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Cover image: Blades for Moray East offshore wind farm. Credit: Ocean Winds

Commissioned by:

With thanks to:

#### OffshoreWind IndustryCouncil









The Offshore Wind Industry Council (OWIC), a senior Government and industry forum, was established in May 2013 to drive the development of the world-leading offshore wind sector in the UK. It is comprised of members drawn from the leading UK and global firms in the offshore wind industry, including developers and original equipment manufacturers. The Council oversees and drives the implementation of the Offshore Wind Sector Deal, co-Chaired by Industry and the UK Minister of State for Energy Security and Net Zero.

The Offshore Wind Growth Partnership (OWGP) is a long-term business transformation programme which promotes closer collaboration across the supply chain, implements structured productivity improvement programmes and facilitates shared growth opportunities between developers and the supply chain. To date and until 2030, OWGP delivery focuses on directly supporting supply chain companies through a combination of business support programmes and grant funding. Offshore Renewable Energy Catapult is the main delivery partner with support provided by other specialists in the sector.

Everoze is an employee-owned consultancy, specialising in renewables, storage, hydrogen and wider energy flexibility. Our unique strength is bridging the gap between the technical and the commercial. We exist to help our clients accelerate the transition to a decarbonised energy system.

BiGGAR Economics is a leading independent economic consultancy based just outside Edinburgh that has provided economic analysis and advice on the energy transition for 20 years.

Lumen Energy & Environment is a specialist renewable energy consultancy focused on supply chain growth and helping organisations manage a successful energy transition.

#### **Foreword**

We are delighted to present the Supply Chain Capability Analysis (SCCA) report, jointly commissioned by the Offshore Wind Industry Council (OWIC) and the Offshore Wind Growth Partnership (OWGP). This report is the product of an industry-wide effort to provide a detailed assessment of the opportunities for the UK offshore wind sector. It presents a step change in the industry's understanding of the potential opportunities for the UK supply chain and how we might best exploit these.

In commissioning this analysis from Everoze Partners, OWIC and OWGP sought to answer the following questions:

- What are the existing strengths in the UK's offshore wind supply chain?
- Where are the opportunities to do more and secure a competitive position in an expanding global marketplace?
- How can the UK collectively unlock these opportunities to maximise the chances of offshore wind supply chain success?

The following report highlights the methodology and key findings from a detailed analysis and investigation conducted by Everoze Partners, led by OWIC and OWGP

The analysis shows that the UK could expect exceptionally high returns if joint government and industry targeted interventions are focused on specific areas of the supply chain. Through a detailed assessment of equipment and services, required across the entire life cycle of an offshore wind farm, a clear understanding of value has been gained. The study calculates that the UK supply chain can capture £92 billion of economic value (Gross Value Add, or GVA) by 2040 if the right actions are taken and investments made in assessed areas in the coming years.

With a highly skilled workforce, world-class innovation and specialised facilities, the UK is home to some of the most experienced and capable companies that can compete in a global offshore wind market. The analysis concludes with nine recommendations, which are all made through the prism of a systemic approach i.e. considering the whole supply chain as a system. It is this overarching approach which will unlock greater value and prevent bottlenecks across the supply chain

For the UK to make the most of this golden opportunity, it is essential that industry and government works together to maximise global competitiveness in offshore wind.

Implementation is key, and this analysis has to be converted into action. OWIC and OWGP will now be taking the outputs of this study forwards, in collaboration with government, to develop an Industrial Growth Plan that will help the UK take advantage of the opportunities highlighted.

Finally, we would like to express our sincere thanks to Everoze Partners, and their associates Lumen Energy & Environment and BiGGAR Economics, as well as key industry leaders, Offshore Wind Clusters, Regional Development Agencies, Local/ Devolved Governments, trade bodies, Developers and supply chain companies who developed and participated in the study and provided valuable input, data, guidance, and expertise.



Sophie Banham
OWIC Vice-Chair



Anil Sayhan

OWGP Programme Director

#### **Executive Summary**

The UK offshore wind supply chain has the potential to deliver over £90 billion of value to the UK economy by 2040. Targeted interventions will ensure this opportunity can be realised through investment in the UK, job creation and increased exports. Developing a long-term, Industrial Growth Plan which builds on the findings of this report will be key to implementing interventions and programmes to capture this growth opportunity.

The UK is a world leader in offshore wind, with more capacity installed than any other country in Europe. Our long-term pipeline of projects, at various stages of development, can strengthen the UK's energy security for decades to come.

State-of-the-art factories in the UK, such as Siemens Gamesa in Hull and Vestas on the Isle of Wight manufacturing offshore wind turbine blades, as well as JDR Cables in Hartlepool and Tekmar Cable Protection Systems in Newton Aycliffe, are just some examples the investments supporting the UK and global offshore wind sector.

Building on the UK Government's target of deploying 50GW by 2030, including 5GW of floating wind, industry wants to maximise the potential growth of the UK supply chain as it looks to more than treble its existing installed capacity. Simultaneously, cost reduction has sparked a global boom in offshore wind, with other countries setting out their own ambitions for renewable deployment. This presents a huge economic opportunity for the UK to seize.

However, to unlock and build on this potential, industry needs to understand where supply chain opportunities exist and how best to assist them with targeted policy support. As the report sets out, with the right support and framework in place, the UK economy could capture £92 billion of GVA by 2040.

Capturing this opportunity will not be easy as the UK is competing with other countries to secure the long-term economic value. This report's analysis estimates that the combination of the entire UK market with the global export market of expected offshore wind projects represents an opportunity of over £500 billion by 2040. While the UK has had notable success stories and received significant investment from developers and government, the analysis recognises more could be done to keep the UK's supply chain resilient and cement its success into the future.

This report provides compelling evidence as to why a strong UK offshore wind supply chain is critical to maximise the economic advantages that the sector's expansion brings; the report outlines how this can be achieved through a series of recommendations. For the UK to maximise its success, the report outlines a systemic approach that should be taken forward as part of a coordinated Industrial Growth Plan.



### **Key Findings**

The UK has good capability A systemic approach is now needed to most effectively within the offshore wind supply chain capture this value To date the UK has largely and effectively The UK is strong in development services, blade manufacture, cables, electrical (design, prioritised cost reduction. As technology control, monitoring and protection), offshore matures and a global market establishes services (construction, commissioning, and itself, the focus should shift to capture Operations and Maintenance - O&M), crew the long term global economic value from offshore wind. transfer vessels (CTVs) and moorings and anchors for floating wind. The UK is at a critical juncture, a fork in the road. The UK should use a systemic approach to capture the long term global economic value from offshore wind. The UK offshore wind supply chain has the potential to capture £92 billion of GVA by 2040 A probable scenario of current supply chain capabilities being supported by targeted government and industry interventions shows a clear path to £92 billion economic value generated by 2040, with more upside to be explored. Risks to long term value include loss of blade manufacture, failing to effectively transition oil and gas (O&G) capability to floating offshore wind (FLOW), and a loss of O&M value to the UK.

#### **UK Capability**

The UK is strong in development services, cables, electrical, offshore services, blade and rotor manufacture, crew transfer vessels, and moorings and anchors for floating wind. The analysis has found that the UK has a capable offshore wind supply chain.

This report has found that the UK has a capable offshore wind supply chain. The UK's strengths are in development services, cables, electrical (design, control, monitoring and protection), blade manufacture, offshore services (construction, commissioning, O&M), crew transfer vessels (CTVs) and moorings & anchors for floating offshore wind (FLOW). Overall, UK based suppliers are winning contracts in around 50% of package areas, by value.

However, there are some clear areas of weakness. The UK lacks a major wind turbine generator (WTG) manufacturer, and until now has almost no capability in WTG foundations, though this is likely to change with the SeAH monopile factory being built in Teesside. The UK also lacks top tier engineering procurement and construction (EPC) contractors able to manage the supply and installation of major components. This means the UK supply chain is often at lower levels within the supply chain, having limited power to shape key decisions.



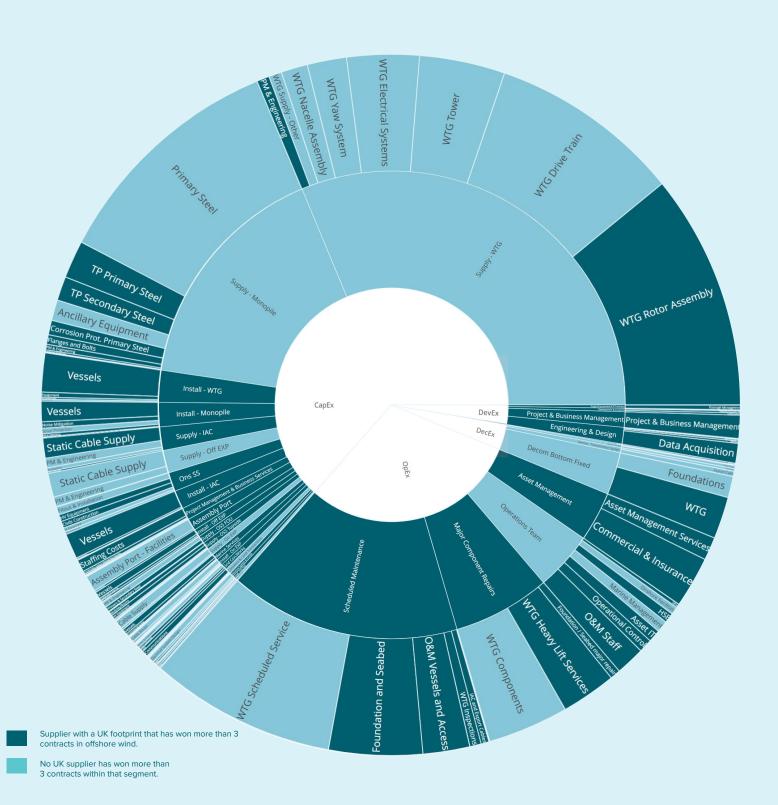
#### Figure 1.

This illustrates UK suppliers' track record at delivering the contract packages required for an example 1400MW high voltage direct current (HVDC) connected monopile project.

The chart is split into three circles. The inner shows the wind farm lifecycle stage. The middle circle shows major contracts typically procured by a developer under a multicontract strategy. The outer circle shows the core elements required to deliver these major contract items.

The size of each segment represents the cost (£ million) of that line item.

The darker segments (coloured teal) show that there is a supplier with a UK footprint that has won more than three contracts in offshore wind. Segments coloured in light blue mean that there is no UK supplier who has won more than three contracts within that segment.



#### **High-value Strengths**

Analysis of the highest value opportunities that build on the UK's current strengths resulted in nine supply chain areas being considered in more detail. The total value of the UK and export markets is estimated at £560 billion.

## **1 Cables** £70bn potential opportunity

This considers the supply, installation, protection, monitoring and repair of array and export cables. UK-based suppliers can manufacture array cables and protection systems in existing facilities, with the potential to add more. The manufacture of export cables represents a live opportunity that would add significant value. UK contractors can also install array and export cables.

### Floating wind (not shown on the graphic) £55 billion potential opportunity

This includes the floater design and fabrication, mooring spreads and anchoring, assembly and installation, dynamic cables and buoyancy, and the lower tiers to support all of this. This is included as an opportunity area due to immaturity of the market and strong UK capability from O&G.

### **7.** Vessels £10bn potential opportunity

UK-based contractors can operate a wide range of vessels including crew transfer vessels (CTVs), service operations vessels (SOVs), heavy lift vessels, remotely-operated vehicle (ROV) service, anchor handler vessels, tug boats and autonomous vessels. It should be possible build some of these vessels in the UK.

## 2. Substations and electrical design £30bn potential opportunity

This considers the design, supply, installation, and O&M of the offshore and onshore substations (including foundations), and overall electrical system design. UK engineering companies can undertake electrical systems design for wind farms. UK contractors have supplied modules for, and constructed, onshore and offshore substations.

### **Development services** £35bn potential opportunity

This includes concept design, environmental impact assessment, early procurement, survey activities and project management. This significant opportunity reflects the UK's accumulated expertise in developing the world's second largest offshore wind generation capacity.

### Blades & rotor assembly £70bn potential opportunity

This focuses on the manufacture of blades, but also considers the design, repair, and recycling of blades. The UK is already home to two major blade factories (Siemens Gamesa at Hull and Vestas at the Isle of Wight), and may attract more. Transferable expertise in large composite components exists in the UK aerospace industry.

## 3. Steel fabrication £100bn potential opportunity

This considers the manufacture of monopiles, jackets, towers, floating semi-submersibles, and UK steel production. Steel fabrication accounts for a significant proportion of offshore wind costs. The UK has multiple quayside locations suitable for fabrication. Any apparent challenges in relation to the UK fabrication's high cost base can be overcome through high-tech facilities.

### 6. Strobn potential opportunity

These are all the tasks required offshore to construct, commission, and operate an offshore wind farm. Multiple UK-based contractors have performed construction, commissioning, and O&M services offshore. Contractors have the required offshore engineering and project management capabilities, with the ability to provide skilled labour. Larger engineering procurement construction and installation (EPCI) capability will require more investment in offshore assets.

## 9. WTG components £20bn potential opportunity

Electrical and ancillary items used within the WTG such as the converter, High Voltage (HV) switchgear, transformers, cables, davit cranes and other ancillary items. Many UK companies have relevant manufacturing skills and capabilities, but the UK opportunity is assessed to be relatively small because of the high entry barriers associated with established original equipment manufacturer (OEM) supply chains.

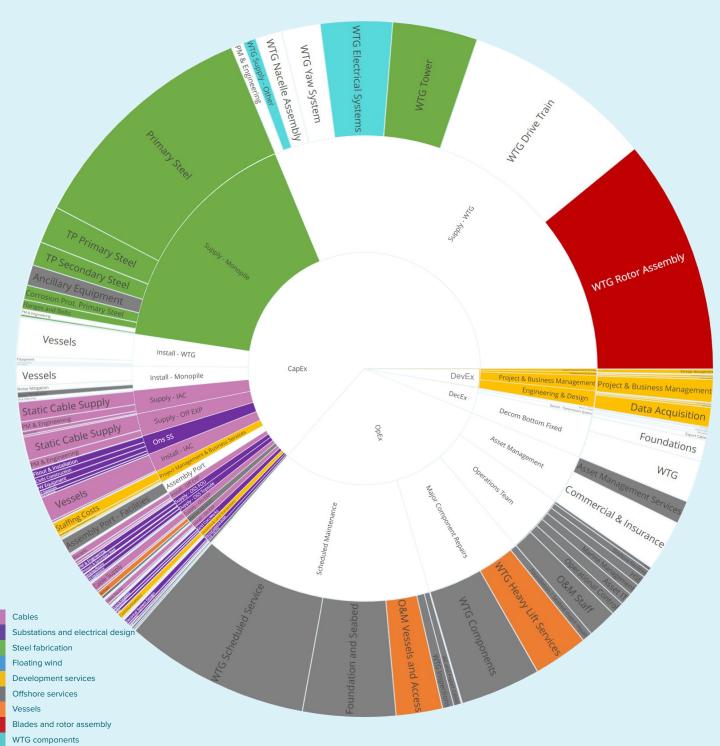
#### Figure 2.

Opportunity areas mapped onto the sunburst chart for an example 1400MW, fixed bottom, HVDC connected project. The inner circle shows the expenditure involved in each wind farm lifecycle stage: Capital Expenditure (CapEx), Development Expenditure (DevEx), Operational Expenditure (OpEx) and Decommissioning Expenditure (DecEx). The middle circle the major contracts typically procured by a developer under a multicontract strategy. The outer circle shows the core elements required to deliver these major contract items.

Each colour corresponds to the relevant opportunity area.

The size of each segment represents the cost (£ million) of that line item.





components)

# Threats and Opportunities

The nine analysed areas are summarised in this strengths, opportunities, weaknesses and threats (SWOT) analysis. Threats to long term value include loss of blade manufacture, failing to effectively transition O&G capability to floating, and loss of O&M value to the UK. However, these threats can be addressed, and other opportunities capitalised on through the interventions proposed in this report.

Opportunity Area	Strengths	Weaknesses	Threats	Opportunities
Cables	End-to-end through life capability, including cable manufacture	Lack major EPC to own package     High cost of manufacture	<ul> <li>Established overseas         players with competitive cost         bases</li> <li>Strong price pressure due         to relative ease of         transporting cables</li> </ul>	HVDC cables, Dynamic cables for FLOW     Use end-to-end capability developed in the UK to grow exports
Substations and electrical design	<ul> <li>Strong delivery track record onshore and offshore</li> <li>Facilities can deliver conventional topsides and modular concepts</li> <li>Specialist consultants and contractors</li> </ul>	Limited manufacturing of electrical items     Lack scale to deliver larger HVDC platforms	<ul> <li>Major supply shortage for HVDC connections</li> <li>Limited number of HV electrical offshore specialists</li> </ul>	<ul> <li>Standardised substation designs (particularly given synergies with transmission projects)</li> <li>Invest in offshore electrical skills</li> </ul>
Steel fabrication	<ul> <li>Proactive, problem-solving network of secondary steel providers</li> <li>Re-emerging primary steel cluster</li> </ul>	<ul> <li>Import dependency for plate steel</li> <li>High logistics costs due to multiple port movements</li> </ul>	<ul> <li>Undercapitalised smaller yards</li> <li>Larger European and Asian facilities preparing for FLOW platform fabrication</li> </ul>	<ul> <li>Supply shortages – e.g. towers</li> <li>Chance to establish volume manufacturing, especially for FLOW</li> <li>Green steel manufacturing in the UK</li> </ul>
Floating wind	<ul> <li>UK pipeline of global significance</li> <li>O&amp;G expertise can transfer, particularly anchors and moorings</li> </ul>	<ul> <li>Lack of port readiness and fragmented supply chain</li> <li>Large investments are required to develop quayside facilities</li> </ul>	<ul> <li>FLOW platform design and engineering control sits outside the UK</li> <li>High cost base using traditional manufacturing methods. High-tech, efficient plants need investment</li> </ul>	UK collaborative approach (e.g. UK Taskforce, the strategic investment model (SIM) and academia) Anchor, moorings and connectors = global export opportunity
Development services	Established UK-based developers, leading engineering, consultancy, and survey suppliers	Exports to date below potential     Ineffective use of data	Lack of skilled people to capitalise on global growth	Coordinated export strategy
Offshore services	Construction and O&M experience     Lots of service providers and specialist contractors	<ul> <li>O&amp;M proposition is primarily due to proximity</li> <li>Service providers are at lower tiers in the supply chain</li> </ul>	Reduced need for, and value from, O&M from UK bases     Service providers stay small and at lower tiers	<ul> <li>Develop digital solutions to increase performance and reliability</li> <li>Better support service- providers</li> </ul>
Vessels	World leading CTV sector with designers active across globe	UK shipbuilding capability has reduced over past decades	Larger non-UK yards better capitalised, plus part shift to SOVs	<ul><li>Investing in UK CTV manufacture</li><li>Move early to low carbon propulsion</li></ul>
Blades and rotor assembly	<ul><li>Two existing blade manufacturing facilities</li><li>Live investment opportunities</li></ul>	<ul><li>Existing sites need to grow</li><li>High cost base</li></ul>	Lose existing manufacturing facility	Secure live investment opportunities to position UK as leader in blades in Europe.
WTG components	Suppliers with existing track records, albeit in lower tiers     Innovation in composites and generators	Established global OEM supply chains with high barriers to entry	OEMs will struggle to innovate and invest without profit and capital	Apply UK's composite knowhow to offshore wind (e.g. Joule programme to develop next generation

# Delivering £92 billion of GVA

With targeted government and industry interventions the analysis shows a clear path to £92 billion economic value generated by 2040, with more upside to be explored.

GVA valuation within timescale (£M)

#### Figure 3.

The review of the nine areas led to interventions being proposed.

Each intervention was assessed for:

- GVA impact (£M)
- Accessibility of the impact to the UK (high/mid/low)
- Timing of the potential impact (early 2024–26, mid 2026–31 and long timescales 2031–36. For 'mid' and 'long' benefits a % reduction was applied to reflect that the proportion of the project pipeline will have already been built out (and is therefore inaccessible to this intervention)

The calculated result was ~£92 billion in GVA out to 2040. This is a total of 'potential capturable' value from all interventions for all opportunity areas. GVA distribution across the timescales is shown with each opportunity area represented by a colour.

# Mid Early Long 60,000 £53bn 50.000 40,000 £34bn 30,000 20,000 10.000 £5bn



#### Recommendations

A systemic approach is the most effective way to mitigate the identified risks and capture the opportunities. This sees the offshore wind supply chain as a system, focuses on value chains (not just factories), scales up companies and captures top tier packages. The analysis makes nine key recommendations:

#### 1.

# See the UK supply chain as a system

With coordinated sector-wide action, a stronger, more resilient UK offshore wind industry will emerge better able to capitalise on the global opportunity this unique sector represents in the decades ahead. Strengthening the importance of UK supply chain in policy, effectively utilising the rules and incentives on developers and other actors in the system, improving information flows, stimulating positive feedback loops, and minimising negative loops will help to improve competitiveness. Our recommendation is for the UK supply chain to be viewed as a system, consisting of industrial activity hubs and clusters communicating UK-wide and supported effectively in accordance with an Industrial Growth Plan.

#### 2.

# Focus on value chains not just factories

The UK needs to effectively focus on priority opportunity areas, and work systemically within these to broaden and deepen capability. Large manufacturing investments will generate value individually, but this value will be limited without the supporting supply chain clusters forming around them. For example, in cables, the UK has end-to-end capability that can be better clustered and leveraged to generate competitive differentiators and bring more value to the UK.

# 3. Scale up to thrive

This analysis highlights that while the UK has supply chain capability spread across offshore wind, it often lacks larger companies with sufficient capital to invest in new opportunities and to manage the significant contract risks found in projects of this scale and complexity. Put simply the UK needs more medium and larger companies able to compete and thrive. This means focusing on how to invest in and support companies who can be 'engines of growth' – scaling up our small and medium companies so that they can thrive in this challenging sector.

#### 4.

#### Capture big packages

At the top tier, effort is needed to secure more value from the main installation contract packages. One route for the UK to target is growing EPC activity and presence so that control of contracting activities is based within the UK, rather than the UK seeking to break into non-UK groups of contractors. An approach of building wide capability in key offshore wind packages is advocated, such as floating structures, cables and O&M. This means identifying successful companies and then building a wider supply chain around them so that over time the UK is seen as the centre for expertise and value. This "ownership" approach requires having clear links across innovation, industry programmes and supply chain support. Where relevant, it will be important to build EPC capability in these large packages so that contract management and execution are also led out of the UK.

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In addition, the UK needs to tip the balance on live investment opportunities, build momentum by aggregating marginal gains and exporting more effectively. With coordinated sector-wide action, a stronger, more resilient UK offshore wind industry will emerge better able to capitalise on the global opportunity this unique sector represents in the decades ahead.

# **5.** Build momentum with marginal gains

The UK has successful companies spread across the supply chain which need support to grow both at home and via exports.

Smaller companies can be supported to collaborate and link up with companies further up the supply chain. Sector support can help to improve their processes and enable them to invest in new technology. Innovation often comes in at this level but needs support to rapidly scale.

The concept of 'marginal gains' has been used to identify how to grow supply chain at lower tiers. Marginal gains should not be overlooked because they build momentum and when aggregated can represent substantial cumulative outcomes.

### 8.

# Tip the balance on live opportunities

The review and engagement with the supply chain highlighted five live opportunities for major inward investments.

Concerted action to get these over the line will be key to delivering the biggest benefit in terms of transformative outcomes.

#### 6

#### **Defend and protect**

The UK has secured several important inward investments. These cannot be taken for granted and need to be protected over time by industry and government.

Given changes to the market such as larger turbines, UK locations need to be nurtured and supported to remain competitive with other European sites. The potential loss of these bigger ticket items would also negatively impact lower tier supply chain participants.

#### 9.

#### **Export more effectively**

The UK supply chain already has a strong capability in offshore services, development, and O&M, with some high value manufacturing. Many of these activities are highly exportable.

However, the UK has had a limited focus on offshore wind exports compared to other mature offshore wind markets elsewhere in Europe.

Export programmes should focus on open markets with growth opportunities, e.g. the USA. Support programmes should target building partnerships between UK companies and local overseas firms.

#### 7.

#### Knowledge is power

Actors in a system can only act on what they are aware of, hence information flows are important.

Supply chain companies need better clarity on project pipelines and timescales. More effort should be made to publish upcoming opportunities through industry systems such as North Sea Transition Authority's Energy Pathfinder.

Standard product specifications will allow supply chain to invest with confidence, particularly in markets that are still maturing e.g. FLOW, where an existing supply chain needs to adapt existing manufacturing infrastructure or invest in new plant and materials.



# Appendix

Methodology - SCCA approach

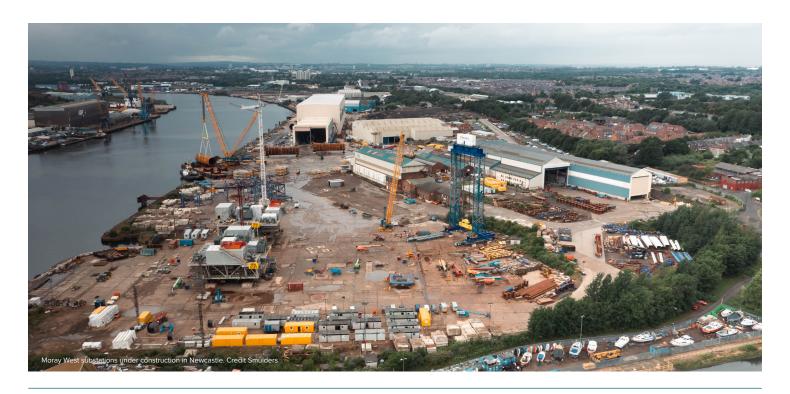
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Glossary

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# Methodology —SCCA approach

OWIC and OWGP worked with Everoze Partners Limited to define a work scope which would support the offshore wind Industry to better understand the key areas of focus – this was formed of four main work packages.



WP1

**REVIEW** (the history)

In Work Package 1 (WP1) thirty one supply chain reports were reviewed, identifying UK supply chain opportunities and tracking progress on recommendations.

This shaped the approach to subsequent Work Packages.



WP2

MAP (the landscape)

In WP2 a detailed model was created (SCCA Model) – providing a contract breakdown, cost, value and jobs assessments for six reference projects indicative of the pipeline out to 2030.

This was integrated with a supply chain database of 1,400 companies. This mapping identified twenty eight distinct 'opportunity areas' for the UK supply chain.



WP3

# PRIORTISE & DEEP DIVE

(the 'opportunity areas')

In WP3, a prioritisation exercise was undertaken using a three-stage process considering among other things UK capability, supply chain positioning and economic impact calculations. This resulted in the identification of nine of the most promising 'opportunity areas' for the UK.

Deep dives were then undertaken on these nine 'opportunity areas', which involved engagement with senior supply chain players from across industry to identify specific support requirements and interventions needed to grow UK economic value.



WP4

### **RECOMMEND** (the 'interventions')

From the nine deep dives, sixty four possible intervention activities were developed in WP4.

These were assessed against the SCCA Model to determine the capturable value from undertaking these interventions.

The key findings are as reported in this summary.

#### Glossary

#### **Term Definition** Capital Expenditure CapEx CTV Crew Transfer Vessel DecEx **Decommissioning Expenditure** DevEx **Development Expenditure** EPC/I Engineering, Procurement, Construction / Installation FLOW Floating Offshore Wind GVA Gross-Value Added HVAC/HVDC High-Voltage Direct Current / Alternating Current IAC Inter-array Cable Oil & Gas O&G OEM Original Equipment Manufacturer O&M Operations & Maintenance OFTO Offshore Transmission Owner Operational Expenditure OpEx Offshore Substation OSS OSW Offshore Wind OTM Offshore Transformer Module PPA Power Purchase Agreement ROV Remotely Operated Vehicle **SCADA** Supervisory Control and Data Acquisition SCCA Supply Chain Capability Analysis Standard Industrial Classification SIC SIM Structured Investment Model T&I Transport & Installation **WBS** Work Breakdown Structure Work Package WP

Wind Turbine Generator



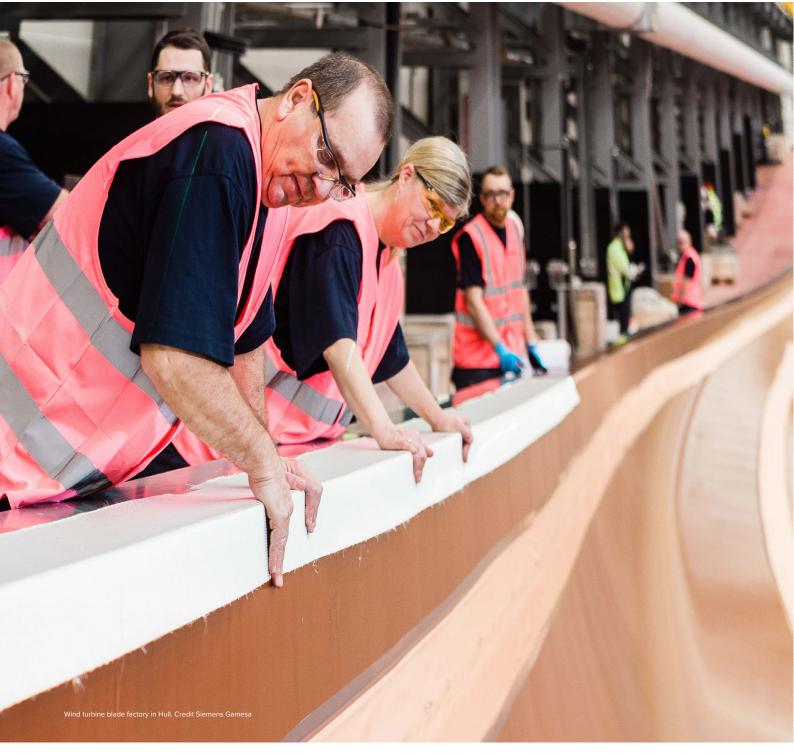




WTG







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