INNOVATION & RESEARCH CAUCUS

VALUE OF OFFSHORE WIND

A Case Study of the UK with German Comparator

IRC Report No: 092

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This document relates to IRC Project IRCP0024: Net Zero Capabilities of UK Industries

Acknowledgements

This work was supported by the Economic and Social Research Council (ESRC) grant ES/X010759/1 to the Innovation and Research Caucus (IRC) and was commissioned by Innovate UK (IUK). We are very grateful to the project sponsors at UK Research & Innovation (UKRI) for their input into this research. The interpretations and opinions within this report are those of the authors and may not reflect the policy positions of IUK.

We would also like to acknowledge and appreciate the efforts of the IRC Project Administration Team involved in proofreading and formatting, for their meticulous attention to detail and support.

Dr Lauren Tuckerman would also like to thank Prof Grant Allan for his support and feedback on early iterations of the framework presented in the report.

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Cite as: Tuckerman, L., Papazoglou, M, Vorley, T., 2026 UK *Value of Offshore Wind: A Case Study of UK with a German Comparator,* Oxford, UK: Innovation and Research Caucus

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EXECUTIVE SUMMARY

This report outlines the value of offshore wind to the UK across the lifecycle of offshore wind projects and using a series of different value lenses: financial, innovation, energy & environmental, and community & wellbeing. To do so, we utilised secondary data, both quantitative and qualitative to build insights into where the UK shows strengths. We compared UK data against data available for Germany as a comparator. We outline data availability issues around the availability and non-standardised reporting of data.

We find that the UK's offshore wind sector shows potential for addressing regional economic inequalities, and the industry set local value capture allows UK supply chains to benefit from offshore wind investment. Circular economy principles are strongly advocated for by industry bodies such as the Offshore Renewable Energy Catapult, and early innovations are qualitatively captured in the report. Compared to Germany, the UK is generating more offshore wind energy and increasing capacity at a quicker rate.

Our key insights include:

- **CAPEX capture:** While CAPEX is the point of highest expenditure it remains the lowest point of local capture. Interventions in upstream supply for development of offshore wind sites could provide a source of local economic value for the UK.

- **Supporting offshore specific technologies**: Offshore wind technologies are likely to start evolving away from the more mature technologies available in onshore wind, particularly around the materials and construction of components to withstand corrosive environments at sea, and where floating structures differ from onshore wind components.

- **Circular economy as an opportunity:** The sector is already embracing principles of circular economy, and innovations around circular economy are emergent, but opportunity has yet to be fully grasped, as pioneering in the repowering, reuse and recycling of offshore wind materials offers opportunities in the UK and on a global scale.

- **Supporting offshore wind is a regional rebalancing opportunity:** Current patenting evidence suggests that offshore wind activity happens outside of London and the 'golden triangle' where the majority of patenting would typically occur suggesting that offshore wind can be a means of providing innovation value to those areas. Understanding how offshore wind can rebalance regional economic inequality in the UK is an area future research interest.

- **Potential to pioneer in community offshore energy:** While local content industry standards are high meaning local supply chains benefit from offshore wind in the UK, Offshore wind's requirements for capital make community ownership more challenging, and offshore wind is behind onshore wind in making community funding available. There is an opportunity to pioneer new ways (such as those proposed by Project Collette) of structuring offshore wind projects so that community ownership is more feasible.

1. Introduction

This report aims to answer the question of 'what is the value of offshore wind to the UK?', from different perspectives of value creation, using secondary data sources. It serves as a case study of evidence to demonstrate the potential of further investment in the UK Offshore Wind sector, particularly in relation to encouraging further innovation in the sector. To deepen our understanding of where, how, and what value is captured in the UK offshore wind sector, we use Germany as a case comparator, bringing in data from similar sources to demonstrate alternative and complimentary approaches.

Four broad areas of interest inform the content and structure of this report:

- **Understanding the UK Innovation Edge:** what are the innovation strengths of UK Offshore Wind?
- **Value Retention:** what types of value are created and when? Where does value leak out of the UK system? Where could investment increase domestic value capture?
- **International Comparison:** How does the UK compare to Germany? What can the UK learn or adopt?
- **Future Facing Technology:** Which emerging technologies represent the next big opportunity for the UK Offshore Wind sector?

2. Approach

This report utilises secondary data and existing literature to address the board questions above. In doing so, we use the following parameters to guide our selection and search for data and information:

- Primarily looking for quantitative metrics that are reported at or can be easily aggregated to national level.
- Building a rich picture using both quantitative and qualitative evidence by combining indicators and case studies/narratives.
- The evidence base should be as recent as possible (i.e. where possible within the last 5 years).
- The evidence base can include both input and outputs as indicators.
- Limitations of the information gathered should be acknowledged, and therefore, industry sources are also appropriate as long as the sources are made clear.

While the indicators chosen are comprehensive, they are not exhaustive and are designed to give a broad overview of the potential value of offshore wind to the UK.

2.1 Lifecycle Value Framework

To understand the value of a particular (energy) technology sector over time, and from different perspectives of value, we developed the framework outlined in Figure 1. This takes as its basis the lifecycle framework frequently utilised in project management, and often in large scale energy infrastructure projects. This typically sets out four stages to a project: development, installation, operation and decommissioning. In our framework we compress development and installation into one phase, to capture pre, during and post effects more clearly.

To capture different subcategories of value, we focused on the following:

- **Financial**: Focused on tracing monetary value.
- **Innovation**: Looking at new product, service and process development and deployment.
- **Energy & Environmental**: Centred on energy output, emissions, and nature-based impacts.
- **Community & Wellbeing**: Understanding the impact on people and places.

Under each section of the framework, we provide indicators of valuable activities across the stages of the lifecycle. These indicators are not exhaustive but are designed to be indicative. The framework has been developed to be ideally a replicable process aligned with budgetary reviews. We have also acknowledged some of the data gaps and limitations which we outline below. Where metrics are relevant but challenging to aggregate to a meaningful level or are unavailable, they appear in the top row of the framework but greyed out.

2.2 Limitations

Often data is reported on an ad hoc basis, sometimes through one off (consultancy) reports rather than regularly release (government) statistics. Levels of reporting vary from component parts (e.g. in export data) to general reporting of renewables, with many different levels between. Inconsistencies in how data is gathered and analysed mean comparisons cannot be easily made between countries, even where measures appear standardised (see for example the GVA of offshore wind). Often measures are modelled, based on planning rather than actuals, and information on decommissioning is scarce as decommissioning in both the UK and Germany is in its early stages.

Offshore and onshore wind are often reported together, and disaggregating between onshore and offshore wind technologies can be challenging as many similar technologies are used in both industries (see section 5 where we report on Wang et al.'s (2024) study that reports the crossover between the technological base of both industries).

Value Creation Framework

	Development & Installation	Operation	Decommissioning
Financial £ value flows	— Development Expenditure (DEVEX) — Capital Expenditure (CAPEX) — Local content — Private investment	— Operating Expenditure (OPEX) — Gross Value Added (GVA) — Local content — Levelised cost of energy (LCOE) — Reduction in the cost of energy — Exports of technology	— Decommissioning Expenditure — Local content
Innovation R&D & IP	— Gov spend on R&D — Demonstrators — BERD — Patent applications	— Patents granted — Spinouts — Continued R&D spend — Licenses	— Circular innovations — New applications
Energy & Environmental Climate & nature	— Construction emissions — New installations (by number/energy generated) — Species richness — Construction sound levels	— Energy generated — Emission reductions — Installed capacity — Behavioural changes (Physical barriers, Electromagnetic fields, Collisions, Food web alterations, invasive species)	— Rates of repowering & life extensions — Waste & materials — Net zero contribution — Seabed restoration — Biodiversity legacy
Community & Wellbeing People & places	— Employment created — Community support/engagement — Disruption to local economy (fishing & tourism)	— Community funds — Ownership models — Diversity and inclusion in workforce — Skills gaps	— Employment transition — Local economic legacy — Port & coastal impact

Figure 1: Overall Value Creation Framework

3. Background to UK and Germany's Offshore Wind Sector

The UK has set the goal of increasing offshore wind capacity to 50GW by 2030 (UK Government, n.d), which requires significant investment in the sector. Current grid installed capacity was 16.5GW in 2025 (Crown Estate, 2026). The UK Government investing in supply chains in offshore wind (UK Government, 2025), suggesting a desire to capture more value from offshore wind than energy generation alone. In the UK the offshore wind industry is represented and supported by the Offshore Renewable Energy Catapult. Innovate UK actively encourages new innovation in the sector through the Offshore Wind Energy Programme with £10 million in its first round of competition (Innovate UK, 2026(a)).

Germany has set a goal to triple its installed or under construction offshore wind energy to 30GW by 2030 and 40GW by 2035 (Naimoli, 2021). Germany are redesigning their auction systems, following zero bid auctions last year, moving towards a similar approach as CfD (Olgemöller, U.H., et al., 2026). This issue of low bids/lack of interest seems to be a pattern in multiple countries in the EU. Offshore wind in Germany is supported by the Fraunhofer Institute for Wind Energy Systems.

Figure 2 shows the offshore wind developments in the UK in 2025. Figure 3 shows the offshore wind developments in Germany.

Figure 2: Offshore Wind Developments in the UK (Lumify Energy, 2026)

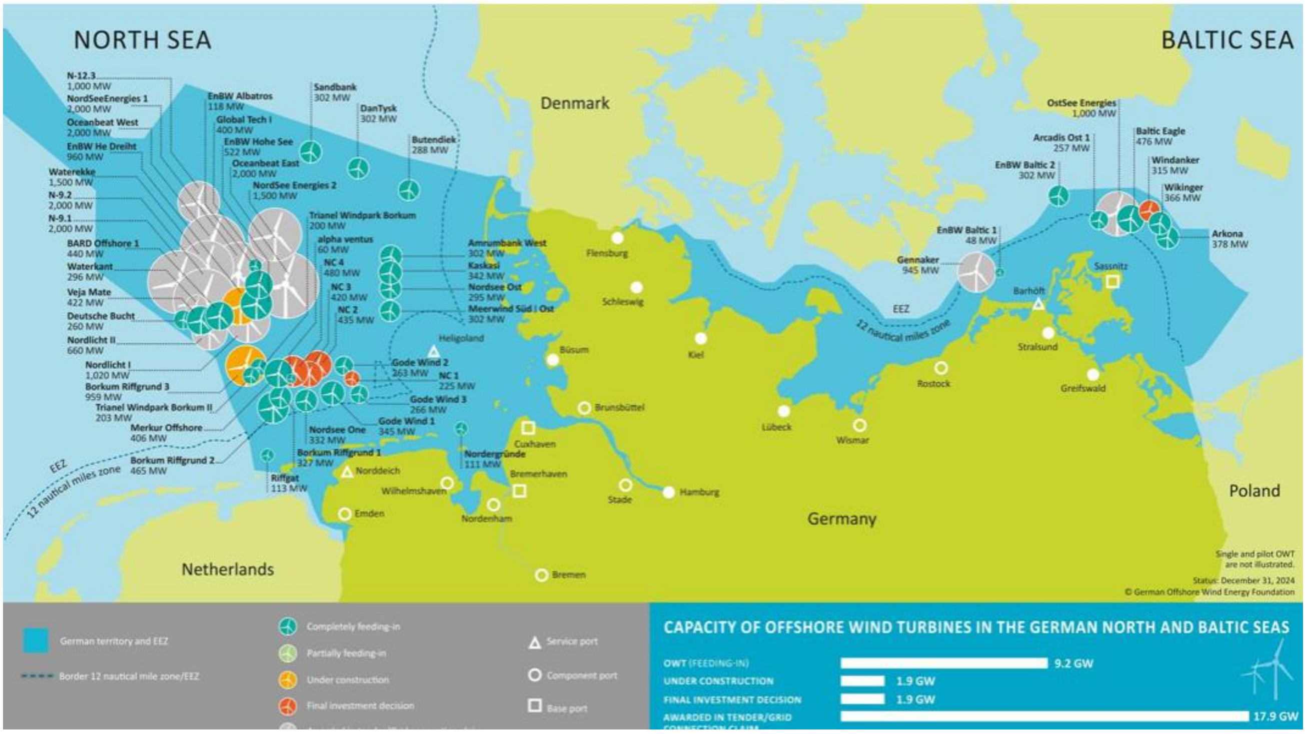
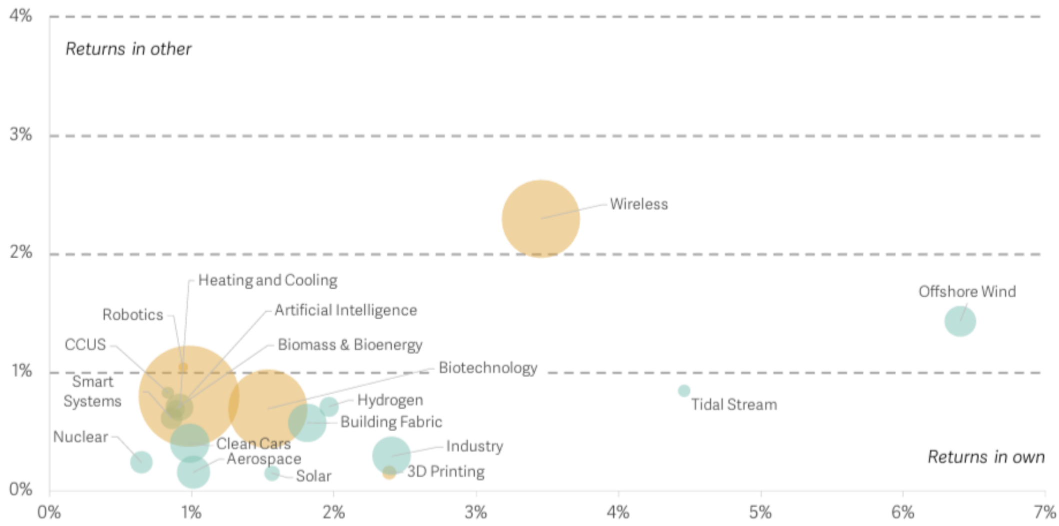


Figure 3: Offshore wind developments in Germany (Deutsche WindGuard, 2024)

3.1 Regional value

While overall this report looks to paint a national picture, it is important to recognise the potential regional value of offshore wind to the UK's places. Interestingly, offshore wind is perceived as not only able to generate high return on public investment at a national level but also can rebalance growth inequalities between regions in UK (Curran et al., 2022). Returns gained by public investment in offshore wind in regions outside of the 'golden triangle' (formed by London, Cambridge and Oxford) in the UK, are likely to stay within non-golden triangle regions (Curran et al., 2022) - see figure 4. Our own analysis of patents supports Curran et al.'s (2022) suggestion that activity in offshore wind is predominantly outside of London (see figure 5).



NOTES: The vertical axis shows the estimated returns to a £1 additional R&D subsidy in the field outside the region where investments are made, and the x-axis shows the equivalent for returns that are retained in the same region. The size of the bubbles indicates the relative size of a particular technology grouping within the regions in this chart. Patents from 2005-2014 are included. Green bubbles are clean technology categories, and yellow bubbles are technologies within the 'trending' category.
SOURCE: Analysis builds on R Martin & D Verhoeven, Knowledge spillovers from clean and emerging technologies in the UK, CEP Discussion paper 1834, March 2022.

Figure 4: Return on Public Investment into Clean Technologies in the UK (Curran et al., 2022)

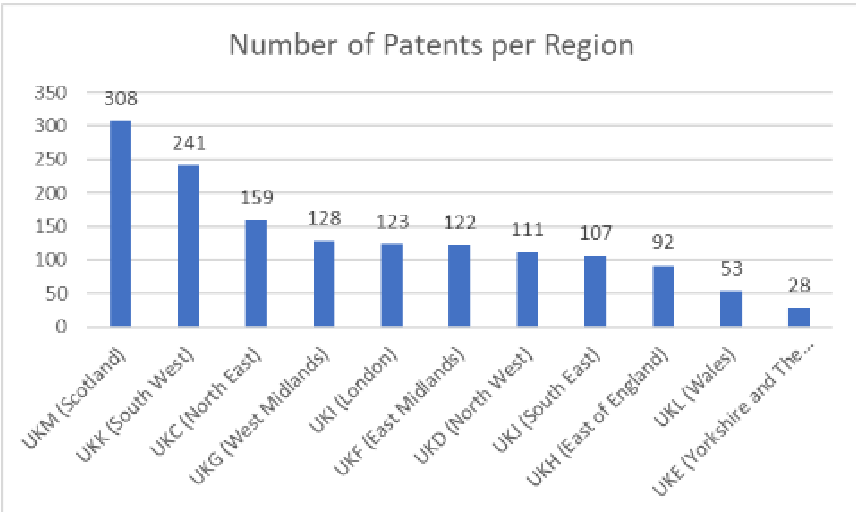


Figure 5: Patents per UK Region (Source: Our analysis of EPO & IRENA Offshore Wind Patent Dataset)

In Germany the benefits of offshore wind appear more widespread throughout the country. The north of the country benefits from offshore capacity building whereas inland benefits from the manufacturing of parts for offshore wind (see figure 6 below).

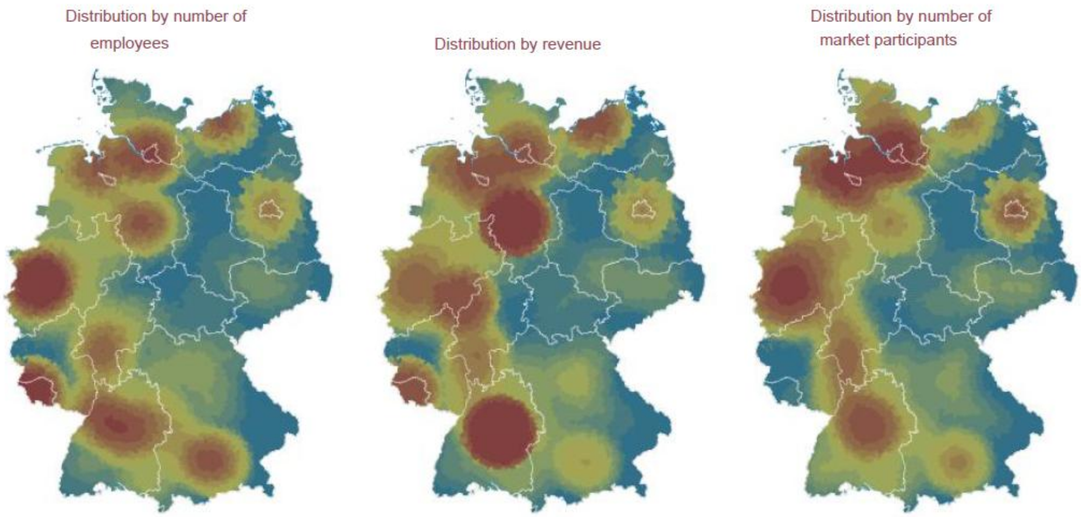


Figure 6: Regional Impacts of Offshore Wind in Germany (Wind Research, 2026).

4. Financial

Capturing financial value across the lifecycle of offshore wind projects in the UK requires that we explore both the investments made into offshore wind but equally to understand the amount of financial value generated that is currently captured by UK businesses. We therefore look at expenditure, as well as local content, whereby a set amount of a project's investment is captured by businesses based in the UK.

Figure 7 provides an overview of the indicators associated with financial value to the UK of offshore wind.

Insights from the indicators in Figure 7 include:

- CAPEX is the biggest known expenditure in the lifecycle, but the lowest point of local content
- Floating wind is seen as having more potential for local content capture than fixed offshore wind as floating foundations are more likely to be constructed locally, drawing more on local supply chains (BVG Associates, 2021; Tait et al., 2023)
- Aim for local content to be 60% by 2030 (Offshore Wind Sector Deal)

While export data proved challenging to extract a distinct measure for, Curran et al (2022) report that UK is particularly specialised in wind (in general) but is not capitalising well on exporting these specialised technologies. The Offshore Wind Industrial Growth Plan (2024) suggests that the UK is mainly trading with Germany, Denmark, Netherlands, and Taiwan, with array cables being the component most exported (Offshore Wind Industrial Growth Plan, 2024).

UK

	Development & Installation	Operation	Decommissioning
Financial £ value flows	— DEVEX — CAPEX — Local content — Private investment	— OPEX — GVA — Local content — Levelised cost of energy (LCOE) — Reduction in the cost of energy — Exports of technology	— Decommissioning CAPEX — Local content
Data sources & availability	— DEVEX : £216/kW average (Arup, 2025) — CAPEX: £2,823/kW average(Arup, 2025) — Local content: 80% DEVEX; 12% CAPEX (BVG Associates, 2021) — Private investment: £3.4bn (UK Government, 2026)	— OPEX: £46.5k/MW/a average (Arup, 2025) — GVA: £2-3 bn / GW installed (Offshore Wind Growth Plan, 2024) — Local Content: 81% OPEX (BVG Associates, 2021) — LCOE: £88.5/MWh for 2023 real figures (Arup, 2025) — Reduction in the cost of energy: £38 per MWh amounts to a price cut of 31% (Ralston, 2026)	— Decommissioning CAPEX: £86k/MW (Arup, 2025); £426million/GW for fixed, £450 million/GW gross for floating (Guides to Floating and Fixed Offshore Wind); £132.8 and £229 million, excluding contingency costs for 500MW estimated (Adedipe & Shafiee, 2021) — Local content: 30% DECEX — The cost of decommissioning 37 offshore wind farms could be between £1.3 billion (€1.4 billion) and £3.6 billion (€4.1 billion). (Spyroudi, 2021)
Limitations	— Data sources are predominantly UK based — Often consultancy based — Years vary and stats might not be repeated — Some issues with transparency	— Actual reported figures vs projected figures	— Actual reported figures vs projected figures

Figure 7: Financial Value in the UK

Table 1 provides a comparison between similar figures that could be found in the UK and Germany. It should be noted that even in standard metrics like GVA, there is a difference in how calculations are made that make them not directly comparable. Where the UK figure reported is an estimate that focuses on the value per GW installed to capture the local content of installation as well as some operational costs, the German figure seems to be taken directly from reported accounts and captures value from operations.

Localised cost of energy in both countries appears similar, and for both countries decommissioning is in its early stages, meaning capturing comparable measures is challenging. Related to value retention, Germany does not have the same standard for local content as the UK. Discrepancies in the potential value of decommissioning relate to the difficulty in modelling the costs associated while decommissioning is in its early stages, as well as whether costs can be recouped from sales of recyclable materials.

Table 1: Indicators of Financial Value in UK and Germany

Indicator	UK	Germany
GVA	» GVA: £2-3 bn per new GW installed » Offshore Wind Industrial Growth Plan (2024), based on Noonan & Smart (2017) estimates of CAPEX and some OPEX, adjusted using an offshore wind economic multiplier. Represents economic value associated with deployment of new offshore wind capacity, including supply-chain impacts.	» € 3.1 billion in 2022 (around £2.6bn) - installed capacity for Germany in 2022 was 8.05GW » European Commission (2025) accounting-based estimate of the annual GVA contribution of the existing offshore wind sector, primarily reflecting operational activities (electricity generation, transmission and distribution).
LCOE	» £88.5/MWh, 2023-2024 current costs (Arup, 2025)	» 62-109 €/MWh in 2024 (European Commission, 2025) – £52-92/MWh
Potential cost of decommissioning	» Decommissioning CAPEX: £86k/MW (Arup, 2025); £426million/GW for fixed, £450 million/GW gross for floating (Guides to Floating and Fixed Offshore Wind); £132.8 and £229 million, excluding contingency costs for 500MW estimated (Adedipe & Shafiee, 2021) » The cost of decommissioning 37 offshore wind farms could be between £1.3 billion (€1.4 billion) and £3.6 billion (€4.1 billion). (Spyroudi, 2021)	» Germany's first offshore wind farm, Alpha Ventus, is due to be decommissioned starting in 2027/2028. Value of invitation to tender: € 50 million

4.1 Highlight: UK's Local Content Standards

As a result of world trade agreements, the UK and many European countries are unable to legally require a level of local content in infrastructure project consents. However, the UK has a strong industry negotiated commitment and has created a strong policy push towards local content capture (van der Loos, 2022). A recent study of the effectiveness of local content mechanisms in offshore wind supply chains in Belgium, Denmark, Germany, the Netherlands, Sweden, and the United Kingdom found that local content stimulates locally sourced suppliers for more standardised goods and services. However, their effectiveness is more limited for complex, specialist activities where supply chains depend on established technical capabilities, long-term relationships and specialist expertise (van der Loos, 2022). A limitation of this study is that the only country with a local content push was the UK. Local content mechanisms can be constrained by international trade agreements (e.g. challenges to CfD subsidies) (Gilbert & Wood, 2022), so alternatives to formal procurement procedures are also important to encourage. Everoze (2024) sets out some mechanisms for encouraging more local content across the lifespan of offshore (floating) wind projects (see figure 8 below).

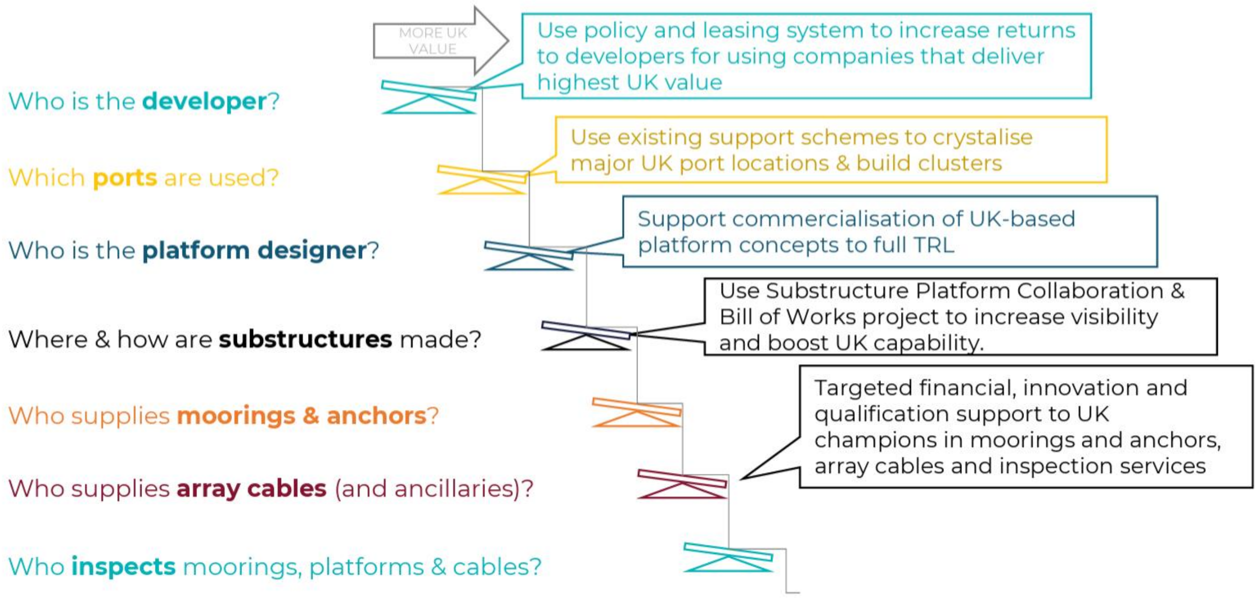


Figure 8: Encouraging local value capture (Everoze, 2024)

5. Innovation

Capturing innovation across the lifecycle of offshore wind captures not only innovations at the point of energy generation, but also during operation, as part of maintenance and reuse/ recycling. In this section, we explore both the input in terms of investment into R&D from public and private sectors, as well as outputs, such as patents and spinouts. In figure 9, we show the indicators for the UK.

Points of interest:

- Government spend on R&D in Offshore Wind is clear, but the match funding provided by private R&D is not easily found.
- Little evidence of spinouts in the UK.
- Circular economy principles are clearly being considered.

UK	Development & Installation	Operation	Decommissioning
Innovation R&D & IP	— Gov spend on R&D — Demonstrators — BERD — Patent applications	— Patents granted — Spinouts — Continued R&D spend — Licenses	— Circular innovations — New applications
Data sources & availability	-Gov spend on Demonstrators: £4.545m in 2024 (IEA, 2026) - Gov spend on R&D: £3.073m (IEA, 2026) - Total gov RD&D: £7.618m (IEA, 2026)	- 10 patents grants related to offshore wind in 2022 (EPO & IRENA, 2023) - GtR+ has little evidence of UK Offshore Wind spinouts (similar to our Beauhurst data) - UK and Ireland Innovation Hub: £500,000 (Bould, Orsted, n/d)	- First UK Offshore Wind REPM turbine recovery project completed (Innovate UK, 2026) - RWE using recyclable blades in Sofia Offshore Wind Farm (RWE, n/d), which were developed by Siemens Gamesa factory in Hull (Murphy, 2025) - Reblade's bladeboard (Reblade, n/d)

Limitations	- BERD reported at the SIC level or at the detailed product group level.
	  - SIC too broad (and problematically reported
	  - Closest in detailed product group is "Electricity, gas and water supply; waste management"
	- IEA report private R&D in Austria, Portugal, Czech Republic and Italy
		- Spinout register has company name, but no specific subdivisions beyond academic discipline
		- GtR+ has little evidence of UK Offshore Wind spinouts
		- Patent lags
		- Not offshore wind specific
			Data is project by project rather than aggregated
			Very early in decommissioning timelines

Figure 9: Innovation Value in the UK

In table 2, we show figures comparing UK and Germany based on data available for the two countries. Public investment levels per capita are similar between the two countries.

Table 2: Indicators of Innovation Value in UK and Germany

Indicator	UK	Germany
Government Spend on R&D	» £7.618m (£0.11 per capita) in 2024 (IEA, 2026) » €9.212m (€0.13 per capita) (constant prices and exchange rates) in 2024 (IEA, 2026)	• €11.639m (€0.14 per capita) (constant prices and exchange rates) in 2024 (IEA, 2026
Patenting activity	• 10 patents grants (0.15 patents per million capita) related to offshore wind in 2022 (EPO & IRENA, 2023)	• 25 patents granted (0.3 patents per million capita) in 2022 in Germany related to Offshore Wind (EPO & IRENA, 2023)
Circular innovation examples	» First UK Offshore Wind REPM turbine recovery project completed (Innovate UK, 2026 (b)) » RWE using recyclable blades in Sofia Offshore Wind Farm (RWE, n/d), which were developed by Siemens Gamesa factory in Hull (Murphy, 2025) » Reblade's bladeboard (Reblade, n/d)	• Near Heligoland in the North Sea in 2022, Siemens Gamesa installed the world's first commercial recyclable wind turbine blades at the Kaskasi wind project (Siemens Gamesa, 2023)

5.2 Case Study: Reblade's BladeBoard

Reblade, a firm based in Scotland, which focuses on decommissioning of wind turbines. EDF donated their decommissioned turbine blades to Reblade, who repurposed them into EV-charging shelters in Dundee. This initial project led to a wider collaboration between Reblade, ED, and investors Dalmore Capital and Foresight as well as Scottish Enterprise, which resulted in the development of BladeBoard; a product developed by shredding blades and mixing them with other waste materials to create planks which can be used for a wide variety of purposes.

"Each BladeBoard® contains 45-50% blade material and delivers approximately 500 linear metres of finished product per tonne of blade material processed, making it one of the most material-efficient circular solutions in the wind energy sector." (Reblade, n.d.)

5.3 Technological edge & future advancements

Offshore and onshore wind have high levels of crossover in relation to technology used. Wang et al., (2024) use patents to understand the relatedness of technologies in offshore oil and gas, onshore wind, and offshore wind. They find that onshore and offshore wind share many patents, whereas offshore oil and gas and offshore wind, relatively few (see figure 10). They also identify that spillovers from onshore to offshore are most likely in electrical apparatus, rotors, nacelles, and control technologies. Towers, moorings, and foundations & installation techniques are reportedly evolving away from onshore wind innovations, and therefore it is in this space we are most likely to see offshore specific innovations and where increased capacity is likely to be generated (Wang et al., 2024), likely due to the need for these components to be more resistant to corrosive environments (Pasimeni et al., 2024). Modelling of investment in 2GW of floating wind installed in Northern Ireland has suggested benefits across different sectors at different stages of development (Connolly, 2025). Interestingly, the benefits of cheaper electricity extend beyond technical advancements and components to professional services (see figure 11) (Connolly, 2025). The other professional services category in this context is likely to contain an aggregate of specialised activities not necessarily related of offshore wind itself. Rather it shows the breadth of impact across the economy of offshore wind installation.

The Offshore Wind Industrial Growth Plan (2024) maps components and services against their cost efficiency, UK capabilities and the market opportunities. These figures can be found in Appendix 1.

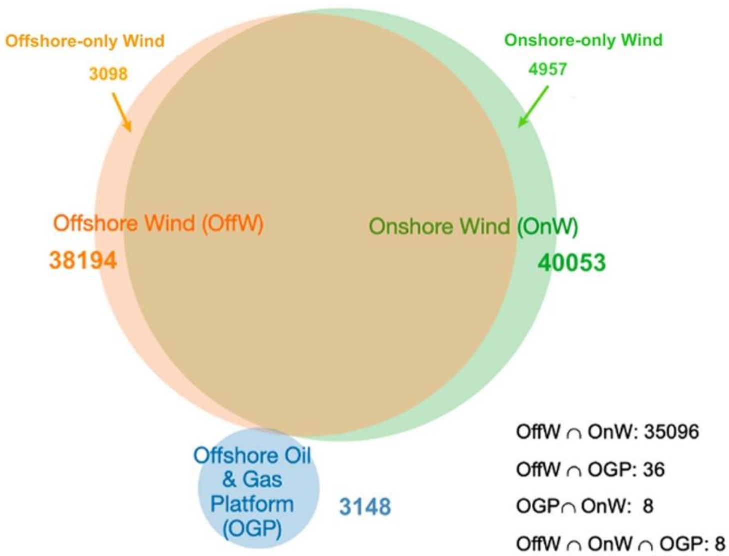


Figure 10: Crossover of Patents in Offshore Wind and Offshore Oil and Gas and Onshore Wind (Wang et al., 2024)

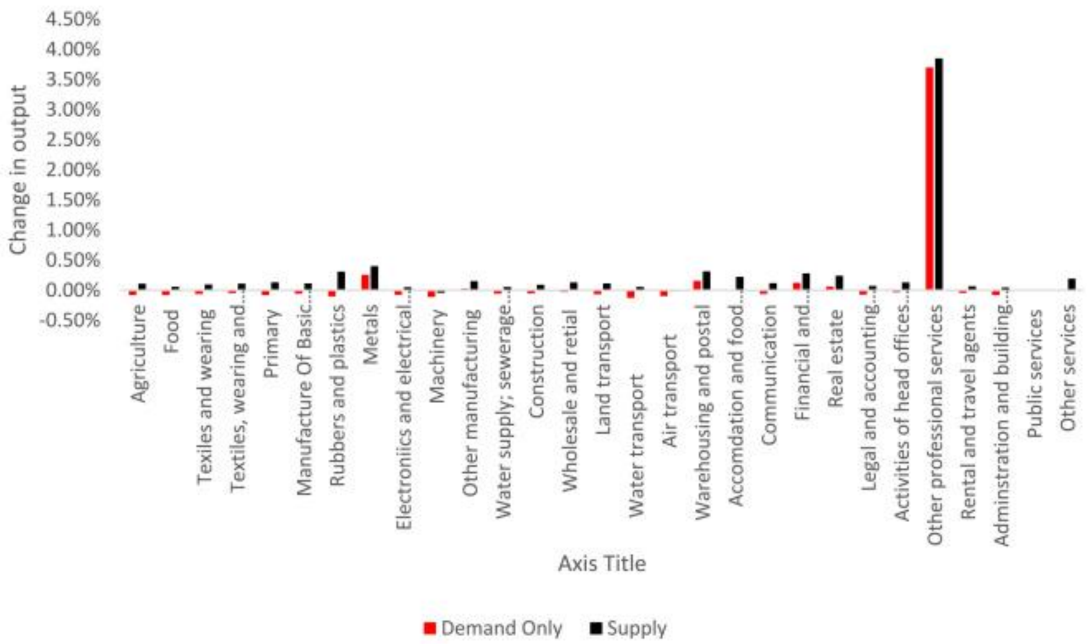


Figure 11: Sectoral change across the economy in output in 2030 for increase of 2 GW of floating wind in Northern Ireland (Connolly, 2025)

Future technological developments often focus on how the UK can maximise opportunities from floating wind (Curran et al., 2022; Everoze, 2024), energy storage, and offshore wind collocated with hydrogen production, which is also discussed as a future opportunity (Pasimeni et al., 2024).

6. Energy & Environmental

While the main motivation for increasing installations of offshore wind is one of environmental sustainability, there is an inherent tension between these installations and the natural environment they are built within. It is therefore important to attempt to understand both the energy generated, how much greenhouse gas emissions these installations might reduce, but also the potential adverse effects on the environment from constructing offshore wind facilities. Thus, we include energy and environmental together, as both complementary and conflicting elements of the framework. Figure 12 shows the UK overall picture.

Points of interest:

- Offshore Wind in the UK displaced 20.8 million tonnes of CO2 emissions in 2025 (Crown Estate, 2025).
- Wind turbines *can* be recycled, the extent to which they are is currently unclear.

But the opportunity to find secondary uses for the materials is high as 1.5GW globally will need to be decommissioned by 2030 (Offshore Renewable Energy Catapult, 2021)

UK	Development & Installation	Operation	Decommissioning

Energy & Environmental Climate & nature	— Construction emissions
	— New installations (by number/energy generated)
	— Species richness
	— Construction sound levels
		— Energy generated
		— Emission reductions
		— Installed capacity
		— Behavioural changes
		  — Physical barriers
		  — Electromagnetic fields
		  — Collisions
		  — Food web alterations
		  — Attraction of invasive species
			— Rates of repowering & life extensions
			— Waste & materials
			— Net zero contribution
			— Seabed restoration
			— Biodiversity legacy

Data sources & availability	- Construction emissions: estimated between 23,432-63,763Mt CO2e 2019-2054 (Allan et al., 2020)
	- New installations:
	  - 1,049MW new offshore wind energy capacity in 2025 (Crown Estate, 2025; Wind Europe, 2026)
	  - Four projects, all planned as floating offshore wind developments in Scotland, submitted offshore planning applications; total 4.3 GW of capacity (Renewables UK, 2026)
	- Biodiversity: 45 wind farms, it was found that abundance of benthic species increased in 38% in the first 2 years following construction, compared to 15% where abundance decreased and 45% with neutral change. (Mather, 2021) – based on 2012-2013 data
		- GWh generated: 16.5GW grid connected offshore wind capacity & 52 TWh generated in 2025 (Crown Estate, 2025).
		- Emission reductions: Offshore wind displaced an estimated 20.8 million tonnes of CO_2 in 2025 (Crown Estate, 2025)
			- Recycling turbines can save at least 35% of embodied carbon emissions equivalent per kWh compared to new manufacturing (Spyroudi, 2021)
			- 1.5GW of offshore wind will need to be decommissioned by 2030 globally and 13GW by 2040 (Spyroudi, 2021)
			- Possible to recycle 85-90% of materials in wind turbines but lessons from onshore suggest this is harder in practice (Spyroudi, 2021)
			- turbines contributes 50% to the carbon emissions of primary materials used
			  - Steel turbines emit more
			  - Fibre glass are harder to recycle (Spyroudi, 2021)
			- 17 MW decommissioned in 2025 (WindEurope, 2026)
			- 80 MW repowered in 2025 (WindEurope, 2026)

Limitations	-Data on biodiversity can be challenging to find, and there are widely acknowledged data gaps - Complex to distil down into handful of metrics	- Estimated figures	- No actual reported recycling figures - Decommissioning and powered are onshore & offshore combined

Figure 12: Energy & Environmental Value

The UK installed around twice the amount of offshore wind capacity of Germany in 2025, resulting in a similar almost double amount of energy generated in the same year. Germany decommissioned and repowered all wind at a much higher rate than the UK however, as this includes onshore wind, this is likely to come mostly from repowering Germany's large onshore wind sites.

Table 3: Indicators of Energy & Environmental Value in the UK & Germany

Indicator	UK	Germany
New Capacity installed	1,049MW new offshore wind energy capacity in 2025 (Crown Estate, 2025; Wind Europe, 2026)	• 503 MW new capacity in offshore wind in 2025 (Wind Europe, 2026)
Energy Generated	52 TWh generated in 2025 (Crown Estate, 2025).	• 26.1 TWh of electricity in 2025. (Deutsche WindGuard, 2025)
Decommissioning	17 MW decommissioned in 2025 (Wind Europe, 2026) – both onshore & offshore	• 631 MW decommission in Germany in 2025 (Wind Europe, 2026) – both onshore & offshore
Recommissioning	80 MW repowered in 2025 (Wind Europe, 2026) – both onshore & offshore	• 1548 MW repowered in Germany in 2025 (Wind Europe, 2026) – both onshore & offshore

6.1 Challenge: National Level Metrics on Biodiversity

Until very recently the UK has relied on project-by-project monitoring and no centralised measures have been agreed or collated and published. The Marine Data Exchange does provide rich datasets on baseline marine life and species level studies but not aggregated to standardised measures. In 2025, the Marine Management Organisation published the *Marine licensing: Standardisation of Post-Consent Environmental Monitoring for Wind Farms in English Waters* which sets out recommended methods for measuring post construction phase biodiversity of offshore wind sites. It stresses that the decision about *what* to monitor remains project dependent. The UK (alongside Australia) uses a decentralised approach to monitoring (and identification of leasing areas) where developers conduct surveys (Watson et al., 2025).

Germany, on the other hand, has had a long-standing measurement system, the *Investigation of the Impacts of Offshore Wind Turbines on the Marine Environment* standard (Bundesamt für Seeschifffahrt und Hydrographie, 2013), which sets out a method for monitoring different aspects of biodiversity impact, by stage of project and taxa. Germany (alongside Denmark and the Netherlands) uses a centralised system for monitoring (and identification of leasing areas) where government conducts surveys (Watson et al., 2025).

Neither country publishes standardised aggregate reports on the effects of offshore wind on biodiversity at a country level.

7. Community & Wellbeing

Installing offshore wind has an impact on the communities around the site. Although defining communities for offshore wind is not as easy as understanding the communities around more onshore renewable projects, we can still try to understand some localised effects on place of installations. Figure 13 provides an overview of community and wellbeing value off UK offshore wind.

Points of interest:

- For offshore wind there are challenges in identifying the ‘community’ relevant to the site.
- Best practice and more data exists for onshore, but offshore is slower to follow.

UK

	Development & Installation	Operation	Decommissioning
Community & Wellbeing People & places	— Employment created — Community support/engagement — Disruption to local economy (fishing & tourism)	— Community funds — Ownership models — Diversity and inclusion in workforce — Skills gaps	— Employment transition — Local economic legacy — Port & coastal impact

Data sources & availability	- Total employment: 39,898 employment 2025
	    - 24 % increase from 2023 (Renewables UK, 2025)
	- Fishermen are adversely impacted by displacement from offshore wind farms; small vessels more affected. No standardised compensation (Szostek et al., 2025)
		- Community funds: Much less established/ formalised than onshore, with no 'best practice' rate per MW, generally lower than onshore wind (Glasson, 2020)
		- Project Collette is early stage attempt to build community offshore wind near Cumbria (Green Finance Community Hub, 2025)
		- Ownership of offshore wind farm during operational and development stage:
		    - Utility 55%
		    - Financial investor 26%
		    - Oil & Gas 11%
		    - Corporate or state owned (Crown Estate, 2024)
		- DEI:
		    - Women make up 21.9% of the workforce
		    - Ethnic minorities make up 7.2% (Crown Estate, 2025)
		- Wind Turbine Technician remains the most in-demand role, with an average shortfall of over 11,000 technicians annually—despite a projected need of 17,300 (Wind Industry Skills, 2025)	

Limitations	- Projected figures based on submitted employment records - Impact on tourism using quantitative measures is an identified research gap (Glasson et al., 2021)	- Wind skills reported across offshore and onshore	- Very little evidence of local economic impacts from decommissioning

Figure 13: Community and Wellbeing Value

Employment was the only clear indicator with comparable information regarding community and wellbeing. This is perhaps due to a longstanding issue regarding standardised measures of community and wellbeing measures. Skilled labour shortages are described in both countries as problematic and have been identified as a potential barrier to reaching policy goals for increased offshore wind capacity (Wind Industry Skills, 2025; German Offshore Wind Industry Association, 2026). While in the UK, the Wind Industry Skills report details the gaps the UK faces, in Germany, the recently published *Skilled worker roadmap for offshore wind energy* identifies a lack of understanding of what skills are missing, where they are needed, where losses are and the extent of gaps (German Offshore Wind Industry Association, 2026). In both countries community ownership of offshore wind is limited due to the capital intensity of offshore wind farm development.

Table 4: Indicators of Community & Wellbeing Value in UK & Germany

Indicator	UK	Germany
Employment	» 39,898 employment 2025 » 24% increase from 2023 (Renewables UK, 2025)	• 31,500 FTE employment • rise to 120,000 FTEs by 2045 (BWO, 2026)

7.1 Challenge: Offshore Wind and Fishing Industry Displacement

Displacement of fishing in both countries remains an unresolved issue. Some industry news coverage has suggested that the German government’s move to buyout local fisherman to enable further offshore wind development has met with resistance from right wing politicians (McBride, 2025). The tensions between the offshore wind industry and fishing in Germany remain, as offshore wind actors resisted movement towards allowing active fishing in offshore wind sites, citing potential damage and proposing passive fishing as a potential solution (German Offshore Wind Energy Association (BWO), 2025) Schupp et al. (2021) compared the east coast of Scotland with the German North Sea EEZ and found that in both cases commercial fishing was driving multiuse agreements where the offshore wind sector remained resistant. In the UK, a recent study found that members of the fishing community who participated in the research felt offshore wind was threatening their livelihoods (Szostek et al., 2025). The scale of the problem is hard to ascertain as although methods for monitoring impacts are similar (Vessel Monitoring System (VMS), Automatic Identification System (AIS), and logbooks), data is inconsistent and these typically do not capture impacts on smaller vessels (under 15m) (Scottish Government, 2025(a)). These vessels have been identified as particularly vulnerable to changes in their territory due to offshore wind projects (Szostek et al., 2025). Part of the length consent process for new offshore wind sites involves consultation with the fishing industry. In particular, it is suggested that new projects engage with best practices created by Fishing Liaison with Offshore Wind and Wet Renewables Group (FLOWW) (Scottish Government, 2025(b); Scottish Government, 2014). However, recent research suggests that these consultation processes may not be sufficient to address the fishing community's concerns (Withouck et al., 2023).

7.2 Case Study: Community Offshore Wind Energy - Project Collette

Project Collette is a proposed community owned offshore wind farm, incubated by Green Finance Community Hub. The proposed wind farm would be off the Cumbrian coast and have a capacity of 1.2 GW. The project would integrate social enterprise legal structures to ensure community voice and governance, while seeking institutional investment to raise capital for the project. Green Finance Community Hub takes inspiration from two successful community offshore wind projects: Middelgrunden Wind Cooperative (Denmark) and Windpark Fryslân (Netherlands) both of which raised significant investment through community shares (Green Finance Community Hub, 2025).

8. Conclusions

This report set out to understand the value of offshore wind to the UK, utilising different lenses. In doing so, we can see some opportunities for the UK to capitalise and maximise public investment in offshore wind, beyond the clean, green energy it provides. We identified six key insights:

- **CAPEX capture:** While CAPEX is the point of highest expenditure it remains the lowest point of local capture. Interventions in upstream supply for development of offshore wind sites could provide a source of local economic value for the UK.

- **Supporting offshore specific technologies**: Offshore wind technologies are likely to start evolving away from the more mature technologies available in onshore wind, particularly around the materials and construction of components to withstand corrosive environments at sea, and where floating structures differ from onshore wind components.

- **Circular economy as an opportunity:** The sector is already embracing principles of circular economy, and innovations around circular economy are emergent, but opportunity has yet to be fully grasped, as pioneering in the repowering, reuse and recycling of offshore wind materials offers opportunities in the UK and on a global scale.

- **Supporting offshore wind is a regional rebalancing opportunity:** Current patenting evidence suggests that offshore wind activity happens outside of London and the 'golden triangle' where the majority of patenting would typically occur suggesting that offshore wind can be a means of providing innovation value to those areas.

Understanding how offshore wind can rebalance regional economic inequality in the UK is an area future research interest.

- **Potential to pioneer in community offshore energy:** While local content industry standards are high meaning local supply chains benefit from offshore wind in the UK, Offshore wind's requirements for capital make community ownership more challenging, and offshore wind is behind onshore wind in making community funding available. There is an opportunity to pioneer new ways (such as those proposed by Project Collette) of structuring offshore wind projects so that community ownership is more feasible.

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APPENDIX: Offshore Wind Components and Services – Market advantages (Offshore Wind Industrial Growth Plan, 2024)

Cost efficiency is the number of contracts won on the global market by UK headquartered firms.

Capability is the end-to-end capability across innovation and existing suppliers.

Component	UK's ability to win: Cost-efficiency[a]	UK's ability to win: Capability[b]	2035 Market opportunity: Wider benefits	2035 Market opportunity: Market value	Outcome
Tower	Low	Medium	High	High	Make
Blades	Low	High	High	High	Make
Nacelle assembly	Low	Medium	Medium	High	Buy
Drive train	Low	High	High	Medium	Nurture
Yaw and electrical system	Low	High	Medium	Medium	Buy
Monopile foundation	Medium	High	Medium	Medium	Protect
Monopile Transition Piece	Low	High	Medium	Low	Protect
Deeper water foundations	Medium	High	Medium	High	Make
Steel semi-submersible	Medium	Medium	Medium	High	Nurture
Concrete semi-submersible	Medium	Low	High	Medium	Nurture
Moorings & anchors	Medium	High	Medium	High	Make
Static & dynamic array cable	Medium	High	High	High	Make
Offshore export cable	Medium	High	High	Medium	Make
Onshore export cable	Medium	Medium	Medium	High	Nurture
Electrical system & SCADA	Low	Low	High	Medium	Nurture
Offshore substation foundations	Medium	High	Medium	High	Make
Offshore substation topside	Medium	Medium	Medium	Medium	Buy

High capability/output
Medium capability/output
Low capability/output

Make: High value & high ability to win
Nurture: High value & low current ability to win
Buy: Low value & low ability to win
Protect: Low value & high ability to win

Service	UK's ability to win: Cost-efficiency[a]	UK's ability to win: Capability[b]	2035 Market opportunity: Wider benefits	2035 Market opportunity: Market value	Outcome
Development services	High	Medium	Medium	Low	Buy
Wind turbine installation	High	Medium	Low	Medium	Protect
Wind turbine installation vessels	High	High	Low	High	Make
Monopile installation	High	Medium	Low	Low	Protect
Jacket installation	High	Medium	Low	Medium	Buy
Foundation installation vessels	Low	Medium	Low	Medium	Buy
Floating turbine installation	Medium	Medium	Medium	Medium	Nurture
Floating assembly	Medium	Low	High	Medium	Nurture
Array and offshore export cables installation	High	Medium	Medium	Low	Buy
Cables installation vessels	Low	Medium	Medium	High	Nurture
Landfall HDD & Cable Pull	High	Medium	High	Medium	Make
Onshore export cables installation	Medium	Low	Medium	Medium	Buy
Offshore substation (OSS) installation	Medium	Low	Medium	Medium	Buy
Environmental surveys	High	High	High	Medium	Make
Operations Team	Low	Medium	High	High	Make
Asset Management Services	Low	High	High	High	Make
Commercial & Insurance	Low	Medium	High	High	Make
Scheduled maintenance & repairs	Low	High	High	High	Make
O&M vessels	Low	High	High	High	Make
Decommissioning	Low	Medium	Medium	Low	Nurture

- High capability/output
- Medium capability/output
- Low capability/output

Make	High value & high ability to win
Nurture	High value & low current ability to win
Buy	Low value & low ability to win
Protect	Low value & high ability to win

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