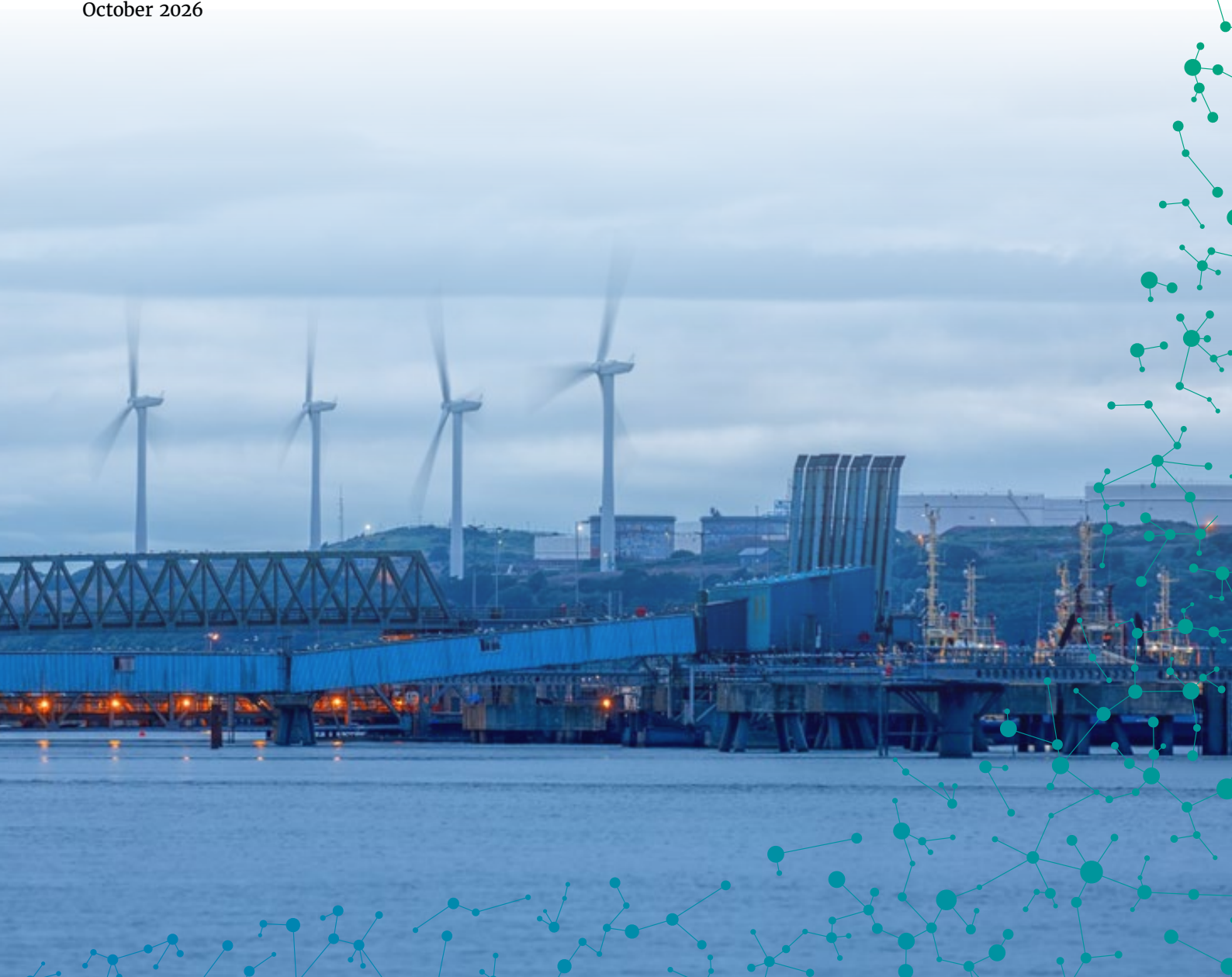


Green Industrial Policy in the UK: A Political Economy Perspective

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Executive Summary

Achieving net zero in the UK will require the large-scale deployment of technologies such as offshore wind, electric vehicles (EVs), batteries and heat pumps. Green industrial policy has therefore become increasingly important, not only as a climate strategy but also as a means of providing a political underpinning of that strategy through generating economic growth and jobs, attracting investment, strengthening energy security and supporting regional economic development.

This report argues that the success of UK green industrial policy depends on two interrelated political economy challenges: building sufficient state capacity to implement industrial strategy effectively, and creating markets for low carbon technologies whilst managing opposition from consumers, businesses and workers.

The report finds that the UK has performed strongly in deploying low carbon technologies, particularly offshore wind, but has generally been less successful in capturing associated

manufacturing opportunities. The UK remains heavily reliant on overseas manufacturers for key components and technologies across offshore wind, EVs and heat pumps. While governments have repeatedly promoted green industrial policy as a source of large-scale manufacturing employment and regional regeneration, these outcomes have been more limited than anticipated.

A common criticism of UK industrial policy is that it has been characterised by policy instability, weak industrial expertise within



government, and a tendency for Treasury priorities to dominate long-term industrial development goals. The report acknowledges these criticisms but argues that they do not tell the whole story. Beneath successive industrial strategies, the UK has developed a substantial network of institutions, including cross-sectoral organisations such as the National Wealth Fund and the Catapult centres, along with sector-specific institutions such as the Automotive Council, the Advanced Propulsion Centre and the Offshore Wind Industry Council. These organisations have provided continuity, sectoral expertise and in some cases growing funding over time, forming what can be described as a ‘delegated networked state’.

However, this networked approach has had mixed results. Its greatest success has been in supporting innovation, research and technology development rather than the creation of large-scale manufacturing firms. For example, in the battery sectors, the approach has helped build a strong ecosystem of innovative companies but not scale manufacturing. In offshore wind, where the focus for many years was on reducing costs, the UK has developed strengths in project development, installation and operations, but with the exception of some blade manufacturing, the production of high-value turbine manufacturing remains located overseas. As a result, green industrial policy has generated more high-skilled technical and professional jobs than the broad-based manufacturing employment often promised in political discourse.

Because of these limits, and the inability to grow new national champions, the report argues that UK green industrial policy in practice operates through two strategies. The first is a “convert” strategy, which seeks to persuade existing manufacturers to shift from high-carbon to low carbon products, such as moving from internal combustion engine vehicles to EVs or from gas boilers to heat pumps. The second is an “attract” strategy, which aims to bring foreign-owned low carbon manufacturers to the UK, particularly in

sectors where no strong domestic producers exist, such as offshore wind turbines and battery production.

Both strategies rely crucially on policies to create new markets for low carbon technologies, but the politics of market creation differ significantly across sectors. Offshore wind represents the strongest case, benefiting from stable policy support, limited public opposition and strong institutional coordination. The EV transition is more challenging, involving direct consumer choices and a large incumbent automotive industry concerned about costs, competitiveness and employment. The heat pump sector remains the weakest, characterised by uncertain demand, high electricity prices relative to gas, fragmented industry organisation and inconsistent government commitment to replacing gas boilers. Across both EVs and heat pumps, governments have often weakened or delayed policies in response to political and industry pressure, creating uncertainty for investors and manufacturers.

The report concludes that the UK has built a relatively effective green innovation system but not a strong green manufacturing system. Existing institutional networks have helped create technological capabilities but have not delivered the scale of industrial transformation necessary to secure substantial manufacturing growth or widespread regional renewal. To address this, we recommend (i) sector-specific conversion strategies more tailored to the distinct circumstances of different industries, and (ii) building coalitions for a more ambitious, long-term approach to industrial policy and reforms to strengthen state capacity for delivering that policy. Without these reforms, the UK risks meeting parts of its decarbonisation objectives while missing many of the economic and political benefits that green industrial policy is intended to achieve.

1. Introduction

At its core, decarbonisation of the UK economy requires a massive deployment of manufactured technologies: from electric vehicles to heat pumps, wind turbines to solar panels, and electrolyzers for hydrogen to cables for subsea interconnection.

One key issue is how much of the manufacturing (and associated services) for that deployment happens within the UK, which in turn is partly determined by what the government can do to boost UK 'green' manufacturing. Jobs and investment generated by the transition to a clean energy economy have long been a key part of how policy makers have tried to build support for that transition in the UK. For example, in the 2025 Clean Energy Technologies sector plan for the Modern Industrial Strategy, former Energy Secretary of State Ed Miliband argues that:

"In our industrial heartlands and coastal communities, there is an enormous opportunity to build the energy industries of the future and create the good jobs at good wages that people have long demanded... [clean energy technology industries] can create hundreds of thousands of jobs for engineers, technicians, mechanics, electricians, and welders in every corner of the country. But our vision will not just deliver jobs. It will create a new generation of good, industrial jobs with strong trade union representation and position the UK as a world-leading exporter of low carbon products, services and innovation."

The framing of this agenda thus presents the energy transition in the UK as helping to address long-standing and entrenched problems, including regional inequality and a lack of opportunities for non-graduates (who tend to be concentrated in regions with low incomes, productivity and investment). The recent Clean Energy Jobs Plan¹ emphasises the creation of clean energy jobs with a wide range of skills, including non-graduates, and across the country, not just in London and the South-East. It also offers the prospect of quite large numbers of new jobs, of the

order of hundreds of thousands by 2030. These themes of good jobs, 'levelling up' and the economic growth potential of new low-emissions sectors are thus important ways in which green industrial strategy has been narrated².

More recently, there is also an explicit focus on securing the UK's place in the face of intense international economic competition for a share of a clean tech market estimated to be worth US\$2 trillion by 2035³ in a newly geopolitical world, dominated especially by China⁴. Importantly, the development of green industries within the UK is also increasingly argued to be central to 'strategic autonomy' in the country's energy supply.

The political relevance of these arguments has grown in recent years as the net zero agenda has become increasingly polarised^{5 6}. The investment costs of decarbonising the electricity system are growing just as the public wrestle with cost-of-living crises driven by high energy prices in turn arising from conflicts in Ukraine and now the Gulf. There is concern that support for the energy transition has stalled⁷. In this context the promise of jobs, growth and security as 'co-benefits' of the low carbon energy transition is seen as a key way to underpin and revitalise that support.

These arguments have also become more important within an increasingly difficult context for British industry over this period. While the UK has a strong science base and a good record of innovation, its manufacturing is in long term decline. Recent years have seen comparatively high and rising energy costs, which have contributed to a sharp contraction in the output of energy intensive industries since 2021^{8 9}. UK manufacturers are facing new trade barriers in the US (and



potentially the EU) and increasing competition from China and other countries even in high value manufacturing¹⁰.

Since the global financial crisis in 2009, there has been an increasing turn, globally and within the UK, to the idea of active industrial policy to retain and grow jobs in expanding green industries. Green industrial policy involves a state-led transformation of the structure of the economy, with targeted support for critical low carbon industries, technologies and supply chains. In the UK, such a strategy also needs to be aligned with a timetable set by the overarching climate policy framework of achieving net zero emissions by 2050.

The stakes for the UK are, therefore, high. In this report, we argue that how far it will succeed will be shaped by two kinds of *political* conditions. The first is *state capacity* – bureaucratic capabilities and appropriate institutions – to formulate and implement industrial strategy, which is necessarily complex, multi-sector and long-term. As discussed in Section 3 below, the account given in the political economy literature of the UK's attempts at industrial policy since the late 2000s suggests serious problems: swings

in policy; struggles over resource allocation leading to funding instability, and government departments with weak capacity in and limited expertise in industry, technology and energy. As a result, the UK in many respects remains a green industrial laggard.

However, underneath this headline account, we argue that the UK has been successful in building up a widely overlooked *delegated* capacity. This capacity exists in the form of networks of institutions comprising public agencies, industry and partnerships between these actors. Some of the agencies are cross-economy in nature, but many are specific to particular sectors and are typically devolved from government departments. We show that these networks have played different roles in different sectors and at different times. In some sectors, notably in batteries, these have been successful in incubating innovation. In more mature industries, including automotive, offshore wind and heat pumps, while there are innovative elements (i.e., floating offshore wind (FLOW)), they have focused historically on improving efficiency in deployment and products, and much more recently on developing the UK manufacturing supply chain (so far without major success).

The green industrial policy ‘on the ground’ of this UK delegated networked state has thus had some effects. However, it has largely not attempted the classic developmental state strategy of building new, scale manufacturers. Importantly, while it has already generated innovative activity in some areas (batteries) and has potential to do so in others (CCS, floating offshore wind), there are well-known barriers (in finance, skills and training, etc.) that work against this activity scaling to major new industries within the UK, especially in their manufacturing dimensions. This means that there is major risk that the delegated networked state approach to green industrial policy will not generate the abundant semi-skilled jobs spread across the UK’s under-served regions often seen as a central plank of the political case for the energy transition.

A second condition is the right politics for *market creation*. Green industrial strategy is distinctive in that it requires the creation of new markets for low carbon products and services (e.g., heating, electricity, cars) in

which fossil fuel alternatives already exist. The net zero and Clean Power 2030 targets also mean that there is a pressing timetable for market creation.

There is, however, a further complicating factor – the fact that industrial strategy has so far not succeeded in establishing major new firms manufacturing low carbon goods means the UK is dependent on incumbents in two ways. The government has to (i) engage with existing, incumbent manufacturers of high-carbon products in the UK on how to retool to produce low carbon alternatives (for example in heating technology and automotive manufacturing), and (ii) induce incumbents based abroad to invest in production in the UK (for example in offshore wind turbines and EV batteries). We call these ‘convert’ and ‘attract’ strategies respectively.

The first of these strategies in particular may well be met with resistance, and the state must find tools to manage this, from derisking to regulatory mechanisms. This task is





complicated by the fact that many incumbent manufacturers in the UK are subsidiaries of foreign-owned parent companies, with key investment decisions taken abroad, whilst other countries also offer attractive inducements for the manufacturing of low carbon goods.

Market creation can also be supported by action on the demand-side, meaning that the state must marshal consumers away from high-carbon products towards their low carbon replacements, even where this comes with a cost premium. This represents a significant challenge, amplified by the factors of net zero scepticism and cost-of-living crisis identified above. Here we argue that governments must carefully design and manage these processes to contain conflict across the two constituencies on which they depend: industry interest groups and consumers as voters. The UK does have policies in place to try to engage with these dynamics, but it currently runs the risk of an unbalanced approach, failing to develop demand fast enough to make supply side expansion make commercial sense.

In this report, we explore the challenges of state capacity and market creation in the UK, and the implications for the UK's wider energy transition. We do so by illustrating how they work in three key sectors: electric vehicles and lithium-ion batteries, offshore wind, and heat pumps. The analysis is based on a review of official and market data, secondary sources and eight interviews with actors in policy and industry (see Appendix).

Section 2 briefly introduces the three sectors, giving an idea of the size of demand and production in the UK for each. Section 3 examines UK state capacity for industrial policy, and the resulting tendency for that policy to support the development of innovation rather than scale manufacturing. In Section 3 we look at the politics of market creation on both the supply and demand sides. Section 4 concludes and makes recommendations.

2. Three Key Sectors for Net Zero

Three technologies will play a central role in the route to net zero in the UK: offshore wind, which will be the central zero carbon electricity generating technology; electric vehicles, which will play a major role in zero carbon passenger transport, and heat pumps, which will provide a large part of the solution for zero carbon heating. This section briefly describes the current state of UK manufacturing in these sectors, including the growth of the market, UK manufacturing and the supply chain.

Offshore wind

The UK has been a global leader in the growth of offshore wind deployment and generation, with rapid and sustained growth since the end of the 2000s. From under 1 GW in 2009 installed capacity has risen to 16 GW in 2025, with another 5.5 GW under construction or contracted^{11 12}. Offshore wind plays a central role in the government's Clean Power Plan 2030, which calls for a hugely accelerated deployment by 2030, with a target range of 43-50 GW installed capacity, i.e. further growth of 27-34 GW¹³. But despite this impressive record in deployment,

manufacturing of wind turbines and blades in the UK is dwarfed by that in other countries. The UK accounts for less than 1% of global offshore wind blade manufacturing, compared with 6% located in the US and 13% in Europe¹⁴. There has been 'demand-pull' for market creation but relatively little manufacturing.

The OSW supply chain has inputs across three main phases: (i) supply of the main elements of turbines, foundations, cables and substations, (ii) construction, involving ports, vessels and installers, and (iii) operation and management, including maintenance (Figure 1).



Each phase has its own inputs of manufactured goods and supply chain dependencies. For example, turbine supply chains provide components such as towers, nacelles, blades, control instruments, etc. There are two turbine OEMs with manufacturing facilities in the UK, i.e., Siemens Gamesa in Hull and (from 2026) Vestas in the Isle of Wight, but both make blades only. UK suppliers are strong, however, in development services, cables, electrical components (transformers, switchgear), offshore services (construction, commissioning, O&M), crew transfer vessels (CTVs) and moorings &

anchors for floating offshore wind. Since last year the UK has also had foundation capacity in the form of the SeAH monopile facility in Teesside, which can produce for both domestic and export markets¹⁵. Overall, UK-based suppliers are present in about half of the supply chain areas¹⁶, and OSW sector exports were worth £2.4bn in 2022¹⁷. However, the UK industry is not present in most of the high value turbine manufacturing chain, apart from some blade manufacturing, as it lacks engineering, procurement and construction (EPC) contractors able to manage the supply and installation of major components.

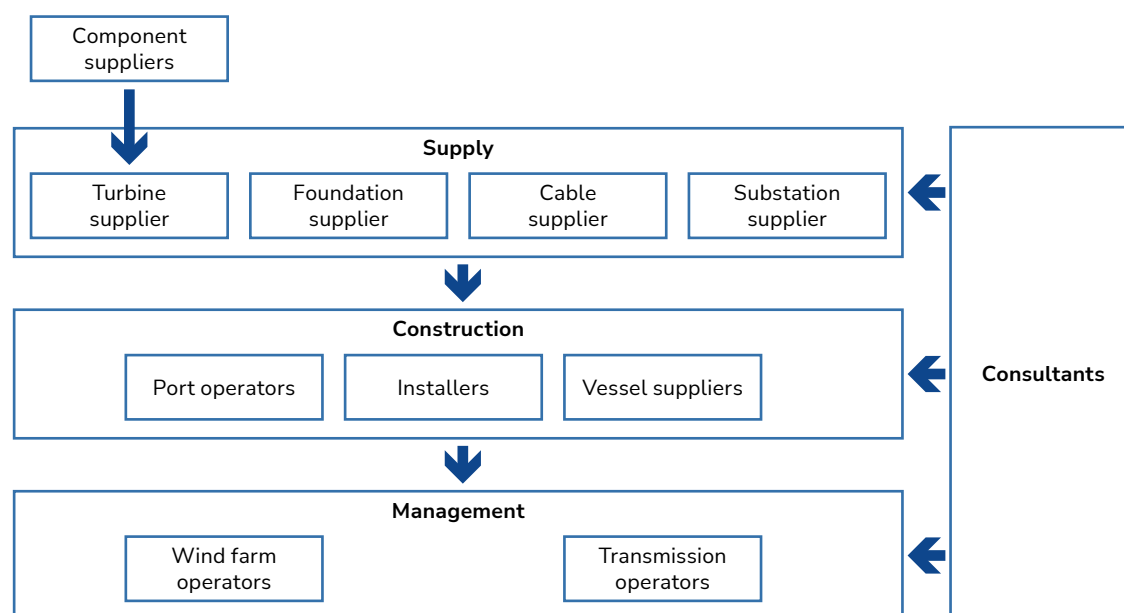


Figure 1. Offshore wind supply chain

Source: Adapted from D'Amico et al.¹⁸

EVs and batteries

The UK automotive industry has a long history going back to the late 19th century, but in a global perspective is now relatively small. In 2025, the UK produced under one million vehicles, compared with 14 million in the US and 17 million in Europe. With almost 80% of vehicles made for export, the UK industry is also very outward looking. Both the industry and the UK market are undergoing a shift from

internal combustion engine vehicles (ICEV) to electric vehicles (EVs). UK car production remains dominated by petrol and diesel vehicles, but over 35% of units produced in 2024 included battery drivetrains¹⁹, although most of these were hybrid or plug-in hybrids rather than full battery electric vehicles. On the consumption side, just under half of new UK sales in 2025 were vehicles with batteries, with full BEVs making up just under a quarter (Figure 2)²⁰.

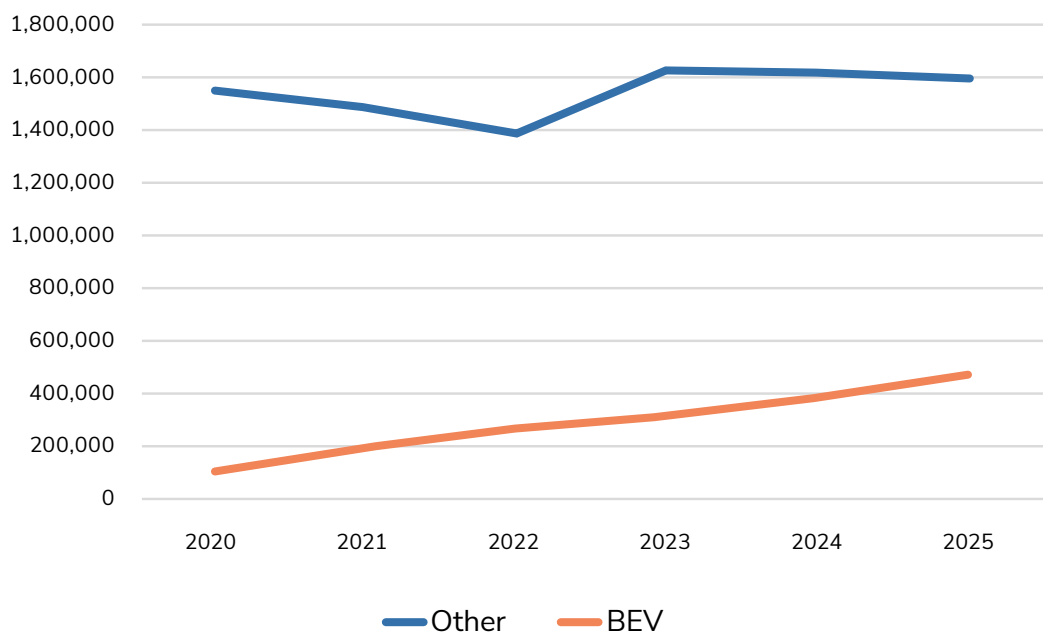


Figure 2. Battery Electric Vehicles and all other new car sales

Source: DfT²¹

For automakers, EVs include an entirely new electrochemical and software supply chain that is beyond their core competence, presenting a major challenge to their role as the apex of supply chains. The wider context for this transition is the challenges faced by the UK industry, where production levels have fallen by about 50% from a peak in the 2010s. This longer-term trend has been exacerbated recently by the erection of trade barriers. Around three quarters of cars produced are exported, with 54% going to the EU and 17% to the US. The latter market already has tariffs in place, and the proposed EU Made in Europe policy could have the same effect on UK exporters. At the same time, the 2021 Trade and Cooperation Agreement with the EU means UK car producers won't be able to export to European markets unless they onshore a significant share of their battery supply chain. Unlike the EU and US markets, the UK has not put in place any tariff barriers

to imports of cheaper EVs from China. The UK industry also faces relatively high electricity prices. Given these challenges, and the future requirement for automotive and battery production to be co-located and commercially integrated, the future of UK-based operations of some volume manufacturers may be in doubt.ⁱ

ⁱ In 2025 Vauxhall (owned by Stellantis) closed its Luton plant and in 2026 JLR announced job losses

Battery supply is a crucial issue for UK automotive OEMs in this context. At the same time, a viable future for automotive OEMs is a fundamental requirement for any significant UK battery industry.ⁱⁱ It is increasingly clear that attempts to develop standalone battery production facilities ('gigafactories') are not viable (as the examples of Britishvolt and Northvolt show), and instead these will be built and run through partnerships between OEMs using the batteries in vehicles and specialist battery technology production firms (many of which are Chinese owned). Currently the UK has two operational gigafactories, compared with 30 in Europe and 13 in the US. The two plants are both in Sunderland, servicing Nissan; one small Envision-AESC 1.8 GWh plant and, from 2025, a much larger plant, also built and owned by AESC, with an initial planned capacity of 15.8 GWh²². A further 40 GWh gigafactory is under construction in Somerset by Agratas (Tata). A third investment (the 'West Midlands Gigafactory' or 'Green Power Plant') which could support a 20 GWh facility may also materialise in future. This would give the UK a gigafactory capacity of 57-77 GWh, which is still modest in comparison with key European competitors, especially relative to the size of its automotive sector. A recent estimate is that there will be 110 GWh of demand for UK EV battery manufacturing capacity by 2030, and almost 200 GWh by 2040²³. Given that gigafactories have a lead time of over five years, investments to meet 2030 demand are required urgently to meet this demand.

Heat pumps

The heat pump (HP) market in the UK has been increasing in recent years (Figure 3), although growth slowed in 2026²⁴. Demand is dominated by the residential sector, and within this, by the air-source HP (ASHP) marketⁱⁱⁱ ²⁵. The Heat Pump Association (HPA) expects that the market will continue to grow, given current policies, to around 436,000 installations a year by 2028²⁶, but there are reasons to think this is an optimistic view (see below). Gasperin et al²⁷ emphasises the potential of the UK market as one of the least developed in Europe, given that heat technology sales are still overwhelmingly gas boilers, with around 1.7 million sold a year.

The global market for heat pumps also has large growth potential. Globally, 10% of sales in heating equipment is accounted for by heat pumps, up from 5% in 2010²⁸. While growth overall stalled in 2023 and in Europe in 2024, future heat pump sales are expected to accelerate. By 2030 heat pumps should represent 43% of global heating equipment sales under the International Energy Agency's scenario compatible with net zero targets²⁹ ³⁰. At the same time there is projected to be a shortage of manufacturing capacity of 64% under a net zero scenario by 2030³¹.

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- ii Nissan and JLR are developing gigafactories, but they have a stake in the UK that other OEMs do not: Sunderland is Nissan's only European factory and JLR is organised much like a UK-headquartered firm. However, Nissan is in the middle of a major corporate restructuring, and there have been warnings about its plant in Sunderland, which it will now probably share with Chery. Stellantis production is too low to justify a gigafactory and it will import cells from its facilities in Europe. Mini has paused EV production at Oxford and may relocate operations to Leipzig and China. Toyota is the only real candidate for an OEM with enough volume to justify another gigafactory but its strategy for the moment seems to be based on hybrids, for which it has pressed the government to relax phase-out rules. The gap between the UK's gigafactory pipeline and peers in Europe is large and growing.
 - iii Most ASHPs in the UK are monobloc technology, meaning that they do not require F-gas certified technicians to install.

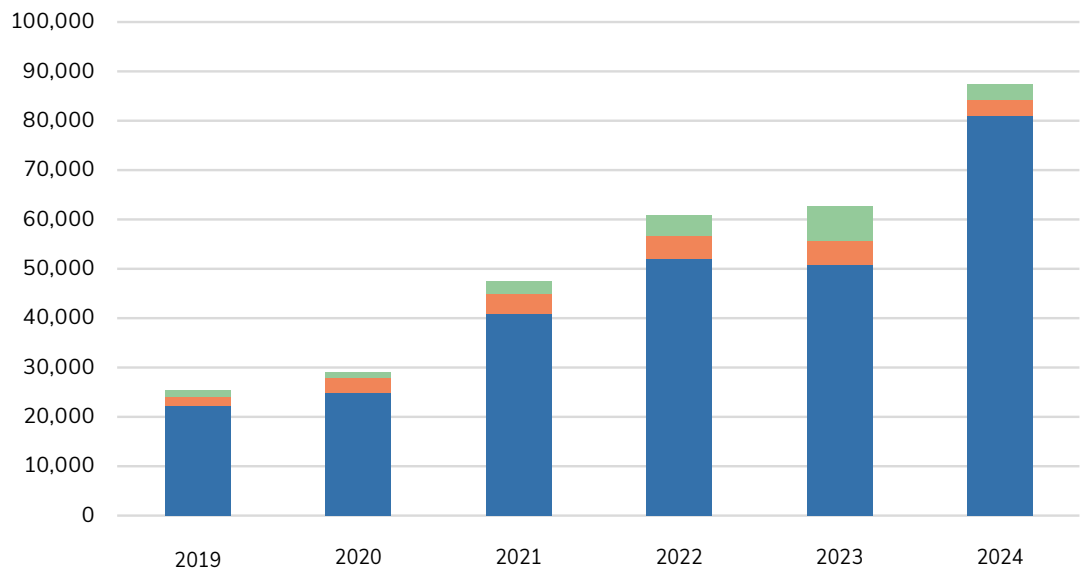


Figure 3. UK heat pump factory gate sales.

Source: Heat Pump Association (<https://www.heatpumps.org.uk/resources/statistics/>)

The global industry remains dominated by Asian producers, with the US and continental Europe also playing a significant role. The UK currently has 5 production facilities, compared with 27 in the US and 255 across the EU³². Most heat pumps manufactured in Europe and Asia are for domestic consumption; the U.S. is the dominant exporter³³. In terms of heat pump technology innovation, patent activity over the last twenty years has been led mainly by Japanese, Chinese and German firms³⁴.

The UK industry is thus small from a global perspective. Around one-third of heat pumps installed in the UK are produced domestically, with the rest imported mainly from Europe and Asia³⁵. The UK industry also exports heat pumps to Europe (especially France, the Netherlands and Ireland) and beyond, but the share of markets is very small (*ibid*). Most elements of the supply chain for UK manufacturing, including refrigerants, compressors, heat exchangers and control systems, have been sourced from abroad³⁶.



3. State Capacity for Industrial Policy

Green industrial policy in the UK goes back to the 2000s. With climate policy coming onto the agenda in a major way, there were several initiatives pursued by business and trade departments in the middle of the decade^{37 38}. In the wake of the global financial crisis of 2008/09, industrial policy began to move up the political agenda, and the subsequent 15 years have seen a series of strategies and plans (Figure 4), all with a ‘green’ element.

In 2009 the New Labour government launched a UK Low Carbon Industrial Strategy, focusing on offshore wind, marine energy, nuclear power, CCS, low carbon vehicles and low carbon buildings. This was replaced in 2013 with Vince Cable’s Industrial Strategy, which was in turn superseded in 2017 with a new Industrial Strategy led by Greg Clark under Theresa May’s post-Brexit

referendum government. The 2017 strategy was constructed on the basis of four ‘grand challenges’, one of which was clean growth, and had a major emphasis on electric vehicles and CCS. With the election of a Labour government in 2024, a new ‘Modern Industrial Strategy’ was launched, with a Green Paper in 2024 and a White Paper in 2025.

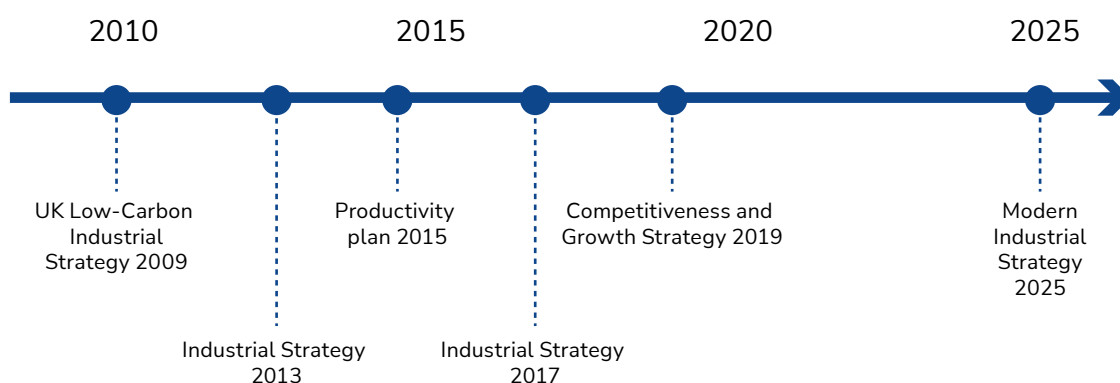


Figure 4. UK industrial and competitiveness strategies and plans, 2009-2025

The Modern Industrial Strategy is organised around eight key sectors (the IS-8) (Box 1). One of these is clean energy industries, comprising wind and nuclear energy,

CCUS, hydrogen, heat pumps and electricity networks. Another is advanced manufacturing, which includes batteries and EVs.

Box 1: The Modern Industrial Strategy

The Modern Industrial Strategy (MIS) is the industrial strategy of the Labour government. The main goal of the MIS is economic growth and competitiveness. It identifies 8 sectors (the 'IS-8') with the highest potential over the next decade:

- Advanced manufacturing
- Creative industries
- Life sciences
- Clean energy
- Defence
- Digital and technologies
- Professional and business services
- Financial services

Some of the main 'green' elements of the MIS can be found in the clean energy sector strategy, where a number of 'frontier' industries are identified: wind; nuclear fission; fusion; hydrogen; carbon capture, utilisation and storage (CCUS), and heat pumps. This sectoral strategy also includes decarbonisation of foundation industries such as steel and cement, building on the 2021 Industrial Decarbonisation Strategy. The other key 'green' industry elements are electric vehicle and battery manufacturing, which are in the Advanced Manufacturing sector strategy.

The MIS has some new policies but also draws together and in some cases extends existing policies. As a mechanism for policy stability and accountability for delivery, the MIS has also created an Industrial Strategy Advisory Council, which unlike predecessor bodies, is supposed to be put on a statutory basis (although this has not yet happened).

3.1 UK institutions and the challenge of effective industrial strategy

Successful industrial policy can deliver a range of benefits, including jobs, investment and improved supply chain resilience, along with lower cost products for both domestic and export markets. But policy is not always successful, and poor design runs the risk of increasing costs, with potential knock-on effects for the net zero transition. The 'new economics' of industrial policy points to certain policy recommendations, such as providing patient capital while building in performance review and sunset clauses to

support industries³⁹, but above all points to the importance of institutions^{40 41 42 43}. Mechanisms for close cooperation between government officials and private sector actors whilst also avoiding capture by special interests or political bias, i.e., the concept of 'embedded autonomy'⁴⁴, are seen as essential. Technical expertise in parts of government, or in public agencies, is also important, as are institutional arrangements that allow direction-setting and a long-term, stable approach.

In the case of the UK, there is a body of political economy analysis that points to aspects of the institutional context which raise questions about the ability of the state to deliver an effective industrial strategy.

One is the problem of *political centralisation and policy instability*. Coyle and Muhtar⁴⁵ argue that industrial policy in the UK is formulated from above by ministers and then cascades down the hierarchy of government, rather than working upwards from a process of state-society discovery as the new economics of industrial policy prescribes. At the same time, ministerial-level policymaking also breeds departmental silos, with little whole-of-government collaboration, leaving the 'ownership' of industrial policy with just a few core departments. Top-down policy dictated by ministers who are replaced every political cycle inevitably leads to instability and a lack of continuity. This, in turn, undermines the UK's ability to develop institutions for effective industrial policy, knowledge of sectors, technologies and innovation⁴⁶, and to create institutional memory, networks, and learning.

A second theme is a *lack of state capacity*. Instability and an economic policy paradigm hostile to sector- or industry-specific interventions have led to the atrophying of capacity to deliver industrial strategy within the civil service, the extensive use of consultants⁴⁷, and a reliance on private sector actors for information and expertise (see⁴⁸). The latter makes industrial policy more prone to capture by organised incumbent lobbies. For example, Theresa May's 'sectoral deals' involved an open invitation to industries to submit their own deals, effectively outsourcing policymaking to the dominant firms in each sector.

A third concern is the *dominance of finance and the Treasury*. A common theme in analyses of UK industrial strategy is the observation that the financial services play a relatively large role in the UK economy, especially compared with manufacturing, which has itself become increasingly subject to the needs of financial markets⁴⁹. UK financial institutions are also argued to be mainly interested in financing housing and consumer debt, rather than in long-term lending to UK industry⁵⁰.



The dominance of finance is then argued to be closely related to the unusually powerful role in policymaking of the UK's combined economic and finance ministry, i.e., the Treasury⁵¹. The power of the Treasury increased in the 1980s and strengthened further after the 2008-09 global financial crisis. A closeness to financial interests is seen as shaping a 'Treasury view' that is hostile to industrial policy and uninterested in developing manufacturing^{52 53 54 55}. One example cited is that of the Green Investment Bank, set up by the business department in 2012 and intended as a vehicle that would raise funds from private markets, but denied such powers by Treasury and effectively reduced to a funding agency before being sold off in 2015. These tendencies in turn imply that while industrial strategies and policy initiatives are developed, they are susceptible to being weakened or converted back into horizontal growth plans within a few years, rather than being sustained over time, again reinforcing policy instability. For example, Cable's 2013 industrial strategy was quickly displaced by the 2015 Treasury-led Productivity Plan, and the 2017 industrial strategy was supplanted by the Treasury's Growth and Competitiveness Plan of 2019.

A final issue is the pursuit of *multiple goals* through industrial strategy, especially *regional policy*, alongside competitiveness. Rapid and deep deindustrialisation in the UK has left lasting negative impacts on investment, productivity, employment, incomes, social mobility and wider deprivation in post-industrial regions^{56 57 58}. As a result, the UK is one of the most regionally unequal

countries in the OECD⁵⁹. In the wake of the Brexit referendum, these inequalities shot up the political agenda, and they remain there in part due to the cost-of-living crisis. Industrial policy as an instrument of regional policy and reviving manufacturing became a core concern of the post-referendum May government. This continued into the Johnson administration in the form of 'levelling up', to which the 2021 Industrial Decarbonisation Strategy devoted a whole chapter. The 2025 Modern Industrial Strategy likewise has a whole chapter on regional aspects of industrial policy and argues that it focuses on sectors "*best placed to create the wealth, jobs, and higher wages our country needs in every community*". However, the productivity gaps between regions mean that there are potential trade-offs between the goals of growth of the national economy on the one hand and addressing regional inequalities on the other that are glossed over in such statements.

Addressing regional inequalities often becomes entwined with the idea of reviving manufacturing and construction (as opposed to services), as can be seen in the quote in the Introduction. However, this approach faces two inter-related challenges. One is that manufacturing is now far less labour intensive than it was in the 1970s, before the shrinking of the industrial base, mainly due to technical change. The other is that manufacturing jobs are now higher skilled, and without regionally targeted training policies the risks are that jobs created by industrial policy go to workers from outside regions with a preponderance of low skills.

3.2 Delegated industrial policy institutions

These accounts of unstable strategies and poor capacity in the UK are important. But they tend to focus on aspects of failure of the industrial strategy process, especially at the level of the central state, and look for explanations in poor institutions, rather than tracking the actual outcomes of policy on the ground. In fact, as

we show in this section, consecutive industrial strategies, while only temporary, have created most lasting arms-length and sector-specific institutions that have evolved in some cases into a dense interconnected network. This alternative perspective thus yields a view of the UK state as having a more delegated

networked capacity for industrial policy. It also gives a more complete view of what UK industrial policy, including green industrial policy, actually is.

However, as we also go on to argue, the effects of this networked developmental state have so far been limited. Cross-cutting and sectoral institutions have not produced new national champions in the form of lead manufacturing firms and have even had little impact in deepening supply chains for existing manufacturers. Rather, their main success has been in supporting the emergence of innovative, knowledge-intensive firms in areas such as batteries, where technology is still evolving.

Cross-cutting institutions

We start with two important cross-cutting functions, i.e., finance and innovation. Successive governments have set up institutions to try to address the *financing* gaps in the critical move from invention to scale manufacturing. A *British Business Bank (BBB)*, with a broad remit as an early-stage investor in smaller innovative firms, was set up in 2013. Around the same time, the government established a *Green Investment Bank (GIB)*, which became an important keystone investor in early offshore wind projects before being sold off to the private sector in 2017. This was followed in 2021 by the establishment of the *UK Infrastructure Bank (UKIB)*, owned by the Treasury but operationally independent. This had a remit to support regional and local economic growth and to help tackle climate change. In addition, finance for UK industries seeking to break into

export markets has also long been provided by *UK Export Finance (UKEF)*, which goes back to 1919.

In 2024, the new Labour administration converted the UKIB into the *National Wealth Fund (NWF)*, which provides low-cost debt financing, equity investment, and various forms of guarantees to derisk investments to four focus sectors: clean energy, advanced manufacturing, digital and technologies, and transport^{60 61}. In addition, the new government established Great British Energy (GBE) in 2025, which has a remit to invest specifically in clean electricity generation.

These financial institutions have been criticised as being too small and too constrained in their lending^{62 63}. Nevertheless, each has provided support to some of the sectors relevant for net zero. As noted above, the GIB was an investor in early wind projects, and GBE has played a similar role in floating offshore wind. The BBB and UKEF have both given support to battery-related firms^{iv}. UKEF has provided financing of £1.2bn for exports to offshore wind farms in Asia^v. The NWF has played a significant role in the automotive sector, including a £200mn bridge loan for the construction of Envision-AESC's second gigafactory adjacent to the Nissan Factory in Sunderland⁶⁴, and has also invested in refurbishment and development of ports for facilitating offshore wind, committing at least £5.8bn.

The other cross cutting area is support to *innovation*. Originating in a 2010 review of technology and innovation centres in other countries^{vi}, a set of *Catapult* organisations were set up in 2011 to create and build networks, connect R&D to industrial activity,

iv For example, the UKEF's £1bn export development guarantee to Ford UK was central to the government's package of support to entice the company to make a £380mn investment to retrofit its Halewood plant to produce electric motors, see [63]

v For example, UKEF helped secure £55m contracts for British suppliers (including Cadeler, providing installation vessels, crew, sea fastening services, and crane operators) to the 495 MW Fengmiao offshore windfarm in Taiwan.

vi e.g., the Fraunhofer Institutions in Germany, Electronics and Communications Research Institute in South Korea, Carnot Institutes in France, DARPA in the US.

and help commercialise research⁶⁵. They are funded through Innovate UK and matching private sector contributions and operate as independent not-for-profit centres. The Catapult family has survived the multiple changes in high-level industrial strategies, and over the years has seen increased funding⁶⁶.

The *High Value Manufacturing Catapult (HVMC)* is important for the automotive sector, offering businesses access to advanced equipment and skilled technicians⁶⁷. It has a number of centres, including the Warwick Manufacturing Group (WMG), which has a focus on low carbon mobility, especially vehicle electrification. The WMG opened a £50mn Energy Innovation Centre in 2016 to develop cheaper, more energy dense batteries. Other work on material synthesis and process scale-up is carried out at the Centre for Process Innovation in Redcar, and manufacturing scale-up across a number of other centres in Glasgow, Bristol and Sheffield.

The OSW industry benefits from a dedicated *Offshore Renewable Energy (ORE) Catapult* (see below)⁶⁸. The *Energy Systems Catapult (ESC)* has provided support to the heat pump market, for example through a pilot project⁶⁹.

Finally, much support for innovation in industry is coordinated through UK Research and Innovation (UKRI). Formed out of the existing research councils and Innovate UK in 2017, it was made the delivery vehicle for the £2bn industrial strategy challenge fund, and is the political-administrative backbone for the delivery of grant competitions held by organisations like the APC and Faraday.

Sector-specific institutions

The **OSW industry** has benefited from a dense interlocking network of supporting institutions (Figure 5).

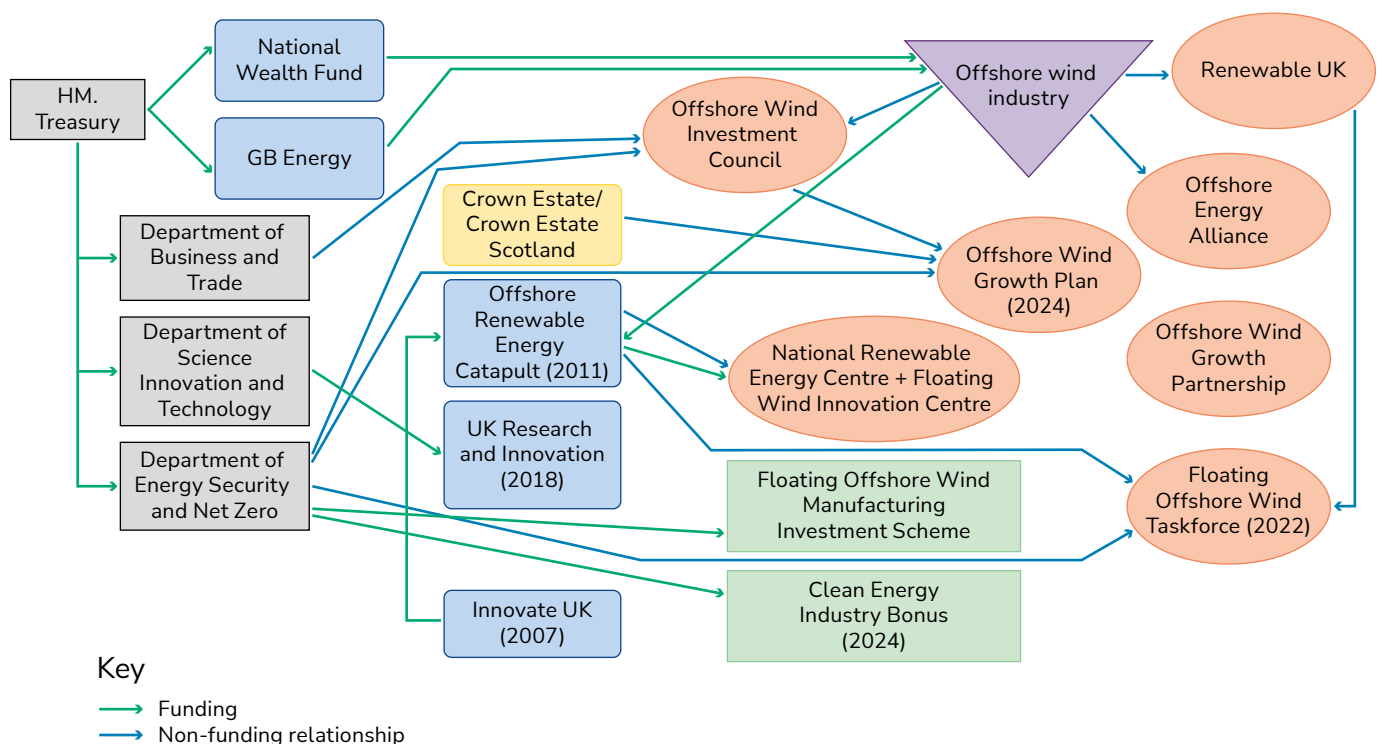


Figure 5. The UK networked state in the OSW sector



In addition to leasing seabed rights, the Crown Estate in England and Scotland has been an important actor in coordinating the industry since its early stages⁷⁰. Together with the government and major offshore wind industrial players, the Crown Estate helped set up the *Offshore Wind Investment Council (OWIC)*⁷¹ as part of the 2013 Industrial Strategy with the aim of making the UK a leader in what was then a new technology frontier. It was supported by a delivery team based at *Renewable UK*, a renewables lobby group dominated by wind.

The OWIC was closely involved in the development of an *Offshore Wind Sector Deal* in 2019⁷², which created an *Offshore Wind Growth Partnership*⁷³ to develop the supply chain with support of £250 million, along with industry funding. An *Offshore Wind Manufacturing Investment Scheme* made £60m of funding available to support investment in major port and manufacturing infrastructure⁷⁴, and a further £160m directed towards the floating OSW supply chain and infrastructure. The Deal also catalysed the formation of a regional *Offshore Energy Alliance*⁷⁵ in North Wales and the North West of England to maximise benefits for local supply chain businesses.

In 2024, OWIC, Crown Estate, Crown Estate Scotland and Renewable UK developed an *OSW Growth Plan*⁷⁶ intended to build on the

Sector Deal and accelerate the development of UK supply chain elements in advanced turbine technologies, foundations, cables, smart environmental services and next generation O&M, supported by Industrial Growth and Innovation Funds⁷⁷. The Plan targets £25bn in GVA by focusing on technology areas vital to domestic supply or where the UK has capabilities to build competitive advantage and leadership in innovation. It also called for a national innovation hub for late-stage testing and a new advanced turbine technology institute.

So far around £27m of funding has been given out to almost 400 projects under the Plan, which is funded partly by the OWIC and partly by the *Clean Energy Industry Bonus* programme. The latter is a scheme by which the government supports renewable energy firms (including those in the OSW and floating wind sector) investing in industrial communities and coastal areas, including traditional oil and gas communities. It also rewards firms in the supply chain developers with more sustainable low carbon factories. The CEI bonus is structured around each auction round, and the budget for AR7 is £544 million⁷⁸.

In addition to these sources of later stage support, there has also been a high degree of coordination of floating OSW. Renewable UK, the ORE Catapult and the UK, Scottish,

and Welsh Governments set up a *Floating Offshore Wind Taskforce* in 2022, which produced a 2040 Roadmap for floating wind in the UK⁷⁹. The ORE Catapult also provides a National Renewable Energy Centre in Blyth which focuses on innovation, and a Floating Wind Innovation Centre in Aberdeen.

Support to the *automotive and battery industries* (Figure 6) has come through two key institutions^{80 81}: the Automotive Council and the Faraday Battery Challenge. The *Automotive Council* was established in late 2009 under the impetus of the car industry,

including representatives from government, academia and associated industries. It has played a key role in every major industrial strategy initiative in the 2010s and 2020s. The Council developed a sector strategy under the 2013 industrial strategy with an emphasis on onshoring more of the supply chain and supporting the development of lower-emission ICE vehicles, reflecting industry priorities⁸². It then negotiated an Automotive Sector Deal⁸³ under the 2017 Industrial Strategy and went on to help formulate the March 2022 Automotive Roadmap⁸⁴.

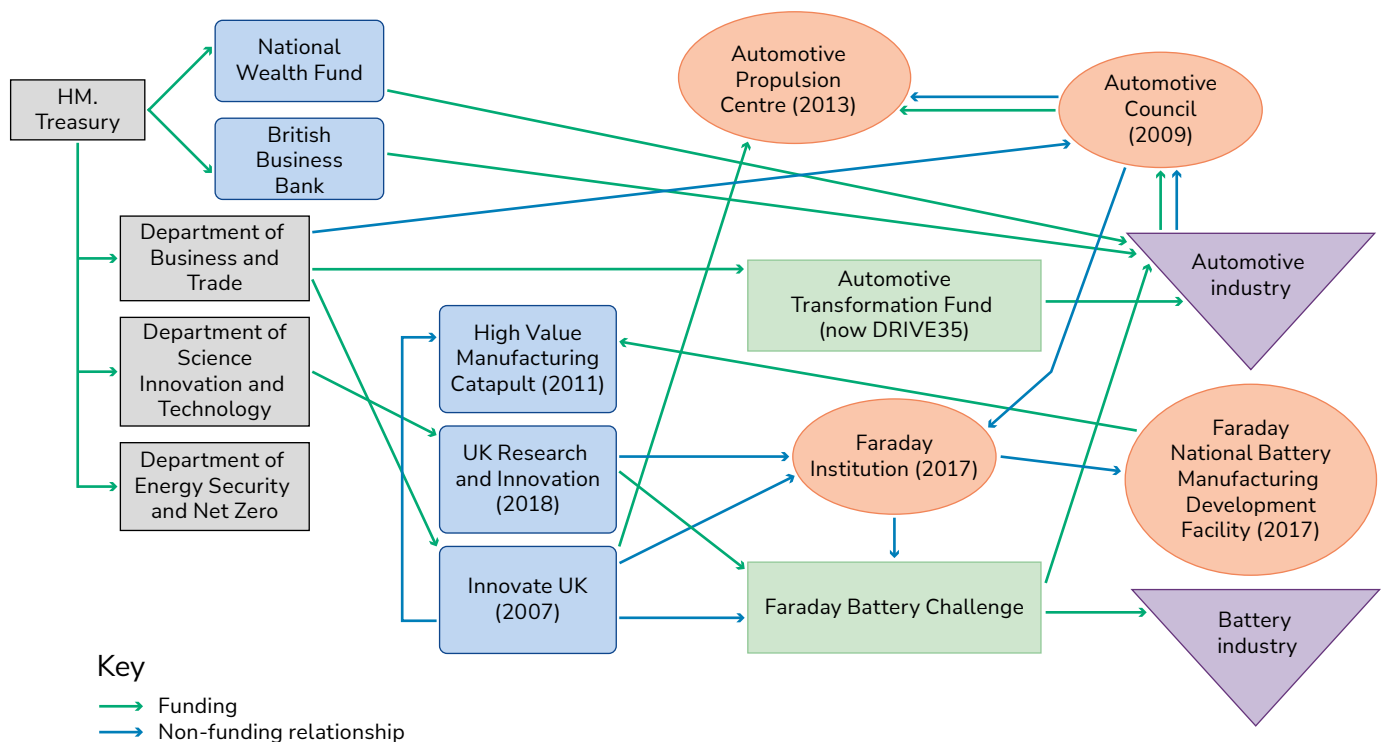


Figure 6. The UK networked state in the automotive/battery sector

A key step in the 2013 strategy was the establishment of the *Advanced Propulsion Centre* (APC)⁸⁵ which supported R&D through funding competitions (run effectively to benefit incumbents)^{vii}. These initially focused

on more efficient internal combustion engines but moved focus gradually to EVs by the end of the 2010s. The APC also expanded into programmes to incubate and support

vii For example, APC-6 funded the Ford-led 'project dynamo' to improve the fuel efficiency of passenger vehicle powertrains for £11mn over four years, in a consortium including engineering / electronics firms (Cambustion, Siemens), engineering consultancies (Ricardo, HSSMI), and various universities.

early-stage technology companies to reach investment and market readiness.

The APC's focus on batteries underwent a step change with the establishment of the *Automotive Transformation Fund*⁸⁶ in 2020, a £1bn fund for major capital investments to help reach UK battery production capacity at scale. This fund has played a role in most of the UK's largest EV-related projects over the last five years, including support to Ford, BMW, Dana UK Axle, Nissan and JATCO to repurpose manufacturing plants to produce electric vehicles, drivetrains and other parts, and to the development of gigafactories (Britishvolt^{viii}, Tata, Envision-AESC). The ATF has supported both major, established companies (Envision-AESC, JLR, Lotus, Johnson Matthey) and smaller innovative battery technology firms like Nyobolt, Echion, and AMTE Power.

The *Faraday Battery Challenge* emerged from the 2017 Industrial Strategy⁸⁷. This was conceived of as an integrated programme encompassing R&D, battery production and EV manufacture. The automotive sector deal included £246mn for the Challenge, which comprised: £78mn for the Faraday Institution⁸⁸ to support fundamental academic research and early-stage commercialisation, and £80mn for a Faraday National Battery Manufacturing Development Facility located in Coventry^{ix}. This allows firms to develop and scale battery technologies, without the huge capital outlay of building their own plant. There is also an £88m Faraday Battery Challenge programme delivered by Innovate UK, offering funding to develop and commercialise UK battery technologies and their supply chains. Funding has been expanded since its inception, with £452mn made available for 2026-2030⁸⁹.



By comparison with OSW and automotive/batteries, the *heat pump* sector (Figure 7) has much less of a history of institutional development and, as a result, a much less developed industry. There is an innovation scheme, the *Heat Pump Ready Programme*, set up in 2021, but this is aimed mainly at innovation in deployment and installation rather than product development. In 2023 the government set up a *Heat Pump Investment Accelerator Competition*, which provides grant support to manufacturers for investments in new or expanded capacity and to diversify supply chains⁹⁰. A first phase had a budget of £30m, with support going to Ideal for its new production line in Hull and to a supplier of compressors based in Northern Ireland*. A second round with expanded funding of £90m was announced in the 2025 Budget.

viii The Britishvolt case was controversial – its executive team claim that say that an 18-month long due diligence process starved it of capital at a critical development juncture, and by the time money was offered, the company was already in crisis.

ix Later becoming the UK Battery Industrialisation Centre.

x Successful projects can be seen at: <https://www.gov.uk/government/publications/heat-pump-investment-accelerator-competition-successful-projects/heat-pump-investment-accelerator-competition-successful-projects>

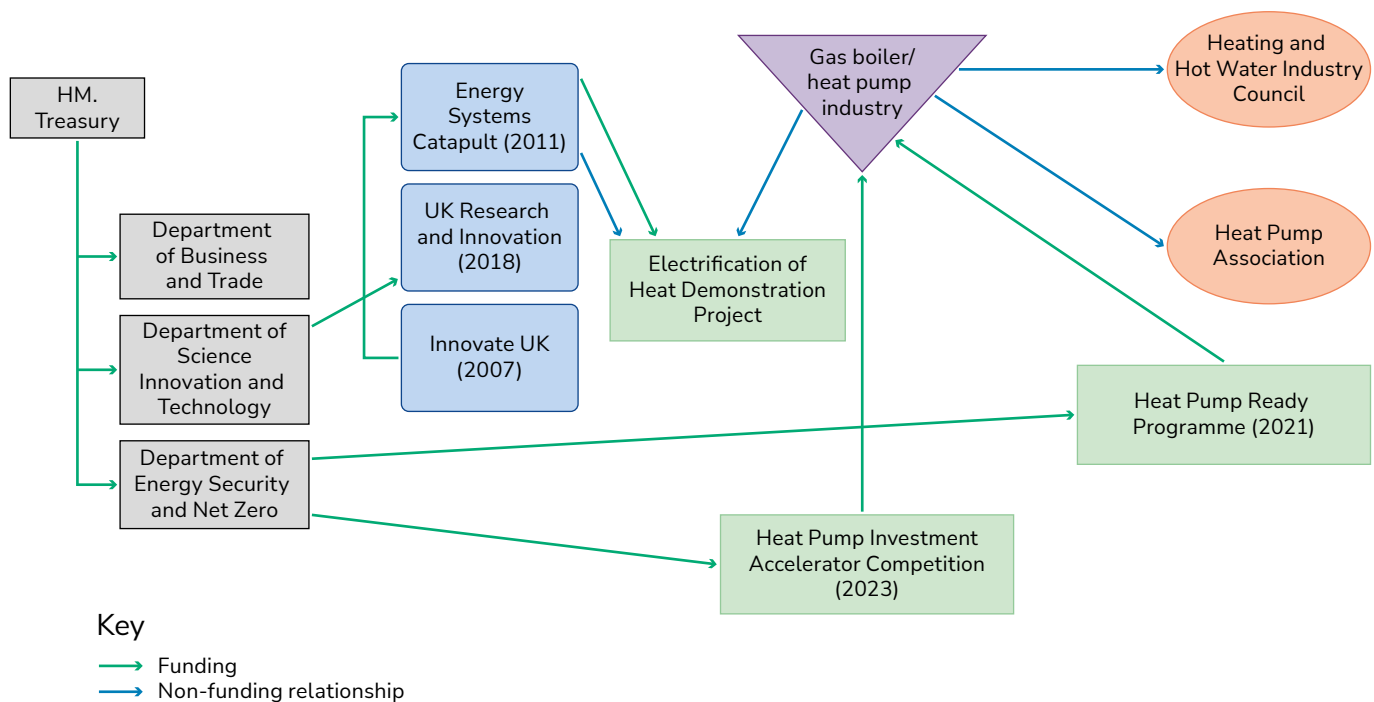


Figure 7. The UK networked state in the heat technology sector

3.3 Delegated institutions and UK green industrial development

Several themes arise from this review of the decentralised network of cross-cutting and sector-specific industrial policy institutions:

- First, it shows that in at least some sectors, while headline industrial strategies have come and gone, they have left lasting institutional arrangements that have not disappeared but rather have grown and deepened over time.
- Second, the strength and nature of networks varies across sectors, reflecting the political priority given to each. Across our case study sectors, automotive, battery and OSW sectors have a dense network of supporting organisations and funding schemes, while the heat technology sector network is relatively undeveloped.
- Third, networks of institutions have evolved not only in number but also in the

roles they have played over time, ways that reflect the fact that the UK has been a latecomer to the manufacture of low carbon technologies. In the wind sector, there was no serious attempt to develop a manufacturing industry, with a prioritisation of cost-reduction in wind development pursued from the 1990s through to the 2010s. Turbine manufacturing took place overseas and the UK industry was mainly in development, installation and O&M services. Little attention was paid to localising manufacturing supply chains until recently, while taking WTO rules on local content requirements quite seriously. This has also been true in the heat pump sector. In the automotive sector, for many years the focus was on improving the efficiency of ICEVs, and it was only from 2017 that this changed to EVs and batteries.

- Fourth, in contrast with the ambition of industrial strategies (including the current Modern Industrial Strategy) to nurture homegrown ‘superstar’ firms that can capture major export markets, networks of institutions across all these sectors have not attempted to build new scale manufacturers of low carbon technologies. The case of the failure of Britishvolt was partly the result of a poor business model but also partly the inability of state-guided industrial developmentalism to develop a better one. Instead, the main area of success has been in supporting asset-light, knowledge-intensive innovative activities in areas such as batteries and FLOW. This is clearest in the battery field, where industrial policy institutions have helped to create a thriving and innovative ecosystem of smaller battery technology specialist companies working on both automotive and grid-connected products, many of them spin-outs from its universities^{xi}. The limitations of the UK networked state approach arise both from the factors discussed in Section 3.1 above (the downscaling of ambitions for the NWF by the Treasury being an example), and a wider institutional landscape⁹¹, including high energy costs, unstable, misdirected and underfunded skills policy⁹², and an absence of domestic finance willing to invest in scaling innovative firms⁹³. All of these militate against the expansion of UK manufacturing⁹⁴.

The fact that green industrial policy on the ground has been more successful in developing knowledge-intensive innovative firms than new manufacturing giants has important implications for net zero policy.

One is that UK green industrial strategy has thus far failed to generate large numbers of manufacturing jobs open to less skilled workers in poorer regions that could provide a convincing political underpinning for net zero policies. While certain low carbon industries are clearly important in certain locations – for example OSW in Humberside – this is not the case for the UK as a whole⁹⁵. Rather, many jobs associated with green industrial policy in practice are in high-skilled technical and service employment.

Another is that if the growth in demand for low carbon technologies sufficient for meeting net zero targets is to be achieved, and production of those technologies in the UK is to be retained (or possibly expanded), this will not happen through the creation of new national champions.^{xii} Rather, in areas where there are already established industries, the state will have to either (i) engage with existing, incumbent manufacturers of high carbon products in the UK on how to *retool* to support those companies to produce low carbon alternatives (for example in heating technology and automotive manufacturing), or (ii) induce incumbents based abroad to invest in production in the UK (for example in offshore wind turbines and EV batteries).

xi These include: Invinity (vanadium flow batteries, supported by the NWF); Faradion (sodium-ion cell technology); Ilika (solid-state batteries, working with the UK Battery Innovation Centre to scale-up production); Volklec (also working with the UK BIC); Nexxon (silicone anode developer); Breathe Battery Technologies (battery modelling and adaptive charging software, now being used by Volvo); Nyobolt (fast charging battery solutions); Dukosi (cell-monitoring technology); Echiontech (world-leading supplier of niobium anode materials), and Green Lithium (lithium refining).

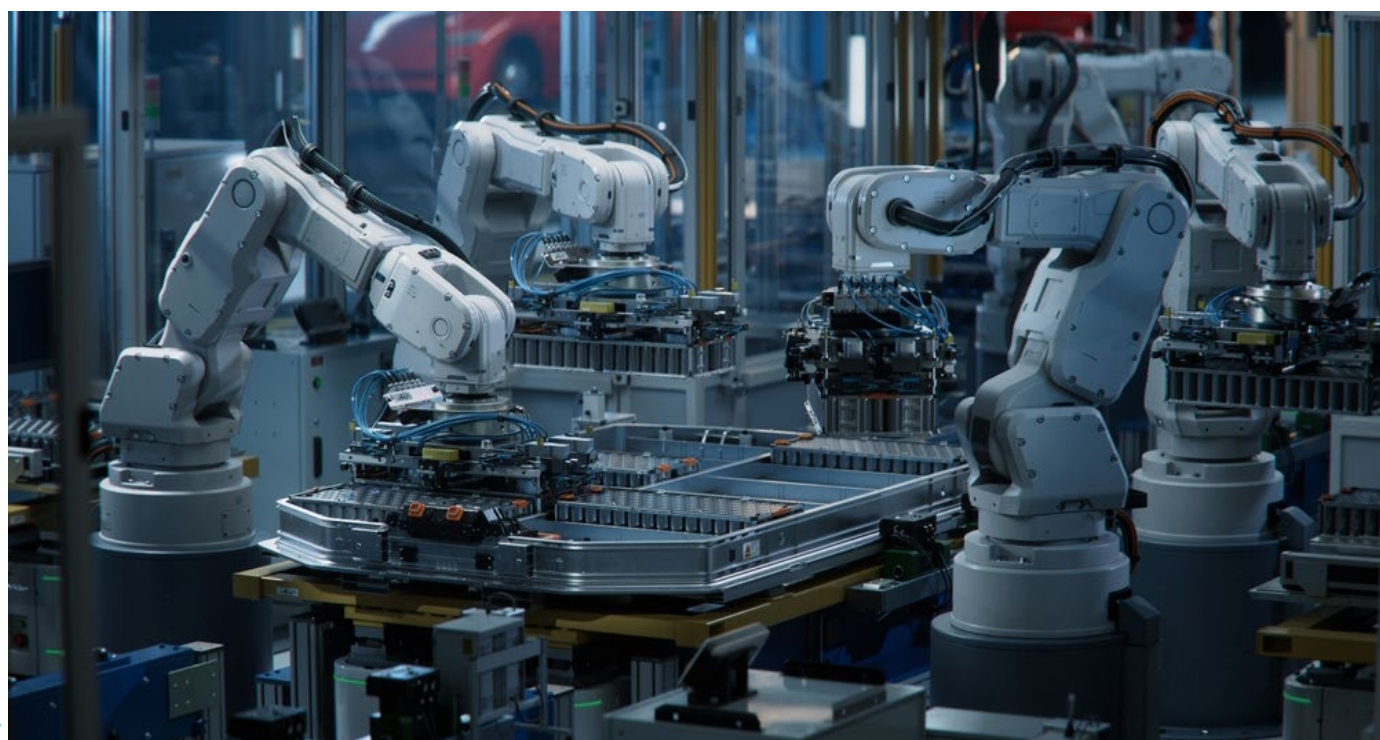
xii Although CCS and FLOW might provide exceptions

4. The Politics of Market Creation for Low Carbon Technologies

Meeting net zero goals for decarbonisation in the UK means getting households to switch from high carbon heating and mobility technologies to low carbon alternatives at scale and at pace, through incentives or regulations or some combination of both.

At the same time, if decarbonisation is also to be an opportunity for jobs, growth and regional revival, then policies are needed to support the manufacture of those technologies within the UK, through green industrial policy. Through the green industrial strategy, this requires a careful coordination of supply and demand for low carbon technologies. Both sides of the market creation equation are potentially politically difficult. If consumers (also voters) resist switching for cost, or other reasons, this may feed into mass, electoral politics. Interest group politics come into play if businesses are strongly opposed to switching, or at least at the pace that policy may require.

The previous section concluded that despite evolving a network of supportive institutions at the sectoral level, the UK has failed to incubate but then scale up new national champions in key net zero technology sectors. This implies that net zero targets will instead have to be met either (i) by inducing existing, territorial (i.e., UK based) incumbent scale manufacturers already producing high-carbon versions of products *to switch production over to low carbon versions* (e.g., from ICE vehicles to EVs, and from gas boilers to heat pumps), or (ii) by inducing existing, sector-leading non-territorial incumbent manufacturers of low carbon technologies *to locate in the UK* (e.g., in the cases of batteries, offshore wind turbines).





We characterise these as ‘convert’ and ‘attract’ strategies respectively.

An important context for these strategies is that in *both* cases incumbent firms are mostly foreign-owned. The UK’s persistent trade deficit has meant a balancing inflow of funds on the capital account, much of which has been in the form of investment in UK industry. Just under 30% of GVA was generated by foreign-owned businesses in 2021⁹⁶. Foreign ownership dominates across the industries we looked at: all volume car manufacturers, most luxury car makers, all existing and planned EV battery gigafactories, all major boiler manufacturers, the larger heat pump manufacturers and the two wind turbine manufacturers currently in the UK have parent companies or major shareholders abroad (Table 1)^{xiii}.

This pattern of ownership makes effective *convert* and *attract* strategies more difficult.

As Bridge and Watt⁹⁷ put it: “*key decisions on capacity, strategy and the supply chain are often not made at the level of the UK*”, and companies can more credibly threaten to exit the UK if they perceive that conditions are not right or if better incentives are offered elsewhere. This latter insight is important given the rise in green industrial strategies in many competitor countries. In addition, many of the UK’s manufacturing facilities operate as ‘branch-plants’, led from overseas, reliant on the import of technology and materials, with “limited opportunities for building UK supply chains” and mainly focused on assembly, all of which makes onshoring of supply chains more challenging. For example, in a detailed examination of automotive industries across European countries in terms of the transition to EVs, Gracia et al.⁹⁸ characterise the UK’s automotive industry as being in the periphery.

xiii Foreign parent companies in some cases acquired UK businesses as a platform for exporting manufactured goods to the EU, pre-Brexit. Post-Brexit, the export strategy is more difficult.

UK based company	Parent company/ownership and location
Volume automotive manufacturers producing >100,000 units a year	
Nissan	Renault (15% stake), Japan/France
JLR	Tata Motors, India
BMW Mini	BMW, Germany
Stellantis-Vauxhall	Stellantis, HQ in the Netherlands, major shareholders in Italy and France
Toyota	Japan
Battery gigafactories existing and under construction	
Envision-AESC	Envision, Nissan and Tokin Corporation, China/Japan
Agratas	Tata, India
Luxury automotive manufacturers	
Aston Martin	Major shareholders in Canada
Bentley	Volkswagen, Germany
Lotus	Geely, China
Rolls-Royce	BMW, Germany
McLaren	CYVN, Abu Dhabi
Wind turbine manufacturers	
Siemens	Siemens Gamesa, Germany/Spain
Vestas	Denmark
Heat pump manufacturers	
Mitsubishi Electric	Mitsubishi, Japan
Vaillant	Vaillant, Germany
Ideal	Group Atlantique, France
Renewable Energy Devices	Octopus Energy, UK
Kensa	Partly owned by L&G and Octopus Energy, UK
Gas boiler manufacturers	
Dimplex	Glen Dimplex, Ireland
Vaillant	Vaillant, Germany
Ideal	Group Atlantique, France
Baxi	BDR Thermea, Netherlands
Worcester Bosch	Bosch, Germany

Table 1. Ownership of UK manufacturers in motor vehicles, batteries, wind turbines and heat technologies (as of 2026)

Both convert and attract strategies require active management of the demand for and supply of low carbon products (and in the case of OSW, electricity as a service) and managing the relationship between the two. The convert strategy is particularly complex because incumbent high carbon industries in the UK produce for both the domestic market and for export (the export market is particularly important for the automotive industry). For this convert strategy, the challenge is therefore to avoid a situation where increased demand (for example for EVs or heat pumps) simply pulls in imported products manufactured elsewhere, while not undermining the ability of the UK industry to continue to export. For the attract strategy, the supply side challenge is not only to attract investment in manufacturing capacity by foreign-based lead OEMs but also to try to maximise local content in the supply chain.

As noted above, both strategies are potentially politically contentious and may face opposition from some consumers (also voters) and incumbent industries (both companies and workers through unions). However, there are some differences between *convert* and *attract* strategies. This can be seen by contrasting offshore wind with EVs. For a long time, the government encouraged a *least-cost* approach, whereby developers of offshore wind farms would procure turbines from sector-leading incumbents based overseas, because the



absence of existing UK firms made this politically easier. This is not the case for EVs, because the UK already has an incumbent automotive sector. There is thus a lot more at stake with the convert strategy, especially in terms of loss of existing jobs. We now briefly review the politics of these strategies in our three net zero sectors.

4.1 Offshore wind

OSW deployment expansion started in the late 2000s, by which time there were established incumbents in wind turbine manufacturing, many based in Europe. The UK government was focused mainly on cost reduction and competition in procurement rather than on establishing UK based OEMs. Instead, an *attract* strategy was effectively adopted. It is only relatively recently that there has been more of an explicit policy effort to create more supply chain jobs (see above section 3.2)

The growth of OSW has not met any major public opposition. Wind feeds into the electricity wholesale market rather than directly to end-use consumers. The key demand-side policy is the *contract-for-difference feed-in tariff (CfD FiT)*, which has been in place in its current form since 2014 and creates a degree of revenue certainty for investors while limiting cost exposure to electricity consumers (also voters), while also not being particularly visible to them. Overall, the approach has been highly successful,

driving investment and strong growth in OSW generation over seven auction rounds to January 2026^{xiv}. Although some households are directly affected by onshore infrastructure related to OSW, such as transformers and new transmission pylons, these are a relatively small but growing number.

To date, all governments since the early 2010s have been consistently supportive of the industry, partly due to the perceived benefit of job creation. In practice, OSW jobs are rather small in number so far compared with the

automotive sector (Table 2)^{xv}. Some of these are in services such as project development, which tend to be high-skilled. However, jobs in particular parts of the supply chain (especially turbine blade manufacture, sub-sea infrastructures, installation, and O&M) require lower skills levels and are concentrated in de-industrialised regions, especially Humberside, Teesside, Merseyside and near Inverness^{xvi}, some of which have included constituencies that have been marginal in the last two elections.

	Offshore wind	Automotive	Low emissions vehicles and infrastructure	Boilers	Heat pumps
Manufacturing and supply chain	30,000 in 2024; 100,000 by 2030, including induced employment.	c.140,000	N/A	6,000 (manufacturers only)	<1,000
Sales/ installation	N.A.	c.600,000		c. 130,000	4,500
Total	100,000	740,000	40-50,000	136,000	5,500
As % of UK workforce jobs	0.27%	2.02%	0.13%	0.37%	0.01%

Table 2. Estimates of employment in case study industries

Sources: OSW – DESNZ⁹⁹; Automotive – Murray et al.¹⁰⁰, SMMT¹⁰¹, IMI¹⁰²; Low emissions vehicles and infrastructure – ONS¹⁰³; Boilers: BEIS, EUA¹⁰⁴; Heat pumps – HPA; Workforce jobs – ONS¹⁰⁵

- xiv With the exception of AR5 in 2023, when the government set too low a reserve price for the auction and no bids were received for OSW. As it has matured various proposals for further reform have been suggested under the Review of Electricity Market Arrangements – see: Department for Energy Security and Net Zero. Review of electricity market arrangements: summary of consultation responses [Internet]. London: DESNZ; 2024. Available from: <https://assets.publishing.service.gov.uk/media/675afaa0a3e5a798955a01b1/rema-summary-of-consultation-responses.pdf>
- xv Estimates are that longer-term there could be a further 97,000 jobs associated with floating offshore wind by 2050, also largely in de-industrialised regions.
- xvi See above. Locations include: Siemens in Hull and Manchester and Vestas in the Isle of Wight (blade technologies); JDR Cables in Blyth and Sumitomo in Nigg (cables), Schneider Electric in Scarborough (switchgear) and SeAH in Teesside (foundations). HVDC transformers are made in the West Midlands.

The expansion of OSW (especially compared with onshore wind) has made it a central plank of successive government net zero strategies and is now being accelerated in Labour's Clean Power Mission. However, OSW has now become a target for political parties critical of net zero policies¹⁰⁶. These challenges are related to the fact that OSW expansion has not yet led to any major reduction in electricity prices at a time when these are highly inflated by gas costs, due to the design of the wholesale market¹⁰⁷.

The industry interest group politics of OSW on the supply side have been relatively muted. As noted above, the political economy of supply side policies for OSW has been dominated by

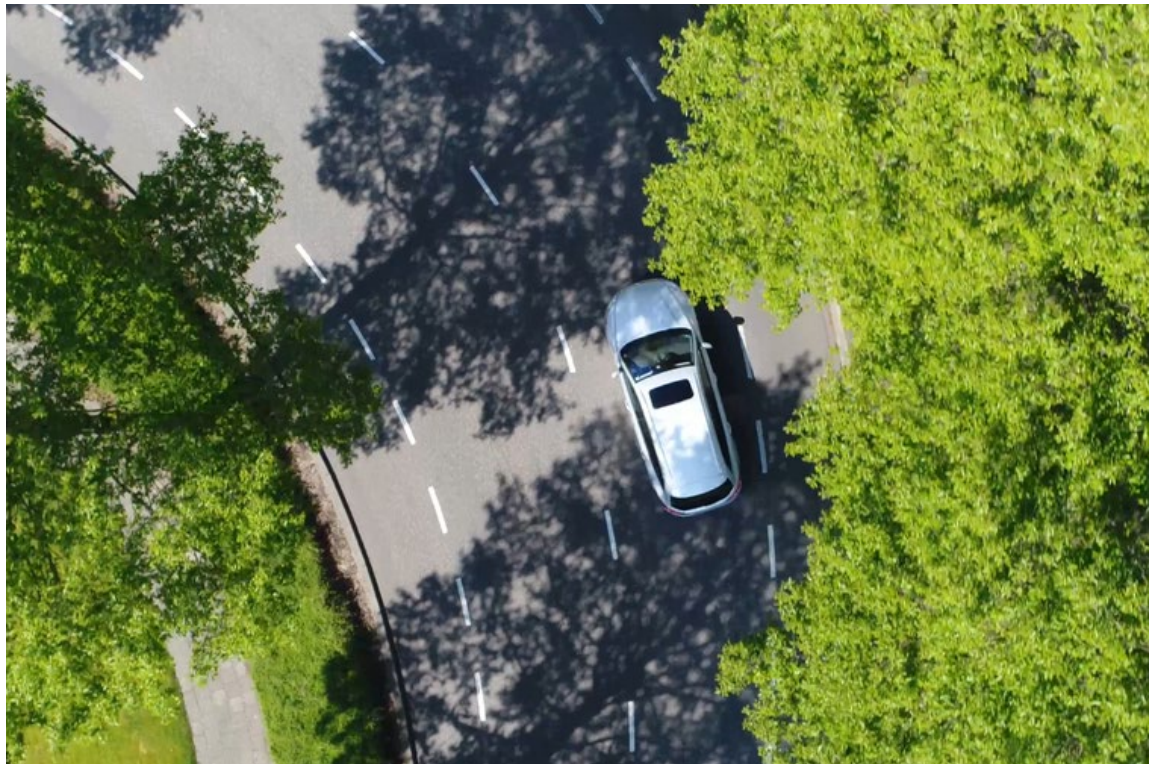
the fact that the UK lacks a domestic turbine OEM. As a result, there are no large companies with sunk investments in production lines that have to be reoriented. The main struggles over the expansion of renewables, involving resistance from the large electricity generation companies with fossil fuel assets, took place in the 2000s and early 2010s and had been largely resolved by the time OSW took off. Many of the electricity generators divested fossil fuel assets¹⁰⁸ or were compensated through the introduction of the Capacity Market¹⁰⁹. The main interest group more critical of OSW has been unions because of a lack of union recognition, and poorer terms and conditions than in other offshore industries such as oil and gas¹¹⁰.

4.2 EVs/batteries

The overarching strategy in the automotive sector is one of *convert*, since the UK has a significant incumbent industry. However, in the new sub-sector of battery manufacture, the failure to establish independent gigafactory scale producers has led to an attract strategy.

Unlike in OSW, market demand creation policies for EVs are aimed directly at consumers. Following on from the Plug-in Vehicle Grant (terminated in 2022), the government introduced a £650mn *Electric Car Grant* in 2025¹¹¹.





This gives private buyers up to £3,750 when they upgrade or switch to an electric car with a price at or under £37,000^{xvii}. In addition, employees using EV company cars are taxed at a much lower rate on benefits-in-kind than those using ICEVs¹¹². Households, businesses and other organisations can also access grants for putting in charging points¹¹³. New building regulations ('Part S') in 2021 require all new-build and retrofit homes and commercial buildings in England to be installed with EV charging points¹¹⁴. Complementing these carrots is the stick of a phase out of sales of new petrol and diesel cars starting from 2030 and completing by 2035¹¹⁵.

A key driver for growing the supply of electric vehicles, and hence automotive batteries, is the *Zero Emissions Vehicle Mandate* (ZEV) adopted in 2024^{xviii}. The regulation requires both UK manufacturers and those importing vehicles into the UK to achieve an increasing proportion of zero tailpipe emission vehicles in their UK sales each year, aligned with the phase-out of ICE cars in 2030 as above. However, it should be noted that the small overlap between UK production and the UK market (around 75% of UK-manufactured cars are exported, while over 90% of cars bought in the UK are imported from abroad^{116 117}) means that the ZEV Mandate is a blunt instrument for converting the production of domestic incumbent manufacturers.

xvii Eligibility depends on part on judgements about the sustainability of production of the vehicle, seen as a means of excluding Chinese manufactured cars from the scheme – see: Britain slams door on subsidies for Chinese electric cars. Politico Europe [Internet]. 2025. Available from: <https://www.politico.eu/article/britain-slams-door-on-subsidies-for-chinese-electric-cars/>

xviii See: Department for Transport. Pathway for zero emission vehicle transition by 2035 becomes law [Internet]. London: DfT; 2024. Available from: <https://www.gov.uk/government/news/pathway-for-zero-emission-vehicle-transition-by-2035-becomes-law>. As discussed below, the Mandate was weakened in September 2023 but the phase out target for 2030 was reestablished when the Labour government came to power.

Aggregate targets for cars are shown in Figure 8, and fines are incurred where targets are missed. Each manufacturer has its own target related to its market share; some are in surplus and others in deficit, but allowances are tradeable¹¹⁸. Firms can also borrow credits

from future years to meet present shortfalls. While targets appear to have been met for 2024 and 2025, manufacturers claim that it is forcing them to sell cars at a loss, adding to the financial pressures on OEMs in the UK^{119 120}.

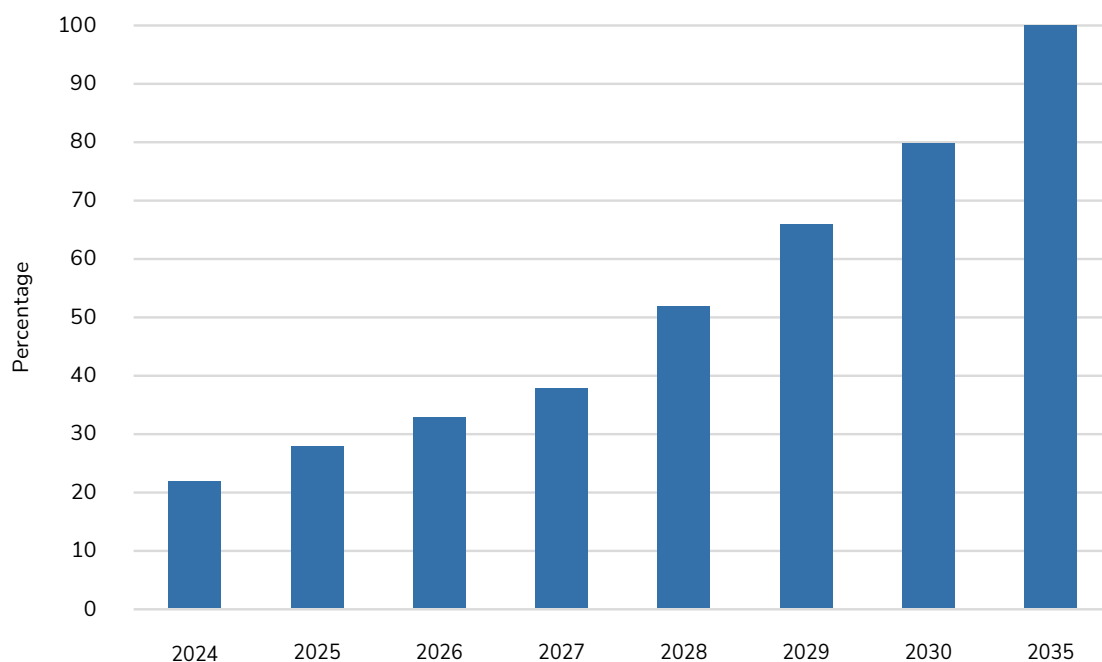


Figure 8. Industry ZEV Mandate targets for cars

The politics of the battery and EV industries are clearly different from OSW. The phase out of sales of new ICE cars and vans will directly impact consumers and hence voters, and is potentially controversial – survey data suggests that while politicians overestimate opposition, a 2035 phase out date is opposed by around 40% of voters (Figure 9; see also¹²¹). As the 2030 date approaches, opposition by some parts of the public may strengthen, and with a general election likely to be in 2029, there is a risk that some political parties may seek to use the phase out as a wedge issue. If market growth for EVs slows, or if there is any uncertainty about future demand, green industrial policies on the supply side are likely

to become ineffective. Manufacturers have to be confident that there is profit to be made from the energy transition in order to go along with it.

The transition from ICEVs to EVs using batteries is also more politically salient because the automotive industry is a relatively large employer (Table 2), particularly in the West Midlands and the North East^{xix}. It has a symbolic role in British politics, having been the second largest in the world in the 1950s and surviving the crisis of deindustrialisation in the 1980s. Politicians therefore have a strong interest in ensuring the industry survives the transition to EVs.

xix Although most jobs are actually in retail and maintenance and would be there even if UK manufacturing ceased.

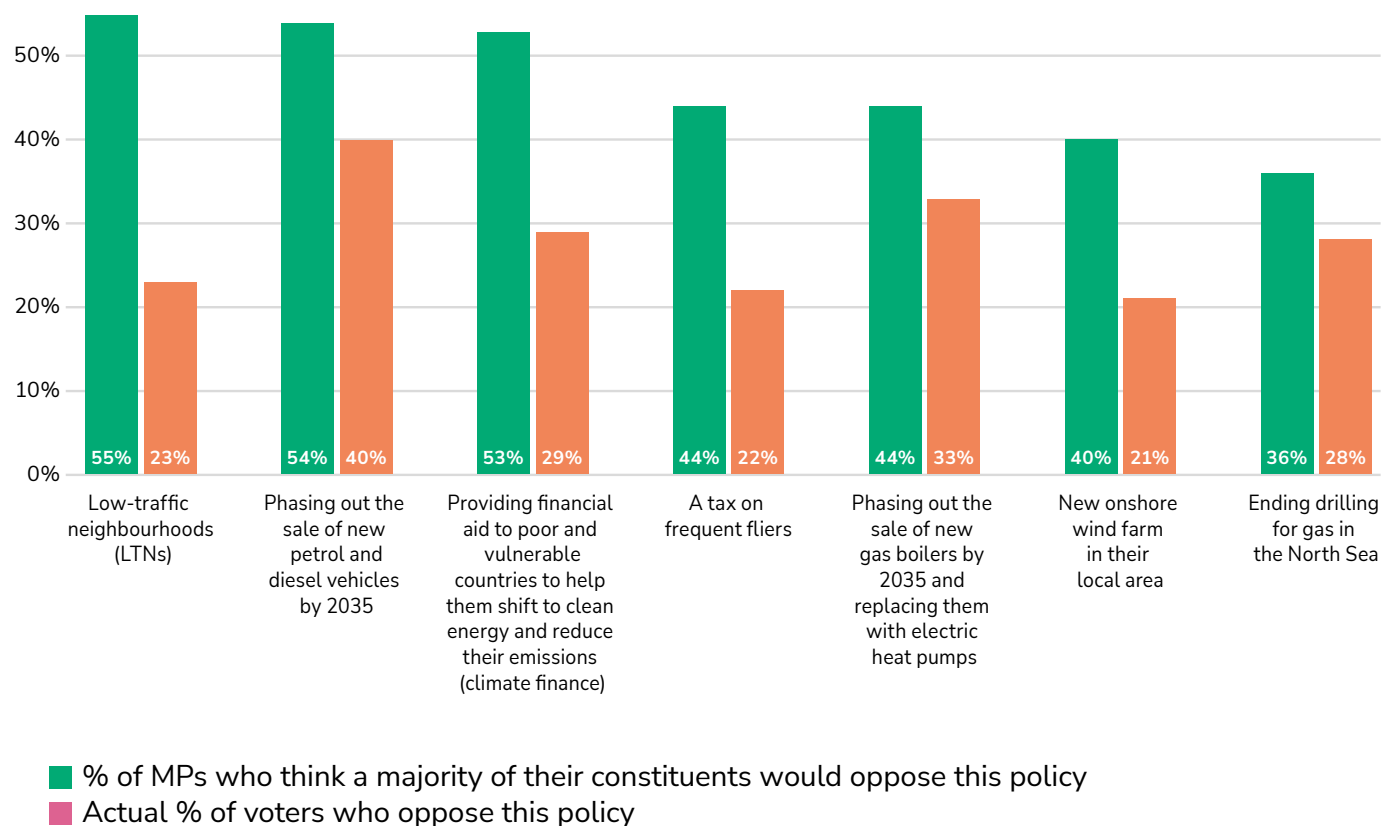


Figure 9. Opposition to net zero policies

Source: Massey-Chase et al.¹²²

The political economy of interests in the automotive industry is also more complex than that for the OSW sector. Incumbents are well organised through the SMMT and have a strong institutional venue for influencing transition policy in the Automotive Council. On the one hand, the shift to a new electrochemical supply chain is a major opportunity, and the ZEV Mandate is playing a major role in stimulating investment and potential job creation¹²³. On the other hand, increasing trade barriers, and the fact that profit margins on EVs are lower than on ICEVs (especially in aftersales), pose challenges to an industry which is already in decline¹²⁴. EV manufacture also, importantly, involves fewer jobs, which is a concern for the union in the industry (Unite). While not opposing the development of EVs outright (in part because of the direction of travel in the global industry), both OEMs and unions in the UK

have therefore sought to manage the pace and nature of the transition.

However, there are also differences within the industry. According to Influence Map¹²⁵, a split emerged from 2017 onwards between firms supporting a faster transition, including Nissan and Bentley, and those opposing (including Jaguar Land Rover (JLR), Toyota, BMW and Honda). The SMMT sided with the latter group. JLR, in the late 2010s the largest carmaker by volume in the UK, was a particularly active lobbyist. This split was evident in further pressure from parts of the industry on the government to weaken market creation policies, leading to the announcement in September 2023 that the 2030 phase-out target for ICE cars would be pushed back to 2035. While JLR responded positively to the change, Ford was opposed¹²⁶.

Pressure from parts of the industry, including Unite¹²⁷, was not sufficient to prevent the new government from seeking to reimpose the 2030 phase out target in early 2025¹²⁸. But in the face of US tariffs, the government agreed to industry calls for a weakening of other aspects of the Mandate, including allowing companies to sell hybrid and plug-in hybrid vehicles until 2035^{129 130 131 xx}. Fines for missing targets were reduced, and greater flexibility was allowed through trading of credits between types of vehicle and across years. Luxury manufacturers like Aston Martin and McLaren were exempted.

Moreover, pressure on the government to weaken the phase out date and other aspects of policy remains. Following a weakening of similar a EU phase out, the government brought forward a planned 2027 review of the ZEV Mandate in December, pledging to be 'responsive' to the industry¹³². In January

2026, the Faraday Institution-established Policy Commission on Gigafactories published a report calling for a further relaxation of the mandate with a target of only 50-60% of sales to be EVs in 2030, with penalties for non-compliance by carmakers also reduced¹³³. The argument of the report, reflecting the position of many companies in the industry, is that the Mandate is running ahead of underlying consumer demand and introduces compliance penalties that make operations loss making and thus work against investment in gigafactories and new assembly lines. In June it was reported that the Mandate may be weakened by reducing the requirement for pure electric cars to be 80% of all sales by 2030 to 50%¹³⁴.

In summary, while the ZEV Mandate has not been reversed, it has been considerably weakened and may be further weakened in future.

4.3 Heat pumps

As with the automotive sector, the government has adopted a *convert* strategy for heat pumps, since the UK has a sizeable incumbent heating technology industry. The home heating market in the UK is currently dominated by gas boilers, with an estimated 1.8 million replacement sales a year^{135 136}, most of which are produced within the UK. In 2021, the government stated an 'ambition' to ban the installation of new and replacement gas boilers for all homes beyond 2035¹³⁷ and to move off-gas-grid homes away from oil and LPG heating systems from 2026 onwards¹³⁸. Separately, the Scottish government also brought in a phase-out date of 2033 for gas-grid connected home which remains in place.

However, in September 2023, the UK targets were weakened; the phase-out of fossil fuel heating in off-grid homes was pushed back to 2035, and instead of a total ban on gas boilers by 2035, the goal shifted to phasing out 80% of them, with no requirement for homeowners to replace existing gas boilers^{xxi}. In January 2025, there were media reports that the Labour Government would scrap these targets. In its July 2025 Progress Report to Parliament, the CCC said that there was "*lack of clarity about whether the Government will replace or continue with the 2035 phase-out date for new fossil fuel boiler installations in the previous Government's CBDP*".

xx The decision on hybrids especially favours Toyota which has built its strategy around these technologies.

xxi Under the FHS, new homes built from 2025 must produce 75–80% fewer carbon emissions compared to those constructed under 2013 regulations. The Future Buildings Standard sets similar requirements for new non-domestic buildings. For more, see: Prime Minister's Office. PM speech on net zero: 20 September 2023 [Internet]. London: Prime Minister's Office; 2023 Sep 20. Available from: <https://www.gov.uk/government/speeches/pm-speech-on-net-zero-20-september-2023>



At present there is thus no clear equivalent in the heating market of the phase out date for new sales of ICE vehicles at the UK level. The one area where gas boilers are due to be effectively ruled out is in new build housing (and non-domestic buildings), through the 2026 *Future Homes Standard (FHS)*¹³⁹, involving new standards of energy efficiency enforced via changes to the Building Regulations. The FHS has been subject to intensive lobbying from housebuilders and was delayed from 2021¹⁴⁰.

There is a consumer subsidy programme in place to support the installation of heat pumps. In 2022 the Renewable Heat Incentive programme in England and Wales was replaced by the *Boiler Upgrade Scheme (BUS)*^{xxii}, due to run until at least 2030, which offers an up-front grant of £7,500^{xxiii}. The

scheme has played a significant role within the scale of the existing market, with over 100,000 ASHP installations supported to date¹⁴¹. However, the ambition of the policy has so far been limited by its budget^{142 143}. Under the Warm Homes Plan (WHP)¹⁴⁴, funding will now be expanded to a total of £2.7 billion over 2026-2030. However, even at this increased scale, this is equivalent to only 72,000 installations a year, well short of the central target in the plan of 450,000 by 2030¹⁴⁵. This target itself is lower than the target set in the 2021 Heat and Buildings Strategy to install 600,000 heat pumps annually by 2028, and is also lower than the recommended rate set out in the CCC's central net-zero pathway¹⁴⁶.

A major factor affecting the demand for residential heat pumps is the cost of electricity

xxii In Scotland the Home Energy Scotland Grant and Loan currently offers loans for heat pumps. For more, see: Ofgem. Boiler Upgrade Scheme (BUS) [Internet]. London: Ofgem; [date unknown]. Available from: <https://www.ofgem.gov.uk/environmental-and-social-schemes/boiler-upgrade-scheme-bus>

xxiii And then raised again to £9000 for households using oil or LPG boilers in April 2026

relative to gas. The seasonal performance factor of ASHPs in the UK ranges from around 2.8 to 3.8¹⁴⁷. With gas boiler efficiency in the high 90% range, this means that if the ratio of domestic electricity to gas prices is higher than around 3, the running costs of heat pumps will be higher than those for gas boilers¹⁴⁸. In the UK the ratio has been over 4 since 2018, and is amongst the highest in Europe^{149 150}. The government signalled in the 2021 *Heat and Building Strategy* that it would seek to rebalance electricity and gas prices, and the 2025 Budget moved the costs of the Renewables Obligation from electricity bills. Further measures to reduce the effective cost of renewables for consumers were brought in in April 2026¹⁵¹, but these are likely to have a relatively small effect on relative prices. Overall, the ratio is set to remain well above 3.

On the supply side, the main market creation policy is the *Clean Heat Market Mechanism* (CHMM)¹⁵², which is modelled on the Zero Emissions Vehicle Mandate. The CHMM places an obligation on larger gas boiler manufacturers^{xxiv} to meet targets for the proportion of low carbon heat pumps they sell each year, relative to fossil fuel boilers, increasing every year. Companies earn a tradeable certificate for each of their heat pumps installed, with fines for failing to reach their target¹⁵³. The target for the first year (2025-26) was set at 6% of relevant sales (scaled back from earlier more ambitious proposals)¹⁵⁴, increasing to 8-10% in 2026-27. This is anticipated to be equivalent to around 90,000-130,000 heat pumps.

The UK has the largest gas boiler industry in Europe. Boiler manufacturers have advantages in moving into heat pump production, in that they have a strong engineering base and some overlap in supply chains. However, since heat pumps are technologically different and their manufacture requires different skills such as brazing, producing them requires investment

in new production lines. Of the three boiler manufacturers which have recently invested in new heat pump lines, Vaillant took the decision prior to the publication of the CHMM consultation, but both Dimplex and Ideal took decisions afterwards, implying that the CHMM had some role in these decisions. However, other boiler manufacturers such as Baxi and Worcester Bosch have so far decided not to diversify.

The electoral politics of market creation policies for heat pumps are potentially difficult. Polling suggests that, while opposition to a phase out target for gas boilers does not attract as much opposition as ICE vehicle phase outs, politicians believe that public opposition is significant (Figure 9). As noted above, governments have been nervous of a domestic boiler phase-out; proposals in 2021 for a 2035 phase-out date were weakened in 2023 and then appear to have been abandoned by the new government in 2024. Parts of the print and broadcast media have been consistently hostile to the idea of a ban that is framed as

the government planning to 'rip out' gas boilers from homes¹⁵⁵. A policy of reducing the ratio of electricity to gas prices, as pressed for by the heat pump industry, is also potentially difficult as it may disadvantage gas consumers.

At the same time, employment in both the nascent heat pump manufacturing industry and the incumbent gas boiler manufacturing, at around 6,000 people, is relatively small (Table 2). This is also because most of the supply chain for both industries is located abroad. However, these industries are located in parts of the country (West and East Midlands, North East and North West) that currently look like they will swing away from the government to Reform and so are electorally important.

xxiv Companies with boiler sales less than 20,000 relevant gas boilers and 1,000 relevant oil boilers, corresponding to roughly 1% of the UK market, will be exempt, as will Small Companies with respect to the Companies Act 2006.

As with the automotive industry, the political economy of interests in the gas boiler and heat pump industries is complex. But unlike the automotive industry, they lack institutions that can negotiate sector deals to support a transition away from boiler production. Parts of the boiler industry are resistant to the transition to heat pumps. The main demand side market creation policy, the BUS, is seen as insufficient by the industry, which is calling for is a reduction in the ratio between electricity and gas prices, as they see this as the key factor that will drive market expansion, and hence underpin decisions on investment in further capacity.

The Heating and Hot Water Industry Council, part of the Energy and Utilities Association (EUA), explicitly positions itself as having campaigned vigorously against the CHMM¹⁵⁶. Under the last government in March 2024 the introduction of the CHMM was delayed for a year following lobbying¹⁵⁷. In November 2024

the level of fines that would be paid by firms missing the targets – framed as a ‘boiler tax’ by the industry as they passed on costs to consumers¹⁵⁸ – was reduced, from an expected £682 million over 2024-2026 to £28 million, a reduction of around 95%, making the CHMM rather toothless. The GMB, a large donor to the Labour party, has also criticised the CHMM¹⁵⁹.

The heat pump lobby has historically been fragmented, with companies in different parts of the value chain being represented through the Heat Pump Association (HPA), the Heat Pump Federation and BEAMA. Consolidation into the HPA as a unified voice for the industry happened only in January 2026¹⁶⁰. However, no clear line can be drawn between the two lobbies. All the major boiler UK manufacturers (i.e., Vaillant, Baxi, Ideal, Bosch Thermotechnology (parent company of Worcester Bosch) and Dimplex) are in both the EUA and the HPA.



4.4 Summary

Our analysis of the three industries is summarised in Figure 10.

The OSW sector faces little public opposition and receives a lot of support from government but also increasing criticism from opposition parties. Firms in the sector are broadly supportive of policy, and the industry is well-coordinated. Both market creation and supply side policies are strong. There is limited OEM turbine manufacturing in the UK, but there is a supporting industry that is strong in some parts of the supply chain.

The transition to EVs, and especially the phase-out of petrol and diesel cars and

vans, is potentially more controversial with the public. The industry is well-organised through the SMMT and the Automotive Council, but is divided on policies, especially the ZEV Mandate, which has been weakened. Investment in gigafactories appears to be expanding slowly but is still fragile.

The transition from gas boilers to heat pumps remains the weakest. Public opposition to a phase out remains a potential problem, the industry is split, and political attention is low. Market creation policies remain relatively weak, and the main supply side policy is opposed by the gas boiler industry.

	Mass opposition	Industry coordination	Incumbent opposition	Government attention	Demand creation policies	Supply creation policies
Offshore wind	Low but disliked by opposition parties	High	No	High	Strong	Strong
EVs	Potentially high	High	Divided	Medium	Medium	Strong but weakening
Heat pumps	Potentially high	Low	Divided	Low	Weak	Strong but weakening

Figure 10. Three industries compared

5. Conclusion and Recommendations

Green industrial policy has a potentially important role not only in growing the UK's capacity to manufacture the low carbon technologies that will be needed for the net zero transition, but also in helping to generate the jobs and investment that would underpin public support for the net zero transition. However, in this report we have argued that green industrial policy in the UK faces two kinds of political constraints.

The first is the politics of *state capacity*. At the level of central government, the history of the UK's attempts at industrial policy shows a record of instability and a tendency for the priorities of finance to dominate over those of industry. The macro-institutional context for successful green industrial policy in the UK is therefore weak.

However, while most political economy studies focus on this macro-level, the review of important net zero industries such as offshore wind, heat pumps, automotive and batteries in this study reveals delegated networks of sector-specific public agencies, partnerships and other actors which have emerged and expanded over time. These networks differ in strength and nature across sectors, and their roles have changed over time. For example,

the network of actors and partnerships in the battery sector has supported the creation of an ecosystem of small but innovative firms. The OSW network has been focused on reducing the costs of deployment for many years but has recently shifted to try to deepen the UK supply chain beyond existing strengths in development and installation services and into manufacturing.

However, the outcomes of the activities of these networks have so far fallen short of building major new UK companies producing low carbon technologies (i.e., 'national champions'), or even of significantly transforming supply chains in the UK, in areas such as OSW. The greatest potential for the development of new national champions is in frontier areas such as new battery



technologies, floating offshore wind and possibly CCS and hydrogen, but the UK has a poor record of transforming such firms into scale manufacturers, in part because of the macro-level institutional weaknesses mentioned above.

There are implications both for the role of green industrial policy in helping to underpin net zero politically, and for reaching net zero targets. Generating knowledge-intensive work in areas such as battery innovation or OSW services has tended to benefit higher-skilled workers, and the asset-light nature of the companies means they can be located in wealthier, higher-cost regions. It is unlikely to create large numbers of new, lower-skilled green jobs in manufacturing that politicians often imply will be generated and that could play an important role in underpinning the net zero transition politically.

At the same time, reaching net zero targets means there is an urgent need to scale up markets for low carbon technologies. If the production of such technologies is to happen in the UK at any scale, then the absence of new national champions means that UK green industrial policy in practice focuses on (i) engaging with existing, incumbent manufacturers of high carbon products in the UK on how to retool to produce those low carbon alternatives (for example, moving from making gas boilers to making heat pumps, or from making ICEVs to making EVs), and (ii) inducing low carbon technology incumbents based abroad to invest in production in the UK (for example in offshore wind turbines and EV batteries). These strategies – ‘convert’ and ‘attract’ respectively – require policies to drive market creation for low carbon versions of previously high carbon products and services.

However, such policies, acting on the demand side with consumers and on the supply side with manufacturers, have run up against the second kind of constraint – the politics of *market creation*, especially in industries where a convert strategy is needed. Policymakers are nervous that strong demand creation policies, especially phase-outs of high carbon versions

of technologies, will be unpopular with the public. This leads to weak demand-side policies and slow market creation, which then in turn generates resistance from industries to ambitious supply-side policies.

A key conclusion is that there is considerable risk to net zero policy goals, if the large numbers of jobs for lower-skilled workers effectively promised by politicians do not materialise. Of particular concern is the UK-based car industry, which is at high risk of contraction.

What are the implications of the political economy analysis of green industrial policy in this study for policy? There is not sufficient space for detailed policy recommendations for each sector. Rather, here we draw out two more strategic recommendations: (i) tailoring convert strategies to sector circumstances better, and (ii) building the constituency for a more active and committed green state.

Tailoring convert strategies to sector circumstances

The report shows that the UK faces two kinds of challenge: the wider institutional context limits the potential impacts of green industrial policy interventions, and the politics of the convert and attract strategies can be difficult. Below, we consider how to address the issue of the wider institutional context; the first of our recommendations takes this as given and focuses on improving the effectiveness of the convert and attract strategies, especially the first of these.

One clear message from this review is that the context for, and nature of, different sectors is very diverse. For example, while costs have risen in the offshore wind sector in recent years, the pipeline of projects is strong for the next few years. By contrast, the UK automotive industry faces severe headwinds, including US tariffs and strong competition from China. The emerging UK heat pump industry is less under threat, although the Chinese heat pump industry

may be gearing up for an export drive to Western markets. There are also differences in the degree to which UK consumption and production are aligned; most cars made in the UK will be exported, but OSW turbine blades produced in the UK are primarily for use in UK projects, which in turn serve largely domestic consumers^{xxv}, while the heat pump industry lies in between. Some sectors, such as OSW, involve mature technologies where the UK, as a latecomer can hope to only carve out modest niches, such as in cables and floating platforms, whereas others, such as batteries, are still open to radical innovation, creating the possibility for leapfrogging. The nature of products in each sector is also different, not least because unlike cars and electricity, residential heating technologies are typically a distress replacement purchase.

However, despite these important differences, policy approaches look similar across sectors. For example, the Clean Heat Market Mechanism is designed along the same lines as the Zero Emission Vehicle Mandate, while grants are available for both heat pumps and EVs. In both cases, a fairly standard market transformation approach is being taken. There are two limitations to this approach. One is the weakness common to both *convert* strategies, which is that electricity prices are too high, as widely argued. However, the other limitation is that not tailoring strategies to the specific details of sector circumstances risks undermining their effectiveness. Reforming *convert* strategies in ways that give more attention to those details is therefore desirable.

The EV sector provides an example. On the demand side, while the Electric Car Grant provides some support to sales (and high petrol prices due to the current crisis in the Middle East are boosting the market further), this does not address specific and important barriers. These include, for example, the need for much wider availability of on-street charging, ideally with more attractive time-of-use tariffs, for urban markets.

On the supply side, as described above, there is pressure from some OEMs to weaken the targets in the ZEV mandate. While this would be undesirable for net zero goals, there are other ways in which the Mandate could be reformed to reflect the specific circumstance of the sector, and which could also reduce opposition in parts of the industry. These relate to the design of the Mandate rather than its goals. One example is the differential benchmarking of emissions targets for legacy car makers and new entrants that operates to favour the latter group¹⁶¹. Another relates to the complaint from UK-based manufacturers which are converting from ICEVs to EVs that they need to buy credits under the Mandate from new entrants from China as well as companies such as Tesla. Because the latter make and sell only EVs, UK producers are effectively cross-subsidising importers, at a time when they face multiple difficulties. While there may be an element of industry lobbying here, this aspect of the design of the Mandate does effectively undermine efforts to support the *convert* strategy through the delegated network of institutions we describe in the report. A better alternative design might be to require all firms selling cars in the UK to meet targets, but those that need to buy credits to make up any shortfall would then need to do so not from firms in surplus but from a government counterparty. The revenue raised could then be recycled used to support the conversion of manufacturing by UK based firms. This would preserve regulatory certainty and maintain the pressure to grow the EV market in the UK while also being more consistent with helping UK-based manufacturers *convert* production (most of which is actually sold abroad), thereby preserving jobs. The UK has no control over the demand for EVs in export markets, but in both the major markets, i.e., the EU and the US, this demand is expected to grow¹⁶².

xxv Some wind generation is exported via interconnectors



Building a constituency for a more active and committed green state:

The report shows that the green industrial policies pursued through the delegated network state in the UK are limited not only by the actions of the Treasury, but by a set of wider institutional factors that include a lack of sources of willing finance for scaling innovative companies from within the UK, and insufficient investment in skills, training and retraining. In theory, the British state could adopt a more active green industrial policy, moving beyond the main focus currently on limited derisking and moving towards a more directed strategy. The UK's biggest opportunities for developing new national champions are in areas where incumbents are not yet established globally, such as floating offshore wind, new battery technologies such as vanadium flow, and other areas such as CCS. The delegated networks are in place, but without larger fiscal support and a credible commitment to a long-term approach, there is a risk that the UK will not develop major industries in these areas. While the current Modern Industrial Strategy tries to address some of the issues (for example, trying to reduce uncertainty by establishing a

statutory industrial policy advisory body akin to the Climate Change Committee), it remains limited in scope and scale.

The example of China is sometimes invoked as a 'big green state' model¹⁶³, as it has built up dominance in supply chains for and manufacture of technologies like solar PV and EVs over periods of 15-20 years. However, the economic, political and cultural¹⁶⁴ context of China is radically different from that of the UK, while at the same time the net zero timetable requires expansion in demand for and supply of low carbon technologies now rather than in 20 years' time. A more relevant comparison would be with a country such as France, where the state has been more proactive. For example, its directive equity stake in Stellantis has allowed it to provide firm offtake for state-backed indigenous battery champions, in a model quite different to Britishvolt (which failed to secure contracts with carmakers). French subsidies are also higher and more risk-tolerant; despite having a small offshore wind market, it has managed to attract manufacturing of blades, nacelles and other products.

The nature of UK institutions and their limitations as a basis for a more interventionist green state are well-known, but despite regular calls for reforms that would make the UK more like France, achieving major change has proven hard. One critic of the UK's institutions, Will Hutton, identified many of the issues early on, but is still calling for reforms 30 years later. This situation persists in part because UK institutions in finance, labour markets, corporate governance, welfare and training all reinforce each other in an interconnected system that supports growth through credit and consumption rather than through competitive export-oriented industry¹⁶⁵. Changing any one element in isolation is difficult and may have limited effect.

(for example, union opposition to a more rapid transition to EVs). A potential coalition would also have to agree a set of core institutional change objectives (that might for example, include redefining the roles of the Treasury, a new funding settlement and autonomy for the NWF and BBB, regional devolution with fiscal powers, and a new basis for active labour market policies (i.e., skills and training)). Only by coalescing around a core set of changes that would bring about a reconfiguration of the UK system would a coalition be effective in building a more active state. It is possible that some of this institutional change agenda will be adopted by the current administration in its 'machinery of government' reforms¹⁶⁶, but the historical record shows how hard it is to bring about permanent change¹⁶⁷.

This suggests that a systematic approach is needed, which would require not only coordination but also bold redirection of the growth model. Transforming state capacity in the UK is therefore as much a political as a policy challenge; there is no shortage of analyses and proposals, but these are not adopted because the inertia of the institutional system and the power of incumbent actors

have been too great to date^{xxvi}. However, the UK's market-led institutional system, associated policy paradigm and unbalanced consumption-led growth model have become increasingly dysfunctional over time, and in this sense there is an opportunity for change. Beyond a major crisis, change is most likely to come from new coalitions. In the case of UK green industrial policy, there is perhaps potential for a coalition comprising environmental organisations, emerging firms in the low carbon economy and unions, using mobilising ideas of the Green New Deal and just transition. However, in practice there are still divisions within this potential coalition that would require specific deals to overcome

xxvi See, for example, the account of changes in industrial policy in Thailand in Juhász and Lane, including building state capacity, made possible only through changes in coalitions of interests following building crisis in the 1970s and early 1980s. See more: Juhász R, Lane N. The political economy of industrial policy. *Journal of Economic Perspectives*. 2024;38(4):27-54.

Appendix

Interviews conducted:

Name	Organisation	Date
Tim Stock	DESNZ	7 March 2025
Tom Smith	Tony Blair Institute	10 March 2025
Stewart Clements	HHIF- EUA	15 September 2025
Steve Coulter	Green Alliance	21 March 2025
Jonathan Marshall	Resolution Foundation	12 March 2025
Bean Beanland	Heat Pump Federation	21 October 2025
Simon Harpin	BEAMA	1 May 2025
Mark Wilkins	HPA/Vaillant	18 November 2025

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