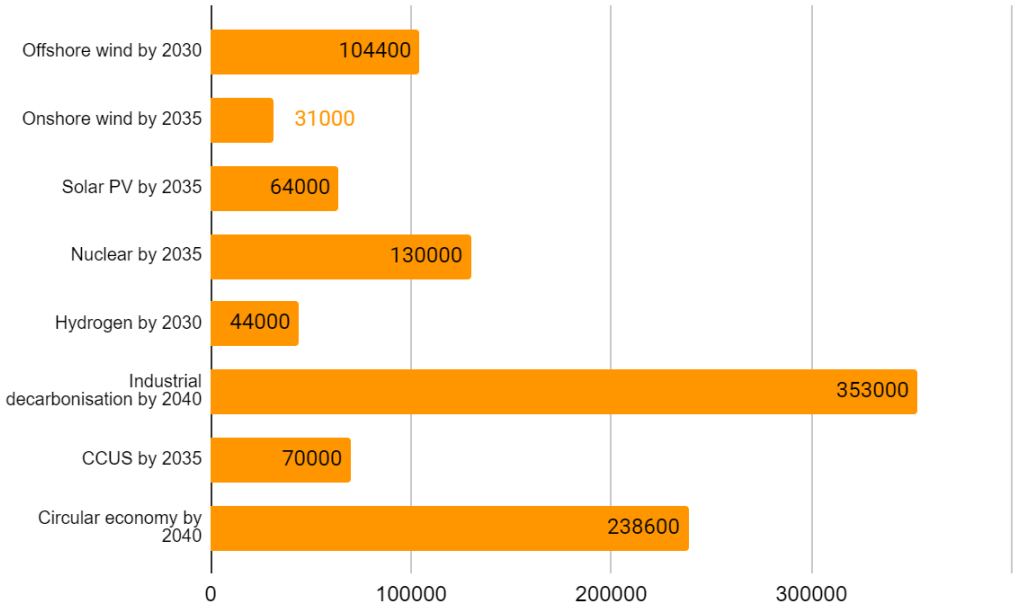


Fig 6: Estimates of jobs created in sectors underpinning decarbonisation.[34 35 36 37 38 39 40 41]

Industrial strategy provides an opportunity to develop more durable institutions to run Labour Market Intelligence (LMI) and inform skills policy towards delivering government objectives.

A lack of access to talent and inadequate government support for training were consistent across sectors. Many government initiatives focus on education or new market entrants, but adult and lifelong learning are equally important. When asked about the skills challenge our index pointed to, businesses cited the high cost of retraining as a major barrier, alongside declining apprenticeship numbers, and difficulties attracting high-skilled migrants. In some places the private sector is tackling this challenge, but to scale, the government will need to intervene.

[34] OWIC, Offshore Wind Skills Intelligence Report 2023
[35] Renewable UK, Onshore Wind Industry Prospectus
[36] Solar Energy UK, Solar's role in addressing the energy crisis
[37] UK Government, The ten point plan for a green industrial revolution
[38] Hydrogen UK, Hydrogen in the UK: Moving from strategy to delivery
[39] IDRIC, Enabling skills for the industrial decarbonisation supply chain
[40] CCSA, Workforce and Skills position paper
[41] CIWM, Beyond Waste: Essential skills for a greener tomorrow

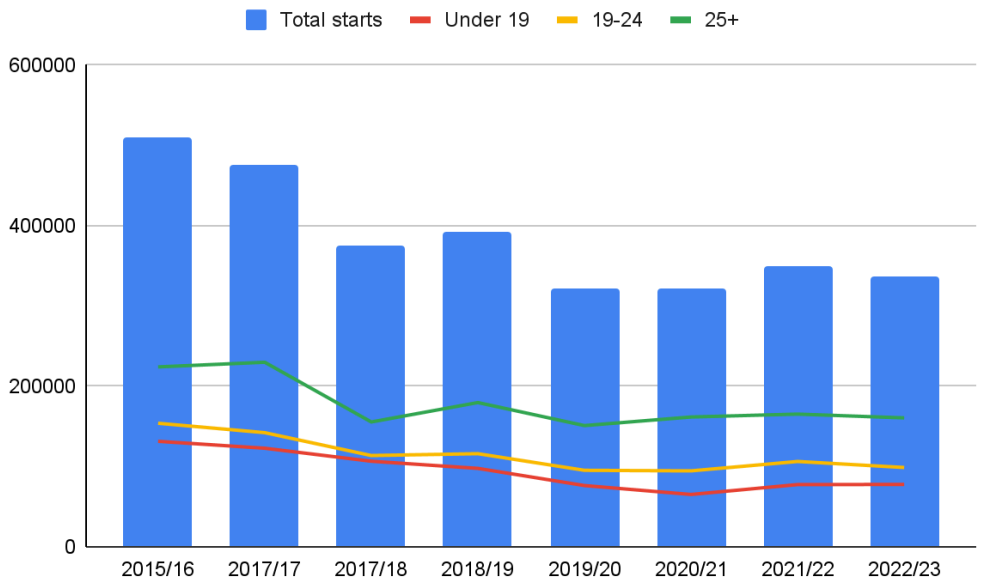


Fig 7: Apprenticeship uptake in England (lines by age group), 2015-23. Source: Commons Library.[42]

CATCH, the Humber

The CATCH training facility (including the National Net Zero Training Centre) in the Humber is an example of industry and training providers working together, scaling training for new entrants in energy and engineering. The facility provides apprenticeships, scholarships certified by the ECITB, reskilling, and ex-offender and ex-forces programmes. The scholarship programme has enlisted over 500 people, supplying industry with a pipeline of talent, focusing on skills in industrial processes. By collaborating with industry, CATCH is able to tailor programmes to meet live industry demand, and ensure on-the-job training for a range of groups. The facility was backed with £12 million for its initial campus near Grimsby, and last year revealed plans for a £60 million training centre in the Humber. The programme is funded by industry partners including ECITB, Phillips 66, Harbour Energy, and VPI Power.

The Growth & Skills Levy will need to have more flexible applications alongside more direct support. Between 2017 and 2023, £2.2 billion of apprenticeship levy funding has

[42] House of Commons Library, Apprenticeship statistics for England

gone unspent.[43] Government has yet to clarify how flexibility will be delivered through the levy. Although inflation will tip more companies over the £3 million threshold at which point the levy applies, the government will also need to provide its own investment into the skills system.

Austria's system provides a model to incentivise private investment. Its system grants a full tax allowance for training expenses and a further 20% of actual expenses if deducted from taxable income of firms investing in 'human capital'. This amounts to a 120% tax allowance in real terms. If a firm does not make enough profit to qualify for this allowance, it can instead claim a tax credit of 6% of training expenses. Measures such as this can easily be employed in the UK to incentivise employer investment in line with the goals of industrial strategy.

RECOMMENDATIONS

- Ensure Skills England gather Labour Market Intelligence where it is needed or work with industry sectoral mapping that already exists to identify trends and skills shortages across sectors. This should build on existing data, and be undertaken in consultation with the Migration Advisory Committee and Industrial Strategy Council to ensure alignment. Its functions could include:
    - Review SIC and SOC codes to differentiate direct and indirect jobs;
    - Provide annual workforce-need surveys and forecasts, identifying upskilling needs;
    - Provide policy recommendations on addressing skills shortages to government;
    - Design training programmes to test innovative skills solutions in priority sectors;
    - Drive uptake of skills and training opportunities through workforce campaigns;
    - Work with local authorities and industry bodies to better match employers with training providers in priority sectors.
- Dedicate 50% of Skills Levy funding to apprenticeships or non-apprenticeship training programmes in areas with identified shortages.
- Create tax reliefs for businesses investing in training.
- Create enhanced incentives for SMEs to train new and existing staff.
- Work with industry to aggregate demand for skills in geographies and industries where shortages have been identified.
- Ensure local councils are sufficiently resourced to deliver the Government's recent guarantees of training, for example through kite-marking skills bootcamps akin to the CATCH facility.

[43] FE Week, DfE records £96m apprenticeship levy underspend in 2022-23

Complex technologies require a new approach to financing. Updating capital stocks for advanced manufacturing processes, innovation to develop new technologies, hiring new skilled workers, and expanding sites all require investment. While the government has already promised a step change in public investment it must also ensure that businesses have access to low-cost finance so that they can invest. The focus here is on accessing finance for new technologies: in the next section, we look at grant funding for more mature technologies.

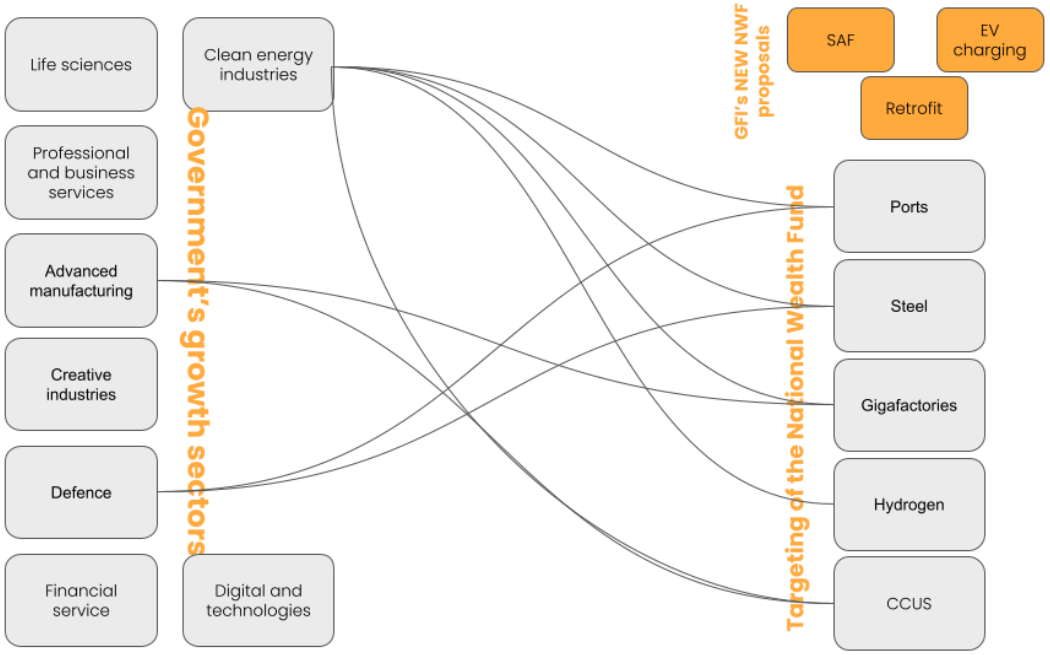


Fig 8: The disconnect between identified sectors and proposed National Wealth Fund investment.

The UK has a strong funding ecosystem at the early stage. However, as UK companies look to grow from series B stage and beyond, investment is often found from the US and elsewhere as a result of the significant investment gap between early stage and later stage funding in the UK. Series B is the point at which the type of investment needed provides a challenge for standard finance models. US companies receive 1.4 times more funding compared to UK companies at the late VC stage.[44]

There is also, as with all three of the foundational problems that our policy recommendations seek to address, a significant regional element to problems around firms' access to capital. British Business Bank data shows that although firms inside and outside London receive similar initial investment sizes (non-London actually receive slightly more funding), London-based firms raise almost twice as much as non-London based firms seven years after the first investment.[45]

[44] British Business Bank, Small Business Finance Market Report 2024
[45] https://www.hks.harvard.edu/sites/default/files/centers/mrcbg/files/198_AWP_final.pdf

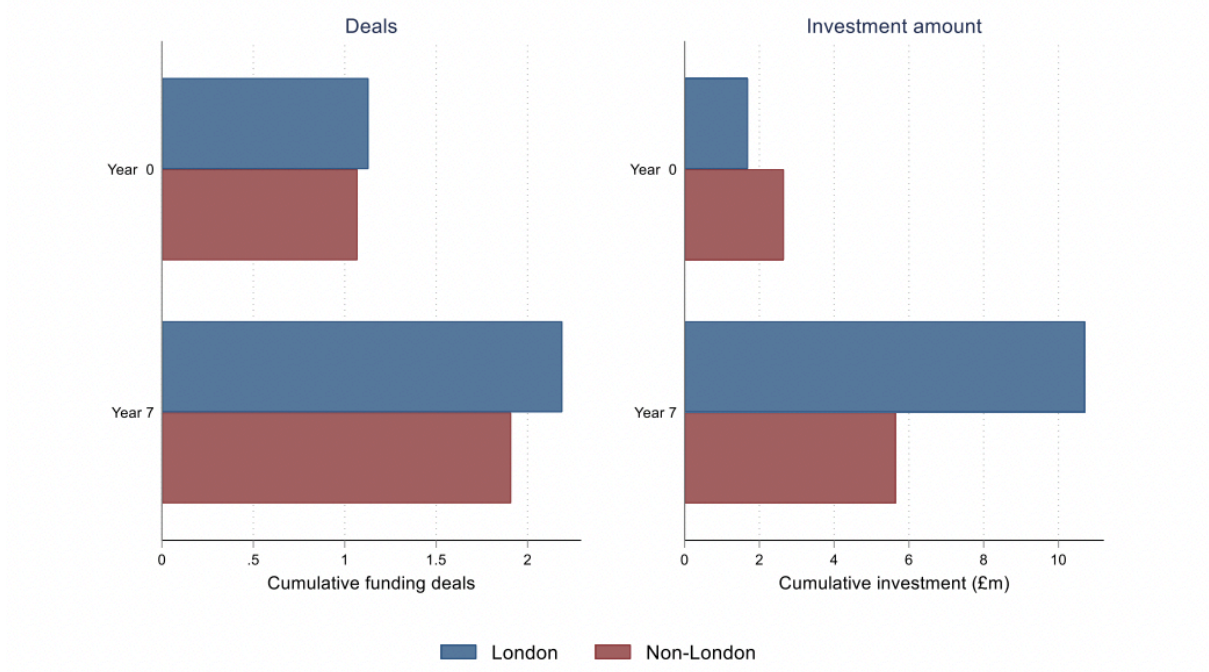


Fig 9: Early stage funding in London versus non-London firms

This 'missing middle' finance gap, particularly in non-London firms, can be addressed through public finance, but the current landscape is piecemeal. This lack of later stage funding risks firms relocating their operations overseas, particularly leaving the regions where there are the largest opportunities for clean energy and advanced manufacturing.

More generally, cleantech firms have common features which raise their risk profile:

- High capex costs;
- Longer lead times to profitability;
- VCs tend to have experience in scaling software rather than hardware;
- A policy landscape struggling to advance mature technologies such as Direct Air Capture, Long Duration Storage, or green hydrogen;
- Work undertaken by Public First for IFM Investors finds that performance data is also an issue here: there is insufficient performance data available for financial models to drive large infrastructure investment into long-term projects.[46]

Between the British Business Bank, and the National Wealth Fund, there is catalytic finance available, but it is not being effectively deployed.

There are a range of instruments that can deploy catalytic public finance to derisk private investment, including first-loss capital, grants, and guarantees. Taking clean technologies as an example, there are three key public funding sources to derisk investment in cleantech:

[46] IFM Investors, Mobilising pension capital for net zero

- The NWF's remit is to act in cases where 'there is undersupply of private sector financing and reducing barriers to investment - thereby crowding in private capital'.[47] It can use equity, debt, guarantees, and concessional finance;
- The BBB supports companies by growing funds, with limited capacity for debt or equity. It supported £505 million in cleantech investment between 2014-2022;[48]
- The £1 billion Net Zero Innovation Portfolio supports the commercialisation of cleantech. It has committed £933 million to date, leveraging £345 million of private capital.[49] [50] However it is unclear whether this will continue now under the new Government.

The largest direct support on offer from the BBB is £10 million, while the NWF's minimum ticket is £25 million, creating a funding gap, exacerbating the UK's scaleup funding gap. To address this, government will need to revise the mandate of one of the organisations. A full funding ladder is required across the BBB and NWF which leverages private investment at all stages, taking steps to ensure there is more capital available to UK projects and VC funds.

To encourage investment, Labour in opposition also expressed an interest in an equivalent to France's 'Tibi' scheme. Launched in 2019, this fund of funds increases financing capacity by mobilising the savings of institutional investors. France has drawn an additional £16 billion into private capital funds investing in French tech since 2020. A UK equivalent should learn from several of Tibi's features: its commitment from the top of government, championed by the President, its broad investor base, geographically diverse investment, bridging the scale-up gap, and simple accreditation.

The British Growth Partnership is the first step to a fund-of-funds, or Tibi equivalent, in the UK, a welcome development that could solve multiple issues. It could feature a specific pot for venture capital to specifically target the cleantech scale-up gap. To engage however investors need greater simplicity. It could replace the European Investment Fund, from which the UK has missed out on £44 billion in investment since the Bank largely withdrew from the UK. This could, in turn, reduce the number of UK companies sold overseas or before maturity, or prevent them from listing on the NASDAQ, depriving the UK economy of their value.

The Partnership marks an important step to increase UK pension scheme investment into private capital funds, but will be in the form of a co-investment model and while this is positive overall, it is harder to achieve scale quickly, given the limited number of co-investment opportunities and the challenge with ensuring investors are backing the best performing companies. There is also greater risk for institutional investors if they hold a less diversified investment portfolio. A fund of funds vehicle would be the best way to achieve greater diversification and access to higher returns from UK VC and growth equity funds.

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[47] UKIB, Strategic Plan 2022
[48] UK Government, Green Finance Strategy
[49] UK Government, Net Zero Innovation Portfolio Progress Report
[50] Barclays, Scaling the green economy

RECOMMENDATIONS

- The British Business Bank and National Wealth Fund should launch a cleantech fund with a focus on supporting transactions between £10-25 million ticket size.
- Demonstrate the effectiveness of industrial strategy by establishing a workstream under the NWF for high-risk or first-of-a-kind cleantech where it can bridge gaps in capital markets, before expanding in the future to further priority sectors. Within this, launch a cleantech-specific first-loss guarantee scheme, aimed at driving VC into high-risk, capex-intense startups.
- Assess whether the NWF's risk appetite is effective in reaching the government's goals. Cleantech is inherently high-risk, but UKIB's required portfolio-level return on equity is 2.5-4%. Ensure capital expenditure on plant,machinery, and equipment is within scope of qualifying costs for R&D tax credits, bringing the UK in line with nations such as France.
- Communicate the successes of the BBB and UKIB to date to drive awareness and public support for investment.

CHAPTER FIVE

Growing the priority sectors

Addressing fundamental problems with land, skills and capital will undoubtedly support growth in clean energy and advanced manufacturing. However, to grow both sectors, broad cross-sector supply-side interventions are not sufficient. Supporting clean energy and advanced manufacturing will require specific interventions. There is a particular need for focused action to decarbonise broader industry, so that investors and businesses know the size and structure of the market they are playing in.

Clean energy and advanced manufacturing markets are growing significantly. Much of this comes from the role of public policy, such as net zero targets, in driving growth in new technologies. Two thirds of global industrial policies in 2023 tackled climate mitigation, supply chain resilience, and security, attracting investment in skills, infrastructure, and cleantech.[51] As these policies get more granular and near-term, such as the Clean Power by 2030 target, industrial strategy can provide the coherence required for businesses to grow and sell into those new markets.

Research from Barclays finds that cleantech firms view the UK as an attractive environment for innovation, but do not see it as a good option for growth, with more attractive incentives offered elsewhere.[52] How the government decarbonises the wider economy will be a key test of its industrial strategy in practice.

The clean energy and advanced manufacturing sectors face two distinct but linked challenges:

1. There is a lack of clarity about the government's broad approach to industrial decarbonisation, with a particular lack of impetus decarbonising heavy industry.
2. The expansion of specific technologies, notably wind, hydrogen and carbon capture utilisation and storage (CCUS), is held back by confusion and high costs, and will require specific support to ensure ongoing innovation and deployment.

[51] CEPR, The Return of Industrial Policy in Data

[52] Barclays, 2024 Clean Tech Report

The Peak Cluster

The Peak Cluster, straddling Staffordshire, Derbyshire, and Cheshire (just outside the Manchester TTWA) is an example of a significant non-urban opportunity for UK investment which suffers from no visibility of future policy or funding support.

- **A major decarbonisation opportunity:** The cluster could decarbonise 40% of the UK's cement and lime industry, crucial to UK infrastructure.
- **Job protection and creation:** The cluster plans to safeguard over 2,100 existing jobs in the region, creating a further 1,500 over the construction and lifetime of the project.
- **Inward investment and economic growth:** Recent research finds that the Cluster will generate an additional £180 million GVA every year from the latter part of the 2020s.[53]

To support both sectors, the government needs to take clear steps to deliver wider industrial decarbonisation, as well as acting decisively to support these specific technologies.

Industrial Decarbonisation

With demand for green products mounting, supporting foundation industries to decarbonise is vital. However, industrial decarbonisation is conspicuous in its absence from the Green Paper. The UK is committed to creating the world's first net zero industrial cluster by 2040, and at least four low-carbon clusters by 2030. The clusters are ideal places to roll out those technologies we identify above, notably CCUS and hydrogen.

However, the story is different for energy-intensive industries (EIIs) situated outside the clusters. Often, their decarbonisation relies on technologies not yet ready at commercial scale, or which are prohibitively expensive, significantly impacting the commercial case for investment. In cement and lime, for example, 70% of emissions are process emissions unrelated to energy use: CCUS will be vital but to be realised it requires clarity of government support (beyond track 1 and 2 clusters), visibility of enabling policies such as the UK ETS, and clear plans for a a wider transport network.[54]

[53] Aggregate Industries, Peak Cluster Economic Impact Report
[54] DESNZ, CCUS: A vision to capture a competitive market

Alongside the technologies required to deploy these at scale, policy needs to support investment and innovation along the supply chain - in gas transportation, skills, and business models - to support EIIs outside of clusters and ensure their international competitiveness. In the US, a $6 billion package supports 33 projects to decarbonise by accelerating commercial-scale demonstration, while the EU's €40 billion Innovation Fund develops market-ready solutions for industrial decarbonisation.[55][56] The most notable mechanisms in place in the UK are the £500 million Industrial Energy Transformation Fund (IETF) and Full Expensing. The British Industry Supercharger is also in place to mitigate high policy and network costs that impact EIIs, but does not do enough to support electrification of industry. The lack of ongoing support in the Autumn Budget also means there is currently no project development funding available int he UK, and a replacement is urgently required.

The British Industry Supercharger's distortive impact

The British Industry Supercharger (BIS) will provide £320-410 million in savings to 300 energy intensive businesses in 2025, reducing electricity costs by approximately £20/MWh. It includes a 100% relief from renewable levies, a 100% indirect exemption from capacity market chargers, and a Network Charging Compensation scheme. However, eligibility is based on an 'electro-intensity' test - electricity must account for over 20% of a firm's GVA. A reference price is used for all businesses, multiplied by electricity consumption, applying regardless of that firm's size. As a result, larger firms pay less, and smaller consumers more. However, the majority of the 4685 firms on the Black Country cluster are SMEs. The electro-intensity test skews these firms' costs, making them appear lower than they are in reality, barring them from accessing the Supercharger. Instead, they pay the redistributive costs of larger firms that can. The application is also laborious, with the length of time applications take to be assessed and funding provided too long to fit with budgeting cycles. There is no question that the supercharger is vital to maintaining competitiveness, but a more responsive process, allowing manufacturers to apply on a rolling basis to simplify access.

[55] US Energy Department, Biden-Harris Administration Announces $6 Billion to Transform America's Industrial Sector

[56] EU Commission, What is the Innovation Fund?

RECOMMENDATIONS

- Outline an economic justification for sectoral funding settlements in the Industrial Decarbonisation Strategy, ensuring a level playing field that provides sufficient support for all energy-intensive industries.
- Consolidate, extend and increase funds such as the IETF and British Supercharger from 2025, with applications streamlined.
- Remove the electro-intensity test from the BIS with a product eligibility test based on market-reflective prices, with applications available on a rolling basis.
- Hypothecate Emissions Trading System (ETS) or CBAM revenues for industrial decarbonisation measures, as under the EU Innovation Fund, transitioning to CBAM revenues when introduced.
- Target research funding so it is aligned with the goals of its industrial strategy under a refreshed Net Zero Innovation Portfolio.
- Move forward with the creation of the National Materials Datahub to identify which materials are most needed and in which sectors of the economy, their criticality, and timelines for their availability.
- Establish a new National Innovation Hub to act as a focal point for national cleantech innovation in the manner of the AMRC in Sheffield.
- Combine the Net Zero Innovation Portfolio with the former Green Industries Growth Accelerator, including a GDP-based R&D intensity target, repackaging it as an Industrial Innovation Fund to support supply chain opportunities.

Specific Technologies

Electrification: The Offshore Wind sector

Many technologies will play a role in industrial decarbonisation, but electrification will be a core option for many applications and processes. 50% of current industrial fuels could be replaced with electricity, using technology that is already available.[57] Electrified options are beginning to emerge for heavy industry, such as electric arc furnaces for steel, or industrial-scale heat pumps.[58] At present, UK EIIs face significantly higher costs than their European counterparts, risking their competitiveness. In 2021, the average UK industrial electricity price was 13.05p/kWh, 62% higher than the IEA median. In 2010, it was 8.4% higher.[59] Both France and Germany as well as providing higher investment in decarbonisation of industry than the UK also provide significant exemptions for heavy industry to support electrification, notably from network costs.

[57] McKinsey, What electrification can do for industry

[58] Euractiv, Large electrical heat pumps can be key to decarbonising Europe's industry

[59] DESNZ, International energy price comparison

There is also a crucial need for more long-term certainty around budget allocation and the amount of capacity contracted under CfDs. Rather than being reliant on annual announcements, producers need an allocation schedule that ensures they have greater visibility to more effectively forecast plans in advance.

Other nations have used corporate Power Purchase Agreements (PPAs) to support electrification by reducing the risk to developers. The €600 million FERGEI Guarantee Scheme in Spain guarantees payments when offtakers cannot meet them, moving Spain to the top of the European PPA market in 2022 (24% of the market), having only entered in 2018.[60] Analysis undertaken by Public First for Energy UK found that PPAs are underused in the UK, with 7% of solar under a PPA compared to 20% in Spain and 34% in Denmark.

Given the political focus the government has given CCUS and hydrogen and the UK's expertise identified above, action is also required here. In practice, that means ensuring a focus on wind as a key subsector of the industrial strategy. This has the potential to deliver a major economic boost across the UK, creating jobs and new investment opportunities. Crucially, it can help to support other sectors to decarbonise (such as defence, advanced manufacturing, or technology), acting as both a growth sector, and an enabler of investment in others. With high electricity costs acting as a major barrier to investment in the UK, offshore wind will do the most to encourage the electrification required to bring down industrial power prices in the longer term.

The sector is already one of the UK's major success stories, employing over 30,000 people, but it can go further through policy intervention and the right business environment. However, the ending of the Green Industries Growth Accelerator (GIGA) poses a major risk to the sector, specifically to supply chain investment, hence our recommendation above of renewing the GIGA. While the National Wealth Fund will support some parts of the sector, its primary function is lending and guarantees, but to boost supply chain capacity in the face of increased competition from Europe, further grant funding is required.

[60] Energy Monitor, Data insight: Spain leads the European corporate renewable PPA market.

The EU Wind Power Package: A model for the UK?

The EU's Wind Power Package strengthens the competitiveness of Europe's wind supply chain in partnership with the European Investment Bank (EIB). Investments such as Vestas' nacelle and blade factory in Szczecin, Poland have followed, supporting 700 jobs.[61] Permits for new projects have risen in France, Germany, Belgium, Spain, and Greece.

The Package includes a €4 billion grant programme under the EU Innovation Fund to support cleantech manufacturing in Europe, and a European Competitiveness Fund to boost cleantech financing. The EIB has set up a €5 billion counter guarantee facility to boost supply chain investments., providing counter-guarantees to commercial banks to derisk their own guarantees to wind projects. This is projected to facilitate up to €80 billion in new investment.[62] The first use of this facility saw a deal worth €500 million struck with Deutsche Bank, part of a €1 billion portfolio the bank will use to invest in wind farms and supply chain facilities, triggering additional private investments of up to €8 billion in Germany.[63] The EIB has also agreed a €450 million loan to Prsymian for the manufacture of extruded cabling in Finland, France, and Italy, and €35 to Haizea million to support advanced manufacturing for wind farm assembly in Spain.[64] [65]

RECOMMENDATIONS

- Lay out a CfD pipeline under a 10-year, volume allocation schedule to encourage electrification, budgeted allocation schedule, identifying target capacity by technology per allocation round, and extend contracts beyond 15 years to reflect longer project lives and unlock lower cost of capital.
- Compensate industry for 90% of network charges, matching French and German electrification support, alongside broader network charge reform to avoid a situation under which the demand side is exempt from chargers but suppliers have to shoulder the burden of volatile network chargers.
- Underwrite PPAs, providing a credit wrap to shield developers from customers' credit risk. This should be provided as a new funding line administered by DBT.

[61] Vestas, A new offshore nacelle and assembly factory in Szczecin, Poland
[62] EIB, EIB Commits €5 billion to support Europe's wind manufacturers
[63] EIB, EIB and Deutsche to boost Europe's wind energy manufacturers
[64] EIB, EIB provides €450m to Prysmian to promote European energy transition
[65] EIB, EIB and Haizea sign €35 million green loan boosting European wind energy sector component manufacturing

- Exempt PPAs from the CfD Supplier Obligation Levy, based on the proportion of total supply volume contracted under a PPA.

Hydrogen

Hydrogen is a critical fuel-switching option, with demonstrators in steel, chemicals, glass, cement, lime, and food and drink. It presents the UK with an opportunity to leverage advantages, supporting 30,000 direct jobs and contributing £7 billion GVA by 2030.[66] However, the sector is nascent. The previous government set an ambition of up to 10 GW of low carbon hydrogen by 2030, up to 6GW of which will be generated by electrolytic hydrogen. There are currently only about 5 MW of operational projects in the UK. The Hydrogen Production Business Models (HPBM) are essential in kickstarting large operational projects by derisking and reducing finance costs.

Under Hydrogen Allocation Round 1 (HAR1), 11 green hydrogen projects (produced with renewables) were successful, with £2 billion of public funding provided, but so far none has signed a contract or taken an Final Investment Decision. The Government has also produced a Hydrogen Production Delivery Roadmap and announced a £240 million Net Zero Hydrogen Fund. However, the new government now needs to set out its desired end use for hydrogen (something which has caused significant investor confusion). It also needs to grow the pipeline of green hydrogen projects through annual allocation rounds, as well as the pipeline of blue hydrogen (gas and carbon capture) projects by setting up a programme of regular contract allocation rounds under the CCUS Cluster Sequencing Programme. Finally, it will also need to allocate contracts for the first hydrogen transport and storage infrastructure projects, consult on the longer term funding source(s) for production and transport and storage projects, and generally provide greater clarity on the role of hydrogen in power.

The most attractive export opportunities for the UK for Hydrogen are in electrolysis package manufacturing, high pressure compressor package manufacturing for cavern storage, green hydrogen production, electrical equipment and materials for green hydrogen production, and civil or structural materials for cavern storage.[67] The cost of green hydrogen also depends on the cost of electricity, covered above.

RECOMMENDATIONS

- Provide clarity on the end uses for hydrogen by progressing the first rounds of the Hydrogen Storage Business Model and Hydrogen Transport Business Model.
- Support projects under Hydrogen Allocation Round 1 to ensure they progress to final investment decisions (FIDS) as soon as possible.
- Work with the National Energy System Operator (NESO) to plan H2 and CO2 pipeline infrastructure in the same way as electricity networks to ensure that

[66] Hydrogen UK, EIA Report 2024
[67] Wood, Supply chains to support a hydrogen economy

fuel switching is complemented by the development of transport and storage infrastructure.
- Establish a nationwide, digitised infrastructure pipeline for hydrogen and CCUS.

Carbon Capture, Utilisation and Storage

CCUS represents a major opportunity for the UK. With a pipeline of regional projects and storage infrastructure, CCUS could create 70,000 new jobs and protect 77,000 existing ones in UK industrial heartlands, particularly in regions outside the South-East. However, with other markets committing significant funding to CCUS, the UK must ensure that it capitalises on its geological advantage as a host of almost one third of Europe's storage capacity.

Particular UK strengths lie in construction and management services, engineering design, column vessel manufacture, heat exchanger manufacture and assembly, process control technology, and operation and maintenance within the CCUS value chain.[68] Many of these are opportunities to transfer skills from the oil and gas industry, allowing for a more orderly transition. Similarly, the technology creates opportunities to protect jobs in other industries that need to decarbonise.

The UK boasts an estimated CO2 storage capacity of 78 billion tons, among the largest in Europe, but policy needs to ensure that private capital flows into transport and storage networks and industrial capture initiatives.[69] If policy can lower the cost of transport and storage networks, the UK can establish a source of long-term revenue and offset the mid-term UK Government investment to kickstart the industry (including the £21 billion already committed).

Following early progress on CCUS Track 1 with the selection of HyNet and East-Coast Cluster as Track-1 CCUS clusters in November 2021, further decisions are required on Track 2 and Track 1 expansion projects, as well as the future for dispersed sites and clusters not yet incorporated into the cluster sequencing program, to provide confidence to investors who might otherwise look at opportunities in Europe and the US. Investor confidence has already been damaged by two previously cancelled CCS competitions and a lack of clarity over government's vision for clusters and dispersed sites; there is a clear need for decisive action, particularly to ensure there is more clarity around the building of transport infrastructure to encourage investment.

RECOMMENDATIONS

- Maintain progress on track-1 projects to ensure FIDs can be achieved as soon as possible.

[68] Arup, A remarkable new infrastructure system
[69] NSTA, Carbon Capture and Net Zero

- Publish a delivery roadmap and provide certainty on revenue support envelopes for Track-2 clusters and the expansion of both Track-1 clusters, and other cluster/projects which can deploy on similar time frames. Provide clarity on successful projects in Track-1 expansion and Track 2, and future revenue support envelope for UK cluster deployment across the clusters and dispersed sites.
- Publish a roadmap of how and when the government intends to facilitate the building of transport infrastructure required for CCUS.
- Progress needs to be made to the workstreams and priorities of the CCUS vision, to accelerate the journey towards a self-sustaining CCUS industry by 2035 or before.
- Establish a nationwide, digitised infrastructure pipeline for hydrogen and CCUS.

CONCLUSION

Making the industrial strategy work

In opposition, Labour talked up the opportunities of industrial strategy as a means of incentivising private investment and spurring economic growth. The opportunities of this approach are great, with huge demand for investment across technologies, supply chains, and geographies. However, this requires choices to be made.

The Industrial Strategy Green Paper describes net zero, regional growth, and economic resilience as the core goals of the government's Strategy. International competition for capital is stiff, but the UK's state capacity is limited and fiscal headroom is narrow. The majority of global industrial strategies focus on decarbonisation, technologies (particularly those in the clean energy supply chain), innovation, and access to finance. There is an abundance of evidence to suggest that this focus has major benefits for the productivity of the wider economy. In that context, the Green Paper is a positive step, but the Government will need to narrow its focus. It needs to be clear on what industrial strategy is - for which the goals are helpful - and what it is not; namely, a growth strategy for the whole economy.

Experience tells us that the most effective industrial policies are those with a narrow focus. We believe that this focus should be clean energy industries and manufacturing specific technologies within their supply chain, along with associated services. Investment in decarbonisation most closely aligns to the Strategy's stated goals. As well as being a high-growth sector in its own right, clean energy underpins the decarbonisation of the whole economy, but its complexity and scale are such that it will

not be delivered by markets alone. It requires targeted state intervention, coordinated under an industrial strategy.

We have identified some of the geographies and areas of opportunity for the UK, particularly in the North West and North East, but they need real-terms policy change to incentivise investment. An industrial strategy needs to move beyond the rhetoric of stability and partnership, and the Strategy alone can only ever be one part of a wider economic growth programme. Our proposals are designed to maximise the UK's strengths in innovation, identifying areas where we can exploit existing advantage to gain a market share in the value chains of the future: the levers government can pull to make its industrial strategy work.

Annex 1: Methodology for analysis

Suitable locations for UK industry

To calculate an index of UK major towns and cities and the potential for growth in these places for each industry a number of factors were considered, including:

- The **cost of industrial rent** and the cost of office rent. These metrics used mean rateable value data for the relevant local authority from the Valuation Office Agency as a proxy. Where this data was missing, desk research was conducted to work out the average cost per square foot per year and this was compared to an average town with rateable value data to approximate the rateable value for the town or city with missing data.
- **Connectivity.** This metric consists of two equally weighted parts; the **e**ase of domestic transport which was proxied using a straight line distance from the centre of each town or city to the nearest motorway junction, and the ease of export, which was proxied using a straight line distance from the centre of each town or city to the nearest major goods port.
- **Skills**. This metric used data on the number of employees by Standard Occupational Classification (SOC) in each Travel to Work Area from the Annual Population Survey. A percentile rank was found for the number of employees in each code, this was then equally weighted depending on the SOC codes of interest for each industry; further details of which are provided in Annex 1.
- **Industry specialisation.** The metric uses data from the Business Register and Employment Survey on the number of employees in each Travel to Work Area by three digit Standard Industrial Classification (SIC) codes. A location quotient is calculated for all SIC codes of interest for the sector; further details of which are provided in Annex 1. The location quotient is then percentile ranked.
- **Existing industry.** The metric uses data from the Business Register and Employment Survey on the number of employees in each Travel to Work Area by three digit Standard Industrial Classification (SIC) codes. A percentile rank was found for the number of employees in each code, this was then equally weighted depending on the SIC codes of interest for each industry; further details of which are provided in Annex 1.
- **Industry growth.** The metric uses the same approach as the existing industry metric but for 2018 data in order to work out the five year growth in number of employees for the relevant industry.
- **Research Institutions.** The metric took into account the proximity and relevant research output in the relevant field of the top 50 universities in that field according to EduRank.
- **Investment.** This metric consists of two equally weighted parts: Foreign Direct Investment and UK government spending on enterprises and economic

development. The latest two years of ONS data on regional inward investment by industry was used to calculate a percentile rank for each region and industry,with each place then being matched with the relevant regional score. The UK government spending portion of the metric uses the Treasury index on UK identifiable expenditure on services by function per head.

- **Business environment.** This metric consists of two equally weighted parts. The first part uses ONS business demography data to calculate the percentage of high growth businesses in each upper tier local authority. This is then percentile ranked and matched with the relevant town or city. The second part also uses ONS business demography data to calculate the five year survival rate for businesses at a lower tier local authority level.

Each major town or city was assigned a score from 0 to 10 for each metric, based on percentile ranking. To calculate an overall score for each industry in every location, these metric scores were equally weighted if the metric in question was deemed relevant to the industry. All these metrics were considered for the overall advanced manufacturing sector score and overall clean energy industries score.

Annex 1: SIC and SOC codes of interest by industry

Industry	**SOC codes**	**SIC codes**
Advanced Manufacturing	21, 31, 52, 81	211, 212, 261, 262, 263, 264, 265, 266, 267, 268, 303
Clean Energy	21, 31, 52, 53	251, 271, 272, 273, 351, 432, 711, 721

Annex 2: Towns and cities index rankings

A full, interactive version of our towns and cities ranking can be found here, broken down into sectors (the government's key growth sectors), existing strengths, and future opportunities.